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1.01 Vasovagal Syncope (Faint, swoon)

Presentation

The patient experiences a brief loss of consciousness, preceded by a sense of anticipation. First, there is a period of sympathetic tone, with increased pulse and blood pressure, in anticipation of some stressful incident, such as bad news, an upsetting sight, or a painful procedure. Immediately following the stressful occurrence, there is a precipitous drop in sympathetic tone, pulse and blood pressure, causing the victim to fall down or lose consciousness. Transient bradycardia and few clonic limb jerks may accompany vasovagal syncope, but there are usually no sustained palpitations, arrhythmias or seizures, incontinence, tongue biting, or injuries beyond a contusion or laceration from the fall. Ordinarily, the victim spontaneously revives after spending a few minutes supine, and suffers no sequelae, and can recall the events leading up to the faint. The whole process may transpire in the ED, or a patient may have fainted elsewhere, in which case the diagnostic challenge is to reconstruct what happened and rule out other causes of syncope.

What to do:

- Arrange for patients, family, and friends anticipating unpleasant experiences in the ED to sit or lie down and be constantly attended.
- If someone faints in the ED, catch him so he is not injured in the fall, lie him supine on the floor for 5-10 minutes, protect his airway, record several sets of vital signs, and be ready to proceed with resuscitation if the episode turns out to be more than a simple vasovagal syncope.
- If a patient is brought to the ED following a faint elsewhere, ask about the setting, precipitating factors, descriptions of several eyewitnesses, and sequence of recovery. Be alert for evidence of seizures, hysteria, and hyperventilation (see sections below). Record several sets of vital signs, including orthostatic changes, and examine carefully for signs of trauma and neurologic residua.
- After full recovery, explain to the patient that this is a common physiological reaction and how, in future recurrences, he can recognize the early lightheadedness and prevent a full swoon by lying down or putting his head between his knees.

What not to do:

- Do not let families stand for bad news, let parents stand while watching their children being sutured, or let patients stand for shots or venipunctures.
- Do not traumatize the faint victim with ammonia capsules, slapping, or dousing with cold water.

Discussion

Vasovagal syncope is a common occurrence in the ED. Observation of the sequence of
stress, relief, faint makes the diagnosis, but, better yet, the whole reaction can usually be prevented. It should be noted that although most patients suffer no sequelae, vasovagal syncope with prolonged asystole can produce seizures as well as rare incidents of death. The differential diagnosis of a loss of consciousness is extensive and therefore loss of consciousness should not immediately be assumed to be due to vasovagal syncope.

References:

1.02 Hyperventilation

Presentation

The patient is anxious and complains of shortness of breath and an inability to fill the lungs adequately. A patient may also have palpitations, chest or abdominal pain, and tingling or numbness around the mouth and fingers, or possibly even flexor spasm of the hands and feet. His respiratory volume is increased, which may be apparent by an increased respiratory rate, or only be an increased tidal volume or frequent sighing. The remainder of the physical examination is normal. The patient's history may reveal an obvious precipitating emotional cause (such as having been caught stealing or being in the midst of a family quarrel).

What to do:

- Perform a brief physical examination, checking especially that the patient's mental status is good, there is no unusual breath odor, there are good, equal excursion and breath sounds in both sides of the chest, and there is no swelling, pain or inflammation of the legs.
- Measure pulse oximetry, which should be 98-100%.
- Explain to the patient the cycle in which rapid, deep breathing can cause physical symptoms upsetting enough to cause further rapid, deep breathing. Repeat a cadence ("in...out...in...") to help him voluntarily slow his breathing, or have him voluntarily hold his breath for a while.
- If he cannot reduce his ventilatory rate and volume, provide a paper bag or length of tubing through which to breathe, keeping the pulse oximetry monitor on to avoid hypoxia. This will allow him to continue moving a large quantity of air, but provide air rich in carbon dioxide, allowing the blood Pco2 to rise towards normal. (Carbogen gas (5% CO2) may also be used, if available.) Administration of 50-100mg of hydroxyzine (Vistaril) im often helps to calm the patient.
- If you cannot reverse these symptoms and reduce respiratory effect in this manner in 15-20 minutes, you should double check the diagnosis by obtaining arterial blood gases, looking for a metabolic acidosis or hypoxia indicative of underlying disease.
- Reexamine the patient after hyperventilation is controlled.
- Make sure the patient understands the hyperventilation syndrome and knows some strategies for breaking the cycle next time. (It may be valuable to have him reproduce the symptoms voluntarily.) Arrange for followup as needed.

What not to do:

- Do not miss the true medical emergencies which also present as hyperventilation, including: pneumothorax, pneumonia, pulmonary embolus, diabetic ketoacidosis, salicylate overdose, sepsis, uremia, myocardial infarction and CVA.
- Do not use a paper bag on a patient with a low oxygen saturation on pulse oximetry (<96%)
Discussion

The acute metabolic alkalosis of hyperventilation causes transient imbalances of calcium, potassium, and perhaps other ions, with the net effect of increasing the irritability and spontaneous depolarization of excitable muscles and nerves. First-time victims of the hyperventilation syndrome are the most apt to visit the ED, and this is an excellent time to educate them about its pathophysiology and the prevention of recurrence. Repeat visitors may be overly excitable or may have emotional problems and need counseling.

References:

1.03 Minor Head Trauma ("Concussion")

Presentation

A patient is brought to the ED after suffering a blow to the head. There may or may not be a laceration, scalp hematoma, headache, transient sleepiness and/or nausea, but there was NO loss of consciousness, amnesia for the injury or preceding events, seizure, neurological changes, or disorientation. The patient or family may express concern about a "mild concussion," the possibility of a skull fracture, or a rapidly developing scalp hematoma or "goose egg."

What to do:

- Corroborate and record the history from witnesses. Ascertain why the patient was injured (was there a seizure or sudden weakness?) and rule out particularly dangerous types of head trauma. (A blow by a brick or hammer is more likely to produce a depressed skull fracture.)
- Perform and record a physical examination of the head, looking for signs of a skull fracture, such as hemotympanum or bony depression, and examine the neck for spasm, bony tenderness, rage of motion, and other signs of associated injury.
- Perform and record a neurological examination, with special attention to mental status, cranial nerves, strength, and deep tendon reflexes to all four limbs.
- If the history or physical examination suggests there could be a clinically significant intracranial injury, obtain a non-contrast computed tomogram (CT) scan of the head. Criteria for obtaining a CT scan include: documented loss of consciousness, amnesia, cerebrospinal fluid leaking from nose or ear, blood behind the tympanic membrane or over the mastoid (Battle's sign), stupor, coma, or any focal neurological sign.
- If the history or physical examination suggests there could be a clinically significant skull fracture, obtain skull x rays. Criteria for obtaining skull x rays include: a blow by a heavy object, suspected skull penetration and palpable depression.
- If there is no clinical indication for CT scan or skull films, explain to the patient and concerned family and friends why x-ray images are not being ordered. Many patients expect x rays, but will gladly forego them once you explain they are of little value.
- Explain to the patient and responsible family or friends that the more important possible sequelae of head trauma are not diagnosed with x rays, but by noting certain signs and symptoms as they occur later. Make sure that they understand and are given written instructions that any abnormal behavior, increasing drowsiness or difficulty in rousing the patient, headache, neck stiffness, vomiting, visual problems, weakness, or seizures are signals to return to the ED immediately.

What not to do:

- Do not skimp on the neurological examination or its documentation.
- Do not be reassured by negative skull films, which do not rule out intracranial bleeding or edema.
Discussion

The risks of late neurological sequelae (subdural hematoma, seizure disorder, meningitis, post concussion syndrome, etc.) make good followup essential after any head trauma; but the vast majority of patients without findings on initial examination do well. It is probably unwise to describe to the patient all of the subtle possible long-term effects of head trauma, because many may be induced by suggestion. Concentrate on making sure all understand the danger signs to watch for over the next few days. A large scalp hematoma may have a soft central area which mimics a depression in the skull when palpated directly, but allows palpation of the underlying skull when pushed to one side. Cold packs may be recommended to reduce the swelling, and the patient may be reassured that the hematoma will resolve over days to weeks. Patients with minor head injuries who meet the criteria for a CT scan but who have a normal scan and neurological examination may be safely discharged from the ED.

References:

1.04 Seizures (Convulsions, fits)

Presentation

The patient may be found in the street, the hospital, or the emergency room. The patient may complain of an "aura," feel he is "about to have a seizure," experience a brief petit mal "absence," exhibit the repetitive stereotypical behavior of continuous partial seizures, the whole-body tonic stiffness or clonic jerking of grand mal seizures, or simply be found in the gradual recovery of the postictal phase. Patients experiencing grand mal seizures can injure themselves, and generalized seizures prolonged for more than a couple of minutes can lead to hypoxia, acidosis, and even brain damage.

What to do:

- If the patient is having a grand mal seizure, stand by him for a few minutes until his thrashing subsides, to guard against injury or airway obstruction. Usually only suctioning or turning the patient on his side is required, but breathing will be uncoordinated until the tonic-clonic phase is over.
- Watch the pattern of the seizure for clues to the etiology. (Did clonus start in one place and "march" out to the rest of the body? Did the eyes deviate one way throughout the seizure? Did the whole body participate?)
- If the seizure lasts more than two minutes, or recurs before the patient regains consciousness, it has overwhelmed the brain's natural buffers and may require drugs to stop. This is defined as status epilepticus, and is best treated with diazepam (Valium) 5-10mg iv, followed by gradual loading with iv phenytoin.
- Check a quick finger stick blood sugar (especially if the patient is wearing a "diabetes" MedicAlert bracelet or medallion) and administer intravenous glucose if it is below normal.
- If the patient arrives postictal, examine him thoroughly for injuries and record a complete neurological examination (the results of which are apt to be bizarre). Repeat the neurological exam periodically. If the patient is indeed recovering, you may be able to obviate much of the diagnostic workup by waiting until he is lucid enough to give a history.
- If the patient arrives awake and oriented following an alleged seizure, corroborate the history through witnesses or the presence of injuries like a scalp laceration or a bitten tongue. Doubt a grand mal seizure without a prolonged postictal recovery period.
- If the patient has a previous history of seizure disorder, or is taking anticonvulsant medications, check old records, speak to his physician, find out whether he has been worked up for an etiology, look for reasons for this relapse (e.g., infection, ethanol, lack of sleep), and draw blood for levels of anticonvulsants.
- If the seizure is clearly related to alcohol withdrawal, ascertain why the patient reduced his consumption. He might be broke, be suffering from pancreatitis or gastritis that requires further evaluation and treatment, or have decided to dry out completely. If the last, and is demonstrating signs of delerium tremens, such as tremors, tachycardia and hallucinations, his withdrawal should be medically supervised, and covered with benzodiazepines (e.g. Librium, Valium, Ativan). Many
emergency physicians presumptively treat alcohol withdrawal symptoms with an intravenous infusion containing glucose, 100mg thiamine, 2Gm magnesium and multivitamins.

- If the seizure is a new event, make arrangements for a workup, including an EEG. About half of patients with a new onset of seizures will require hospitalization, and most of these patients can be identified by abnormalities on physical examination, head CT or blood counts. Other tests (lumbar puncture, serum electrolytes, glucose, calcium) may also identify new seizure victims who require admission.
- If the workup will be as an outpatient, the patient should be loaded with phenytoin (Dilantin) 17-20mg/kg over 1/2 hour iv, or over 6 hours po to protect him from further seizures. If there is any question, check a serum phenytoin level before giving this loading dose. Patients should be on a cardiac monitor during iv loading, which should be slowed if they develop conduction blocks or dysrythmias.

**What not to do:**

- Do not stick anything in the mouth of a seizing patient. The ubiquitous padded throat sticks may be nice for a patient to hold and bite on at the first sign of a seizure, but do nothing to protect his airway, and are ineffective when the jaw is clenched.
- Do not rush to give intravenous diazepam to a seizing patient. Most seizures stop in a few minutes. It is diagnostically useful to see how the seizure resolves on its own; also, the patient will awaken sooner if he has not been medicated. Reserve diazepam for genuine status epilepticus.
- Be careful not to assume an alcoholic etiology. Ethanol abusers sustain more head trauma and seizure disorders than the population at large.
- Do not treat alcohol withdrawal seizures with phenobarbital or phenytoin. Both lack efficacy (and necessity, since the problem is self-limiting) and can themselves produce withdrawal seizures.
- Do not rule out alcohol withdrawal seizures on the basis of a toxic serum ethanol level. The patient may actually be withdrawing from a yet higher baseline.
- Do not be fooled by pseudoseizures. Even patients with genuine epilepsy occasionally fake seizures for various reasons, and an exceptional performer can be convincing. Amateurs may be roused with ammonia or smelling salts, but few can simulate the fluctuating neurological abnormalities of the postictal state, and probably no one can produce the pronounced metabolic acidosis or serum lactate elevation of a grand mal seizure.
- Do not release a patient with persistent neurologic abnormalities without a head CT or specialty consultation.
- Do not let a seizure victim drive home.

**Discussion**

Grand mal seizures are frightening, and inspire observers to "do something," but usually all that is necessary is to stand by and prevent the patient from injuring himself. The age of the patient makes some difference as to the probable underlying etiology of a first seizure and therefore makes some difference in disposition. Under age 3, rapid rise of temperature can cause a generalized febrile seizure which does not lead to epilepsy, and is best treated by control of fever. Brief febrile seizures may not require a lumbar
puncture to evaluate the cause of the fever, but these children should be managed in consultation with the primary care physician to ensure early follow up. In the 12 to 20-year-old patient, the seizure is probably "idiopathic," although other causes are certainly possible. In the 40-year-old patient with a first seizure, one needs to exclude neoplasm, post-traumatic epilepsy, or withdrawal. In the 65-year-old patient with a first seizure, cerebrovascular insufficiency must also be considered. Such a patient should be treated and worked up with the possibility of an impending stroke, in addition to the other possible causes. For these reasons, a patient with a first seizure who is 30 years old or older needs to have a CT scan, preferably while in the ED. A noncontrast study can be obtained initially. If there are abnormalities present or if there are still suspicions of a focal abnormality, a contrast study can be obtained at the same time or later, whichever is convenient. Also, patients should be discharged for outpatient care, only if there is full recovery of neurological function, with a full loading dose of phenytoin, and with clear arrangements for follow-up or return to the ED if another seizure occurs. An EEG can usually be done electively, except in status epilepticus. A toxic screen may be needed to detect the many overdoses that can present as seizures, including amphetamines, cocaine, isoniazide, lidocaine, lithium, phencyclidine, phenytoin and tricyclic antidepressants.

References:

1.05 Hysterical Coma or Seizure

Presentation

The patient is unresponsive and brought to the emergency department on a stretcher. There is usually a history of recent emotional upset—a unexpected death in the family, or breakup of a close relationship. The patient may be lying still on the stretcher or demonstrating bizarre posturing or even seizure-like activity. The patient's general color and vital signs are normal, without any evidence of airway obstruction. Commonly, the patient will be fluttering his eyelids or will resist having his eyes opened. A striking finding is that the patient may hold his breath when the examiner breaks an ammonia capsule over the patient's mouth and nose (real coma victims usually move the head or do nothing). A classic finding is that when the patient's apparently flaccid arm is released over his face, it does not fall on the face, but drops off to the side. The patient may show remarkably little response to painful stimuli, but there should be no true focal neurologic findings and the remainder of the physical exam should be normal.

What to do:

- Do a complete physical exam. Patients sometimes react with hysterical coma under stress of illness or injury.
- When there is significant emotional stress involved, administer a mild tranquilizing agent such as hydroxyzine pamoate (Vistaril) 50-100mg im.
- Do not allow any visitors and place the patient in a quiet observation area, minimizing any stimulation until he "awakens." Check vital signs every 30 minutes. If there is a question of a generalized seizure, verify with a lactate level or blood gas that shows metabolic acidosis.
- When the patient becomes more responsive, re-examine him, obtain a more complete history, and offer him followup care, including psychological support if appropriate.
- If the patient is not awake, alert, and oriented after about 90 minutes, begin a more comprehensive medical workup.

What not to do:

- Do not get angry with the patient and torture him with painful stimuli in an attempt to make him "wake up."
- Do not perform an expensive workup routinely.
- Do not ignore or release the patient who has not fully recovered. Instead, he must be fully evaluated for an underlying medical problem, which may require hospital admission.

Discussion

True hysterical coma is substantially an unconscious act that the patient cannot control. Antagonizing the patient often prolongs the condition, while ignoring him seems to take
the spotlight off his peculiar behavior, allowing him to recover. Some psychomotor or complex partial seizures are difficult to diagnose with their dazed confusion or fuge-like activity, and might be labeled hysterical. If the diagnosis is not obviously hysteria, the patient might need an EEG during sleep and deserves a referral to a neurologist.
1.06 Dystonic Drug Reaction

Presentation

Patients arrive with peculiar posturing or difficulty speaking, and are usually quite upset and worried that they are having a stroke. Often there is no history offered at all—the patient may not be able to speak, may not be aware he took any phenothiazines or butyrophenones (e.g., Haldol has been used to cut heroin), may not admit he takes psychotropic medication, or may not make the connection between symptoms and drug (e.g., one dose of Compazine given for vomiting). Acute dystonias usually present with one or more of the following symptoms:

- buccolingual: protruding or pulling sensation of tongue
- torticollic: twisted neck, or facial muscle spasm
- oculogyric: roving or deviated gaze
- tortipelvic: abdominal rigidity and pain
- opisthotonic: spasm of the entire body

These acute dystonias can resemble partial seizures, the posturing of psychosis, or the spasms of tetanus, strychnine poisoning, or electrolyte imbalances. More chronic neurologic side effects of phenothiazines, including the restlessness of akathisia, tardive dyskinesias, and Parkinsonism, do not usually respond as dramatically to drug treatment as the acute dystonias.

What to do:

- Give 2mg of benztropine (Cogentin) or 50mg of diphenhydramine (Benadryl) iv, and watch for improvement of the dystonia over the next five minutes. This step is both therapeutic and diagnostic. Benztropine produces fewer side effects (mostly drowsiness), and may be slightly more effective, but diphenhydramine is more likely to be on hand in the ED.
- Instruct the patient to discontinue the offending drug, and arrange for followup if medications must be adjusted. If the culprit is long-acting, prescribe benztropine (Cogentin) 2mg or diphenhydramine (Benadryl) 25mg po q6h for 24 hours to prevent a relapse.

What not to do:

- Do not persist with treatment in the face of a questionable response or no response, but get on with the workup to find another etiology for the dystonia (tetanus, seizures, hypomagnesemia, hypocalcemia, alkalosis, muscle disease, etc.).
- Do not use intravenous diazepam first, because it relaxes spasms due to other etiologies, and thus leaves the diagnosis unclear.

Discussion
The extrapyramidal motor system depends on excitatory cholinergic neurotransmitters and inhibitory dopaminergic neurotransmitters, the latter susceptible to blockage by phenothiazine and butyrophenone medications. Anticholinergic medications restore the excitatory-inhibitory balance. One intravenous dose of benztropine or diphenhydramine is relatively innocuous and rapidly diagnostic, and is probably justified as an initial step in any patient with a dystonic reaction.

References:

1.07 Tension Headache

Presentation

The patient complains of a dull, steady pain, described as an ache, pressure, throb, or constricting band, located anywhere from eyes to occiput, perhaps including the neck or shoulders. Most commonly, the headache develops near the end of the day, or after some particular stress. The pain may improve with rest, aspirin, acetaminophen, or other medications. The physical exam will be unremarkable except for cranial or posterior muscle spasm or tenderness.

What to do:

- Perform a complete general history (including environmental factors and foods which precede the headaches) and physical examination (including a neurological examination).
- If the patient complains of sudden onset of the "worst headache of my life," accompanied by any change in mental status, weakness, vomiting, seizures, stiff neck, or persistent neurologic abnormalities, suspect a cerebrovascular cause, especially a subarachnoid hemorrhage, intracranial hemorrhage, or arteriovenous malformation. The best initial diagnostic test for these is computed tomography, but when CT is not available and the patient does not have papilledema or other signs of increased intracranial pressure, rule out these problems with a lumbar puncture.
- If the headache is accompanied by fever and stiff neck, or change in mental status, you need to rule out bacterial meningitis as soon as possible, again with lumbar puncture.
- If the headache was preceded by ophthalmic or neurologic symptoms, now resolving, suggestive of a migraine headache, you may want to try sumatriptan or ergotamine therapy. If vasospastic symptoms persist into the headache phase, the etiology may still be a migraine, but it becomes more important to rule out other cerebrovascular causes.
- If the headache follows prolonged reading, driving, or television watching, and decreased visual acuity is improved by viewing through a pinhole, the headache may be due to a defect in optical refraction, curable with new eyeglass lenses.
- If the temples are tender, check for visual defects and myalgias that accompany temporal arteritis.
- If there is a history of recent dental work or grinding of teeth, tenderness anterior to the tragus, or crepitus on motion of the jaw, suspect arthritis of the temporomandibular joint.
- If there is fever, tenderness to percussion over the frontal or maxillary sinuses, purulent drainage visible in the nose, or facial pain exacerbated by lowering the head, consider sinusitis.
- If pain radiates to the ear, be sure to inspect and palpate the teeth, which are a common site of referred pain.
- Finally, after checking for all these other causes of headache, palpate the temporalis, occipitalis, and other muscles of the calvarium and neck, looking for areas of
tenderness and spasm which usually accompany muscle tension headaches. Keep an eye out for especially tender trigger points which may resolve with gentle pressure or massage.

- Prescribe anti-inflammatory analgesics (ibuprofen, naproxen), recommend rest, and have the patient try cool compresses and massage of any trigger points.
- Explain the etiology and treatment of muscle spasm of the head and neck.
- Volunteer the information that you see no evidence of other serious disease (if this is true); especially that a brain tumor is unlikely. (Often this is a fear which is never voiced.)
- Arrange for followup. Instruct the patient to return to the ED or contact his own physician if symptoms change or worsen.

What not to do:

- Do not discharge without followup instructions. Many serious illnesses begin with a minor cephalgia, and patients may postpone urgent; care in the belief that they have been definitively diagnosed on the first visit.
- Do not miss subarachnoid hemorrhage and meningitis. (If you are not obtaining a majority of negative CTs and LPs, you may not be looking hard enough.)

Discussion

Headaches are common and most are benign, but any headache brought to medical attention deserves a thorough evaluation. Screening tests are of little value--a laborious history and physical examination are required. Other causes of headache include carbon monoxide exposure from wood heaters, fevers and viral myalgias, caffeine withdrawal, hypertension, glaucoma, tic douloureux (trigeminal neuralgia) and intolerance of foods containing nitrite, tyramine, xanthine. Tension headache is not a wastebasket diagnosis of exclusion but a specific diagnosis, confirmed by palpating tenderness in craniocervical muscles. ("Tension" refers to muscle spasm more than life stress.) Tension headache is often dignified with the diagnosis of "migraine" without any evidence of a vascular etiology, and is often treated with minor tranquilizers, which may or may not help. Focal tenderness over the greater occipital nerves (C2, 3) can be associated with an occipital neuralgia or occipital headache, and be secondary to cervical radiculopathy from cervical spondylosis. These tend to occur in older patients and should not be confused with tension headache. Remember to probe for the patient's hidden agenda. "Headache" may often be the justification for seeing a physician when some other physical, emotional, or social concern is actually the patient's major problem.
1.08 Migraine Headache

Presentation

The patient comes to the ED with a steady, severe, pain in the left or right side of the head, following ophthalmic or neurologic symptoms which resolved as the headache developed. Scintillating castellated scotomata in the visual field corresponding to the side of the subsequent headache are the classic aura, but transient weakness, vertigo, or ataxia are more likely to bring patients to the ED. Unlike other headaches, migraines are especially likely to awaken one in the morning. There may be a family or personal history of similar headaches as well.

What to do:

- Migraine headaches (and similar recurrent headache syndromes, with or without nausea and vomiting) are usually aborted with intravenous prochlorperazine (Compazine) 10mg or metoclopramide (Reglan) 10mg, with a liter of saline.
- If the migraine is of recent onset, and the patient has not already taken ergotamines, and you want to avoid starting an intravenous line, begin treatment with sumatriptan (Imitrex) 6mg sc, or dihydroergotamine (DHE 45) 1mg im (DHE can also be given iv).
- If the pain has been present most of the day, and has precipitated a secondary muscle headache, evinced by scalp tenderness, add ketorolac (Toradol) 60mg im or ibuprofen (Motrin) 800mg po for non-steroidal anti-inflammatory effect.
- If the pain remains severe, add narcotic analgesics (meperidine, 50-100mg im or iv) and let the patient lie down in a dark, quiet room. It can be cruel to attempt a complete history and physical examination (and unrealistic to expect the patient to cooperate) before achieving some relief of pain.
- After 20 minutes, when the patient is feeling a little better, undertake the history and physical examination. If there are persistent changes in mental status or neurological examination, a stiff neck, or fever, proceed with computed tomography and/or lumbar puncture to rule out intracranial hemorrhage or infection as the actual cause of the "migraine."
- If the presentation is indeed consistent with a migraine, allow the patient to sleep in the ED, undisturbed except for a brief neurological examination each hour. Typically, the patient will awaken after a few hours, with the headache completely resolved or much improved, and no neurological residua.
- For future attacks, if there are no cardiovascular risks, prescribe a self-injector preloaded with 6mg of sumatriptan. If the patient prefers to take medication orally, try tablets of ergotamine 2mg and caffeine 100mg (Cafergot), two at the first sign of the aura, then one every half hour up to a total day's dose of 6 tablets. If nausea and vomiting prevent oral medication, Cafergot is also available in rectal suppositories at the same dosage, but one or two suppositories are usually sufficient to relieve a headache.
- Instruct the patient to return to the ED for any change or worsening of the usual migraine pattern, and make arrangements for medical followup. First-time migraine attacks deserve a thorough elective neurological evaluation to establish the diagnosis.
What not to do:

- Do not prescribe medications containing egotamine, caffeine, or barbiturates for continual prophylaxis. They will not be effective this way, and withdrawal from these drugs may produce headaches.
- Do not omit followup, especially for first attacks.
- Do not miss meningitis, subarachnoid hemorrhage, glaucoma or stroke, which may deteriorate rapidly undiagnosed.

Discussion

Even more characteristic of migraine than the aura is the unilateral pain ("migraine" is a corruption of "hemicranium"). The pathophysiology is probably unilateral cerebral vasospasm (producing the neurological symptoms of the aura) followed by vasodilation (producing the headache). Neurologic symptoms may persist into the headache phase, but the longer they persist, the less likely they are due to the migraine. Cluster headaches, probably also of vascular origin, are characterized by lacrimation, rhinorrhea, and clustering in time, but the treatment of an attack is usually the same as for migraines. Acute migraine headaches are self-limited and respond well to placebos, so many therapies are effective. Medications for acute migraine pass in and out of style, and the above represent popular regimens at the time of writing. Ergotamines, phenothiazines and serotonin inhibitors may all work by cerebral vasoconstriction. One should be cautious in the use of ergot or serotonin agonists in any patient who has angina or focal weakness or sensory deficits. It is possible to precipitate an ischemic infarct of the brain or heart in such patients by using preparations which act by causing vasoconstriction. Patients with aneurysms or A-V malformations can present clinically as migraine patients. If there is something different about the severity or nature of this headache, one must think of the possibility of a subarachnoid hemorrhage. Headaches that are always on the same side and in the same location are very suspicious for an underlying structural lesion (e.g., aneurysm, AV malformation). Many patients seeking narcotics have learned that faking a migraine headache is even easier than faking a ureteral stone, but they usually do not follow through the typical course of falling asleep after a shot of and waking up a few hours later with pain relieved. It is a good policy to limit narcotics to one or two shots for migraine headaches, and not prescribe oral narcotics from the ED.

References:

1.09 Polymyalgia Rheumatica

Presentation

An elderly patient (more commonly female) complains of a week or two of morning stiffness, which may interfere with her ability to rise from bed, but improves during the day. She may ascribe her problem to muscle weakness or joint pains, but physical examination discloses that symmetrical pain and tenderness of neck, shoulder, and hip muscles are the actual source of any "weakness." There may be some mild arthritis of several peripheral joints, but the rest of the physical examination is negative.

What to do:

- Perform a complete history and physical examination, particularly of the cervical and lumbar spines and nerve roots (strength, sensation, and deep tendon reflexes in the distal limbs should be intact with PMR). Confirm the diagnosis of PMR by palpating tender shoulder muscles (perhaps also hips, and, less commonly, neck).
- Confirm the diagnosis by obtaining an erythrocyte sedimentation rate, which should be in the 30-100mm/hour range. (An especially high ESR, over 100/hour suggests more severe autoimmune disease or malignancy.)
- Mild and borderline cases may respond with nonsteroidal anti-inflammatory medications (ibuprofen, naproxen). More severe cases will respond to prednisone 20-60mg qd within a week or two, after which the dose should be tapered. Failure to respond to corticosteroid therapy suggests some other diagnosis.
- Explain the syndrome to the patient and arrange for followup.

What not to do:

- Do not miss temporal arteritis, a common component of the polymyalgia rheumatica syndrome, and a clue to the existence of ophthalmic and cerebral arteritis, which can have dire neurological consequences. Palpate the temporal arteries for tenderness, swelling, or induration, and ask about transient neurological signs.
- Do not postpone diagnosis or treatment of temporal arteritis pending results of a temporal artery biopsy showing giant cell arteritis. The lesion typically skips areas, making biopsy an insensitive diagnostic procedure.

Discussion

Stiffness, pain, and weakness are common complaints in older patients, but polymyalgia rheumatica may respond dramatically to treatment. Rheumatoid arthritis produces morning stiffness, but is usually present in more peripheral joints, and without muscle tenderness. Polymyositis is usually characterized by increased serum muscle enzymes with a normal ESR, and may include a skin rash (dermatomyositis). Often, a therapeutic trial of prednisone helps make the diagnosis.
1.10 Weakness

Presentation

An older patient comes to the emergency department or is brought by family, complaining of "weakness," or an inability to carry on his usual activities or care for himself.

What to do:

- Work at obtaining as much history as possible. Speak to available family members or friends, as well as the patient, and ask for details. Is the patient weak before certain activities? (suggestive of depression). Is the weakness located in the limb girdles (suggestive of polymyalgia rheumatica or myopathy). Is the weakness mostly in the distal muscles? (neuropathy). Is the weakness brought out by repetitive actions? (myasthenia gravis). Is the weakness unilateral with slurring of speech or confusion? (cerebrovascular accident).
- Obtain a thorough medical history and physical examination, including a review of systems (headaches, weight loss, cold intolerance, appetite, bowel habits), strength of all muscle groups (graded on a scale of 1-5), deep tendon reflexes, and neurological status. Order a head CT if there is an unexplained change in mental status or if there are abnormal neurologic findings.
- Obtain a spectrum of laboratory tests which will be available within the next 2 hours, including pulse oximetry, chest x ray, electrocardiogram, urinalysis, blood counts, glucose, BUN, and electrolytes which may disclose hypoxia, anemia, infection, diabetes, uremia, polymyalgia rheumatica, hyponatremia and hypokalemia, all of which are common causes of "weakness." (Testing for serum phosphate and calcium are also valuable, if available stat.)
- If no etiology for weakness can be found, probe the patient, family, and friends once again for any hidden agenda, and if none is found, reassure them about all the serious illnesses which have been ruled out. At this time, discharge the patient and make arrangements for definite followup.

What not to do:

- Do not order any laboratory tests the results of which you will not see. Your best strategy is to stick to tests which will return while the patient is in the emergency department, and defer any long investigations to the followup physician. Laboratory results which are never seen or acted upon are worse than none at all.
- Do not insist upon making the diagnosis in the emergency department in every case. In this clinical situation, your role in the ED is to rule out acutely life-threatening conditions, and then make arrangements for further evaluations elsewhere.

Discussion
Approach the patient with "weakness" with an open mind and be prepared to take some time with the evaluation. Demonstrable localized weakness usually points to a specific neuromuscular etiology, while generalized weakness is the presenting complaint for a multitude of ills. In young patients, weakness may be a sign of psychological depression while in older patients, in addition to depression, it may be the first sign of a subdural hematoma, pneumonia, urinary tract infection, diabetes, dehydration, malnutrition, heart failure, or cancer. It is important to exclude the Guillain-Barre syndrome as one of the critical, life-threatening etiologies to weakness. The pattern is not always an ascending paralysis or weakness, but usually does depress deep tendon reflexes. Botulism is another condition that must be excluded by history or observation. Patients who are suffering from these sorts of neuro-muscular weakness get into danger when they can't breathe. Pulmonary function studies like pulse oximetry, capnography, blood gases, peak flow or vital capacity can be helpful in selecting patients who might be close to severe respiratory embarrassment.
**1.11 Vertigo ("Dizzy, lightheaded")**

**Presentation**

This may be a nonspecific complaint which must be refined further into either an altered somatic sensation (giddiness, wooziness); orthostatic blood pressure changes (lightheadedness, sensation of fainting); or the sensation of the environment (or patient) spinning (true vertigo). In inner ear disease, vertigo is virtually always accompanied by nystagmus, which is the ocular compensation for the unreal sensation of spinning; but the nystagmus may be extinguished when the eyes are open and fixed on some point (by the same token, vertigo is usually worse with the eyes closed). Nausea and vomiting are common accompanying symptoms, but less common (depending on the underlying cause) are hearing changes, tinnitus, cerebellar or adjacent cranial nerve impairment.

**What to do:**

- Have the patient tell you in his own words what it feels like (without using the word "dizzy"). Ask about any sensation of spinning, factors which make it better or worse, and associated symptoms. Ask about drugs or toxins which could be responsible.
- Determine whether the patient is describing vertigo (a feeling of movement of one's body or surroundings) or a sensation of an impending faint or a vague unsteady feeling.
- If the problem is near syncope or orthostatic lightheadedness, then consider potentially serious etiologies such as heart disease, cardiac dysrhythmias or blood loss.
- With a sensation of dysequilibrium or an elderly patient's feeling that he is going to fall, look for peripheral neuropathy, cervical spondylosis, stiff legs and vasodilator medication. These patients should be referred to their primary care physicians for management of their underlying medical problems and adjustment of their medications.
- If there is light-headedness that is unrelated to changes in position and posture and there is no evidence of disease found on physical examination and laboratory evaluation, then instruct the patient to hyperventilate by breathing deeply in and out fifteen times. If this reproduces the symptoms, assess the patient's emotional state as a possible cause of his symptoms.
- If the patient is having true vertigo, examine for nystagmus, which can be horizontal, vertical or rotatory (pupils describe arcs). Have the patient follow your finger with his eyes as it moves a few degrees to the left and right (not to extremes of gaze) and watch whether there are more than the normal 2 to 3 beats of nystagmus before the eyes are still. You may detect nystagmus when the eyes are closed by watching the bulge of the cornea moving under the lid.
- If nystagmus is not clearly evident and the patient can tolerate it, attempt a provocative maneuver for positional nystagmus by having the patient sit up and then lie back, quickly hang his head over the stretcher side and turn his head and eyes to one side. Repeat to the other side. When this maneuver produces positional nystagmus, it indicates a benign inner ear dysfunction. A negative test is not helpful.
- Examine ears for cerumen, foreign bodies, otitis media, and hearing loss.
- Examine the cranial nerves. Test cerebellar function (rapid alternating movement, finger-nose, gait). Check the corneal blink reflexes: if absent on one side in a patient who does not wear contact lenses, consider acoustic neuroma.
- Decide, on the basis of the above, whether the etiology is central (brainstem, cerebellopontine angle tumor, multiple sclerosis) or peripheral (vestibular organs, eighth nerve). Central lesions may require further workup, otolaryngologic or neurologic consultation, or hospital admission, while peripheral lesions, although more symptomatic, are more likely self-limiting.
- In the emergency department, treat moderate to severe symptoms of vertigo with intravenous diazepam (Valium) 10 mg or diphenhydramine (Benadryl) 50mg. Add promethazine (Phenergan) 25mg iv for nausea. If there are no contra- indications (e.g. glaucoma) then a patch of transdermal scopolamine can be worn for three days. Some authors recommend hydroxyzine (Vistaril, Atarax) while others suggest corticosteroids (Solu-Medrol, Prednisone). Nifedipine (Procardia) had been used to alleviate notion sickness but is no better than scopolamine patches, and should not be used for patients with postural hypotension or who take beta blockers. If the patient does not respond, he may require hospitalization for further parenteral treatment.
- Treat vertigo symptoms in outpatients with diazepam (Valium) 5-10mg qid, meclizine (Antivert) 12.5-25mg qid, diphenhydramine (Dramamine, Benadryl) 25-50mg qid, promethazine (Phenergan) 25mg qid, or hydroxyzine (Vistaril) 25mg qid, and bedrest as needed until symptoms improve.
- Arrange for followup if there is no clear improvement in 2 days or if there is any suggestion of a central etiology.

**What not to do:**

- Do not attempt provocative maneuvers if the patient is symptomatic with nystagmus.
- Do not give anti-vertigo drugs to elderly patients with dysequilibrium. These medications have sedative properties which can make them worse.
- Do not make the diagnosis of Meniere's disease (endolymphatic hydrops) without the triad of paroxysmal vertigo, sensorineural deafness, and tinnitus, along with a feeling of pressure or fullness in the affected ear.

**Discussion**

In general, the more violent and spinning the sensation of vertigo, the more likely the lesion if peripheral. Central lesions tend to cause less intense vertigo and more vague symptoms. Peripheral etiologies of vertigo or nystagmus include irritation of the ear (utricle, saccule, semi-circular canals) or the vestibular division of the eighth cranial (acoustic) nerve by toxins oitis, viral infection, or cerumen or a foreign body against the tympanic membrane. The term "labyrinthitis" should be reserved for vertigo with hearing changes, and "vestibular neuronitis" for the common short-lived vertigo without hearing changes usually associated with viral upper respiratory infections. Paroxysmal positional vertigo may be related to dislocated otoconia in the utricle and saccule. If it occurs following trauma, suspect a basal skull fracture with leakage of endolymph or perilymph, and consider otolaryngologic referral for further evaluation and positional Central
etiologies include multiple sclerosis, temporal lobe epilepsy, basilar migraine and hemorrhage in the posterior fossa. A slow-growing acoustic neuroma in the cerebellopontine angle usually does not present with acute vertigo but rather a progressive unilateral hearing loss with or without tinnitus. The earliest sign is usually a gradual loss of auditory discrimination.

Vertebrobasilar arterial insufficiency can cause vertigo, usually with associated nausea, vomiting and cranial nerve or cerebellar signs. It is commonly diagnosed in dizzy patients who are older than 50, but more often than not the diagnosis is incorrect. The brainstem is a tightly-packed structure in which the vestibular nuclei are crowded in with the oculomotor nuclei, the medial longitudinal fasiculus, cerebellar, sensory and motor pathways. It would be unusual for ischemia to produce only vertigo without accompanying diplopia, ataxia, sensory or motor disturbance. Although vertigo may be the major symptom of an ischemic attack, careful questioning of the patient commonly uncovers symptoms implicating involvement of other brainstem structures. Objective neurologic signs should be present in frank infarction of the brainstem.

Either central or peripheral nystagmus can be due to toxins, most commonly alcohol, tobacco, aminoglycosides, minocycline, disopyramide, phencyclidine, phenytoin, benzodiazepines, quinine, quinidine, aspirin, salicylates, non-steroidal anti-inflammatories and carbon monoxide. Nystagmus occurring in central nervous system disease may be vertical and disconjugate, whereas inner ear nystagmus never is. Central nystagmus is gaze-directed (beats in the direction of gaze) whereas inner ear nystagmus is direction-fixed (beats in one direction regardless of the direction of gaze). Central nystagmus is brought out by visual fixation, which supressed inner ear nystagmus.

References:

1.12 Bell's Palsy (Idiopathic Facial Paralysis)

Presentation

This condition creates a very frightening facial disfigurement. An adult complains of sudden onset of "numbness," a feeling of fullness or swelling, pain or some other change in sensation on one side of the face; a crooked smile, mouth "drawing" or some other asymmetrical weakness of facial muscles; an irritated, dry or tearing eye; drooling out of the corner of the mouth; or changes in hearing or taste. Often there will have been a viral illness one to three weeks before. Upon initial observation of the patient, it is immediately apparent that he is alert and oriented, with a unilateral facial paralysis that includes one side of the forehead.

What to do:

- Perform a thorough neurological examination of cranial and upper cervical nerves, and limb strength, noting which are involved, and whether unilaterally or bilaterally. Ask the patient to wrinkle the forehead, close the eyes forcefully, smile, puff the cheeks and whistle, observing closely for facial asymmetry. Central or cerebral lesions result in relative sparing of the forehead. Check tearing, ability to close the eye and protect the cornea, corneal desiccation, hearing, and, when practical, taste. Examine the ear canals for herpetic vesicles and the tympanic membrane for signs of otitis media or cholesteatoma. Patients presenting with facial paralysis accompanied by acute otitis media, chronic suppurative middle ear disease, otorrhrea or otitis externa require otolaryngologic consultation.
- If the cornea is dry or injured from the patient's inability to make tears and blink, protect it by patching. If patching is not necessary, then recommend wearing eyeglasses and applying methylcellulose artificial tears regularly during the day and using a protective bland ointment at night.
- If there is a history of head trauma, obtain a CT scan of the head (including the skull base) to rule out a temporal bone fracture.
- If the diagnosis is clearly an early idiopathic cranial nerve palsy not caused or complicated by trauma, infection, or diabetes, try to ameliorate symptoms with a short course of corticosteroids (e.g., prednisone 60mg qd, tapering after 5 days.)
- Send a serum specimen for acute phase Lyme disease titers, if available, because this is another treatable disorder which can present as a facial neuropathy. In areas where Lyme disease is endemic, a 10 day course of tetracycline or doxycycline may be indicated.
- If the etiology appears to be zoster-varicella (e.g., grouped vesicles on the tongue) prescribe acyclovir or famcyclovir as for shingles.
- Reassure the patient that 70-80% of cases of Bell's palsy recover completely in a few weeks, but provide for definite followup and reevaluation.
- Provide appropriate specialty referral when there is a mass in the head or neck or a history of any malignancy.
What not to do:

- Do not forget alternate causes of facial palsy which require different treatment, such as cerebrovascular accidents and cerebellopontine angle tumors (which usually produce weakness in limbs or defects of adjacent cranial nerves), multiple sclerosis (which is usually not painful, spares taste, and often produces intranuclear ophthalmoplegia), Ramsay Hunt syndrome (or herpes zoster of the geniculate ganglion, which causes decreased hearing, pain, and vesicles in the ear canal), and polio (which presents as fever, headache, neck stiffness, and palsies).
- Do not order a CT unless there is a history of trauma or the symptoms are atypical and include such findings as vertigo, central neurological signs, or severe headache.
- Do not make the diagnosis of Bell's palsy in patients who report gradual onset of facial paralysis over several weeks or facial paralysis that has persisted 3 months or more. These patients need further evaluation by a neurologist or otolaryngologist.

Discussion

Idiopathic nerve paralysis is a common malady. It affects 20 per 100,000 people a year. Although Bell's palsy was described classically as a pure facial nerve lesion, and physicians have tried to identify the exact level at which the nerve is compressed, the most common presenting complaints are related to trigeminal nerve involvement. The mechanism is probably a spotty demyelination of several nerves at several sites, caused by a viral infection. Diabetics and pregnant women have increased incidence of Bell's palsy.

References:

2.01 Periorbital Ecchymosis (Black Eye)

Presentation

The patient has received blunt trauma to the eye, most often from a fist, a fall, or a car accident, and is alarmed because of the swelling and discoloration. Family or friends may be more concerned than the patient about the appearance of the eye. There may be an associated subconjunctival hemorrhage, but the remainder of the eye exam should be negative and there should be no palpable bony deformities, diplopia or subcutaneous emphysema.

What to do:

- Clarify as well as possible the specific mechanism of injury. A fist is much less likely to cause serious injury than a baseball bat.
- Perform a complete eye exam including a bright light exam to rule out an early hyphema, a funduscopic exam to rule out a retinal detachment or dislocated lens, and a fluorescein stain to rule out a corneal abrasion. Visual acuity testing should always be performed, and with an uncomplicated injury, would be expected to be normal. All patients having contusions associated with visual loss should be referred to an ophthalmologist. Special attention should be given to ruling out a blowout fracture of the orbital floor or wall. Test extraocular eye movements, look especially for diplopia on upward gaze, and check sensation over the infraorbital nerve distribution. Enophthalmus is usually not observed, although it is part of the classic textbook triad associated with a blow-out fracture. Subcutaneous emphysema is a recognized complication of orbital wall fracture.
- Symmetrically palpate the supra- and infraorbital rims as well as the zygoma, feeling for a deformity such as one would encounter with a displaced tripod fracture. A unilateral deformity will be obvious if your thumbs are fixed in a midline position while you use your index fingers to palpate the patient's facial bones simultaneously both left and right.
- When there is a substantial mechanism of injury or if there is any clinical suspicion of an underlying fracture, obtain x rays of the orbit. CT scans are more sensitive and can visualize subtle fractures of the orbit and small amounts of orbital air. CT scanning is indicated for patients with abnormal physical examinations but normal routine films.
- If a significant injury is discovered, then consult with an ophthalmologist.
- When a significant injury has been ruled out, reassure the patient that the swelling will subside within 12-24 hrs with use of a cold pack and the discoloration will take one to two weeks to clear. Acetaminophen should be all that is required for analgesia.
- Instruct the patient to follow up with an ophthalmologist if there is any problem with vision or pain developing after the first few days. Uncommonly, traumatic iritis, retinal tears, or vitreous hemorrhage may develop later secondary to blunt injury.

What not to do:

- Do not get unnecessary radiographs. Minor injuries with normal eye exams and no
palpable deformities do not require x rays.

- Do not brush off bilateral deep periorbital ecchymoses ("raccoon eyes") especially if caused by head trauma remote to the eye. This may be the only sign of a basilar skull fracture.

Discussion

Black eyes are most commonly nothing more than uncomplicated facial contusions. Patients become upset about them because they are so "near the eye," because they produce such noticeable facial disfigurement, and because there is often secondary gain being sought against the person who hit them. Nonetheless, serious injury must always be considered and ruled out prior to the patient's discharge from your care.
2.02 Conjunctivitis (Pink Eye)

Presentation

The patient complains of a red eye, a sensation of fullness, burning, itching, or scratching, and perhaps a gritty or foreign body sensation and tearing or purulent discharge and crusting or mattering. Examination discloses generalized injection of the conjunctiva, thinning out towards the cornea (localized inflammation suggests some other diagnosis such as a foreign body, episcleritis, or a viral or bacterial ulcer). Vision and pupillary reactions should be normal and the cornea and anterior chamber should be clear. Any discomfort should be temporarily relieved by instilling topical anesthetic solution. Deep pain, photophobia, decreased vision and injection more pronounced around the limbus (ciliary flush) suggest more serious involvement of the cornea and iris.

Different symptoms suggest different etiologies. Tearing, preauricular lymphadenopathy and upper respiratory symptoms suggest a viral conjunctivitis. Pain upon awakening with lid crusting and a copious purulent exudate suggests a bacterial conjunctivitis. Few symptoms upon awakening but discomfort worsening during the day suggests a dry eye. Little conjunctival injection with a seasonal recurrence of chemosis and itching, and cobblestone hypertrophy of the tarsal conjunctiva suggests allergic (vernal) conjunctivitis. Physical and chemical conjunctivitis, caused by particles, solutions, vapors, natural or occupational irritants that inflame the conjunctiva, should be evident from the history.

What to do:

- Instill proparcaine anesthetic drops (Alcaine, Ophthaine) to allow for a more comfortable exam and to help determine if the patient's discomfort is limited to the conjunctiva and cornea or, if there is no pain relief, that the pain comes from deeper eye structures.
- Examine the eye, including visual acuity, inspection for foreign bodies, pupillary reaction fundoscopy, estimation of intraocular pressure by palpation of the globe above the tarsal plate, slit lamp examination (when available), and fluorescein and ultraviolet or cobalt blue light to assess the corneal epithelium.
- Ask about and look for any rash, arthritis, or mucous membrane involvement which could point to Stevens-Johnson syndrome, Kawasaki's, Reiter's, or some other syndrome that can present with conjunctivitis.
- For bacterial conjunctivitis, start the patient on warm compresses and seven days of topical antibiotics such as erythromycin, sulfacetamide, tobramycin or gentamycin ointment (which transiently blurs vision) every 4 hours, or solutions such as sulfacetamide 10%, tobramycin 0.3% or ciprofloxacin every 2 hours, with oral analgesics as needed. If it is unclear whether the problem is viral or bacterial, it is safest to treat it as bacterial.
- For viral and chemical conjunctivitis, use cold compresses and weak topical vasoconstrictors such as naphazoline 0.1% (Naphcon) every 3-4 hours, unless the
patient has a shallow anterior chamber that would be prone to acute angle-closure glaucoma with mydriatics.

- For allergic conjunctivitis, use cold compresses and topical decongestant-antihistamine combinations such as drops of naphazoline with pheniramine (Naphcon A) or naphazoline with antazoline (Vasocon A) every 3-4 hours. Topical corticosteroid drops provide dramatic relief, but prolonged use increases the risk of opportunistic viral, fungal and bacterial corneal ulceration, cataract formation and glaucoma. If a severe contact dermatitis is suspected, then a short course of oral prednisone would be indicated.
- If the problem is dry eyes (keratoconjunctivitis sicca) use methylcellulose (Dacriose) artificial tear drops.
- Have the patient follow up with the ophthalmologist if the infection does not clearly resolve in 2 days. Obtain early consultation if there is any involvement of cornea or iris.

**What not to do:**

- Do not forget to wash your hands and equipment after examining the patient, or you may spread herpes simplex or epidemic keratoconjunctivitis to yourself and other patients. Also, do not forget to instruct the patient on the importance of hand washing and separation of towels and pillows for ten days after the onset of symptoms.
- Do not patch an affected eye, as this interferes with the cleansing function of tear flow.
- Do not give steroids without arranging for ophthalmologic consultation, and never give steroids if a herpes simplex infection is suspected.

**Discussion**

Warm compresses are soothing for all types of conjunctivitis, but antibiotic drops and ointments should be reserved for when bacterial infection is likely. Neomycin-containing ointments and drops should probably be avoided, because allergic sensitization to this antibiotic is common. Any corneal ulceration requires ophthalmological consultation. Most viral and bacterial conjunctivitis will resolve spontaneously, with the possible exception of staphylococcus, meningococcus, and gonococcus infections, which can produce destructive sequelae without treatment.

Most bacterial conjunctivitis is caused by Streptococcus pneumoniae, Haemophilus aegyptius and Staphylococcus aureus. Routine conjunctival cultures are seldom of value, but you should Gram stain and culture a copious purulent exudate. Neisseria gonorrhoeae infection confirmed by Gram-negative intracellular diplococci on Gram stain requires immediate ophthalmologic consultation. Corneal ulceration, scarring and blindness can occur in a matter of hours. Chlamydial conjunctivitis will usually present with lid droop, mucopurulent discharge, photophobia and preauricular lymphadenopathy. Small white elevated conglomerations of lymphoid tissue can be seen on the upper and lower tarsal conjunctiva, and 90% of patients have concurrent genital infections. Doxycycline 100mg bid or erythromycin 400mg tid by mouth plus topical tetracycline (Achromycin Ophthalmic) for three weeks should control the infection (also treat any sexual partner).
Epidemic keratoconjunctivitis is a bilateral, painful, highly contagious conjunctivitis usually caused by an adenovirus. The eyes are extremely erythematous, sometimes with subconjunctival hemorrhages. There is copious watery discharge and preauricular lymphadenopathy. Treat the symptoms with analgesics, cold compresses, and, if necessary, corticosteroids. Because the infection can last as long as three weeks and may result in permanent corneal scarring, provide ophthalmologic consultation and referral. Herpes simplex conjunctivitis is usually unilateral. Symptoms include a red eye, photophobia, eye pain and mucoid discharge. There may be periorbital vesicles, and a branching (dendritic) pattern of fluorescein staining makes the diagnosis. Treat with trifluridine 1% (Viroptic), analgesics and cold compresses. Cycloplegics such as homatropine may help control pain from iridocyclitis. Topical corticosteroids are contraindicated, because they can extend the infection, and ophthalmological consultation is required.

Herpes zoster ophthalmicus is shingles of the opthalmic branch of the trigeminal nerve, which innervates the cornea and the tip of the nose. It begins with unilateral neuralgia, followed by a vesicular rash in the distribution of nerve. Ophthalmic consultation is again required, because of frequent ocular consultations, but topical corticosteroids may be used. Prescribe systemic acyclovir (Zovirax) 800mg q4h (five times a day) for ten days or famcyclovir (Famvir) 500mg tid for seven days.
2.03 Iritis (uveitis)

Presentation

The patient usually complains of unilateral eye pain, blurred vision and photophobia. He may have had a pink eye for a few days, trauma during the previous day, or no overt eye problems. There may be tearing but there is usually no discharge. Eye pain is not markedly relieved after instillation of a topical anesthetic. When you look at the junction of the cornea and conjunctiva (the corneal limbus) you will see a circumcorneal injection which, on close inspection, is a tangle of fine ciliary vessels, visible through the white sclera. This limbal blush or ciliary flush is usually the earliest sign of iritis. A slit lamp with 10x magnification may help, but is usually evident on close inspection. As the iritis becomes more pronounced, the iris and ciliary muscles go into spasm, producing an irregular, poorly reactive, constricted pupil and a lens which will not focus. The slit lamp may demonstrate white blood cells or light reflection from a protein exudate in the clear aqueous humor of the anterior chamber (cells and flare).

What to do:

- Perform a complete eye exam, including topical anesthesia if necessary; visual acuity, pupillary reflexes, funduscropy, slit lamp examination of the anterior chamber (including pinhole illumination to bring out cells and flare) and fluorescein staining to detect any corneal lesion.
- Attempt to ascertain the cause of the iritis (is it generalized from a corneal insult or conjunctivitis, a late sequela of blunt trauma, infectious, or autoimmune?)
- Explain to the patient the potential severity of the problem: this is no routine conjunctivitis, but a process which can develop into blindness.
- Arrange for ophthalmologic consultation or followup, and, if acceptable to the consulting ophthalmologist . . .
- Dilate the pupil and paralyze ciliary accommodation with 1% cyclopentolate (Cyclogyl) drops once, which will not only relieve the pain of the muscle spasm, but will keep the iris away from the lens, where meiosis and inflammation might cause adhesions (posterior synechiae). For a prolonged effect, instill 1 drop of homatropine 5% before discharge.
- Suppress the inflammation with topical steroids, like 1% prednisolone (Inflamase) drops once;
- Prescribe po pain medicine if needed; and
- Ensure that the patient is seen the next day in followup.

What not to do:

- Do not let the patient shrug off his "pink eye" and escape followup, even if he is feeling better, because of the real possibility of permanent visual impairment.
- Do not overlook a penetrating foreign body as the cause of the inflammation.
- Avoid dilating an eye with a shallow anterior chamber and precipitating acute angle closure glaucoma.
Discussion

Iritis (or anterior uveitis) always represents a real threat to vision which requires emergency treatment and expert followup. The inflammatory process in the anterior eye can opacify the anterior chamber, deform the iris or lens, scar them together, or extend into adjacent structures. Posterior synechiae can potentiate cataracts and glaucoma. Treatment with topical steroids can backfire if the process is caused by an infection (especially herpes keratitis); thus the slit lamp examination is especially useful.

Iritis may have no apparent cause, or be associated with ankylosing spondylitis, Reiter’s syndromes, psoriatic arthritis, sarcoidosis and infections such as tuberculosis, Lyme disease and syphilis.

Sometimes an intense conjunctivitis or keratitis may produce some sympathetic limbal blush, which will resolve as the primary process resolves, and require no additional treatment. A more definite, but still mild, iritis, may resolve with cycloplegics, and not require steroids. All of these, however, mandate ophthalmologic consultation and followup.

References

2.04 Conjunctival Foreign Body

Presentation

Low-velocity projectiles, like wind blown dust particles, can be loose in the tear film or lodged in a conjunctival sac. The patient may not be very accurate in locating the foreign body by sensation alone. On exam, normally occurring white papules inside lids can be mistaken for foreign bodies, and transparent foreign bodies can be invisible in the tear film (until outlined by fluorescein dye).

What to do:

- Instill topical anesthetic drops.
- Perform visual acuity and funduscropy, examine the anterior chamber and tear film with a bright light (best done with a slit lamp) and examine the conjunctival sacs.
- To examine the lower sac, pull the lower lid down with your finger while the patient looks up.
- To examine the upper sac, hold the proximal portion of the upper lid down with a cotton-tipped swab while pulling the lid out and up by its lashes, everting most of the lid, as the patient looks down. Push the cotton swab downward to help turn the upper conjunctival sac "inside out." The stiff tarsal plate usually keeps the upper lid everted after the swab is removed, and as long as the patient continues looking down. Looking up reduces the lid to its usual position.
- A loose foreign body usually adheres to a swab lightly touched to the surface of the conjunctiva, or will be washed out by copious irrigation with saline. Picture
- Perform a fluorescein exam to disclose any corneal abrasion caused by the foreign body. These vertical scratches occur when the lid blinks over a coarse object and should be treated as described under "Corneal Abrasion."
- Follow with saline irrigation for possible fragments.

What not to do:

- Do not overlook a foreign body in the deep recesses of the upper conjunctival sac.
- Do not overlook an eyelash that has turned in and is rubbing on the surface of the eye. Sometimes you may see a lash sticking out of the inferior lacrimal punctum. Extract any such lashes.
- Do not overlook an embedded or penetrating foreign body.
- Do not overlook a corneal abrasion.

Discussion

Good first aid (copious irrigation and not rubbing eyes) will take care of most ocular foreign bodies. The history of injury with a high velocity fragment such as a metal shard chipped off a hammer or chisel, should raise the question of a penetrating foreign body, and x rays should be obtained. Techniques for conjunctival foreign body removal can
also be applied to locating a displaced contact lens, (see) but be aware that fluorescein dye absorbed by soft contact lenses fades slowly.
2.05 Corneal Foreign Body

Presentation

The eye has been struck by a falling or blowing particle, often a fleck of rust while working under a car, or a loose foreign body has become embedded by rubbing, thereby producing intense pain. Moderate to high-velocity foreign bodies (fragments chipped off a chisel by a hammer or spray from a grinding wheel) can be superficially embedded or lodged deep in the vitreous. Superficial foreign bodies may be visible during simple sidelighting of the cornea or by slit lamp examination. Deep foreign bodies may be visible only as moving shadows on funduscropy, with a trivial-appearing or invisible puncture in the sclera.

What to do:

- Instill topical anesthetic drops.
- Perform visual acuity and funduscropy (look for shadows), bright light anterior chamber (slit lamp is best), and check pupillary reflexes (for iritis) and conjunctivae (for loose foreign bodies).
- If there is any suspicion of a penetrating intraocular foreign body, then get special orbital x rays or CT scans to locate it or rule it out.
- A barely embedded foreign body might be touched out with a moistened swab as shown in the section on the conjunctival foreign body, but if firmly embedded, it will have to be scraped off (under magnification) with an ophthalmic spud or an 18 gauge needle. Give the patient an object to fixate upon to keep his eye still, brace your hand on his forehead or cheek, and approach the eye tangentially so no sudden motion can cause a perforation of the anterior chamber. Removal of the foreign body leaves a defect which is treated as a corneal abrasion. If a rust ring is present, it will appear that a foreign body remains adherent to the cornea. Use the needle to continue to scrape away this rust-impregnated corneal epithelium. A corneal burr is preferable for this task, if available.
- If unclear, perform a fluorescein exam to document the extent of the corneal defect.
- Finish with further irrigation for possible fragments, instill drops of a mydriatic like homatropine, antibiotic ointment, eye patch, and analgesic medication (Percocet, ibuprofen, etc.), the first dose given before leaving the ED.
- Make an appointment for ophthalmologic followup the next day, to evaluate healing and any residual foreign bodies.

What not to do:

- Do not overlook a foreign body deep inside the globe: the delayed inflammatory response can lead to blindness.
- Do not leave an iron foreign body in place without arranging early ophthalmic followup.
- Do not be stingy with pain medication. Large corneal abrasions following foreign body removal can be quite painful despite patching the eye.
• Do not forget to tell the patient, if homatropine was instilled, that he will have blurred near vision and an enlarged pupil for 12-24 hours.

Discussion

Decide beforehand how much time you will spend (and how much trauma you will inflict on the cornea) before giving up on removing a corneal foreign body and calling your ophthalmologic consultant. Some emergency physicians recommend using a small needle for scraping, to minimize the possibility of a corneal perforation, but with a tangential approach the larger needle is less likely to cause harm.
2.06 Corneal Abrasion

Presentation

The patient may complain of eye pain or a foreign body sensation after being poked in the eye with a finger or twig. The patient may have abraded the cornea inserting or removing contact lenses. Removal of a corneal foreign body produces some corneal abrasion, but corneal abrasion can even occur without identifiable trauma. There is often excessive tearing and photophobia. Often the patient cannot open his eye for the exam. Abrasions are occasionally visible on sidelighting the cornea. Conjunctival inflammation can range from nothing to severe conjunctivitis with accompanying iritis.

What to do:

- Instill topical anesthetic drops (to permit exam).
- Perform a complete eye exam (visual acuity, funduscopy, anterior chamber bright light, conjunctival sacs for foreign body).
- Perform the fluorescein exam by wetting a paper strip impregnated with dry orange fluorescein dye and touching this strip into the tear pool inside the lower conjunctival sac. After the patient blinks, darken the room and examine the patient's eye under cobalt blue or ultraviolet light (the red-free light on the ophthalmoscope does not work). Areas of denuded or devitalized corneal epithelium will fluoresce green.
- If a foreign body is present, remove it and irrigate the eye.
- If iritis is present (evidenced by photophobia, an irregular pupil or meiosis, and a limbic blush in addition to conjunctival injection) consult the ophthalmologic followup physician about starting the patient on topical mydriatics and steroids (e.g., cyclopentolate or homatropine and prednisolone).
- Instill antibiotic ointment (e.g., erythromycin, tobramycin) in the lower sac. A small, superficial, non-painful abrasion may be left uncovered. Picture
- For large, deep, and painful abrasions, patch the eye with enough pressure to keep the lid closed by folding one eyepatch double to rest against the lid, covering it with a second unfolded eyepatch, and taping both tightly with several strips of 1" tape running from the cheek to mid forehead.
- Prescribe analgesics (e.g., oxycocone, ibuprofen, naproxen), and give the first dose.
- Warn the patient the pain will return when the local anesthetic wears off.
- Make an appointment for ophthalmologic followup to reevaluate the abrasion the next day.

What not to do:

- Do not be stingy with pain medication. Patching alone will not eliminate the pain.
- Do not give patient any topical anesthetic for continued instillation.
- Do not patch a patient with a bacterial conjunctivitis or ulcer.
- Do not tape an eye patch up and down or across the nose.
Discussion

Corneal abrasions are a loss of the superficial epithelium of the cornea. They are generally a painful injury, because of the extensive innervation. Healing is usually complete in one to two days unless there is extensive epithelial loss of underlying ocular disease (e.g., diabetes). Scarring will occur only if the injury is deep enough to penetrate into the collagenous layer.

Fluorescein binds to corneal stroma and devitalized epithelium, but not to intact corneal epithelium. Collections of fluorescein elsewhere, in conjunctival irregularities and in the tear film, are not pathological.

Continuous instillation of topical anesthetic drops can impair healing, inhibit protective reflexes, permit further eye injury, and even cause sloughing of the corneal epithelium. If the abrasion is small or the patient is significantly distressed by patching, topical antibiotic drops or ointment can be used alone. The patch does not significantly improve healing or pain relief.

With small superficial abrasions the patient does not require follow up if he is completely asymptomatic in 12-24 hours. With larger abrasions or with any persistant comfort, ophthalmologic follow up is necessary because of the risk of corneal infection or ulceration.

Hard contact lenses can abrade the cornea, but can also cause diffuse ischemic damage when worn for more than 12 hours at a time, by depriving the avascular corneal epithelium of oxygen and nutrients in the tear layer.

References

- Kirkpatrick J: No eye pad for corneal abrasions. Eye 1993;7:468
2.07 Periorbital and Conjunctival Edema

Presentation

The patient is frightened by the facial distortion and itching that seem to appear spontaneously or up to 24 hours after having been bitten by a bug or having contacted some irritant. The patient may have been rubbing his eyes: in fact, an allergen or chemical irritant on the hand may cause periorbital edema long before a reaction, if any, is evident on the skin of the hand. There may be minimal to marked generalized conjunctival swelling (chemosis), but little injection. Tenderness and pain should be minimal or absent and there should be no erythema of the skin, photophobia or fever. Visual acuity should be normal, there should be no fluorescein uptake over the cornea and the anterior chamber should be clear.

What to do:

- After completing a full eye exam, reassure the patient that this is not as serious as it looks.
- Prescribe hydroxyzine (Atarax) 25-50mg q6h for mild to moderate swelling and a six-day course of steroids (Aristopak 4mg) for more severe cases. Naphazoline (Vasocon, Naphcon) ophthalmic drops will be soothing and reduce swelling when the conjunctiva is involved.
- Instruct the patient to use cool compresses to reduce swelling and discomfort.
- Inquire about the cause, including allergies and chemical irritants.
- Warn the patient about the potential signs of infection.

What not to do:

- Do not apply heat: swelling and pruritis will increase.
- Do not confuse this with periorbital cellulitis, a serious infection manifested by pain, heat, fever, deep erythema. Periorbital cellulitis requires hospitalization and aggressive antibiotic therapy.

Discussion

The dramatic swelling that often brings a patient to an emergency department occurs because of the loose connective tissue surrounding the orbit. Fluid quickly accumulates when a local allergic-response causes increased capillary permeability, resulting in dramatic eyelid swelling. The envenomation, allergen, or irritant responsible may actually be located some distance away on the face (or hand) but the loose periorbital tissue is the first to swell.
2.08 Subconjunctival Hemorrhage

Presentation

This condition may be spontaneous or follow a minor trauma, coughing episode, vomiting, or drinking binge. There is no pain or visual loss, but the patient may be frightened by the appearance of his eye and have some sensation of superficial fullness or discomfort. Often it is a friend or family member that insists the patient should be seen in the ED. This hemorrhage usually appears as a bright red area covering part of the sclera, but contained by conjunctiva. It may cover the whole visible globe, sparing only the cornea.

What to do:

- Look for associated trauma, or other signs of a potential bleeding disorder.
- Perform a complete eye exam that includes: a) visual acuity testing, b) inspection of conjunctival sacs, c) bright lighting the anterior chamber, d) testing extraocular movements, and e) fluorescein staining and f) funduscopic examination
- Reassure the patient that there is no serious eye damage: explain that the blood may continue to spread, but that all the redness should resolve in two to three weeks.

What not to do:

- Don't forget to tell the patient that the redness may spread over the next two days.
- Don't ignore any significant finding discovered on the complete eye exam. Penetrating injuries and ruptured globes also present with a subconjunctival hemorrhage obscuring the damage beneath.

Discussion

Although this looks serious, it is usually caused by a leak in a superficial blood vessel from trivial trauma. Recurrent hemorrhage or evidence of other bleeding sites, however, should prompt evaluation of a vasculitis or clotting disorder.
2.09 Ultraviolet Keratoconjunctivitis (Welder's or Tanning Bed Burn)

Presentation

The patient arrives with burning eye pain, usually bilateral, beginning 6 to 8 hours after a brief exposure without eye protection to a high intensity ultraviolet light source such as a sunlamp or welder's arc. The eye exam shows conjunctival injection; fluorescein staining may be negative or show diffuse superficial uptake (discerned as a punctate keratopathy under slit lamp examination). The patient may also have first-degree skin burns.

What to do:

- Apply topical anesthetic ophthalmic drops (once, to permit exam).
- Perform a complete eye exam (visual acuity, funduscopic, anterior chamber bright light, fluorescein, inspection of conjunctival sacs).
- Instill an antibiotic ointment and patch eyes for approximately 12 hours. Cold compresses, rest, and analgesics (oxycodone, codeine, ibuprofen, naproxen) should be prescribed to control pain. The first dose can be given in the ED.
- Warn the patient that pain will return when the local anesthetic wears off, but that the pills prescribed should help to relieve it.

What not to do:

- Do not give the patient a topical anesthetic for continued instillation. It can slow healing and increases the risk of eye injury.
- Do not be stingy with pain medications. This is a painful, albeit short-lived injury.

Discussion

The history of a brief exposure may be difficult to elicit after the long asymptomatic interval. Longer exposures to lower intensity UV sources may resemble a sunburn. Some physicians find it quite acceptable to substitute for the antibiotic ointment a one-time instillation of an ophthalmic anesthetic ointment (Tetracaine), which allows longer-lasting topical anesthesia. Some patients do not tolerate bilateral patching (they may have to get home alone). Cold compresses may be substituted for patches. Healing should be complete in 12-24 hours. If the patient continues to have discomfort, an ophthalmologist should be consulted.
2.10 Hordeolum (Sty)

Presentation

The patient complains of redness, swelling, and pain in the eyelid, perhaps at the base of an eyelash (sty or external hordeolum) or deep within the lid (meibomianitis or internal hordeolum, best appreciated with the lid everted) perhaps with conjunctivitis and purulent drainage.

What to do:

- Examine the eye, including visual acuity and inversion of lids (see "Conjunctival FB" for technique).
- Show patient how to instill antibiotic drops or ointment (e.g., sulfa, tobramycin, erythromycin, gentamycin) into his lower conjunctival sac and apply warm tap water compresses for 10 minutes per hour or 20 minutes four time daily. Picture
- Instruct the patient to return to the ophthalmologist or the ED if the problem is not clearly resolving in two days, or if it gets any worse.
- If the abscess does not spontaneously drain or resolve in two days, you may incise it with the tip of a #11 blade or small needle, with the same follow up instructions.

What not to do:

- Do not miss a periorbital cellulitis, which is a severe infection and requires aggressive systemic antibiotic treatment.

Discussion

The terminology of the two types of hordeolum have become confusing. Meibomian glands run vertically, within the tarsal plate, open at tiny puncta along the lid margin, and secrete oil to coat the tear film. The glands of Zeiss and Moll are the sebaceous glands opening into the follicles of the eyelashes. Both can become occluded and superinfected, producing meibomianitis (internal hordeolum) or a sty (external hordeolum). The ED care of both acute infections is the same. A chronic granuloma of the meibomian gland is called a chalazion, will not drain, and requires excision.
2.11 Contact Lens Overwear and Contamination

Presentation

A patient who wears hard, impermeable contact lenses may come to the ED in the early morning complaining of severe eye pain, after he has fallen asleep with his lenses in or stayed up late, leaving his lenses in for more than 12 hours. Extended-wear soft lenses can cause a similar syndrome when left in for days or contaminated with irritants. The patient may not be able to open his eyes for examination because of pain and blepharospasm. He may show obvious corneal injury, with signs of iritis and conjunctivitis, or show no visible findings at all without fluorescein staining.

What to do:

- Instill topical anesthestic drops.
- Perform a complete eye exam including pupillary reflexes, funduscopy, and inspection of conjunctival sacs. Use a slit lamp if available.
- If you see any ulcerations on the cornea, call for ophthalmologic consultation right away. Acanthameba infections from soft lenses can damage the eye rapidly, and may require excision and hospitalization.
- Instill fluorescein dye (use single-dose dropper or wet a dyeimpregnated paper strip and touch it to the tear pool in the lower conjunctival sac), have the patient blink, and examine under cobalt blue or ultraviolet light for the green fluorescence of dye bound to devitalized corneal epithelium. This staining should demonstrate central corneal uptake of fluorescein without sharply demarcated borders.
- Sketch the area of corneal injury on the patient record, rinse out the dye and instill tobramycin or gentamycin ointment in the lower conjunctival sac.
- Prescribe analgesics (e.g., naproxen, ibuprofen, oxycodone) and give the first dose.
- Instruct the patient to avoid wearing his lenses until cleared by the ophthalmologist, and to seek ophthalmologic followup within one day.

What not to do:

- Do not discharge a patient with topical anesthetic ophthalmic drops for continued administration: they potentiate serious injury.
- Do not let a patient re-use contaminated or infected soft lenses.
- Do not patch contact lens abrasions or early ulcerative keratitis.
- Do not prescribe antibiotic ointments that do not provide prophylaxis against Pseudomonas (e.g., erythromycin and sulfas).
- Do not use steroid-containing drops or ointments.

Discussion

Hard contact lenses and extended-wear soft lenses left in place too long deprive the avascular corneal epithelium of oxygen and nutrients from the tear film. This produces
diffuse ischemia, which usually heals perfectly in a day, but can be exquisitely painful as soon as the lenses are removed. Soft lenses can absorb chemical irritants, allergens, bacteria and ameba if they soak in a contaminated cleaning solution. There are approximately 25 million contact lens wearers in the US. Adverse reactions range from minor transient irritation to corneal ulceration and infection that may result in permanent loss of vision from corneal scarring. Pseudomonas is most commonly associated with contact lens-related keratitis. It is for this reason that the management of these cases should differ from routine care given to mechanical corneal abrasions not caused by contact lenses. Occlusive patching and corticosteroid medications favor bacterial growth and are therefore not recommended in the setting of contact lens use.

References:

2.12 Removal of Dislocated Contact Lens

Presentation

The patient may know the lens has dislocated into one of the recesses of the conjunctiva, and complain only of the loss of refractory correction; or he may have lost track of the lens completely, in which case the eye is a logical place to look first. Pain and blepharospasm suggest a corneal abrasion, perhaps from removal attempts.

What to do:

- If pain and blepharospasm are a problem, topically anesthetize the eye.
- Pull back lids as when looking for conjunctival foreign bodies, invert the upper lid, and, if necessary instill fluorescein dye (a last resort with soft lenses, which absorb the dye tenaciously).
- If the lens is loose, slide it over the cornea, and let the patient remove it in the usual manner. Irrigation may loosen a dry, stuck lens.
- For a more adherent hard lens, use a commercially available suction cup lens remover. Soft lenses may be pinched between fingers or require a commercially available rubber pincer.
- Put the lens in a proper container (sterile saline is always right).
- Complete the eye examination, including acuity, bright light and fluorescein examination. Patch the eye if there is a corneal abrasion.
- Instruct the patient not to wear the lens until all symptoms have abated for 24 hours, and to see his ophthalmologist if there are any problems.

What not to do:

- Do not give up too easily. Lost lenses have been excavated years later from under scar tissue in the conjunctival recesses.
- Don’t omit the fluorescein step for fear of spoiling a soft contact lens. The dye may take a long time to elute out, but it is more important to find the dislocated lens.

Discussion

The deepest recess in the conjunctiva is under the upper lid, but lenses can lodge anywhere; there have been rare cases of lenses perforating the conjunctival sac and migrating posterior to the globe. Be sure to evert the upper conjunctival sac by pushing down with a cotton tipped applicator.
2.13 Complete Eye Exam

What to do:

- Visual acuity, using Snellen (wall) or Jaeger (hand-held) chart without then with the patients own corrective lenses. If glasses are not available, a pinhold will compensate for most refractory errors.
- Wearing gloves, inspect lids, conjunctivae, extraocular movements and pupillary reflexes.
- Use a 10x slit lamp to examine the cornea and anterior chamber, looking for any injection of ciliary vessels at the corneal limbus, indicating iritis. Look for light reflected from protein exudate or suspended white cells in the normally-clear aqueous humor when the slit lamp is stopped down to a pinhole (later signs of iritis). Look for red cells (hyphema) or white cells (hypopion) settling to the bottom of the anterior chamber after the patient has been sitting up for 15 minutes.
- Demonstrate the integrity of the corneal epithelium with fluorescein dye, which is taken up by exposed stroma or non-viable epithelium, and glows green in ultraviolet or cobalt blue light.
- Note the depth of the anterior chamber with tangential lighting
3.01 Cerumen Impaction (Ear Wax Blockage)

Presentation

The patient may complain of "wax in the ear," a "stuffed up" or foreign body sensation, pain, itching, decreased hearing, tinnitus, or dizziness. On physical examination, the dark brown, thick, dry cerumen, perhaps packed down against the ear drum, where it does not occur normally, obscures further visualization of the ear canal.

What to do:

- Explain what you are going to do to the patient. Cover him with a waterproof drape, have him hold a basin or thick towel below his ear, and tilt the ear slightly over it.
- Fill a 20ml syringe with warm water at approximately 98.6F (37C) and fit it with a soft tubing catheter. Aim along the anterior superior wall of the external ear canal (visualize directly) and squirt with all your might.
- Repeat until all of the cerumen is gone. Dry the canal.
- If multiple attempts at irrigation prove to be unsuccessful, then gentle use of a cerumen spoon (ear curette) may be necessary to pull out the excess wax. Warning the patient about potential discomfort or minor bleeding before using the ear curette will save lengthy explanations and apologies later.
- Reexamine the ear and test the patient's hearing.
- Warn the patient that he has thick ear wax, that he may need this procedure done again someday, and that he should never use swabs in his ear.

What not to do:

- Do not irrigate an ear with a suspected or known tympanic membrane perforation, or myringotomy tubes.
- Do not waste time attempting to soften wax with ceruminolytic detergents.
- Do not irrigate with a cold (or hot) solution.
- Do not blindly insert a rigid instrument down the canal.
- Do not irrigate with a stiff over-needle catheter. It can cause a painful abrasion and bleeding or even perforate the tympanic membrane.
- Do not leave water pooled in the canal. That can cause an external otitis. A final instillation of 2% acetic acid (Acetasol, Domboro Otic, half-strength vinegar) will also prevent iatrogenic swimmer's ear.

Discussion

This technique virtually always works within 5-10 squirts. If the irrigation fluid is at body temperature, it will soften the cerumen just enough that it floats out as a plug. If the fluid is too hot or cold it can produce vertigo, nystagmus, nausea, and vomiting.

A conventional blood-drawing syringe, fitted with a butterfly catheter, its tubing cut 1 cm from the hub, seems to work better than the big chrome-plated syringes manufactured
for irrigating ears. An alternative technique is to use a WaterPik. Cerumen spoons can be dangerous and painful, especially with children, for whom this irrigation technique has proven more effective in cleaning the ear canal to provide for assessment of the tympanic membrane.

Cerumen is produced by the sebaceous glands of the hair follicles in the ear canal, and naturally flows outward along these hairs. One of the problems with ear swabs is that they can push wax inwards away from these hairs and against the ear drum, where it can then stick and harden. Patients may ask about "ear candles" to remove wax, but these are also not very effective compared to the technique above.

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these are also not very effective compared to the technique above.

References

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**3.03 Otitis Media**

**Presentation**

Adults and older children will complain of ear pain. There may or may not be accompanying symptoms of upper respiratory infection. In younger children and infants, parents may report that their child is irritable and sleepless, with or without fever, and possibly pulling at his ears. The tympanic membrane is inflamed and may be bulging with loss of landmarks. It may be dull or opacified with reduced mobility on pneumatic otoscopy, and may or may not be accompanied by otorrhea.

**What to do:**

- Investigate for any other underlying illness.
- Inquire as to whether or not the patient has had a recent or unresponsive ear infection, and whether or not the patient has recently been on an antibiotic.
- If the patient has no recent history of otitis media or antibiotic use, then prescribe an appropriate dose of amoxicillin for ten days. Trimethoprim plus sulfamethoxazole may be substituted in the penicillin-allergic patient.
- More expensive antibiotics such as amoxicillin plus clavulinate, erythromycin plus sulfamethoxazole, and cephalosporins should be reserved for treatment failures and where there is associated illness requiring a beta-lactamase-stable antimicrobial.
- Provide pain and fever control with acetaminophen or ibuprofen elixir.
- Recommend a ten-day follow-up examination on all patients under two years of age and in those cases where the parents do not feel the infection has resolved or where a child's symptoms persist, there is a family history of recurrent otitis or the accuracy of the parental observations may be in doubt.

**What not to do:**

- Do not overlook serious underlying illness such as meningitis.
- Do not prescribe antihistamines or decongestants. These drugs do not decrease the incidence nor hasten the resolution of otitis media. Antihistamines can make children drowsy and decongestants can cause irritability.

**Discussion**

Most otitis is caused by a viral infection, and most patients do well regardless of the antibiotic chosen. Despite the increase in antimicrobial resistance of community-acquired Streptococcus pneumoniae, Haemophilus influenzae and Moraxella catarrhalis and the plethora of alternative antibiotics available, amoxicillin remains the drug of choice, because it concentrates in middle ear fluid.

**References:**
3.04 Perforated Tympanic Membrane (Ruptured ear drum)

Presentation

The patient will present with ear pain after barotrauma, such as a blow to the ear or deep-water diving; or after direct trauma with a stick or other sharp object. Hemorrhage will often be noticed within the external canal and the patient will experience some hearing loss. Tinnitus or vertigo may also be present. Otoscopic examination will reveal a defect in the tympanic membrane that may or may not be accompanied by disruption of the ossicles.

What to do

- Clear out any debris from the canal, using gentle suction.
- Test for nystagmus and gross hearing loss.
- Place a protective cotton plug inside of the ear canal and instruct the patient to keep the canal dry.
- Prescribe an appropriate analgesic (e.g., ibuprofen, naproxen, acetaminophen with codeine or oxycodone).
- Insure that the patient gets early follow up by an otolaryngologist.

What not to do:

- Do not instill any fluid into the external canal or allow the patient to get water into his ear. Water in the middle ear is painful, irritating and may introduce bacteria. Covering the cotton plug with petroleum jelly will allow the patient to shower safely.

Discussion

Small uncomplicated perforations usually heal. When there is nystagmus, vertigo, profound hearing loss, or disruption of the ossicles, then early otolaryngologic consultation is advisable.
3.05 Foreign Body in Ear

Presentation

Sometimes a young child admits to putting something like a bead or a bean in his ear, or an adult witnesses the act. Sometimes the history is hidden and the child simply presents with a purulent discharge, pain, bleeding or hearing loss. Most dramatically, a patient arrives at the emergency department panic-stricken because he feels and hears a bug crawling around in his ear.

What to do:

- If there is a live insect in the patient's ear, simply fill the canal with mineral oil (e.g., microscope immersion oil). Lay the patient on his side and drop the oil down the canal while pulling on the pinna to remove air bubbles. This will suffocate the intruder, so it can be removed using one of the techniques below. The least invasive methods should be tried first.
- Water irrigation is often effective for safely removing a foreign body that is not tightly wedged in the ear canal. This can be accomplished with an irrigation syringe, Water Pik, or a standard syringe and scalp vein needle catheter cut short (see above). Tap water or normal saline at body temperature can be used to flush out the foreign body by directing the stream along the wall of the ear canal and around the object, thereby flushing it out.
- If the object is light and moves easily, attempt to suction it out with a standard metal suction tip or specialized flexible tip, whichever can make a vacuum seal on the foreign body.
- If a hard or spherical foreign body remains in the ear canal, and the patient is able to hold still, you can attempt to roll it out with a right-angle hook, ear curette or wire loop. Stabilize the patient's head and fix your hand against it, holding the instrument loosely between your fingers to reduce the risk of injury should the patient move suddenly. Under direct visualization through an ear speculum, slide the tip of the right-angle hook, ear curette or wire loop behind the object (rotate the hook to catch) and then roll or slide the foreign body out of the ear.
- Alligator forceps are best for grasing soft objects like cotton or paper. The wooden shaft of a long cotton swab can be armed with one drop of cyanoacrylate (Super Glue) to adhere to a smooth, clean, dry foreign body. Touch it to the foreign body, hold for ten seconds, then pull. Try not to glue the stick to the wall of the ear canal, but if you do, be thankful for cerumen (above).

What not to do:

- Do not use a rigid instrument to remove an object from an uncooperative patient's ear. An unexpected movement might lead to a serious injury of the middle ear.
- Do not attempt to remove a large bug or insect without killing it first. They tend to be wily, evasive little creatures well equipped for fighting in tunnels. In the heat of battle, the patient can become terrorized by the noise and pain and the instrument that you
are using is likely to damage the ear canal.

- Do not attempt to irrigate a tightly wedged bean or seed from an ear canal. The water may cause the bean to swell.
- Do not attempt to remove a large or hard object with bayonet or similar forceps. The bony canal will slowly close the forceps as they are advanced and the object will be pushed farther into the canal. Alligator forceps are designed for the canal, but even they will push a large, hard foreign body farther into the ear.

Discussion

The cutaneous lining of the bony canal of the ear is very sensitive and is not much affected by topical anesthetics. If your patient is an uncooperative child, you might make one cautious attempt at removal under conscious sedation (see below) with firm head restraint, but your most prudent strategy is to schedule elective removal under general anesthesia by a specialist.

Irrigation techniques and the use of the ear curette can also be effective in removing excess cerumen from an ear canal (see above). Whenever an instrument is used in an ear canal it is a good idea to warn the patient or parents beforehand that there may be a small amount of bleeding.

There should be no delay in removing an external auditory canal foreign body when there is an obvious infection or when the foreign body is a disk battery. On contact with most tissue, this type of alkaline battery is capable of producing a liquefactive necrosis extending into deep tissues. After removal, the canal should be irrigated to remove alkalai residue. Styrofoam beads can be instantly dissolved by spraying them with a small amount of ethyl chloride. Lidocaine has been shown to make cockroaches exit the ear canal, but this may be unpleasant for the patient. On telephone consultation, patients can be instructed to use cooking or baby oil to kill an intra-aural insect, which can then be removed in a subsequent office visit.

Complications of foreign body removal include trauma to the skin of the canal, canal hematoma, otitis externa, tympanic membrane perforations, ossicular dislocations and facial nerve palsy.

References:

- Skinner DW, Chui P: The hazard of button-sized batteries as foreign bodies in the nose and ear. J Laryngol Otol 1986;100:1315-1319.
3.06 Serous Otitis Media

Presentation

Following an upper respiratory infection or an airplane flight, an adult may complain of a feeling of fullness in the ears, inability to equalize middle ear pressure, decreased hearing, and clicking, popping, or crackling sounds, especially when the head is moved. There is little pain or tenderness. Through the otoscope, the tympanic membrane appears retracted, with a dull to normal light reflex, minimal if any injection, and poor motion on insufflation. You may see an air-fluid level or bubbles through the ear drum. Hearing will be decreased and the Rinne test will show decreased air conduction (i.e., a tuning fork will be heard no better through air than through bone).

What to do:

- Tell the patient to lie supine with head tilted back and toward the affected side and then instill vasoconstrictor nose drops like phenylephrine 1% (Neo-Synephrine) or oxymetazoline 0.05% (Afrin), wait two minutes for the nasal mucosa to shrink, reinstill nose drops, and wait an additional 2 minutes for the medicine to seep down to the posterior pharyngeal wall, around the opening of the eustachian tube. Have him repeat this procedure with drops (not spray) every 4 hours during the day for no more than 3 days.
- After each treatment with nose drops, instruct the patient to insufflate his middle ear via his eustachian tube by closing his mouth, pinching his nose shut, and blowing until his ears "pop."
- Unless contraindicated by hypertension or other medical conditions, add a systemic vasoconstrictor (pseudoephedrine 60mg qid).
- Instruct the patient to seek otolaryngologic followup if not better in a week.

What not to do:

- Do not allow the patient to become habituated to vasoconstrictor nose drops. After a few days, they become ineffective, and then the nasal mucosa develop a rebound swelling known as "rhinitis medicamentosa" when the medicine is withdrawn.
- Do not prescribe antihistamines (which dry out secretions) unless clearly indicated by an allergy.

Discussion

Acute serous otitis media is probably caused by obstruction of the eustachian tube, creating negative pressure in the middle ear, which then draws a fluid transudate out of the middle ear epithelium. The treatment above is directed solely at reestablishing the patency of the eustachian tube, but further treatment includes insufflation of the eustachian tube or myringotomy. Fluid in the middle ear is more common in children, because of frequent viral upper respiratory infections and an underdeveloped
eustachian tube. Children are also more prone to bacterial superinfection of the fluid in the middle ear, and, when accompanied by fever and pain, merit treatment with analgesics and antibiotics (e.g., ibuprofen and amoxicillin) (see above). Repeated bouts of serous otitis in an adult, especially if unilateral, should raise the question of obstruction of the eustachian tube by tumor or lymphatic hypertrophy.

References:

3.07 Split Earlobes

Presentation

A patient will present with an earlobe split by a sudden pull on an earring.

What to do:

- Excise the skin edges on both sides of the wound, leaving the apical epithelium intact. Suture these freshened wound edges together using a fine monofilament material.
- If the patient wants to maintain a pierced ear lobe, tie a loop of sterile suture material through the hole to maintain a tract while the rest of the lobe heals.
- Provide tetanus prophylaxis if needed

What not to do:

- Do not suture the wound primarily. The edges may epithelialize, resulting in the split redeveloping after the sutures are removed.

Discussion

There are many techniques for the repair of split earlobes. Some methods, including this one, attempt to preserve the earring hole while others use a Z-plasty on the free margins of the lobes to prevent notching at the points of reunion. Depending on the specific circumstances, it may be advisable to consult with a plastic surgeon before attempting to repair this type of earlobe injury.
3.08 Epistaxis (Nosebleed)

Presentation

A patient generally arrives in the emergency department with active bleeding from his nose or spitting up blood that is draining into his throat. There may or may not be a report of minor trauma such as sneezing, nose blowing or nasal manipulation. On occasion the hemorrhage has stopped but the patient is concerned because the bleeding has been recurring over the past few hours or days. Bleeding is most commonly visualized on the anterior aspect of the nasal septum within Kiesselbach’s plexus. The anterior end of the inferior turbinate is another site where bleeding can be seen. Often, especially with posterior hemorrhaging, a specific bleeding site cannot be discerned.

What to do:

- If significant blood loss is suspected, gain vascular access and administer crystalloid intravenous solution.
- Have the patient maintain compression on the nostrils by pinching with a gauze sponge while you assemble all equipment and supplies at the bedside. Inform the patient that you will be controlling the bleeding in a stepwise fashion.
- Have the patient sit upright (unless hypotensive) Sedate the patient if necessary with a mild tranquilizer such as hydroxyzine (Vistaril) or midazolam (Versed). Cover the patient and yourself to protect your clothes. Wear gloves.
- Prepare 5 ml of 4% cocaine solution or a 1:1 mixture of tetracaine 2% (Pontocaine) for local anesthesia and epinephrine 1:1000 or pseudophedrine 1% (Neo-Synephrine) for vasoconstriction.
- Form two elongated cotton pledgets and soak them in the solution.
- Use a bright headlight or head mirror to free up hour hands and help insure good visualization.
- Have the patient blow the clots from his nose and quickly inspect for a bleeding site using a nasal speculum and Frazier suction tip. Clear out any additional clots or foreign bodies.
- Insert the medicated cotton pledgets as far back as possible into both nostrils.
- Have the patient relax with the pledgets in place for approximately 5-10 minutes. You may use this lull to ask the patient about any past history of nosebleeds or other bleeding problems, the pattern of this nosebleed, which side the bleeding seems to be coming from, any aspirin or blood thinning medication, and any significant medical or surgical problems.
- In the vast majority of cases, active bleeding will stop with this treatment. The cotton pledgets can be removed and the nasal cavity can be inspected using a nasal speculum and head lamp. If bleeding continues, insert another pair of medicated cotton pledgets.
- If the bleeding point can be located, cauterize a 1 cm area of mucosa around the bleeding site with a silver nitrate stick and then cauterize the site itself. Observe the patient for 15 minutes. If this stops the bleeding, cover the cauterized area with
antibiotic ointment and instruct the patient in prevention (avoid picking the nose, bending over, sneezing, and straining) and treatment of recurrences (compress below the bridge of the nose with thumb and finger for five minutes).

- If the bleeding point cannot be located or if bleeding continues after cauterization, insert an anterior pack. The best is a 1 cm by 10 cm stick of compressed cellulose which expands to conform (Merocel, Rhino Rocket). To prevent putrification of the pack, partly cover it with antibiotic ointment before insertion. Leave some cellulose exposed to allow for water absorption. Instill a few drops of saline if it does not expand spontaneously.

- An alternative anterior pack can be made from up to six feet of half-inch ribbon gauze impregnated with petroleum jelly (Vaseline). Cover the gauze with antibiotic ointment and insert it with bayonet forceps. Start with 3-4 plies layered accordion fashion on the floor of the nasal cavity, placing it as far posteriorly as possible, and pressing it down firmly with each subsequent layer. Continue inserting the gauze until the affected nasal cavity is tightly filled (expect to use about 3 to 5 feet per nostril). If unilateral anterior nasal packing does not provide enough pressure, packing the opposite side of the nose anteriorly can sometimes increase the pressure by preventing the septum from bowing over into the side of the nose that is not packed.

- Observe the patient for 15 minutes. If no further bleeding occurs in the nares or the posterior oropharynx, discharge him on a broad spectrum antibiotic (amoxicillin tid 250mg) for five days to help prevent a secondary sinusitis. The packing should be removed in 2-4 days.

- Tape a small folded gauze pad beneath the nose to catch any minor drainage. The patient can replace this from time to time if necessary.

- Instuct the patient against sneezing with his mouth closed, bending over, straining, or nose picking. The patient's head should be kept elevated for 24-48 hours. Provide detailed printed instructions on home care.

- If the hemorrhage is suspected to have been severe, obtain orthostatic blood pressure and pulse recordings along with an hematocrit before making a disposition for the patient.

- If the hemorrhage does not stop after adequate packing anteriorly, then one or two posterior packs or nasal balloons should be inserted, and the patient should be admitted to the hospital under the care of an otolaryngologist.

What not to do:

- Do not waste time trying to locate a bleeding site while brisk bleeding obscures your vision in spite of vigorous suctioning. Have the patient blow out any clots and insert the medicated cotton pledgets.

- Do not get routine clotting studies unless there is other evidence of an underlying bleeding disorder.

- Do not cauterize or use instruments within the nose before providing adequate topical anesthesia (some initial blind suctioning may, however, be required to clear the nose of clots before instilling anesthetics).

- Do not discharge a patient as soon as the bleeding stops, but keep him in the ED for 15-30 minutes more. Look behind the uvula. If it is dripping blood, the bleeding has not been controlled adequately. Posterior epistaxis typically stops and starts cyclically and may not be recognized until all the above treatments have failed.
Discussion

Nosebleeds are more common in winter, no doubt reflecting the low ambient humidity indoors and outdoors and the increased incidence of upper respiratory tract infections. Troublesome nosebleeds are more common in middle-aged and elderly patients. Causes are numerous: dry nasal mucosa, nose picking and vascular fragility are the most common, but others include foreign bodies, blood dyscrasias, nasal or sinus neoplasm or infection, septal deformity, atrophic rhinitis, hereditary hemorrhagic telangiectasis and angiofibroma. High blood pressure makes epistaxis difficult to control but is rarely the sole precipitating cause.

Drying and crusting of the bleeding site, along with nose picking, may result in recurrent nasal hemorrhage. It may be helpful to instruct the patient on gently inserting Vaseline onto his nasal septum once or twice a day to prevent future drying and bleeding. Other useful techniques include electrocautery down a metal suction catheter, ophthalmic electrocautery tips (see subungal hematoma), submucosal injection of lidocaine with epinephrine, and application of hemostatic collagen (Gelfoam). There are also several balloon devices to provide anterior and posterior tamponade, some with a channel to maintain a patent nares. Because of the nasopulmonary reflex, arterial oxygen pressure will drop about 15mmHg after the nose is packed, which can be troublesome in a patient with heart or lung disease, and usually requires hospitalization and supplemental oxygen.

References:

3.10 Nasal Foreign Bodies

Presentation

Children may admit to parents that they have inserted something into their noses, but sometimes the history is obscure and the child presents with a purulent unilateral nasal discharge. Most commonly encountered are beans or other foodstuffs, beads, pebbles, paper wads, and eraser tips. These foreign bodies usually lodge on the floor of the anterior or middle third of the nasal cavity. Occasionally, caustic material was sniffed into the nose or coughed up into the posterior nasopharynx (e.g., a ruptured tetracycline capsule), the patient will present with much discomfort and tearing, and inspection will reveal mucous membranes covered with particulate debris.

What to do:

- Explain the procedure beforehand in detail to patient and parents. Explain that it will be a little uncomfortable, and that aspiration of the foreign body into the trachea is a real but remote possibility.
- After initial inspection using a nasal speculum and bright light, suction out any purulent discharge and insert a cotton pledget soaked in 4% cocaine or a solution of one part phenylephrine (Neo-Synephrine) and one part tetracaine (Pontocaine) to shrink the nasal mucosa and provide local anesthesia. Be careful to avoid pushing the foreign body posteriorly. Remove the pledget after approximately 5-10 minutes.
- If the patient is able to cooperate, have him try to blow his nose to remove the foreign body. With an infant it is sometimes possible to have the parent blow a sharp puff into the baby's mouth while holding the opposite nostril closed to blow the object out of the nose.
- Before attempting any removal using surgical instruments, a potentially uncooperative child must be firmly restrained and sedated (see below)
- Alligator forceps should be used to remove cloth, cotton, or paper foreign bodies. Pebbles, beans, and other hard foreign bodies are more easily grasped using bayonet forceps or Kelly clamps, or they may be rolled out by getting behind it using an ear curette, single skin hook, or right angle ear hook. A soft-tipped hook can be made by bending the tip of a metal-shaft calcium alginate swab (Calgiswab) to a 90 degree angle. An additional approach is to bypass the object with a Fogarty, biliary or small Foley catheter, passing it superior to the foreign body, inflating the balloon with approximately 1ml of air and pulling the object out through the nose.
- Any bleeding can be stopped by reinserting a cotton pledget soaked in the topical solution used initially.
- To irrigate loose foreign bodies and particulate debris from the nasal cavity and posterior nasopharynx, simply insert the bulbous nozzle of an irrigation syringe into one nostril while the patient sits up and forward, ask the patient to close off the back of his throat by repeating the sound "eng" and flush the irrigating solution out through the opposite nostril into an emesis basin.
- After the foreign body is removed, inspect the nasal cavity again and check for additional objects that may have been placed in the patient's nose. Look also for
unsuspected foreign bodies in the ears. Picture

What not to do:

- Do not ignore a unilateral nasal discharge in a child. It must be assumed to be secondary to a foreign body until proven otherwise.
- Do not push a foreign body down the back of a patient's throat, where it may be aspirated into the trachea.
- Do not attempt to remove a foreign body from the nose without first using a topical anesthetic and vasoconstrictor.

Discussion

The mucous membrane lining the nasal cavity allows you the tactical advantages of vasoconstriction and topical anesthesia. In cases where patients have unsuccessfully attempted to blow foreign bodies out of their noses, they may be successful after instillation of an anesthetic vasoconstriction solution. If a patient swallows a foreign body that has been pushed back into the nasopharynx, this is usually harmless and the patient and parents can be reassured (see Swallowed foreign body). If the object is aspirated into the tracheobronchial tree, it may produce coughing and wheezing and bronchoscopy under anesthesia will be required for retrieval. Button batteries can cause serious local damage and should be removed quickly.

References:

3.10 Nasal Fracture

Presentation

After a direct blow to the nose the patient usually arrives at the emergency department with minimal continued hemorrhage. There is usually tender ecchymotic swelling over the nasal bones or the anterior maxillary spine; inspection and palpation may (or may not) disclose a nasal deformity.

What to do:

- Examine for any associated injuries (i.e., blowout fractures, zygoma fractures).
- With minor injuries, explain that x rays are not routinely used or useful, because all therapeutic decisions are made on the basis of the physical examination. If there is a fracture, but it is stable and in good position clinically, it need not be reset. Conversely, a broken and displaced cartilage may obstruct breathing and require operation, but never show up on the film. Send the patient for x rays of the nasal bones only if there is a good reason.
- If bleeding continues, instill cotton pledgets soaked in 4% cocaine or 2% tetracaine (Pontocaine) mixed 1:1 with 1% Neo-Synephrine or epinephrine 1:1000 into both nasal cavities.
- After removing the cotton pledgets, inspect the nasal mucosa for large lacerations or a septal hematoma.
- Patients with nondisplaced fractures without deformity should be sent home with analgesics, cold packs, and instructions to avoid contact sports and related activities for six weeks.
- Patients with displaced fractures and/or nasal deformity should have otolaryngologic or plastic surgery consultation for immediate or delayed reduction. Patients can be instructed that reduction is more accurate after the swelling subsides and there is no greater difficulty if it is done within six days of the injury.
- Septal hematomas should be drained to prevent septal necrosis and the development of a saddle nose deformity. Otolaryngologic consultation is advisable.
- An isolated fracture of the anterior nasal spine (in the columella of the nose), does not necessitate restricting activities. It only hurts when you smile.

What not to do:

- Do not automatically x ray every injured nose. Patients may expect this, because it is the old practice, but routine films have turned out not to help.
- Do not assume a negative x ray means no fracture when a deformity is apparent. X rays can often be inaccurate in determining the presence and nature of a nasal fracture. Rely on your clinical assessment. When there is swelling, arrange for re-examination in 3-4 days when the swelling subsides, to look for subtle deformities.
- Do not pack an injured nose that does not continue to bleed. Packing is generally unnecessary and will only add to the patient's discomfort.
Discussion

The two most common indications for reducing a nasal fracture are an unacceptable appearance and inability of the patient to breathe through the nose. Regardless of x-ray findings, if neither breathing nor cosmesis is a concern, it is not necessary to reduce the fracture. Nasal fractures are uncommon in young children, because their noses are mostly pliable cartilage. Suspect septal hematoma when a patient's nasal airway is completely occluded. Within 48 to 72 hours a hematoma can compromise the blood supply to the cartilage and cause irreversible damage.
3.11 Sinusitis

Presentation

Following a viral infection, the patient will usually complain of a dull pain in the face, gradually increasing over a couple of days, exacerbated by sudden motion of the head, or holding the head dependent, between the knees, and perhaps radiating to the upper molar teeth (via the maxillary antrum), or with eye movement (via the ethmoid sinuses). Often there is a sensation of facial congestion and stuffiness. Children with sinusitis often present with cough and fetid breath. Fever is only present in half of patients with acute infection and is usually low grade. A high fever usually indicates a serious complication such as meningitis or another diagnosis altogether. Transillumination of sinuses in the ED is usually unrewarding, but you may elicit tenderness on gentle percussion or firm palpation over the maxillary or frontal sinuses or between the eyes (ethmoid sinuses). Swelling and erythema may exist and you may even see pus draining below the nasal turbinates, with a purulent, yellow-green and sometimes foul-smelling or bloody discharge from the nose or running down the posterior pharynx. The patient's voice may have a resonance similar to that of a "stopped up" nose, and he may complain of a foul taste in his mouth. Stuffy ears and impaired hearing are common because of associated serous otitis media and eustachian tube dysfunction.

What to do:

- Rule out other causes of facial pain or headache via history (did the patient wake up with a typical migraine?) and physical examination (palpate scalp muscles, temporal arteries, temperomandibular joints, eyes, and teeth).
- Shrink swollen nasal mucosa (and thereby open the ostia draining the sinuses) with 1% phenylephrine (Neo-Synephrine) or 0.05% oxymetazoline (Afrin) nose drops. Drip 2 drops in each nostril, have the patient lie supine 2 minutes, and then repeat the process (this allows the first application to open the anterior nose so the second gets farther back). Have the patient repeat this process every 4 hours, but for no more than three days (to avoid rhinitis medicamentosa).
- Examine the nose for purulent drainage before and after shrinking the nasal mucosa with topical vasoconstrictor.
- Add systemic sympathomimetic decongestants (e.g., pseudoephedrine (Sudafed) 60mg q6h or phenylpropanolamine (Entex LA) 75mg q12h).
- If there is fever, pus, heat, or any other sign of a bacterial superinfection, add antibiotics (e.g., amoxicillin, trimethoprim plus sulfamethoxazole, amoxicillin plus clavulinate, erythromycin plus sulfasoxazole, cefuroxime). First-line antibiotic therapy is amoxicillin, or, for patients with penicillin allergy, Bactrim or Sulfa. If the patient has been recently treated with these medications or if the infection appears to be serious, then treat with a second-line drug like Ceftin or Augmentin.
- Provide pain relief, when necessary (e.g., ibuprofen, naproxyn, acetaminophen, oxycodone, hydrocodone)
- Recommend symptomatic relief with hot water vapor inhalation using a simple teakettle or hot shower or, if available, a steam vaporizer or home facial sauna
device.

- Sinusitis can sometimes be demonstrated on x rays, and you can usually get adequate visualization of maxillary, frontal, and ethmoid sinuses with one upright Water's view. Chronic sinusitis appears as thickened mucosa; acute as an air-fluid level or complete opacification. Films are usually not necessary, however, on an emergency basis. If symptoms and physical findings of sinusitis are classic, plain sinus radiographs need not be obtained before treatment. If an acute attack does not resolve with medical treatment, or the diagnosis of sinusitis is in doubt, plain films are helpful as the primary imaging study.
- Arrange for followup within 1-7 days.

**What not to do**

- Do not ignore signs of an orbital cellulitis with swelling erythema, decreased extraocular movements and possible proptosis. These patients require consultation and admission for intravenous antibiotics.
- Do not ignore the toxic patient with marked swelling, high fever, severe pain, profuse drainage, or other signs and symptoms of a serious infection. See potential complications below. These patients require immediate consultation and intervention.
- Do not prescribe antihistamines, which can make mucous secretions dry and thick, and interfere with necessary drainage. Antihistamines only cure sinusitis on television, or when it is due to allergic rhinitis.
- Do not allow patients to use decongestant nose drops more than 3 days, thereby allowing their nasal mucosa to become habituated to sympathomimetic medication. When they stop the drops they will suffer a rebound nasal congestion (rhinitis medicamentosa) which requires time, topical steroids, and reeducation to resolve.
- Do not prescribe topical or systemic sympathomimetic decongestants to a patient who suffers from hypertension, tachycardia or difficulty initiating urination, all of which may be exacerbated.

**Discussion**

The paranasal sinuses drain through tiny ostia under the nasal turbinates which, if occluded, allow secretions and pressure differences to build up, resulting in pressure and pain of acute sinusitis, and the air-fluid levels sometimes visible on upright x rays. Sinus infections are relatively common and complications relatively rare, but the bony walls of the paranasal sinuses are so thin that bacterial infections can spread through them. Most sinusitis begins with mucosal swelling from a viral upper respiratory infection. Other causes include dental infection, allergic rhinitis, barotrauma from flying, swimming or diving, nasal polyps and tumors and foreign bodies, including nasogastric and endotracheal tubes in hospitalized patients. Abscessed teeth can be the source of a maxillary sinusitis. If there is tenderness to percussion of the bicuspid or molars, arrange for dental referral.

Complications such as orbital cellulitis, osteomyelitis, epidural abscess, meningitis, cavernous sinus thrombosis and subdural empyema can be devastating and therefore patients must be instructed to get early follow up when signs and symptoms worsen or do not improve in 48-72 hours, or if there is any change in mentation. Frontal sinusitis
has the greatest potential for serious complications, particularly in adolescent males, the
group at greatest risk for intracranial complications. Computerized tomographic
scanning of the sinuses is more accurate than plain x rays, particularly when evaluating
the ethmoid or sphenoid sinuses, but CT scans are needed from the ED only in unusual
circumstances. Most patients can have initial treatment begun on the basis of history
and physical findings alone. Anyone who has facial pain, headache, purulent nasal
discharge and nasal congestion persisting for more than ten days, with or without a
fever, should probably be treated empirically for sinusitis.

Many patients have been conditioned by the advertising of over-the-counter
antihistamines for "sinus" problems (usually meaning "allergic rhinitis"), and may relate a
history of "sinuses" which, on closer questioning, turns out to have been rhinitis.

References:

• Williams JW, Simel DL: Does this patient have sinusitis? Diagnosing acute sinusitis
3.12 Pharyngitis (Sore Throat)

Presentation

The patient with a bacterial pharyngitis complains of a rapid onset of throat pain worsened by swallowing. There is usually a fever, pharyngeal erythema, and a purulent, patchy, yellow, gray or white exudate, tender cervical adenopathy, headache and absence of cough. Viral infections are typically accompanied by conjunctivitis, nasal congestion, hoarseness, cough, aphthous ulcers on the soft palate and myalgias. It is helpful to differentiate pain on swallowing (odynophagia) from difficulty swallowing (dysphagia), the latter being more likely caused by obstruction or abnormal muscular movement.

What to do:

- First examine the ears, nose, and mouth, which are, after all, connected to the pharynx, and often contain clues to the diagnosis.
- Depress the tongue with a blade, have the patient raise his soft palate by saying "ah," inspect the posterior pharynx, and swab both tonsillar pillars for a culture. (You can decide later whether you really need to plant the culture. Rapid strep tests may provide results in a few minutes, while cultures may take 1-2 days to incubate and interpret. This delay does not alter the effectiveness of therapy, however. Treatment may begin up to nine days after symptoms and still prevent rheumatic fever.)
- If you are in the middle of an epidemic of group A streptococcal pharyngitis; if the patient is between 3 and 25 years old, has a history of rheumatic fever and recurrent "strep throats" and has been exposed; and if the patient has a red throat, fever, tender anterior cervical nodes, and no viral URI symptoms (or any convincing subset of the above); give antibiotics. Throat culture is optional, at the preference of the follow-up physician. The recommended treatment for streptococcal pharyngitis is oral penicillin VK 250mg q8h for 10 days. Injectable penicillins are preferred for patients unlikely to finish ten days of pills and those with a personal or family history of rheumatic fever. Patients under 60 lbs (30 kg) get one intramuscular injection of benzathine penicillin G 600,000 units and those over 60 lbs get 1,200,000u im. For those allergic to penicillin give erythromycin 250mg qid (or 333mg of erythromycin base tid) for 10 days. Amoxicillin offers no significant advantage for treating group A strep.
- When the infection is not clearly bacterial or you are unsure about the need for an antibiotic (or you or the patient "need to know" if this is a strep infection) then you may obtain a rapid strep test. If the rapid strep test is positive, then treat with antibiotics as above. If the test is negative or unavailable and you have a high clinical suspicion that this is a viral pharyngitis, provide symptomatic treatment (below), send a culture, and hold antibiotics pending results.
- For resistant or recurrent infections with possible beta-lactamase- producing co-pathogens, consider instead 10 days of cephalexin (Keflex), cefadroxil (Duricef, Ultracexc), cefaclor (Ceclor), or cefuroxime (Ceftin, Zinacef).
- If you suspect mononucleosis, draw blood for atypical lymphocytes and a heterophile
or monospot to confirm the diagnosis (see below).

- Relieve pain with acetaminophen, ibuprofen, aspirin, warm saline gargles, and gargles or lozenges containing phenol as a mucosal anesthetic (e.g., Chloraseptic, Cepastat). A one-to-one mixture of diphenhydramine and kaolin-pectin suspension can also provide temporary relief of throat pain. Viscous Xylocaine gargles anesthetize the throat but patients may still have difficult swallowing because of the lack of sensation. For severe pain in patients without contraindications, dexamethasone 10mg im once has been used along with antibiotics.

What not to do:

- Do not miss an acute epiglottitis or supraglottitis. In a child, this presents as a sudden, severe pharyngitis, with a gullet, rather than hoarse voice (because it hurts to speak), drooling (because it hurts to swallow), and respiratory distress (because swelling narrows the airway). Adults usually have a more gradual onset, over several days, and are not as prone to a sudden airway occlusion, unless they present later in the progression of the swelling, already with some respiratory distress.
- Do not give ampicillin to a patient with mononucleosis. The resulting rash helps make the diagnosis, and does not imply ampicillin allergy, but can be uncomfortable.
- Do not miss abscesses, which usually require hospitalization and intravenous penicillin, if not drainage. Peritonsillar abscesses or cellulitis make the tonsillar pillar bulge towards the midline. Retropharyngeal abscesses (and epiglottitis) may require soft tissue lateral neck films to visualize.
- Do not miss gonococcal pharyngitis, which can produce a mild clinical syndrome and requires special cultures on Thayer-Martin medium.
- Do not miss the rare but deadly causes of sore throat. A patient with paresthesia at the site of an old, healed bite and painful spasms when he even thinks of swallowing may have rabies. A patient with facial palsy, myocarditis, and a tough, white, membrane adherent to the posterior pharynx may have diphtheria. You cannot diagnose them unless you think of them.

Discussion

The general public knows to see a doctor for a sore throat, but the actual benefit of this visit is unclear. Rheumatic fever is a sequela of about 1% of group A streptococcal infections, and only about 10% of sore throats seen by physicians represent group A streptococcal infections. Post-streptococcal glomerulonephritis is usually a self-limiting illness and is not prevented with antibiotic treatment. Penicillin therapy does avoid acute rheumatic fever and may sometimes reduce symptoms or shorten the course of a sore throat. Antibiotics probably inhibit progress of the infection into tonsillitis, peritonsillar and retropharyngeal abscesses, adenitis, and pneumonia.

Group A streptococcal infection cannot be diagnosed reliably by clinical signs and symptoms. Typically, a quarter of throat cultures grown group A strep, and half of those represent carriers who do not raise anti-streptococcal antibodies and risk rheumatic fever. Rapid strep screens are less sensitive than cultures. The best approach to the identification and treatment of streptococcal pharyngitis depends on the prevalence of group A streptococcal infection in the patient population, the cost and availability of
culture and rapid test methods, the reliability of communication and follow up and the relative values of cost, antibiotic overuse, and adverse outcomes.

References

3.13 Foreign Body in Throat

Presentation

The patient thinks he recently swallowed a fish or a chicken bone, pop top from an old-style can, or something of the sort, and still can feel a foreign body sensation in his throat, especially (perhaps painfully) when swallowing. He may be convinced that there is a bone or other object stuck in the throat. He may be able to localize the foreign body sensation precisely above the thyroid cartilage (implying a foreign body in the hypopharynx you may be able to see), or he may only vaguely localize the foreign body sensation to the suprasternal notch (which could imply an foreign body anywhere in the esophagus). A foreign body in the tracheobronchial tree usually stimulates coughing and wheezing. Obstruction of the esophagus produces drooling and spitting up of whatever fluid is swallowed.

What to do:

- Establish exactly what was swallowed, when, and the progression of symptoms since then. Patients can accurately tell if a foreign body is on the left or right side.
- If symptoms are mild, test the patient's ability to swallow, first using a small cup of water and then small piece of bread. See what symptoms are reproduced, or if the bread eliminates the foreign body sensation.
- Percuss and auscultate the patient's chest. A foreign body sensation in the throat can be produced by a pneumothorax, pneumomediastinum, or esophageal disease, all of which may show up on a chest x-ray.
- With the patient sitting in a chair, inspect the oropharynx with a tongue depressor, looking for foreign bodies or abrasions.
- Inspect the hypopharynx with a good light or headlamp mirror, paying special attention to the base of the tongue, tonsils and vallecula, where foreign bodies are likely to lodge. Maximize your visibility and minimize gagging by holding the patient's tongue out (use a washcloth or 4x4" gauze for traction and take care not to lacerate the frenulum of the tongue on the lower incisors) and have the patient raise his soft palate by panting "like a dog." This may be accomplished without topical anesthesia, but if the patient is skeptical or tends to gag, you may anesthetize the soft palate and posterior pharynx with a spray (Cetacaine, Hurricaine or 10% lidocaine) or by having the patient gargle with viscous Xylocaine diluted 1:1 with tap water. Some patients may continue to gag even with the entire pharynx anesthetized.
- If you find an foreign body to pluck out or an abrasion of the mucosa, you may have diagnosed the problem. A small fish bone is frequently difficult to see. It may be overlooked entirely except for the tip, or it may look like a strand of mucus. If the object can been seen directly, carefully grasp and remove it with bayonet forceps or hemostat. Objects in the base of the tongue or the hypopharynx require a mirror or indirect laryngoscope for visualization. Fiberoptic nasopharyngoscopy is preferred when available. Further treatment is probably not required, but you should instruct the patient to seek followup if pain worsens, fever develops, breathing or swallowing is difficult, or if the foreign body sensation has not totally resolved in 2 days.
• If you and your patient are not satisfied, you may proceed to a soft tissue lateral x ray of the neck. This will probably not show radiolucent or small foreign bodies, such as fish bones, or aluminum pop tops, but may point out other pathology, such as a retropharyngeal abscess, Zenker's diverticulum, or severe cervical spondylosis, which might account for symptoms (and also allows some time for the patient's gag reflex to settle down, in case you were not able to inspect the hypopharynx on the first try). Lateral soft-tissue x rays can be very misleading because ligaments and cartilage in the neck calcify at various rates and patterns. The foreign body you see on a plain x ray may simply be normal calcification of thyroid cartilage.
• You may also want to proceed to a barium swallow, if available, to demonstrate with fluoroscopy any problems with swallowing motility, or perhaps coat and thus visualize a radiolucent foreign body. Remember that endoscopy is technically difficult after barium has coated the mucosa and possibly obscured a foreign body. It may be preferable to use a water-soluble contrast (e.g., Gastrographin) but even under the best of circumstances, contrast studies are of limited value.
• Reserve rigid laryngoscopy, esophagoscopy, and bronchoscopy under general anesthesia for the few cases where your suspicion of a perforating foreign body remains high (e.g., when the patient has moderate to severe pain, is febrile or toxic, cannot swallow, is spitting blood, or has respiratory involvement.
• If x rays are negative and careful inspection does not reveal a foreign body, and the patient is afebrile with only mild discomfort, the patient may be sent home and observed. Reassure him that a scratch on the mucose can produce a sensation that the foreign body is still there, but that if the symptoms worsen the next day or fail to resolve within two days he may need further endoscopic studies. If there are any continued symptoms, the patient should have an otolaryngology referral and consultation within two to three days.

What not to do:

• Do not assume that a foreign body is absent just because the pain disappears after swallowing local anesthetic.
• Do not reassure the patient that you have ruled out an foreign body if you have not. Explain what is likely and why invasive evaluation is more dangerous than careful follow up.
• Do not miss preexisting pathology incidentally discovered during swallowing.
• Do not attempt to remove a foreign body blindly from the throat with a finger or instrument, as you may push it farther down into the airway and obstruct it or cause damage to surrounding structures.

Discussion

During swallowing, as the base of the tongue pushes a bolus of food posteriorly, any sharp object hidden in that bolus may become embedded in the tonsil, the tonsillar pillar, the pharyngeal wall, or the tongue base itself. In one study, the majority of patients presenting with symptoms of an impacted fish bone had no demonstrated pathology, and their symptoms resolved in 48 hours. Twenty per cent did have an impacted fish bone, and the majority of these were easily identified and removed on initial visit.
All patients who complain of a foreign body of the throat should be taken seriously. Even relatively smooth or rounded objects that remain impacted in the esophagus have the potential for serious problems, and a fish bone can perforate the esophagus in only a few days. Impacted button batteries represent a true emergency and require rapid intervention and removal because leaking alkali produces liquefactive necrosis. A pill, composed of irritating medicine (e.g., tetracycline) swallowed without adequate liquid, may stick to the mucosa of the pharynx or esophagus and cause an irritating ulcer. Bay leaves, invisible on x rays and laryngoscopy, have lodged in the esophagus at the cricopharyngeus and produced severe symptoms until removed via rigid endoscope.

The sensation of a lump in the throat, unrelated to swallowing food or drink, may be globus hystericus, which is related to crico-pharyngeal spasm and anxiety. The initial workup is the same as with any foreign body sensation in the throat.
3.14 Mononucleosis (Glandular Fever)

Presentation

The patient is usually of school age (nursery through night school) and complains of several days of fever, malaise, lassitude, myalgias, and anorexia, culminating in a severe sore throat. The physical examination is remarkable for generalized lymphadenopathy, including the anterior and posterior cervical chains and huge tonsils, perhaps meeting in the midline and covered with a dirty-looking exudate. There may also be palatal petechiae and swelling, splenomegaly, hepatomegaly, and a diffuse maculopapular rash.

**What to do:**

- Perform a complete physical examination, looking for signs of other ailments, and the rare complication of airway obstruction, encephalitis, hemolytic anemia, thrombocytopenic purpura, myocarditis, pericarditis, hepatitis, and rupture of the spleen.
- Send off blood tests: a differential white cell count (looking for atypical lymphocytes) and a heterophil or monospot test. Either of these tests, along with the generalized lymphadenopathy, confirms the diagnosis of mononucleosis, but atypical lymphocytes are less specific, being present in several viral infections.
- Culture the throat. Patients with mononucleosis harbor group A streptococcus and require penicillin with about the same frequency as anyone else with a sore throat.
- Warn the patient that the convalescence is longer than that of most viral illnesses (typically 2-4 weeks, occasionally more), and that he should seek attention in case of lightheadedness, abdominal or shoulder pain, or any other sign of the rare complications above.
- Despite controversy, prednisolone is widely employed for symptomatic relief of infectious mononucleosis, usually 40mg of Prednisone qd for five days. It is particularly helpful in young adults with severe pharyngeal pain, odynophagia or marked tonsillar enlargement with impending oropharyngeal obstruction.
- Arrange for medical followup.

**What not to do:**

- Do not routinely give penicillin for the pharyngitis, and certainly do not give ampicillin. In a patient with mononucleosis, ampicillin can produce an uncomfortable rash, which, incidentally, does not imply allergy to ampicillin.
- Do not unnecessarily frighten the patient about splenic rupture. If the spleen is clinically enlarged, he should avoid contact sports, but spontaneous ruptures are rare.

**Discussion**

All of the above probably apply to cytomegalovirus as well, although the severe tonsillitis
and positive heterophil test are both less likely. Some who report having mono twice probably actually had CMV once and mono once.
4.01 Temporomandibular Joint (TMJ) Pain-Dysfunction Syndrome

Presentation

Patients usually complain of poorly-localized facial pain or headache that does not appear to conform to a strict anatomical distribution. The pain is generally dull and unilateral, centered in the temple, above and behind the eye, in and around the ear. The pain may be associated with instability of the temporomandibular joint (TMJ), crepitus, or clicking with movement of the jaw. It is often described as an earache. Other less obvious symptoms include radiation of pain down the carotid sheath, tinnitus, dizziness, decreased hearing, itching, sinus symptoms, a foreign body sensation in the external ear canal, trigeminal, occipital and glossopharyngeal neuralgias. Patients may have been previously diagnosed as suffering from migraine headaches, sinusitis or recurrent external otitis. Predisposing factors include malocclusion, recent extensive dental work, or a habit of grinding the teeth (bruxism), all of which put unusual stress upon the TM joint. Clinical signs include tenderness of the chewing muscles, the ear canal or the joint itself, restricted opening of the jaw or lateral deviation on opening, and a normal neurological examination.

What to do:

- Examine the head thoroughly for other causes of the pain, including visual acuity, cranial nerves, and palpation of the scalp muscles and the temporal arteries. Pain and popping on moving the TMJ is a useful but not infallible sign. Look for signs of bruxism, such as ground-down teeth. If there is a headache, perform a complete neurologic examination, including fundoscopy. If the temporal artery is tender, swollen or inflamed, send blood for an erythrocyte sedimentation rate.
- If pain is severe, you may try injecting the TMJ, just anterior to the tragus, with 1 ml of plain lidocaine or bupivicaine, along with 10mg of DepoMedrol. If this helps, you may have made the diagnosis, and possibly provided long-term relief.
- Explain to the patient the pathophysiology of the syndrome: how many different symptoms may be produced by inflammation at one joint, how TMJ pain is not necessarily related to arthritis at other joints, and how common it is (some estimates are as high as 20% of the population).
- Prescribe anti-inflammatory analgesics (e.g., aspirin, ibuprofen, naproxen), a soft diet, heat, and muscle relaxants (e.g., diazepam) if necessary for muscle spasm.
- Refer the patient for followup to a dentist or otolaryngologist who has some interest in and experience with TMJ problems. Long-term treatments include orthodontic correction, physical therapy and sometimes psychotherapy and antidepressants.

What not to do:

- Do not rule out TMJ arthritis simply because the joint is not tender on your examination. This syndrome typically fluctuates, and the diagnosis often is made on
Discussion

The relative etiologic roles of inadequate dentition, unsatisfactory occlusion, dysfunction of the masticatory muscles and emotional disorders remain controversial. To stress the role played by muscles, it has been suggested that the term "myofascial pain-dysfunction (MPD) syndrome is more accurate than "TMJ arthritis." There is also much debate as to the indications for and the efficacy of treatment modalities aimed at the presumed etiologies. At the least, irreversible treatments such as surgery should be replaced by more conservative therapy. The use of bite blocks for bruxism was based on outdated information and may only serve to alter normal dental occlusion with deleterious effects.

Perhaps everyone suffers pain in the TMJ occasionally, and only a few require treatment or modification of lifestyle to reduce symptoms. In the ED the diagnosis of TMJ pain is often suspected, but seldom made definitively. It can be gratifying, however, to see patients with a myriad of seemingly unrelated symptoms respond dramatically after only conservative measures and advice.

References:

4.02 Jaw Dislocation

Presentation

The patient's jaw is "out" and will not close, usually following a yawn, or perhaps after laughing, a dental extraction, jaw trauma or a dystonic drug reaction. The patient has difficulty speaking and may have severe pain anterior to the ear. A depression can be seen or felt in the preauricular area and the jaw may appear prominent.

What to do:

- If there was no trauma (and especially if the patient is a chronic dislocator) proceed directly to attempt reduction. If there is any possibility of an associated fracture, obtain x rays first.
- Have the patient sit on a low stool, his back and head braced against something firm--either against the wall, facing you, or with the back of his head braced against your body, facing away from you.
- With gloved hands, wrap your thumbs in gauze, seat them upon the lower molars, grasp both sides of the mandible, lock your elbows, and, bending from the waist, exert slow, steady pressure down and posteriorly. The mandible should be at or below the level of your forearm. Picture
- In a bilateral dislocation, attempt to reduce one side at a time.
- If the jaw does not relocate easily or convincingly, you may want to reassess the dislocation with x rays, and try again using intravenous midazolam to overcome the muscle spasm and 1-2ml of intraarticular 1% lidocaine to overcome the pain. Inject directly into the palpable depression left by the displaced condyle.
- After reducing the dislocation it will be comforting to apply a soft cervical collar to reduce the range of motion at the temperomandibular joint (TMJ). Recommend a soft diet and instruct the patient to refrain from opening his mouth too widely. Prescribe analgesics if needed.
- If reduction cannot be obtained using the above techniques, then consider admission for reduction under general anesthesia.

What not to do:

- Try not to get your thumbs bitten when the jaw snaps back into position. Maintain firm, steady traction and protect your thumbs with gauze.
- Do not put pressure on oral prostheses that could cause them to break.
- Do not attempt to reduce a TMJ dislocation with the patient's jaw at the height of your shoulders or above. You will need the leverage you get from having the patient in a lower position.
- Do not try to force the patient's jaw shut.

Discussion
The mandible usually dislocates anteriorly, and subluxes when the jaw is opened wide. Other dislocations imply the presence of a fracture and require referral to a surgeon. Dislocation is often a chronic problem (avoided by limiting motion) and associated with temporomandibular joint dysfunction. If dislocation is not obvious, then consider other conditions, such as fracture, hemarthrosis, closed lock of the joint meniscus, and myofascial pain.

References:

4.03 Lacerations of the Mouth

Presentation

Because of the rich vascularity of the soft tissues of the mouth, impact injuries often lead to dramatic hemorrhages that send patients to the emergency department with relatively trivial lacerations. Blunt trauma to the face can cause secondary lacerations of the lips, frenulum, buccal mucosa, gingiva, and tongue. Active bleeding has usually stopped by the time a patient with a minor laceration has reached the emergency department.

What to do:

- Provide appropriate tetanus prophylaxis and check for associated injuries such as loose teeth, mandibular or facial fractures.
- When only small lacerations are present and only minimal gaping of the wound occurs, reassurance and simple aftercare is all that is required. Let the patient know the wound will become somewhat uncomfortable and covered with pus over the next 48 hours and tell him to rinse with lukewarm water or half strength hydrogen peroxide after meals and every one to two hours while awake for one week.
- If there is continued bleeding, the wound edges gape significantly or there is a flap or deformity when the underlying musculature contracts, the wound should be anesthetized using lidocaine with epinephrine, cleansed thoroughly with saline and loosely approximated using a 4-0 or 5-0 absorbable suture. Consider using conscious sedation when suturing children who cannot cooperate. A traction stitch or special rubber-tipped clamp can be very helpful when attempting to suture the tongue of a small child or intoxicated adult. The same aftercare as above applies.
- When the exterior surface of the lip is lacerated, any separation of the underlying musculature must be repaired with buried absorbable sutures. To avoid an unsightly scar when the lip heals, precise skin approximation is very important. One must first approximate the vermilion border, making this the key suture. Fine non-absorbable suture material (e.g., 6-0 nylon or Prolene) is most appropriate for the skin surfaces of the lip while a fine absorbable suture (e.g., 6-0 Dexon or Vicryl) is quite acceptable on the mucosa and vermilion.
- For deep lacerations of the mucosa or lip, or any sutured laceration in the mouth, prescribe prophylactic penicillin (penicillin VK 500mg tid x 3-4 days) to prevent deep tissue infections (erythromycin may be substituted in penicillin-allergic individuals). Recommend acetaminophen for pain.
- Have patients return in 48 hours for a wound re-evaluation.
- Recommend cool liquids and soft foods beginning four hours after the repair.

What not to do:

- Do not bother to repair a simple laceration or avulsion of the frenulum of the upper lip. It will heal quite nicely on its own.
- Do not use non-absorbable suture material on the tongue, gingiva or buccal mucosa.
There is no advantage and suture removal on a small child will be an unpleasant struggle at best.

Discussion

Imprecise repair of the vermilion border will lead to a "step-off" or puckering that is unsightly and difficult to repair later on. Fortunately, the tongue and oral mucosa usually heals with few complicating infections and there is a low risk of subsequent tissue necrosis.
**4.04 Aphthous Ulcer (Canker Sore)**

**Presentation**

The patient complains of a painful lesion in the mouth, and may be worried about having herpes. A pale yellow, flat, even-bordered ulcer surrounded by a red halo may be seen on the buccal or labial mucosa, lingual sulci, soft palate, pharynx, tongue, or gingiva. Lesions are usually solitary, but can be multiple and recurrent. The pain is usually greater than the size of the lesions would suggest, and major aphthae (larger than 1 cm) indicate a severe form of the disease which may last for weeks of months.

**What to do:**

- Attempt to differentiate from lesions of *herpes simplex* and reassure the patient of the benign nature of most canker sores.
- Inform the patient that these lesions usually last 1-2 weeks, and that they should avoid hot, acidic or irritating food and drink.
- For transient pain relief, try a tablet of sucralfate crushed in a small amount of warm water, swirled in the mouth or gargled. Tetracycline elixir (or a capsule dissolved in water) not swallowed, but applied to cauterize lesions or used as a mouth wash can relieve pain after single or repeated application. Benadryl elixir mixed one-to-one with Kaopectate, Xylocaïne 2% Viscous Solution, and Orabase HC applied topically can also provide symptomatic relief.
- For more severe cases, prescribe triamcinolone acetonide 0.1% suspension (add injectable Kenolog to sterile water without preservatives) in a 5ml oral rinse and spit out four times a day after meals and before bed, taking nothing by mouth for an hour afterward. An alternative regimen is dexamathasone elixir 1.5mg in 15ml qid rinse and swallow, tapering to three days of 0.5ml in 5ml, then three days swallowing every other dose, but discontinuing the regimen as soon as the mouth becomes comfortable.
- In very severe cases, try a burst dose of prednisone 40-60mg qd x5 (no tapering).

**Discussion**

Aphthous stomatitis has been studied for many years by numerous investigators. Although many exacerbating factors have been identified, the cause as yet remains unknown. Lesions can be precipitated by minor trauma, food allergy, stress, and systemic illness. Recurrent aphthous ulcers may accompany malignancy or autoimmune disease. At present, the treatment is only palliative, and may not alter the course of the syndrome. Aphthous ulcers may be an immune reaction to damaged mucosa or altered oral bacteria. Herpangina and hand-foot-and-mouth disease can produce ulcers resembling aphthous ulcers, but which are instead part of coxsackie viral exanthems, usually with fever and occurring in clusters among children. Behcet's syndrome is an idiopathic condition characterized by oral ulcers clinically indistinguishable from aphthae but accompanied by genital ulcers, conjunctivitis, retinitis, iritis, leukocytosis, eosinophilia and increased erythrocyte sedimentation rate.
References:

4.05 Oral Herpes Simplex (Cold Sore)

Presentation

Patients have swelling, burning or soreness at an intra- or extra-oral lesion consisting of clusters of small vesicles on an erythematous base, which then rupture to produce red irregular ulcerations with swollen borders and possibly crusting or superinfection. These lesions occur on the hard palate or gingiva or, more commonly, at the vermilion border of the lip.

What to do:

- When there is any doubt of the diagnosis, scrape the base of a vesicle (warn the patient this hurts) smear on a slide, stain with Wright's or Giemsa, and examine for multinucleate giant cells (look for nuclear molding). This is called a Tzanck Prep, and establishes the diagnosis of herpes. Alternatively, this swab can be sent for viral cultures, which may take days to grow.
- An equal mixture of Kaopectate and Benadryl elixir will coat and dry the area and reduce pain. Topical Orabase, or Xylocaine 2% Viscous Solution will also relieve the pain. Consider oral analgesics for continuous pain relief. Narcotic analgesics and mild sedation may be required to manage the most severe pain.
- Instruct the patient to keep lesions clean, and avoid touching lesions (so as not to spread the virus to eyes, unaffected skin, and other people).
- Inform the patient that oral herpes need not be related to genital herpes; that the vesicles and pain should resolve over about two weeks (barring superinfection); that they are infectious during this period (and perhaps other times as well); and that the herpes simplex virus, residing in sensory ganglia, can be expected to cause recurrences from time to time (especially during illness or stress).

What not to do:

- Do not prescribe topical or systemic acyclovir (Zovirax) unless the patient or household contacts are immunocompromised. It reduces viral shedding, but has not been shown to benefit oral herpes simplex.
- Do not use topical anesthetics on keratinized skin. They are only effective on oral mucosa.

Discussion

Herpes simplex infection may be either primary or recurrent. Possible causes of herpes reactivation include stress, fever, menstruation, gastrointestinal disturbance, infection, cold, fatigue and sunlight. Primary herpes usually appears as gingivostomatitis, pharyngitis, or a combination of the two, while recurrent infections usually occur as intraoral or labial ulcers. Primary infection tends to be a disease of children or young adults, more severe than recurring episodes, preceded by fever to 105 degrees, sore
throat and headache, and followed by red, swollen gums that bleed easily. This gingivostomatitis may need to be differentiated from herpangina, acute necrotizing ulcerative gingivitis, Stevens-Johnson syndrome, Behet's syndrome and hand, foot and mouth disease.

Herpangina is caused by Coxsackie A virus and involves the posterior pharynx. Acute necrotizing ulcerative gingivitis, also known as Vincent’s angina or trench mouth, is bacterial in origin, has characteristic blunting of the interdental gingival papillae, and responds rapidly to penicillin. Steven-Johnson syndrome is a severe form of erythema multiforme. There are characteristic lip lesions, the gingiva is only rarely affected, and there may be bull's-eye skin lesions on the hands and feet. Behet's syndrome is thought to be an autoimmune response and is associated with genital ulcers and inflammatory ocular lesions. Hand, foot and mouth disease is also caused by the Coxsackie A virus and is associated with concurrent lesions of the palms and soles.

Home remedies for cold sores include ether, lecithin, lysine, and vitamin E. Because herpes is a self-limiting affliction, all of these work, but, in controlled studies, none have outperformed placebos (which also do very well).

References:

4.06 Sialolithiasis (Salivary Duct Stones)

Presentation

Patients of any age may develop salivary duct stones. The vast majority of such stones occur in Wharton's duct from the submaxillary gland. The patient will be alarmed by the rapid swelling beneath his jaw that suddenly appears while he is eating. The swelling may be painful but is not hot or red and usually subsides within two hours. This swelling may only be intermittent and may not occur with every meal. Infection can occur and will be accompanied by increased pain, exquisite tenderness, erythema and fever. Under these circumstances pus can sometimes be expressed from the opening of the duct when the gland is pressed open.

What to do:

- Bimanually palpate the course of the salivary duct, feeling for stones.
- When a small superficial stone can be felt, anesthetize the tissue beneath the duct and ampule with a small amount of lidocaine 1% with epinephrine. If available, a punctum dilator can be used to widen the orifice of the duct. Then milk the gland and duct with your fingers to express the stone(s).
- If the stone cannot be palpated, try to locate it with x rays. Standard x rays of the mandible are likely to demonstrate only large stones. Dental x ray film shot at right angles to the floor of the mouth is much more likely to demonstrate small stones in Wharton's duct. Place film between cheek and gum to visualize Stenson's duct.
- When a stone cannot be demonstrated or cannot be manually expressed, the patient should be referred for contrast sialography and/or surgical removal of the stone. Often sialography will show whether an obstruction is due to stenosis, a stone, or a tumor.
- Begin treatment of any infection with cefalexin or dicloxacillin 500mg po tid x 10 days after obtaining cultures.

What not to do:

- Do not attempt to dilate a salivary duct if mumps is suspected. Acute, persistent pain and swelling of the parotid gland along with inflammation of the papilla of Stenson's duct, fever, lymphocytosis, hyperamylasemia and malaise should alert the examiner to the probability of mumps.

Discussion

Salivary duct stones are generally composed of calcium carbonate and calcium phosphate. Uric acid stones may form in patients with gout. Although the majority form in Wharton's duct in the floor of the mouth, approximately 10% occur in Stenson's duct in the cheek, and 5% in the sublingual ducts. Depending on the location and the size of the stone the presenting symptoms will vary. As a rule, the onset of swelling will be sudden and associated with salivation during a meal.
4.07 Gingivitis

Presentation

The patient will complain of generalized severe pain of the gums, often with a foul taste or odor. The gingiva will appear edematous and red with a grayish necrotic membrane between the teeth. The gums bleed on gentle touch and there is loss of gingival tissue, especially the interdental papillae. The patient is usually afebrile and shows no sign of systemic disease.

What to do:

● Prescribe (in order of preference) tetracycline, penicillin VK or erythromycin, 250mg qid for ten days.
● Instruct the patient to use warm saline rinses, every one to two hours along with flossing and gentle brushing using sodium bicarbonate toothpaste.
● For comfort, prescribe viscous lidocaine.
● For definitive care and the prevention of periodontal disease refer the patient for dental followup care. With appropriate treatment, patients usually respond dramatically in 48-72 hours.

Discussion

Acute necrotizing ulcerative gingivitis is also known as Vincent's angina or trench mouth. This condition is usually seen in patients who practice poor oral hygiene, are under stress, smoke, ad sometimes, have immune deficiencies. Systemic diseases that may simulate the appearance of ANUG include infectious mononucleosis, leukemia, aplastic anemia and agranulocytosis.
4.08 Oral Candidiasis (Thrush)

Presentation

An infant (usually with a concurrent diaper rash) will have white patches in his mouth, or an older patient (usually with poor oral hygiene, diabetes, a hematologic malignancy, some immunodeficiency or on antibiotic, cytotoxic or steroid therapy) will complain of a sore mouth and sensitivity to foods that are spicy or acidic. On physical examination, there are painless white patches in the mouth and on the tongue which wipe off easily with a swab, leaving an erythematous base that may bleed. There may be intense dark red inflammation throughout the oral cavity.

What to do:

- If there is any doubt about the etiology, confirm the diagnosis by smearing the exudate, Gram staining, and examining under a microscope for large, gram-positive pseudohyphae and spores. A fungal culture may also confirm the diagnosis.
- For topical treatment, prescribe an oral suspension of nystatin 200,000 units for infants and 400,000-600,000 u for children and adults, gargled and swished in the mouth as long as possible before swallowing, four times a day, for at least two days beyond resolution of symptoms. Nystatin is also available in pastilles of 200,000 u: one or two can be dissolved in the mouth 4-5 times daily. Alternatively, prescribe clotrimazole in 10mg troches to be dissolved slowly in the mouth 5 times a day for 7-14 days.
- For adults, fluconazole 200mg once, then 100mg qd po x7-14d may be a better regimen. Sometimes a single oral dose is effective, but the longer course decreases the risk of relapse.
- Look elsewhere for Candida: esophagitis, intertrigo, vaginitis, diaper rash. All should respond to topical treatment with topical nystatin or clotrimazole.

Discussion

In the health newborn, thrush is a self-limited infection, but it should be treated to avoid feeding problems. In adults, oral candidiasis is found in a variety of acute and chronic forms. Localized erythema and erosions with minimal white exudate may be caused by candidal colonies beneath dentures and is commonly called "denture sore mouth." Maintenance prophylaxis may be required in patients with AIDS. Nystatin suspension has a high sugar content.
4.09 Perleche

Presentation

The patient complains of inflammation and soreness of the skin and contiguous labial mucous membranes at the angles of the mouth. On examination, there is erythema, fissuring and maceration of the oral commissures.

What to do:

- Attempt to identify a precipitating cause and advise corrective action when possible.
- Prescribe an antifungal cream such as naftidine 1% tid followed in a few hours by a corticosteroid in a non-greasy base such as triamcinolone 1%, and discontinue the steroids when the inflammation subsides in favor of a protective lip balm such as Chap Stick.

Discussion

Perleche is associated with the collection of moisture at the corners of the mouth, which encourages invasion by Candida albicans, staphlococci, streptococci and other organisms. In children, this is often caused by lip licking, drooling, thumb sucking and mouth breathing. Adults may be troubled by age-related changes in oral architecture and poorly fitting dentures. The differential diagnosis includes impetigo and herpes simplex infections. Vitamin B deficiency can be the cause, but this is rare and should not be treated presumptively.
4.10 Burning tongue

Presentation

The patient is very uncomfortable with a burning sensation of the tongue or mouth. There may be xerostomia (reduced salivary flow), dental disease, geographic tongue, 
candidiasis or no visible explanation for the pain.

What to do:

- Treat specific causative factors such as candida infections or dental problems.
- Provide symptomatic relief with a one-to-one mixture of Benadryl elixir and 
  Kaopectate, or prescribe viscous lidocaine.
- If the etiology is uncertain, refer the patient for a comprehensive medical evaluation.

Discussion

Burning tongue or burning mouth symptoms are usually caused by xerostomia, 
candidiasis, other chronic infections, referred pain from the tongue muscles, dental 
disease, reflux of gastric acid, medications, noxious oral habits, blood dyscrasias, 
nutritional deficiencies, allergies, inflammatorily disorders, psychogenic factors, or 
unknown causes. Geographic tongue results from loss of filiform papillae from patches 
on the dorsal surface of the tongue. The location of the patches may appear to shift over 
a period of weeks. It is usually not painful and does not require specific treatment.
4.11 Mucocele (Mucous cyst)

Presentation

A patient may be alarmed by the rapid development of a soft, rounded cyst most often occurring inside the lower lip. The cyst varies from 2 to 10mm in diameter and the surface is made up of pearly or translucent mucosa. The patient may be aware of previous trauma to the lip.

What to do:

- Reassure the patient that this is not a serious tumor.
- Refer the patient to an appropriate oral surgeon where laser ablation or total cyst excision can be performed.

Discussion

This cyst is caused by traumatic rupture of the mucus gland duct with extravasation of sialomucin into the submucosa. This most often occurs inside the lower lip but may also occur under the tongue or in the buccal mucosa. These traumatic mucous retention cysts easily rupture, releasing sticky, straw-colored fluid.
4.12 Uvular edema

Presentation

A patient complains of a foreign body sensation or fullness in the throat, possibly associated with a muffled voice and gagging. Upon examination of the throat, the uvula is swollen, pale, and somewhat translucent (uvular hydrops). If greatly enlarged, the uvula might rest on the tongue and move in and out with respiration. There might be an associated rash or a history of exposure to physical stimuli, allergens, or a recurrent seasonal incidence.

What to do:

- Because of the known association of uvular with hypopharyngeal edema, watch for signs of airway compromise. If a patient complains of respiratory difficulty or breathes with stridor, commence treatment with intravenous lines and intubation and cricothyrotomy equipment at the bedside, and a crosstable lateral soft tissue neck x ray to rule out epiglottic swelling.
- If there is no acute respiratory difficulty, ask about precipitating events. Consider foods, drugs, physical agents, inhalants, insect bites and hereditary angioedema.
- When fever, sore throat and pharyngeal injection are present, culture the throat with a rapid strep screen and give an antibiotic that covers Haemophilus influenzae (e.g., Biaxin, Augmentin, Bactrim).
- It is reasonable to obtain a complete blood count with a manual differential to demonstrate eosinophilia to support the possibility of an allergic reaction or a high leukocyte count with increased granulocytes and bands to support a bacterial infection.
- Initially the patient should receive parenteral H1 and H2 antihistamines like hydroxyzine 50-100mg im or diphenhydramine 25-50mg iv along with cimetidine 300mg iv or po or ranitidine 50mg iv or 150mg po.
- More severe cases should receive repeated doses of epinephrine 0.3ml of 1:1000 sq every 20 minutes x3. Nebulized isomeric or racemic epinephrine or albuterol are also effective.
- Parenteral corticosteroids like SoluMedrol 125mg iv are also typically used, although efficacy remains unproven.
- If there is a history of recurrent episodes of edema and there is a family history of the same, consider ordering a C4 complement level or C’1 esterase inhibitor levels as a screening test for hereditary angioedema. In this condition, the edema often involves the uvula and soft palate together.
- Uvular decompression may be useful in patients that are resistant to medical therapy or whose symptoms progress rapidly. This procedure consists of grasping the uvula with forceps and either making several lacerations with a sterile needle or snipping the distal centimeter as a partial uvulectomy.
- All patient s should be observed for an adequate period of time to insure that there is either improvement or no further worsening of the swelling before being discharged home. Upon discharge, they should receive 4-5 days of H1 and H2 blockers and
steroids if required.

**What not to do:**

- Do not perform a comprehensive and costly laboratory evaluation on every case. do only specific tests that are clearly indicated with results that will be followed up.

**Discussion**

The uvula (Latin for "little grape") is a small conical pedulous process hanging from the middle of lower border of the soft palate. It is composed of muscle, connective tissue and mucous membrane, with the bulk of the uvula consisting of glandular tissue with diffuse muscle fibers interspersed throughout. During the acts of degluttination and phonation, the uvula and soft palate are directed upward, thereby walling off the nasal cavity from the pharynx. During swallowing, this prevents ingested substances from entering the nasal cavity.

Angioedema, also known as angioneurotic edema and Quincke's disease, is defined as a well-localized edematous condition that may variably involve the deeper skin layers and subcutaneous tissues as well as mucosal surfaces of the upper respiratory and gastrointestinal tracts.

Immediate hypersensitivity type I reactions, seen with atopic states and specific allergen sensitivities, are the most common causes of angioedema. These reactions involve the interaction of an allergen with IgE antibodies bound to the surface of basophile or mastocytes. Physical agents, including cold, pressure, light and vibration, or processes that increase core temperature, may also cause edema through the IgE pathway.

Hereditary angioedema, a genetic disorder of the complement system, is characterized by either an absence of functional deficiency of C'1 esterase inhibitor. this allows unopposed activation of the first component of complement, with subsequent breakdown of its two substrates, the second (C'2) and fourth (C'4) components of the complement cascade. This process, in the presence of plasmin, generates a vasoactive kinin-like molecule that causes angioedema. Acquired C'1 esterase inhibitor deficiency and other complement consumption states have been described in patients with malignancies and immune complex disorders, including serum sickness and vasculidities.

Other causes of angioedema include a direct degranulation effect on mast cells and basophils by certain medications and diagnostic agents (opiates, d-tubocurarine, curare and radiocontrast materials); substances such as aspirin, nonsteroidal anti-inflammatory drugs, azo dyes and benzoates that alter the metabolism of arachidonic acid, thus increasing smooth muscle permeability; and angiotensin converting enzyme inhibitors, implicated presumably by promoting the production of bradykinin.

The known infectious causes of uvulitis include group A streptococci, Haemophilus
influenzae, and Streptococcus pneumoniae. An associated cellulitis may contiguously involve the uvula with the tonsils, posterior pharynx, or epiglottis.

References:

4.13 Avulsed Tooth (tooth loss)

Presentation

After a direct blow to the mouth the patient may have a permanent tooth knocked from its socket. The tooth is intact, down to its root, from which hangs the delicate periodontal ligament that used to attach to alveolar bone and provide the tooth with its blood supply.

What to do:

- In the field, avulsed teeth may be stored under the tongue or in the buccal vestibule between the gums and the teeth. If the patient is unconscious, the tooth can be stored in saline, milk or water until a better preservation solution is available. A child's tooth might be preserved, if necessary, in the parent's mouth.
- If the tooth has been out of its socket less than 15 minutes, take it by the crown, drop it in a tooth-preservation solution (Hank's solution, Sav-A-Tooth kit), flush the socket with the same solution, reimplant the tooth firmly, have the patient bite down firmly on a piece of gauze to help stabilize the tooth and when possible secure it to adjacent teeth with wire, arch bars, or a temporary periodontal pack (Coe-Pak). Coe-Pak is a periodontal dressing that comes in the form of a base and catalyst. Mix together and mold the resulting paste, which will eventually set semi-hard, over the gingival line and between the teeth. Put the patient on a liquid diet, prescribe penicillin VK 500mg qid x 2 weeks, and schedule a dental appointment.
- If the tooth was out 15 minutes to 2 hours, soak for 30 minutes to replenish nutrients. Local anesthesia will probably be needed before reimplanting as above.
- If the tooth was out over two hours, the periodontal ligament is dead, and should be removed, along with the pulp. The tooth should soak 30 minutes in 5% sodium hypochlorite (Clorox), and 5 minutes each in saturated citric acid, 1% stannous fluoride and 5% doxycycline before reimplanting. The dead tooth should ankylose into the alveolar bone of the socket like a dental implant.
- If the patient is between 6 and 10 years old, also soak the tooth for 5 minutes in 5% doxycycline to kill bacteria which could enter the immature apex and form an abscess.
- If you are not able to perform all this right away, simply keep the tooth soaking in the preservation solution until a dentist can get to it. The solution should preserve the tooth safely for up to four days.
- If a tooth is lost, obtain a chest x ray to rule out bronchial aspiration.
- Add tetanus prophylaxis if required

What not to do:

- Do not touch a viable root with fingers, forceps, gauze or anything, or try to scrub or clean it. The periodontal ligament will be injured and unable to re-vascularize the re-implanted tooth.
- Do not overlook fractures of teeth and alvolar ridges.
- Do not substitute the calcium hydroxide composition (Dycal) used for covering fractured teeth for the temporary periodontal pack (Coe-Pak) used to stabilized
luxated teeth. They are different products.

- Do not replace primary deciduous teeth. Reimplanted primary teeth heal by ankylosis: they literally fuse to the bone, which can lead to cosmetic deformity since the area of ankylosis will not grow at the same rate as the rest of the dentofacial complex. Ankylosis can also interfere with the eruption of the permanent tooth. Normal developmental shedding of primary decidual teeth is preceded by absorption of the root, so that if such a tooth is brought to the ED by mistake, there is no root to reimplant in the socket, but a new permanent tooth underneath.

**Discussion**

Before commercially-available 320mOs, pH 7.2 reconstitution solutions, the best we could offer the avulsed tooth was rapid reimplantation. Without a preservation solution, the chances of successful reimplantation decline one percentage point every minute the tooth is absent from the oral cavity. In mature teeth, over age 10, the pulp will not survive avulsion even if the periodontal ligament does, and at the one-week follow-up visit with the dentist, the necrotic pulp will be removed to prevent a chronic inflammatory reaction from interfering with the healing of the periodontal ligament.

**References:**

4.14 Dental Trauma (fracture, subluxation and displacement)

Presentation

After a direct blow to the mouth the patient may have a portion of a tooth broken off, or a tooth may be loosened to a variable degree. Ellis class I dental fractures involve only enamel, and are problems only if they leave a sharp edge, which can be filed down. Ellis class II fractures expose yellow dentin, which is sensitive, can become infected, and should be covered. Ellis class III fractures expose pulp, which bleeds and hurts. A tooth that is either impacted inwards or partially avulsed outwards can be recognized because its occlusal surface is out of alignment compared to adjacent teeth. There is also usually some hemorrhage at the gingival margin. If several teeth move together, suspect a fracture of the alveolar ridge.

What to do:

- Assess the patient for any associated injuries such as facial or mandibular fractures. Clean and irrigate the mouth to expose all injuries. Touch injured teeth with a tongue depressor or grasp them between gloved fingers to see if they are loose, sensitive, painful, or bleeding.
- Consider where any tooth fragments are located. Broken tooth fragments may become embedded in the soft tissue, swallowed or aspirated. A chest x ray can disclose tooth fragments aspirated into the bronchial tree.
- For sensitive Ellis II fractures of dentin, cover the exposed surface with a calcium hydroxide composition (Dycal), tooth varnish (copal ether varnish), a strip of stomahesive or clear nail polish to decrease sensitivity. Provide pain medications, instruct the patient to avoid hot and cold food or drink and arrange for follow up with a dentist.
- Ellis III fractures into pulp should be seen by a dentist right away. Calcium hydroxide or moist cotton covered by foil can be used as temporary coverings. Provide for analgesics as needed.
- Minimally subluxed (loosened) teeth may require no emergency treatments. Very loose teeth should be pressed back into their sockets and wired or covered with a temporary periodontal splint (Coe-Pak) for stability, and the patient should be scheduled for dental follow up and a possible root canal procedure. These patients should be on a soft or liquid diet to prevent further tooth motion. Antibiotic prophylaxis should be provided.
- Intruded primary teeth and permanent teeth of young patients can be left alone and allowed to re-erupt. Intruded teeth of adolescents and older patients are usually repositioned by an oral surgeon. An extruded primary or permanent tooth can be readily returned to its original position by applying firm finger pressure. both intrusive and extrusive injuries require early dental follow up and antibiotic prophylaxis.
What not to do:

- Do not miss associated injuries of alveolar ridge, mandible, facial bone, or neck.

Discussion

Exposure of dentin leads to variable sequelae depending upon the age of the patient. Because it is composed of microtubules, dentin can serve as a conduit for pathogenic microorganisms. In children, the exposed dentin in an Ellis class II fracture lies nearer the neurovascular pulp and is more likely to lead to a pulp infection. Therefore, in patients less than 12 years old, this injury requires a dressing such as Dycal. Mix a drop of resin and catalyst over the fracture and cover with dry foil. When in doubt, consult a dentist. In older patients with Ellis class II fractures however, analgesics, avoidance of hot or cold foods and follow up with a dentist in 24 hours is quite adequate. If Coe-Pack or wire are not available to stabilize loose teeth, use soft wax spread over palatal and labial surfaces and neighboring teeth as a temporary splint.
**4.15 Bleeding After Dental Surgery**

**Presentation**

The patient had an extraction or other dental surgery performed earlier in the day, now has excessive bleeding at the site, and cannot reach his dentist.

**What to do:**

- Ask what procedure was done. Inquire about antiplatelet drugs like aspirin, underlying coagulopathies and previous experience with unusual bleeding.
- Using suction and saline irrigation, clear any packing and clot from the bleeding site.
- Roll a 2" x 2" gauze pad, insert it over the bleeding site, and have the patient apply constant pressure upon it (biting down usually suffices) for 20 minutes.
- If the site is still bleeding after 20 minutes of gauze pressure, infiltrate the extraction area and inject into the socket with a local anesthetic and vasoconstrictor such as 2% lidocaine with 1:100,000 or 1:50,000 epinephrine, until the tissue blanches. Again, have the patient bite on a gauze pad for 20 minutes. The anesthetic allows the patient to bite down harder and the epinephrine helps restrict the bleeding.
- If this does not stop the bleeding, pack the bleeding site with Gelfoam, with gauze soaked in topical thrombin, or with bone wax (if the site is a bony socket), place the gauze pad on top, and apply pressure again.
- An arterial bleeder resistant to all the above may require ligation with a figure eight stitch.
- Assess any possible large blood loss with orthostatic vital signs.
- When the bleeding stops, remove the overlying gauze, have the patient leave the site alone for a day, and see his dentist in followup.

**What not to do:**

- Do not routinely obtain laboratory clotting studies or hematocrits, unless there is a suspicion that they should be abnormal.

**Discussion**

Occasionally, this problem can be handled over the telephone. Some say a tea bag works even better than a gauze pad.
4.16 Dental Pain Post Extraction (Dry Socket)

Presentation

The patient develops severe dull throbbing pain two to four days following a tooth extraction. The pain is often excruciating, may radiate to the ear, and is not relieved by oral analgesics. There may be an associated foul odor and taste. The extraction site is filled with necrotic tissue which is delaying wound healing.

What to do:

- Consider an anesthetic nerve block prior to any treatment.
- Irrigate the socket with warm normal saline.
- Pack the socket with 1/4" iodoform gauze soaked in oil of cloves (eugenol).
- Prescribe oxycodone and nonsteroidal anti-inflammatory analgesics for additional pain relief.
- Refer the patient back to his dentist for followup. The gauze packing should be removed and replaced every 24 hours until symptoms subside.

What not to do:

- Do not prescribe antibiotics unless there is a systemic infection. Resolution of the problem depends on granulation the socket rather than elimination of infection.
- Do not try to create a new clot by stirring up bleeding. Scraping the socket center implant bacteria in the alveolar bone, setting the stage for osteomyelitis.

Discussion

Dry socket results from a pathologic process combining loss of the healing blood clot with a localized inflammation (alveolar osteitis). It is most common with extraction of the mandibular molars. This condition may be encouraged by smoking, spitting or drinking through a straw, which create negative pressure in the oral cavity. Intractible pain usually responds to nerve block with long acting local anesthetics.
4.17 Dental Pain - Pulpitis

Presentation

The patient develops an acute toothache with sharp and throbbing pain, often worse with recumbent position. The patient may or may not be aware of having a cavity in that tooth. Initially, the pain is decreased by heat and increased by cold, but as the condition progresses, heat makes the pain worse, while ice will dramatically relieve it. (A patient might come in holding a cup of ice and not allow examination unless ice can be kept on the tooth.) Physical exam may reveal dental cavities (caries) or an extensive tooth restoration without facial or gingival swelling.

What to do:

- Administer a strong analgesic such as oxycodone in combination with acetaminophen or aspirin (Percocet, Percodan) and prescribe additional medication for home use, including nonsteroidal anti-inflammatory analgesia. Severe pain may require a nerve block.
- If a cavity is present, insert a small cotton pledget soaked in oil of cloves (eugenol). The cotton should fill the cavity without rising above the opening (where it would strike the opposing tooth).
- Refer the patient to a dentist within 12 hours for definitive therapy (removal of caries, removal of pulp, or removal of the tooth).

What not to do:

- Do not prescribe antibiotics without signs of cellulitis or abscess formation.

Discussion

As a patient's condition progresses from pulpitis to pulpal necrosis, the patient experiences excruciating pain caused by fluid and gaseous pressure within a closed space. Heat increases the volume and hence the pain, while cold reduces it.

Intractible pain usually responds to nerve block techniques with injection of long-acting local anesthetics. If a patient refuses a nerve block or a nerve block fails to relieve pain, consider the possibility that the patient is drug seeking. At the same time, remember that some people have extreme phobias about dental injections. When in doubt, err on the side of compassion.
4.18 Dental Pain - Periapical abscess

Presentation

The patient complains of dull constant facial or dental pain, often associated with facial swelling and cellulitis and accompanied by signs of systemic toxicity. Dental caries may or may not be apparent. Percussion of the offending tooth causes increased pain. Hot and cold sensitivity may no longer be present because of necrosis of the pulp. There may be increased mobility of the tooth and an examining finger in the soft tissues of the mouth, face, or neck may even palpate a fluctuant abscess.

What to do:

- Adequate pain medication should be administered and prescribed for continued pain relief. A combination of acetaminophen with codeine or oxycodone usually suffices. Add nonsteroidal anti-inflammatory analgesia.
- Depending on the level of toxicity, the patient should initially either be treated with parenteral or oral penicillin, and a 10-day course of penicillin VK 500mg qid should be prescribed. Erythromycin or clindamycin may be substituted in the penicillin-allergic patient.
- If a fluctuant abscess cavity is present, then perform incision and drainage at the most dependent location and, when possible, insert a drain for 24 hours.
- Instruct patients to apply warm compresses to the affected area and seek followup care from a dentist within 24 hours.

What not to do:

- Do not insert an obstructing pack (i.e. cotton soaked with oil of cloves) into a tooth cavity when an abscess or cellulitis is present.
- Do not prescribe aspirin if you anticipate that a tooth will need to be extracted.

Discussion

Dental pain may be refered to the ear, the temple, the eye, neck or other teeth. Conversely, what appears to be dental pain may in fact be due to overlying maxillary sinusitis or otitis. Diabetes and valvular heart disease increase the risk from bacteremia, and local extension of infection can lead to retropharyngeal abscess, Ludwig's cellulitis, cavernous sinus thrombosis, osteomyelitis, mediastinitis and pulmonary abscess.

An acute periodontal (as opposed to periapical) abscess causes localized painful fluctuant swelling of the gingiva, located either between the teeth or laterally, and is associated with vital teeth that are not sensitive to percussion. Treatment consists of local infiltrative anesthesia and drainage by subgingival curettage. In severe cases or where there is fever, prescribe doxycycline 100mg bid x10d, instruct patients to rinse the mouth with warm walt water, and consult a dentist for further treatment.
Presentation

The patient is aged 17-25 and seeks help because of painful swelling and infection around an erupting or impacted third molar (wisdom tooth). Occasionally, there can be trismus or pain on biting. The site appears red and swollen with a flap that may reveal a partial tooth eruption and purulent drainage when pulled open. There is no pain with percussion of the tooth. Picture

What to do:

- Irrigate with a weak (2%) hydrogen peroxide solution. Purulent material can be released by placing the catheter tip of the irrigating syringe under the tissue flap overlying the impacted molar.
- Prescribe oral analgesics for comfort as well as penicillin over the next 10 days (penicillin VK 500mg qid).
- Instruct the patient on the importance of cleansing away any food particles that collect beneath the gingival flap. This can be accomplished by simply using a soft toothbrush or by using water jet irrigation.
- A dental followup should be provided to observe the resolution of the acute infection and to evaluate the need for removal of the gingival flap or molar.

What not to do:

- Do not undertake any major blunt dissection while draining pus. This could spread a superficial infection into the deep spaces of the head and neck or follow a deep abscess posteriorly into the carotid sheath.

Discussion

Pericoronitis is a special type of acute periodontal abscess that occurs when gingival tissue (operculum) overlies an erupting tooth (usually a third molar, also known as a wisdom tooth). Recurring acute symptoms are usually initiated by trauma from the opposing tooth or by impaction of food or debris under the flap of tissue that partially covers the erupting tooth.

When dental referral is not readily available, one procedure for relieving the pain is surgical removal of the operculum. Inject local anesthetic directly into the overlying tissue and then cut it away using the outline of the tooth as a guide for the incision. Sutures are not required.
4.20 Oral nerve blocks

What to do:

- Inferior alveolar nerve block provides rapid relief of pain in all teeth on one side of the mandible and the lower lip and chin.
  - Palpate the retromolar fossa with the index finger and identify the convexity of the mandibular ramus.
  - Hold the syringe parallel to the occlusal surfaces of the teeth so that its barrel is in line between the first and second premolars on the opposite side of the mandible.
  - Retract the soft tissue towards the cheek and find the pterygomandibular triangle.
  - Puncture the triangle, making sure the needle passes through the ligaments and muscles of the medial mandibular surface.
  - Stop advancing the needle when it reaches the bone, withdraw it a few millimeters, aspirate to be sure the tip is not in a vein, and deposit 1-2ml of local anesthetic. Picture

- Supraperiosteal infiltration provides intraoral local anesthesia for pain arising from maxillary teeth.
  - Puncture the mucobuccal fold, holding the bevel of the needle toward the bone, aspirate the area and then inject 1-2ml of anesthetic near the apex of the affected tooth. This technique usually produces full anesthesia in 5-10 minutes. For best results inject as close as possible to the tooth-bearing maxillary bone.
4.21 Orthodontic complications

Presentation

Someone wearing braces on his teeth was struck on the mouth or spontaneously the orthodontic appliances broke, puncturing, hooking or otherwise entrapping some oral mucosa. There may be pain, blood, lacerations, a confusing tangle of wires and elastic bands, and panic on the part of the patient and family. Other problems involve food, candy or chewing gum becoming stuck and causing gingival infection.

What to do:

- Irrigate and cleanse the mouth so you can clearly visualize the nature of the problem.
- Inject local anesthetic into entrapped or punctured mucosa in order to provide comfort and allow necessary manipulation.
- Release mucosa from hook-like attachments by pushing the lip against the teeth and moving it (usually upward) to unhook it.
- Bend any sharp wire end so it points towards the teeth instead of towards sensitive lips and gums. Use a hemostat to grasp the wire. If a brace wire has popped out of the bands around the molars and you can see the grooves the wire fits in, just slide it back in place.
- When a sharp wire cannot be moved, cover the point with soft wax, cotton or gum.
- Release foreign objects by sacrificing them.
- Treat gingival infections with frequent warm saline rinses and penicillin or erythromycin 250mg qid x10d.
- Arrange early orthodontic follow up.

What not to do:

- Do not cut a protruding wire. It will only create another sharp edge.
- Do not administer antibiotics for minor oral abrasions, punctures or small lacerations.

Discussion

Fortunately, the tongue and oral mucosa usually heal with few complicating infections or tissue necrosis.
5.01 Upper Respiratory Infection (Common Cold)

Presentation

Most patients with colds do not visit emergency departments, unless they are unusually ill; the cold is prolonged more than a week, or it is progressing into bronchitis or serous otitis with new symptoms. The patient may want a note from a physician excusing him from work; or a prescription for antibiotics, which "seemed to help" the last time he had a cold.

The common denominator of URIs is inflammation of the respiratory mucosa. The nasal mucosa is usually red, swollen, and wet with reactive mucous. The pharynx is inflamed directly or by drainage of mucous from the nose, and swallowing may be painful. Pharyngitis secondary to nasal drainage is typically worse upon arising in the morning, and signs and symptoms may be localized to the side that is dependent during sleep.

Occlusion of the ostia of paranasal sinuses permits buildup of mucous and pressure, leading to pain and predisposing bacterial superinfection. Occlusion of the orifices of the eustachian tubes in the posterior pharynx permits imbalance of middle ear pressure and serous otitis. The larynx can be inflamed directly or secondarily to drainage of mucus or forceful coughing, lowering the pitch and volume of the voice or causing hoarseness. The trachea can also be inflamed, producing coughing, and the bronchi can develop a bacterial superinfection or bronchospasm with wheezing. In addition to all these ills of the upper respiratory mucosa, there can be reactive lymphadenopathy of the anterior cervical chain, diffuse myalgias, and side effects of self medication.

What to do:

- Perform a complete history and physical examination to document which of the above signs and symptoms are present; to rule out some other, underlying ailment; and to find any sign of bacterial superinfection of ears, sinuses, pharynx, tonsils, epiglottis, bronchi, or lungs, that might require antibiotics or other therapy.
- Explain the course of the viral illness, and the inadvisability of indiscriminate antibiotics. Tailor drug treatment to the patient's specific complaint as follows:
  - For fever, headache, and myalgia, prescribe acetaminophen 650mg q4h, or ibuprofen 600mg q6h.
  - To decongest the nose, ostia of sinuses, and eustachian tubes start with topical sympathomimetics (0.5% phenylephrine nose drops q4h, but only for 3 days) and add systemic sympathomimetics (pseudoephedrine 60mg q6h or phenylpropanolamine 25mg q4h).
  - To dry out a nose, or if the symptoms are probably caused by an allergy, try antihistamines (chlorpheniramine 4mg q6h).
  - To suppress coughing, prescribe dextromethorphan or codeine 10-20mg q6h.
  - To avoid sedation and narcotics, prescribe benzonatate (Tessalon) 100-200mg q8h which provides airway anesthesia.
• With bronchitis or suspected bronchospasm, treat the cough with inhaled bronchodilators like albuterol two puffs q1-8h prn and inhaled steroids like beclomethasone four puffs q12h.

• Arrange for follow up if symptoms persist or worsen, or if new problems develop.

What not to do:

• Do not get bullied into inappropriate prescribing of antibiotics. Most colds are self-limiting illnesses, and many treatments may appear to work by coincidence alone. Do not prescribe inappropriate antibiotics simply because you suspect the insistent patient will obtain them elsewhere. This is not justification for poor medical practice.
• Do not undertake expensive diagnostic testing on uncomplicated cases.

Discussion

Colds are produced by over a hundred different adeno and rhinoviruses, and influenza, coxsackie, and measles can also present as a URI. Especially during the winter, when colds are epidemic, it certainly helps to keep abreast of what is "going around," so that you can intelligently advise patients on incubation periods, contagiousness, expected symptoms, and duration; and also be able to pick an unusual syndrome out of the background.

Some of the medications recommended here are available in various combinations over the counter, but when is more than symptomatic treatment indicated? Bacterial superinfections require antibiotics. Mycoplasma pneumonia can present with headache, cough, myalgias, and perhaps bullous myringitis, and may respond to erythromycin. Coughing can precede wheezing as an early sign of asthma, and response to beta agonists helps make the diagnosis. Antibiotics have not turned out to be very useful for acute bronchitis, and vitamin C as prophylaxis for colds has also not done well in controlled trials.
5.02 Rib Fracture and Costochondral Separation

Presentation

A patient with an isolated rib fracture or a minor costochondral separation usually has a history of falling on the side of the chest, being struck by a blunt object, coughing violently or leaning over a rigid edge. The initial chest pain may subside, but over the next few hours or days pain increases with movement, interfering with sleep and activity and becoming severe with coughing or deep inspiration. The patient is often worried about having a broken rib, and may have a sensation of bony crepitus or abnormal rib movement. Breath sounds bilaterally should be normal unless there is substantial splinting or a pneumothorax or hemothorax is present. There is point tenderness over the site of the injury and occasionally bony crepitance can be felt.

What to do:

- Examine the patient for possible associated injuries; e.g., do an abdominal exam to look for any signs of a splenic or hepatic injury. If there was a significant mechanism of injury, the patient may require a comprehensive evaluation to rule out life and limb threatening injuries.
- When there is a history of minor trauma, check for pain with indirect stress on the suspected fracture site. Compress the rib medially if a posterior or anterior fracture is suspected. Compress the rib anteriorly/posteriorly if a fracture is suspected at a lateral location. When pain occurs at the suspected fracture site with indirect stress, this is clinical evidence of a fracture or separation and should be so documented on the chart.
- Obtain any history of chronic pulmonary problems or heavy smoking.
- Unless the patient is elderly or has pulmonary disease, have him try out a rib belt during his wait for x rays.
- Send the patient for a PA & lateral chest x ray to rule out a pneumothorax, hemothorax, evidence of pulmonary contusion, etc. Additional oblique rib films for radiological documentation of a fracture are optional and often unproductive, but these films are indicated when there is a suspicion of multiple rib fractures, especially in the elderly.
- If there is no suspicion of underlying injury and when there is clinical or radiologic evidence of a rib fracture or chondral separation:
  - Provide a potent oral analgesic (Motrin, Aleve, Tylenol with codeine, Lorcet, Percocet).
  - Instruct the patient on the intermittent use of an elastic and velcro rib belt if it reduces pain. Place the top of the belt at the inferior tip of the xyphoid process, tightening it around the chest enough to obtain maximum pain relief. The fib belt may be left on almost continuously for the first one to four days but it should be removed as comfort allows thereafter.
  - Instruct the patient on the importance of deep breathing and coughing (without the rib belt but using a pillow splint) to help prevent pneumonia. Tell him to take
enough pain medicine to allow coughing and deep breathing.

- Provide the patient with an appropriate work excuse and refer him for followup care in 48 hours. Tell him to expect gradually decreasing discomfort for about two weeks, and forbid strenuous activity for approximately eight weeks.
- Severe worsening of chest pain, shortness of breath, fever or purulent sputum may signal pulmonary complications and should prompt a return visit. A greater incidence of complications can be expected in patients with displaced rib fractures.

- When patients are elderly or have pulmonary or cardiac compromise, or multiple fractures or other injuries which might compromise respiratory dynamics, consider hospitalization for observation, pain control and pulmonary toilet. Blood gases and pulmonary function tests can aid in evaluation of breathing.
- When there is no clinical or radiologic evidence of a fracture, treat the pain as you would any other contusion, using an appropriate analgesic.

What not to do:

- Do not confuse simple rib fractures with massive blunt trauma to the chest. The evaluation and management is quite different.
- Do not tape ribs or use continuous strapping. This will lead to an atelectatic lung prone to pneumonia.
- Do not assume there is no fracture just because the x rays are negative. Rib fractures are often not apparent on x ray, especially when they occur in the cartilagenous portion of the rib. The patient deserves the disability period and analgesics commensurate with the real injury.

Discussion

Most fractures and separations are treated with immobilization, but ribs are a special problem because patients have to continue breathing. In the presence of severe pain one should consider the use of an intercostal nerve block or injection of the fracture hematoma with 0.5% bupivacaine hydrochloride (Marcaine). Because of the risks of pneumothorax or hemothorax, this procedure, in most cases, should be reserved for secondary management when initial treatment has proven ineffective.

References:

5.03 Costochondritis

Presentation

The patient's age is usually in the mid-teens through the thirties, and he complains of a day or more of steady aching with intermittent stabbing chest pain, perhaps following a period of frequent coughing or unusual physical stress, localized to the left or right of the sternum, without radiation, but worse with taking a breath, changing position or moving the arm overhead. He may be concerned about the possibility of a heart attack (though he may not voice his fear) but there is no associated nausea, vomiting, diaphoresis, or dyspnea. The mid anterior costal cartilages (connecting ribs to sternum) are diffusely tender to palpation, without swelling or erythema, exactly matching the patient's complaint. The rest of the physical examination is normal, along with normal vital signs and pulse oximetry.

What to do:

- Perform a thorough history and physical examination. Give special attention to the character of the pain (onset, severity, quality, radiation, duration, relationship to movement), associated symptoms (shortness of breath, nausea, vomiting, diaphoresis, cough), and past history of pre-existing cardiac risk factors (family history of coronary artery disease, smoking, hypertension, diabetes mellitus, elevated cholesterol, cocaine use, age >33 for men and >40 for women). Read the nurse's note for critical details the patient has not repeated to you. Look for pleural or pericardial rubs and arrhythmias and obtain a cardiogram and chest x ray when there is any suspicion of a cardiac or pulmonary disorder. The presence of costochondritis does not exclude the possibility of myocardial infarction, pericarditis, pulmonary embolus pneumothorax, pneumonia, or pleural effusion.
- If there is any suggestion of cardiac or pulmonary disease, complaints of chest tightness or pressure, or significant cardiac risk factors, obtain appropriate consultation to consider admission and further diagnostic evaluation.
- If there is no evidence of other disease, prescribe anti-inflammatory analgesics, have the patient apply heat for comfort, explain the condition and the lack of other disease, and direct the patient to seek followup with instructions to return for any fever, shortness of breath, diaphoresis, change in character of pain, or radiation to arm, shoulder or jaw.

What not to do:

- Do not rule out myocardial infarction especially in the middle aged and elderly patient, simply because there is tenderness over the costal cartilage, which could represent a coincidental finding, skin hypesthesia or contiguous inflammation secondary to the infarct.
Discussion

This local inflammatory process is probably related to minor trauma, and would not be brought to medical attention so often if it did not resemble the pain of a heart attack. Careful reassurance of the patient is therefore most important. This disorder is self-limited, but there may be remissions and exacerbations: the pain usually resolves in weeks to months. Tietze's syndrome is a rare variant that is generally less diffuse and associated with local swelling. When exquisite tenderness localizes over the xyphoid cartilage this represents a xyphoiditis or xyphoidalgia and can often be treated immediately with an injection of DepoMedrol 40mg along with 5cc of 1% Xylocaine and a course of nonsteroidal anti-inflammatories as above. Injection of the xyphoid cartilage is similar to that of other trigger points: use a fine needle and fan out around the point of maximum tenderness. While injecting the xyphoid, you must use some caution to avoid causing a pneumothorax or injecting the myocardium.

References:

5.04 Tear Gas Exposure (Lacrimmers)

Presentation

The patient may have been in a riot dispersed by the police, or accidently sprayed by his own can of Mace. He complains of burning of the eyes, nose, mouth, and skin; tearing and inability to open eyes because of the severe stinging; sneezing, coughing, a runny nose, and perhaps a metallic taste with a burning sensation of the tongue, nausea, vomiting, and abdominal pains. These signs and symptoms last for 15-30 minutes after exposure. Redness and edema may be noted from one to two days following exposure to these agents.

What to do:

- Segregate victims lest they contaminate others. Medical personnel should don gowns, gloves, and masks, and help victims remove contaminated clothes (which should be placed in plastic bags and sealed) and shower with soap and water to remove tear gas from their skin. Exposed eyes should be irrigated with copious amounts of tepid water for at least fifteen minutes. If eye pain lasts longer than 15-20 minutes, examine with fluorescein for corneal erosions, which may be produced by tear gas.
- Look for signs of, and warn patient about, allergic reactions to tear gas, including bronchospasm and contact dermatitis.
- Do not rush to help or allow other helpers to rush in heedlessly and themselves become incapacitated.

Discussion

Agents commonly used as tear gas include CN or Mace, which is sprayed in a weak water solution, CS which is burned, and produces symptoms as long as the victim is in the smoke, and CR which is more potent and longer lasting. Another agent in personal protection spray canisters is capsicum powder, the active ingredient in hot peppers, which is handled in the same fashion above.
5.05 Inhalation Injury

Presentation

The patient was trapped in an enclosed space for some time with toxic gas or fumes produced by a fire, leak, evaporation of solvent, chemical reaction, fermentation of silage, etc., and comes to the ED complaining of some combination of coughing, wheezing, shortness of breath, irritation or running of eyes or nose, chest or abdominal pain, or skin irritation. More severe symptoms include confusion and narcosis. Symptoms may develop immediately or after a lag of as much as a day. On physical examination, the victim may smell of the agent or be covered with soot or burns. Inflammation of the eyes, nose, mouth, or upper airway may be visible, while pulmonary irritation may be evident as coughing, ronchi, rales, or wheezing, although these signs may also take up to a day to develop.

What to do:

- Separate the victim from the toxic agent by removing clothes, hosing down, or showering with soap and water.
- Make sure the victim is breathing adequately, and then add oxygen at 6 to 12 liters per minute. Oxygen helps most inhalation injuries, and is essential in treating carbon monoxide poisoning.
- Look for evidence that may help identify the exposure: Was there a fire? What was burning? What was the estimated length of exposure? Was it an open or a closed space? What is the status of other victims? Was there an associated blast? What material is on the victim? What does he smell of? What are his current signs and symptoms? Is there soot in the posterior pharynx or singed nasal hairs? There may be evidence of a specific toxin which calls for a specific antidote (e.g., muscle fasciculations, small pupils, and wet lungs may imply organophosphates which should be treated with atropine).
- Unless the patient is asymptomatic, obtain a chest x ray and arterial blood gases (record the percentage of oxygen being inhaled). An increased alveolar-arterial PO2 difference may be the earliest sign of pulmonary injury; but even if the CXR and ABGs are normal, they can serve as a baseline for evaluation of later pulmonary problems. Consider obtaining a carboxyhemoglobin (COHgb) level, if only as a marker of other combustion products. Obtain a cyanide (CN) level too if there is any suspicion.
- Determine if there are significant pre-existing conditions such as cardiac or cerebral vascular disease, chronic obstructive pulmonary disease, asthma, or other chronic illness.
- If the patient has difficulty breathing or any x ray or blood gas abnormality suggesting acute pulmonary injury, he should be kept on oxygen and admitted to the hospital, even if only overnight. Wheezing and bronchospasm may be allergic reactions and respond to conventional doses of aerosolized bronchodilators, but, if not promptly reversible, are probably a sign of pulmonary injury.
- If no signs or symptoms of inhalation injury develop, or all have resolved in one hour, it may be safe to send the patient home, with instructions to return for reevaluation the
next day or sooner if any pulmonary signs or symptoms occur (coughing, wheezing, shortness of breath).

- Repeat the patient's vital signs and physical exam, and consider repeating ABGs, and CXR in 12 to 24 hours, looking for any changes indicative of late pulmonary injury.

**What not to do:**

- Do not assume the patient is all right following an inhalation injury simply because there are no symptoms and no ABG or CXR abnormalities evident in the first few hours. Some agents produce pulmonary inflammation which develops over 12 to 24 hours.
- Do not wait for carboxyhemoglobin levels before giving 100% oxygen for suspected carbon monoxide poisoning. Begin oxygen as soon as possible. One hundred percent oxygen (which requires a tight-fitting mask and a reservoir for administration) will reduce the half-life of carboxyhemoglobin from 6 to 1.5 hours.
- Do not insist on having the patient breathe room air for a long period before obtaining ABGs. If the oxygen is helping, its withdrawal is a disservice, and the alveolar-arterial \( PO_2 \) gradient can still be estimated on supplemental oxygen.

**Discussion**

One category of inhalation injury is caused by relatively inert gases, such as carbon dioxide and fuel gases (methane, ethane, propane, acetylene) which displace air and oxygen, producing asphyxia. Treatment consists of removing the victim from the gas and allowing him to breathe air or oxygen, and attending to any damage caused by the period of hypoxia (myocardial infarction, cerebral injury).

A second category of inhalation injury is from irritant gases: ammonia (NH\(_3\)), formaldehyde (HCHO), chloramine (NH\(_2\)Cl), chlorine (Cl\(_2\)), nitrogen dioxide (NO\(_2\)) and phosgene (COCl\(_2\)), which, when dissolved in the water lining the respiratory mucosa, produce a chemical burn and an inflammatory response. The first gases listed, being more soluble in water, tend to produce more upper airway burns, irritating eyes, nose, and mouth, while the latter gases, being less water soluble, produce more pulmonary injury and respiratory distress.

A third category of inhalation injury includes gases which are systemic toxins, such as carbon monoxide (CO), hydrogen cyanide (HCN), and hydrogen sulfide (H\(_2\)S), all of which interfere with the delivery of oxygen for cellular energy production, and aromatic and halogenated hydrocarbons, which can produce later liver, kidney, brain lung, and other organ damage.

A final category of inhalation injury is allergic, in which inhaled gases, particles or aerosols produce bronchospasm and edema much like asthma or spasmodic croup.
6.01 Singultus (Hiccups)

Presentation

Recurring, unpredictable, clonic contractions of the diaphragm produce sharp inhalations. Hiccups are usually precipitated by some combination of laughing, talking, eating, and drinking, but may also occur spontaneously. Most cases also resolve spontaneously, and do not come to the emergency department unless prolonged or severe.

What to do:

- Stimulate the patient's soft palate by rubbing it with a swab, catheter tip or finger, just short of stimulating a gag reflex, and continue this for a few minutes. Alternatively, you may stimulate the same general area by depositing a tablespoon of granulated sugar at the base of the tongue, in the area of the lingual tonsils, and letting it dissolve. Such maneuvers (or their placebo effect) may abolish simple cases of hiccups.
- If hiccups continue, look for an underlying cause, and ask about precipitating factors or previous episodes. Persistence of hiccups during sleep suggests an organic cause, but conversely if a patient is unable to sleep or if the hiccups stop during sleep and recur promptly on awakening, this suggests a psychogenic or idiopathic etiology.
- Look in the ears (foreign bodies against the tympanic membrane can cause hiccups). Examine the neck, chest and abdomen, perhaps including upright chest x rays, to look for neoplastic or infectious processes irritating the phrenic nerve or diaphragm. Pericarditis and aberrant cardiac pacemaker electrode placement are potential sources of persistent hiccups, as well as acute and chronic alcohol intoxication and gastroesophageal reflux. Perform a neurological exam, looking for evidence of partial continuous seizures or brainstem lesions. Early multiple sclerosis is thought to be one of the most frequent neurologic causes of intractable hiccups in young adults.
- Routine laboratory evaluation may include a CBC with differential (looking for infection or neoplasm) and electrolytes (hyponatremia can cause persistent hiccups).
- If hiccups persist, try chlorpromazine (Thorazine) 25-50mg po tid or qid. (The same dose may be given im.) Alternatively, im haloperidol (Haldol) 2-5mg followed by po 1-4mg tid for two days may be equally effective with less potential for side effects. Another approach is to use metaclopramide (Reglan) 10mg iv or im followed by a maintenance regimen of 10 to 20mg qid for 10 days.
- Arrange for followup and additional evaluation. Although unlikely, there are potentially serious complications such as dehydration and weight loss resulting from the inability to tolerate fluids and food.

Discussion

Hiccups are a common malady and fortunately usually transient and benign. The common denominator among various hiccup cures seems to be stimulation of the glossopharyngeal nerve, but, as for every self limiting disease, there are always many
effective cures.

"...hold your breath, and if after you have done so for some time the hiccup is no better, then gargle with a little water, and if it still continues, tickle your nose with something and sneeze, and if you sneeze once or twice, even the most violent hiccup is sure to go." --Eriximachus the physician to Aristophanes, in Plato's Symposium

References:

6.02 Esophageal Food Bolus Obstruction (Steakhouse Syndrome)

Presentation

The patient develops symptoms immediately after swallowing a large mouthful, usually of inadequately chewed meat, the result of intoxication, wearing dentures or being too embarrassed to spit out a large piece of gristle. The patient often develops substernal chest pain that may mimic the pain of a myocardial infarction. This discomfort though, increases with swallowing, is followed by retained salivary secretions which, unlike infarction, leads to drooling. The patient usually arrives with a receptacle under his mouth into which he is repeatedly spitting. At times these secretions will cause paroxysms of coughing, gagging, or choking.

What to do:

- Complete a history and physical examination. If you suspect an esophageal perforation, take PA and lateral x rays of the neck and chest, looking for subcutaneous emphysema, pneumomediastinum, pneumothorax and pleural effusion.
- If the patient is troubled by drooling and spitting of saliva, insert a small nasogastric tube to the point of obstruction and attach it to low intermittent suction. This will assist the patient in handling excess secretions and reduce the risk of aspiration.
- If there is a question of esophageal obstruction, give 5ml of dilute barium po and x ray the chest to locate the foreign body. When the history and physical findings are classic for a meat impaction in the esophagus there is no need to perform a barium swallow, which many later obscure the view of a consulting endoscopist. If there might be a perforation of the esophagus, use a water-soluble contrast medium like Gastrografin.
- Give 1 unit of glucagon iv to decrease lower esophageal sphincter pressure (infuse slowly to prevent nausea and vomiting). This will sometimes allow for passage of a food bolus. If there is no response, repeat after 30 minutes.
- One means of passing a lower esophageal meat impaction of less that six hours into the stomach after glucagon is to have the patient sit up and drink 100ml of a carbonated beverage or EZ gas (sodium bicarbonate, citric acid, simethicone) followed by 240ml of water.
- If the food does not pass spontaneously, and you do not have access to a gastroenterologist with an endoscope, prepare the patient for manual extraction. Start an intravenous line for drug administration and anesthetize the pharynx with Cetacaine spray or viscous lidocaine 2%. Place the patient on his side and slowly administer diazepam intravenously until the patient is very drowsy. Take a gastric Ewald lavage tube, cut off the end until there are no side ports and round off the new tip with scissors. Push the Ewald tube through the patient’s mouth until the obstruction is reached. Take a large aspiration syringe, have an assistant apply suction to the free end of the Ewald tube and slowly withdraw it. If suction is maintained, the bolus will come up with the tubing.
- If the patient is unable to tolerate this procedure or you are unsuccessful in removing
the foreign body, consult with an endoscopist for an early removal with a flexible fiberoptic esophagoscope.

- When removal of the food bolus has been successful, early medical follow up should be provided for a comprehensive evaluation of the esophagus. Patients who have experienced a prolonged obstruction or do not have complete resolution of all their symptoms should be admitted to the hospital for further observation and management.

**What not to do:**

- Do not ignore a patients' claims of a foreign body stuck in the esophagus. They are usually right.
- Do not try to force the food bolus down with the Ewald tube or an other catheter or dilator. This may cause an esophageal tear or perforation.
- Do not use oral enzymes such as papain, trypsin or chymotrypsin. This treatment is slow, ineffective, and may possibly carry a risk of enzyme-induced esophageal perforation.
- Do not attempt to remove a hard, sharp, esophageal foreign body using any of the above techniques. This very likely will cause an esophageal injury.
- Do not give glucagon to patients with pheochromocytoma or insulinoma.
- Do not use barium-impregnated cotton balls to detect esophageal FBs. If a FB is present, they will obscure the view of the endoscopist.

**Discussion**

Patients who experience a food bolus obstruction of the esophagus are usually over 60 years old and often have an underlying structural lesion. One of the more common lesions is a benign stricture secondary to reflux esophagitis. Another abnormality, the classic Schatzki’s ring (distal esophageal mucosal ring), especially above a hiatal hernia, may present with the "steakhouse syndrome" in which obstruction occurs and is relieved spontaneously. Other associated problems include postoperative narrowing, neoplasms and cervical webs as well as motility disorders, neurological disease and collagen vascular disease. Chicken bones are the FBs that most often cause esophageal perforation in adults. Meat impacted in the proximal two thirds of the esophagus is unlikely to pass and should be removed as soon as possible. Meat impacted in the lower third frequently does pass spontaneously and the patient can safely wait, under medical observation, up to 12 hours before extracation. Even if a meat bolus does pass spontaneously, endoscopy must still be done later to assess the almost certain (80-90%) underlying pathology. Additional modes of therapy include the use of sublingual nitroglycerin or nifedipine to relax the lower esophageal sphincter, but they are not usually as effective as intravenous glucagon.

**References:**

- Rice B: Acute esophageal food impaction treated by gas-forming agents. Radiology 1983;146:299-
6.03 Swallowed Foreign Body

Presentation

Parents bring in a young child shortly after he has swallowed a coin, safety pin, toy, etc. The child may be asymptomatic or have recurrent or transient symptoms of vomiting, drooling, dysphagia, pain or a foreign body sensation. Disturbed adults may be brought from mental health facilities to the hospital on repeated occasions, at times accumulating a sizeable load of ingested material.

What to do:

- Ask about symptoms and examine the patient, looking for signs of airway obstruction (coughing, wheezing) or bowel obstruction or perforation (vomiting, melena, abdominal pain, abnormal bowel sounds).
- Obtain two plain x ray views of throat to at least the mid abdomen to determine if indeed anything was ingested or if the foreign body has become lodged someplace or produced an obstruction. A barium swallow may occasionally be necessary to locate a nonopaque foreign body in the esophagus.
- A foreign body with sharp edges or a blunt FB lodged in the esophagus for more than a day should be removed endoscopically, because it is likely to cause a perforation, and is still accessible.
- When a coin or other smooth object has been lodged in the upper esophagus for less than 24 hours, it can usually be removed using a simple Foley catheter technique. When available, it should be performed under fluoroscopy, although it can be done as a blind procedure. With the patient mildly sedated (e.g., midazolam (Versed) 0.5mg/kg per rectum, intranasally or po, with half an hour allowed for absorption) position with the head down (Trendelenberg) to minimize aspiration. Restrain uncooperative patients. Have a functioning laryngoscope, forceps and airway equipment at hand. Test the balloon of an 8 to 12 French Foley catheter to ensure that it inflates symmetrically. Lubricate the catheter with water-soluble jelly and insert it through the nose into the esophagus to a point distal to the FB. Inflate the balloon with 5ml of air and apply gentle traction on the catheter until the FB reaches the base of the tongue. While encouraging the patient to cough or spit out the FB, further traction will cause involuntary gagging and expectoration. Immediately deflate the balloon and remove the catheter. If a first attempt at removal fails, make a second and third try, then consult an endoscopist. When removal is successful, discharge the patient after a period of observation.
- When a FB has passed into the stomach and there are no symptoms which demand immediate removal, discharge the patient with instructions to return for reevaluation in seven days (or sooner if he develops nausea, vomiting, abdominal pain, rectal pain, or rectal bleeding). Pediatricians have a saying that objects larger than two inches will not pass the second portion of the duodenum in a child under two years old. Having parents sift through stools is often unproductive (one missed stool negates days of hard work). It may be helpful to give a bulk laxative to help decrease the intestinal transit time.
What not to do:

- Do not use ipecac for FB ingestions. Emesis is effective for emptying the stomach of liquid and dissolved drugs, but not for removing FBs from the esophagus or stomach.
- Do not forcefully remove an esophageal FB, especially if it is causing pain. This may lead to injury or perforation.
- Do not automatically assume that an ingested FB should be surgically removed. The vast majority of potentially injurious FBs pass through the alimentary tract without mishap. Operate only when the patient is actually being harmed by the swallowed FB or when there is evidence that it is not moving down the alimentary tract.
- Do not attempt to push an foreign body blindly down the esophagus with a nasogastric tube or other such device. Use an endoscope.
- Do not miss additional coins after removing one from the proximal esophagus. Take a repeat x-ray after removal of one.

Discussion

The narrowest and least distensible strait in the gastrointestinal tract is usually the cricopharyngeus muscle at the level of the thyroid cartilage. Next narrowest is usually the pylorus, followed by the lower esophageal sphincter and the ileocecal valve. Thus, anything which passes the throat will probably pass through the anus as well. In general, foreign bodies below the diaphragm should be left alone. A swallowed foreign body can irritate or perforate the GI tract anywhere, but does not require treatment until complications occur.

A significant portion of children with esophageal foreign bodies are asymptomatic and therefore any child suspected of ingesting a foreign body requires an x-ray to document whether or not it is present and if so where it is located. Children with distal esophageal coins may be safely observed up to 24 hours before an invasive removal procedure, since most will spontaneously pass the coins. Even safety pins and razor blades usually pass without incident.

Large button batteries (the size of quarters) have become stuck in the esophagus, eroded through the esophageal wall, and produced a fatal exsanguination; but the smaller variety, and batteries which passed into the gut, have not been such a danger.

References:

- Connors GP, Chamberlain JM, Ochsenschlager DW: Symptoms and spontaneous
6.04 Innocuous Ingestions

Presentation

Frightened parents call or arrive in the emergency room with a two-year-old child who has just swallowed some household product.

What to do:

- Establish exactly what was ingested (have them locate the container or bring in a sample if possible), how much, how long ago, as well as any symptoms and treatment so far.
- If there is any question about the substance, its toxicity, or its treatment, call the regional poison control center. In fact, it is a good policy to call the regional poison center even if you are completely comfortable managing the case, so that they can record the ingestion for epidemiologic purposes.
- If there is any question of this being a toxic ingestion, give the child syrup of ipecac, 15ml po, followed by one glass of water, and expect to see emesis in 20-40 minutes.
- Reassure the parents and child, and instruct them to call or return to the ED if there are any problems. Teach parents how to keep all poisons beyond the reach of children; how to get syrup of ipecac for home use (at any pharmacy, without a prescription, for $1-$2) and how to call the regional poison center first for any future ingestions.
- Do not totally believe what you're told about the nature of the ingestion. Often some of the information immediately available is wrong. Suspect the worst.
- Do not depend on product labels to give you accurate information on toxicity. Some lethal poisons carry warnings no more serious than "use as directed," or "for external use only."
- Do not follow the instructions on the package regarding what to do if a product is ingested. These are often inaccurate or out-of-date.
- Do not give ipecac for emesis of liquids that are corrosive or toxic only when aspirated, such as hydrocarbons.
- Do not improvise treatment of a patient referred to you by the regional poison center. They probably have special information and a treatment plan to share with you, if they have not called already.

Discussion

Fortunately, most products designed to be played with by children are also designed to be non-toxic when ingested. This includes chalk, crayons, ink, paste, paint, and
Play-Doh. Many drugs, such as birth control pills and thyroid hormone, are relatively non-toxic, as are most laundry bleaches, the mercury in thermometers and many plants. On the other hand, some apparently innocuous household products are surprisingly toxic, including camphorated oil, cigarettes, dishwasher soap, oil of wintergreen, and vitamins with iron. Because both the ingredients of common products and the treatment of ingestions continue to change, broad statements and lists are not reliable. Your best strategy is always to call the [regional poison control center](http://www Poisoncontrol.org).
6.05 Regional Poison Control Centers

Many of these centers also have 800 numbers for use in state only.

- **Alabama**
  - Tuscaloosa (205) 345-0600
  - Birmingham (205) 939-9201

- **Arizona**
  - Tucson (602) 626-6016
  - Phoenix (602) 253-3334

- **California**
  - Fresno (209) 445-1222
  - San Diego (619) 543-6000
  - San Francisco (800) 523-2222
  - Santa Clara (408) 885-6000
  - Sacramento (916) 734-3692

- **Colorado** (303) 629-1123
  - District of Columbia (202) 625-3333

- **Florida**
  - Jacksonville (904) 549-4480
  - Tampa (813) 253-4444

- **Georgia** (404) 616-9000
- **Indiana** (317) 929-2323
- **Kentucky** (502) 629-7275
- **Maryland** (410) 528-7702
- **Massachusetts** (617) 232-2120
- **Michigan** (313) 745-5711
- **Minnesota**
  - Minneapolis (612) 347-3141
  - St Paul (612) 221-2113

- **Missouri** (314) 772-5200
- **Montana** (303) 629-1123
- **Nebraska** (402) 390-5555
- **New Jersey** (800) 962-1253
- **New Mexico** (505) 843-2551
- **New York**
- Hudson Valley (914) 366-3030
- Long Island (516) 542-2323
- New York City (212) 340-4494

- Ohio
  - Columbus (614) 228-1323
  - Cincinnati (513) 558-5111

- Oregon (503) 494-8968
- Pennsylvania
  - Hershey (800) 521-6110
  - Philadelphia (215) 386-2100
  - Pittsburgh (412) 681-6669

- Rhode Island (410) 277-5727
- Texas
  - Dallas (214) 590-5000
  - Galveston (409) 765-1420
  - San Antonio (800) 764-7661

- Utah (801) 581-2151
- Virginia (804) 924-5543
- West Virginia (304) 348-4211
- Wyoming (402) 390-5555
6.06 Food Poisoning - Staphylococcal

Presentation

The patient is brought to the ED 1 to 6 hours after eating, with severe nausea, vomiting, and abdominal cramps progressing into diarrhea. He appears very ill: pale, diaphoretic, tachycardic, orthostatic, perhaps complaining of paresthesias or feeling as if he is "going to die." Others may have similar symptoms from eating the same food. The physical examination, however, is reassuring. There is minimal abdominal tenderness, localized, if at all, to the epigastrium or to the rectus abdominus muscle (which is strained by the vomiting).

What to do:

- Completely examine the patient, and perform any tests needed to rule out myocardial infarction, perforated ulcer, dissecting aneurysm, or any of the catastrophes which can present in similar fashion.
- In the meantime, infuse 0.9% NaCl or Ringer's lactate solution intravenously and observe the patient, doing repeated vital sign checks and physical examination. In younger patients, who have the renal and cardiovascular reserve to handle rapid hydration, 1-2 liters infused over an hour often provides dramatic improvement in all symptoms.
- If the patient is improving, and beginning to tolerate oral fluids, discharge him with instructions to advance his diet over the next hours, starting with an oral rehydration solution such as
  - 3/4 teaspoon of table salt
  - one teaspoon of baking soda
  - one cup of orange juice
  - four tablespoons of sugar and
  - four cups of water.

He should expect to be eating and feeling well in another 1 or 2 days.
- If symptoms resolve more slowly, you may want to discharge the patient with a single dose of an antiemetic or antispasmodic such as a prochlorperazine (Compazine) 25mg suppository or a dicyclomine (Bentyl) 20mg tablet.
- If hypotension or other significant symptoms persist; if the patient cannot tolerate parenteral rehydration, or cannot resume oral intake; he may have to be admitted.

What not to do:

- Do not immediately resort to medications (e.g., Compazine, Tigan) for nausea and vomiting. They may interfere with elimination of toxins, and do not help correct the fluid and electrolyte imbalances responsible for many of the symptoms.
- Do not immediately resort to medications (e.g., Lomotil, Imodium) for cramping and
diarrhea, for the same reasons.
- Do not skimp on intravenous fluids.
- Do not pursue expensive laboratory investigations on straightforward cases.
- Do not presume food poisoning without a good history for it.

Discussion

Many of the symptoms accompanying any gastroenteritis seem to be related to electrolyte disturbances and dehydration, which can be substantial even in the absence of copious vomiting and diarrhea, and resistant to oral rehydration, because the gut is unable to absorb, and allows liter after liter to pool in its lumen. Lactated Ringer's solution is the choice for intravenous rehydration, because it approximates normal serum electrolytes, and can be infused rapidly. Lactated Ringer's approximately replaces the electrolytes lost in diarrhea, but normal saline has more of the chloride lost by vomiting.

The most common food poisoning seen in most EDs is caused by the heat-stable toxin of Staphylococcus, which is introduced into food from infections on handlers, and grows when the food sits warm. Chemical toxins have a similar presentation, but the onset of symptoms may be more immediate. Other bacterial food poisonings usually present with onset of symptoms later than 1-6 hours after eating, less nausea and vomiting, more cramping and diarrhea, and longer courses. A clearly implicated food source may give a clue to the etiology: shellfish suggesting Vibrio parahemolyticus, rice suggesting Bacillus cereus, meat or eggs suggesting Staphylococcus, Campylobacter, Clostridium, Salmonella, Shigella, enteropathic E. Coli, or Yersinia..

Whenever someone suffers any gastrointestinal upset, it is natural, if not instinctive, to implicate the last food eaten. Caution patients (especially if they are planning to sue the food supplier) that the diagnosis of food poisoning cannot be established without a group outbreak or a sample of tainted food for analysis.
6.07 Diarrhea

Presentation

Complaints may range from acute, copious diarrhea producing shock, to concern because an occasional stool is not well formed. Typically, there is crampy pain throughout the abdomen, especially before a diarrhea stool, and some irritation of the anus. Tenesmus (the frequent urge to defecate) can exist without diarrhea.

What to do:

- Ask specifically about the frequency of stools, the volume (much liquid implies a defect in absorption in the small bowel, while tenesmus producing little more than mucus implies inflammation of the rectosigmoid wall), the character (color, odor, blood, or mucus) and the consistency (like water or just loose stool). Ask about travel, medications (including antibiotics), prior similar symptoms, and nocturnal symptoms (rare with functional disease).
- Perform orthostatic vital signs and urinalysis and weigh pediatric patients. Any symptoms, fall in pressure, or pulse rise of more than 20 beats per minute after standing for a minute suggests hypovolemia. A urine specific gravity of 1.020 or greater also suggests hypovolemia, and ketones of 2+ or greater suggest starvation ketosis.
- Perform a rectal examination and obtain a sample of stool for occult blood testing and for Wright's or Gram stain. If the rectal ampulla is empty, you can still swab the mucosa, and may get an even better specimen for stool culture. A spontaneous specimen is also good. If the patient has recently been on antibiotics, test the stool for clostridium difficile.
- If there are any white cells in a 400x field, assume the problem is invasive or inflammatory (Campylobacter, Salmonella, Shigella, Entameba, ulcerative colitis, et cetera). Send a stool culture, prescribe ciprofloxacin 500mg bid x 3d, and schedule follow up. Ask the patient to bring a fresh stool sample in a specimen cup at follow up in case it needs to be examined for ova and parasites.
- If there no white blood cells on microscopic examination of the stool, assume the diarrhea is due to a virus or toxin. Afebrile patients with limited diarrhea require no treatment other than fluid and electrolyte replacement. These patients will not benefit from antibiotics, and require follow up only if they have continued diarrhea, abdominal pain, or fever.
- Both classes of diarrhea are best treated with absorbent bulk laxatives, such as bran or ground psyllium seeds (Metamucil 1 tbsp in a glass of water up to qid).
- To adsorb toxins and provide some binding effect, add Amphogel, Diasorb or Kaopectate, 1 tbsp qid, or bismuth subsalicylate (Pepto- Bismol) 2 tbsp each half-hour until symptoms subside, or to a total of eight doses (this does contain salycilates, and bismuth will turn stools black).
- With infants and small children, oral rehydration therapy should be the main treatment. Antimicrobial drugs should be given only for dysentery (bloody diarrhea) and suspected cholera. Have the patients give an oral rehydration mixture with the
goal of replacing the fluid lost. For every one cup of diarrhea lost, give a cup of the following recipe:

- 1/2 to 1 cup precooked baby rice cereal
- 2 cups water
- 1/4 teaspoon salt

Mix the rice cereal, water and salt together until the mixture thickens but is not too thick to drink. Be sure the ingredients are well mixed. Have the parents give the mixture by spoon often and have them offer the child as much as he will accept (every minute if he will accept it). Even if the child is vomiting, the mixture can be offered in small amounts (1/2 - 1 tsp) every few minutes. Banana or other non-sweetened mashed fruit can help provide potassium. Alternatively, one can give commercial rehydration fluids sold in drugstores like Rehydralate, Ricelyte or Pedialyte.

- During or after diarrhea, children should be given small meals frequently (six or more times a day) and actively encouraged to eat. Parents should use well-cooked staple starches that can be easily digested such as rice, corn, potatoes or noodles in a soft mashed form. For infants, they should use a thick porridge or semi-liquid pulp.
- Patients with severe dehydration that cannot be reversed orally may require large amounts of intravenous fluids and occasionally must be admitted to the hospital.

What not to do:

- Do not omit the rectal exam, which may disclose a fecal impaction or abscess.
- Do not stop or reduce breast feeding when a baby has diarrhea. Infants with diarrhea should be breastfed as often and for as long as they want.
- Do not give give or recommend sugary drinks such as Gatorade, sweetened commercial fruit drinks, cola drinks or apple juice, which may cause an osmotic diarrhea and a net loss of fluid.
- Do not give additional aspirin-containing drugs to patients taking bismuth subsalicylate (Pepto-Bismol)

Discussion

Most cases of mild to moderate diarrhea (defined as no more than five unformed stools a day without fever, blood or significant cramps, pain, nausea or vomiting) can be handled without an investigation of the etiology.

When you prescribe bran or psyllium, patients may remind you that they have diarrhea, not constipation, but, because these agents absorb water in the gut lumen, they can relieve both problems, and obviate the rebound constipation often produced by the narcotic and binding agents also used to treat diarrhea.

The three commonest causes of diffuse colonic inflammation and thus fecal leukocyte exudate are Shigella, Salmonella and Campylobacter. Fecal leucocytes can also be a sign of ulcerative colitis and allergic colitis.
Most bacterial diarrheas do not require treatment with antibiotics, which can produce a carrier state. The presumptive ciprofloxacin strategy described for the ED will suite most patients, but may have to be modified in follow up based upon the patient's course and stool culture results. Early empiric treatment of traveller's diarrhea with a single 500mg dose of ciprofloxacin can reduce the duration and severity of the illness.

Infants can become severely dehydrated in short order with viral diarrhea. Old patients medicated for pain or psychosis can develop a fecal impaction which can also present as diarrhea. Irritable bowel syndrome, food allergy, lactose intolerance and parasite infestation can produce relapsing diarrhea, but the pattern may only become apparent on follow up.

References:

# 6.08 Gas Pain and Constipation

## Presentation

Excruciating, bloating, sharp, crampy, migratory abdominal pain may double the patient over, but last only a few seconds and is relieved by bowel movement and passing flatus. It may be related to loud bowel sounds (borborygmi) but not to position, eating, or other causes, and is not accompanied by other symptoms, such as nausea, vomiting, diarrhea, urinary urgency, et cetera. Rarely are patients awakened with nocturnal symptoms. The physical examination is also benign, with no tenderness, masses, organomegaly, or other abnormalities, and the patient does not appear ill between the episodes of abdominal pain. Bowel sounds may become loud during each episode of cramps.

### What to do:

- Take a thorough history and try to determine the time of onset of symptoms and whether their severity is increasing or decreasing. Ask if there was a similar episode in the past. Perform a complete physical examination, including rectal and/or pelvic examination, and a repeat abdominal examination after an interval.
- If the presentation is not clear, consider using diagnostic tests like urinalysis (to help rule out renal colic or urinary tract infection); differential white blood cell count (a clue to infection or inflammation); abdominal x rays (to show free peritoneal air or bowel obstruction); ultrasonography (pyloric stenosis, malrotation and intussusception in children, appendicitis and gallbladder disorders).
- If constipation is part of the problem, disimpact the rectum, if necessary, and try one enema in the ED.
- Instruct the patient to try relieving symptoms with ambulation, and local heat, and to return to the ED or see his personal physician if symptoms do not resolve over the next 12-24 hours. Suggest bulk in the form of bran or Metamucil for prophylaxis.
- If the problem is chronic or recurrent, or associated with alternating constipation and diarrhea, suspect irritable colon inflammatory bowel disease or diverticulitis.

### What not to do:

- Do not discharge the patient without one or two hours of observation, and two abdominal examinations. Many abdominal catastrophes may appear improved for short periods, only to worsen in an hour or two.

## Discussion

While a patient may swallow excessive air in response to anxiety, an increased rate of "empty" swallowing may also accompany a number of gastrointestinal abnormalities including hiatal hernia and chronic cholecystitis. Heartburn increases salivation and therefore the frequency of swallowing. In addition to air swallowing, intraluminal
gas-producing bacteria provide the other major mechanism for causing excess intestinal gas. Some patients may be helped by advising them to reduce or eliminate their intake of foods that contain non-absorbable carbohydrates such as beans, broccoli, cauliflower and cabbage. Alternatively, they can be instructed to take Beano food enzyme tablets with these healthful foods.

Colic attacks usually start when an infant is 7 to 10 days old and increase in frequency for the next one to two months. They do not just happen suddenly one night when the infant is six or eight weeks old. In that situation, look for some other acute problem such as corneal abrasion, incarcerated hernia or digital hair tourniquet in an infant who is irritable or feeding poorly with no previous problems. Constipation is one of the most common causes of pediatric abdominal pain. After a digital rectal examination, a glycerin suppository in infants or a single cleansing enema in children may provide rapid symptomatic relief.
6.09 Enterobiasis (Pinworm or Threadworm)

Presentation

The patient complains of perianal itching which is worse at night, and may contribute to insomnia or superinfection of the excoriated perianal skin. Often, an entire family is affected.

What to do:

- Examine the anus to rule out other causes of itching, such as rectal prolapse, fecal leakage, hemorrhoids, lice (pediculosis), fungal infections (tinea or candidiasis), or bacterial infections (erythrasma).
- Look for pinworms directly (especially if the patient comes in at night), and by pressing the sticky side of cellophane tape wrapped around a tongue blade to the perianal skin. Examine the tape under the low power of the microscope for female worms, approximately 1 cm long, 0.5 mm in diameter, with pointed tails. (Use shiny rather than "invisible" tape, because the latter's rough surface makes microscopy difficult.)
- If you see pinworms or still suspect them, administer a single oral dose of pyrantel pamoate 11 mg/kg (maximum 1 gram) to all family members (Antiminth oral suspension, 1 ml per 10 lb). Alternate drugs include mebendazole (Vermox) 100 mg in a single po dose (not for infants and pregnant women) and pyrvinium pamoate.
- Explain to all concerned that this is not a dangerous infection, and that it should be eradicated from the whole family after one treatment (which may be repeated in two or more weeks if there are recurrences).

Discussion

Pinworms mostly live in the colon, and females migrate down to the perianal skin to lay eggs at night. Eggs on contaminated fingers re-enter via the mouth, but remain viable for several days on surfaces around the house. Perhaps 10% of the U.S. population harbors pinworms, especially children.
6.10 Hemorrhoids (Piles)

Presentation

Patients with external hemorrhoids generally complain of a painful purple lump covered with anal skin. It may have been precipitated by straining during defecation, heavy lifting, or pregnancy, but in most cases there was no definite preceding event. The external hemorrhoidal swelling is caused by thrombosis of the vein and is very tender to palpation and usually does not bleed unless there is erosion of the overlying skin.

Patients with internal hemorrhoids usually seek help because of painless (or nearly painless) bright red bleeding at the time of defecation. Patients usually notice intermittent spotting on toilet tissue or episodic streaking of stool with blood. A prolapsed internal hemorrhoid appears as a protrusion of painless, moist red mass covered with rectal mucose at the anal verge. Prolapsed internal hemorrhoids may become strangulated and thrombosed, and thus painful. Itching is not a common symptom of hemorrhoids.

What to do:

- If the problem is rectal bleeding, it should be approached as any other gastrointestinal bleeding. The amount of bleeding should be quantified with orthostatic vital signs and a hematocrit; the rectum should then be examined with an anoscope. For non-threatening rectal bleeding from hemorrhoids, the initial management should include a high fiber diet, stool softeners and bulk laxatives, and the patient should be instructed to spend less time sitting on the commode. Prolapsed or strangulated hemorrhoids warrant surgical consultation and possible hospital admission. All patients with rectal hemorrhage should be referred for a thorough gastroenterologic evaluation which might include proctosigmoidoscopy, barium enema or colonoscopy. Young patients in whom hemorrhoids are the obvious source of bleeding may not require more than a digital rectal examination and anoscopy.
- If the problem is pain, the rectum should be examined using a topical anesthetic (lidocaine jelly) as a lubricant. First look for thrombosed external hemorrhoids and prolapsed internal hemorrhoids. Have the patient perform a Valsalva maneuver as you provide traction on the skin of the buttocks, to evert the anus. Examine the posterior mucosa for anal fissures. After the topical anesthesia has taken effect, complete the digital rectal exam, looking for internal hemorrhoids and evidence of rectal abscesses or other masses.
- If topical mucosal anesthetic does not give enough relief to permit examination, follow with subcutaneous injection of 10mL of 1% lidocaine with epinephrine or bupivacaine for extended pain relief.
- If topical anesthetics on the rectal mucosa help control the pain, provide for more of the same, perhaps also with some added corticosteroid for anti-inflammatory effect (Anusol-HC cream). Suppositories are convenient, but may not deliver the medication to where it is needed, so prescribe cream or foam (Proctofoam-HC, applied externally rather than internally).
• Instruct the patient to treat lesser pain and itching with witch hazel compresses, Tucks, and ice packs followed by warm sitz baths. Prevent constipation by using bulk laxatives (bran, psyllium) and stool softeners (docusate 50mg qd) and arrange follow up. Inform the patient that hemorrhoids may recur and require surgical removal.
• Small ulcerated external hemorrhoids usually do not require any treatment for hemostasis. Bulk laxatives and gentle cleansing are generally all that is required.
• If a thrombosed external hemorrhoid is still moderately to severely painful after topical anesthesia, apply an ice pack for 15 minutes and then inject around it with a local anesthetic to allow for examination and excision. The thrombus may be enucleated via an elliptical incision over the anal mucosa. Locular clots can be broken up by inserting a straight hemostat into the wound, and spreading the tips, thereby allowing the clots to be expressed. Pain relief from this simple surgical technique can be dramatic, but excision is not effective unless the entire thrombosed lesion is completely removed. Apply a compression dressing and tape the buttocks together for 12 hours to minimize bleeding. The patient can then begin the non-surgical treatment described above. Schedule a follow up examination in 2 days. Narcotics may be prescribed for a day, but should be switched to NSAIDs as soon as the risk of bleeding is less so they do not cause constipation.

What not to do:

• Do not labor to reduce prolapsed hemorrhoids unless they are part of a large rectal prolapse with some strangulation. Everything may prolapse again when the patient stands or strains.
• Do not traumatize the patient with your examination.
• Do not miss infectious and neoplastic processes which can resemble or coexist with hemorrhoids.
• Do not excise a thrombosed hemorrhoid when the patient has a bleeding abnormality, is taking an anticoagulant or daily aspirin, or has increased portal venous pressure.

Discussion

The pathogenesis of hemorrhoids is multifactorial. Predisposing factors include heredity, portal hypertension, straining to defecate, and pregnancy. Internal hemorrhoids are classified into four groups. First-degree internal hemorrhoids do not protrude, cannot be palpated by digital examination, and require anoscopy for diagnosis. Second-degree hemorrhoids protrude with defecation, but reduce spontaneously. Third-degree hemorrhoids protrude and require manual reduction. Fourth-degree hemorrhoids are irreducibly prolapsed. Elastic banding techniques can be 80-90% curative for second, third and fourth degree internal hemorrhoids, but can increase prolapse of first-degree hemorrhoids. Patients with bleeding diatheses, prolapse or both internal and external hemorrhoids are best treated by surgical resection. The diagnosis of "hemorrhoids" may cover a variety of minor ailments of the anus, which may or may not be related to the hemorrhoidal veins. The ED approach consists of ruling out immediately life-threatening problems, and then providing the patient with symptomatic relief and appropriate referral.
6.11 Anal fissure

Presentation

The patient complains of painful rectal bleeding and perhaps constipation. The pain occurs with and immediately after defecation, and the patient is relatively comfortable between bowel movements. Bleeding with defecation is usually slight, only staining the toilet tissue. Mucus discharge may increase perineal moisture and cause itching. Examination of anus reveals a radial tear or ulceration of the posterior midline 95% of the time (the fissure is anterior in 10% of women but only 1% of men). If the condition becomes chronic, distal edema may produce a "sentinel pile."

What to do:

- Provide topical anesthesia with lidocaine jelly or viscous lidocaine in order to perform a reasonably comfortable rectal examination.
- Advise the patient to use psyllium seed supplements (e.g. Metamucil) to soften stools and to use a glycerin suppository twice daily to maintain lubrication of the anal canal.
- Instruct the patient to use warm, soothing sitz baths after each painful bowel movement.
- Prescribe analgesics if needed.
- Inform the patient that an acute superficial fissure will take about one month to heal. He should follow up if symptoms continue.

What not to do:

- Do not assume that a lesion located outside the anterioposterior midline saggital plane of the anus is an anal fissure. Other possibilities include ulcerative colitis, squamous cell carcinoma, leukemia, tuberculosis, syphilis, herpes and trauma from instrumentation and anal intercourse.
- Do not confuse a "sentinel pile" with a hemorrhoidal vein.

Discussion

Pruritis ani has multiple etiologies. Infections such as pinworms, Candida albicans, Tinea cruris and erythrasma can cause anal itching. Mechanical trauma from overly vigorous cleansing of the perianal area may also cause pruritis and may be aggravated by diarrhea and by the presence of external or prolapsed hemorrhoids or multiple skin tags which make cleansing more difficult. Another cause of pruritis ani is allergic or contact dermatitis from agents such as soaps, perfumes in toilet tissue and feminine hygiene sprays as well as spicy foods, tomatoes, citrus fruits and colas, coffee and chocolate. Other causes of pruritis ani include chronic anorectal disease and cancer. If a specific cause of anal pruritis can be determined, then treat it accordingly. If the etiology is obscure, the patient can be treated with hydrocortisone cream to reduce itching and inflammation, followed by zinc oxide as a barrier cream. The patient should be
instructed to gently cleanse the anal area with a cotton ball and a perineal cleansing lotion after each bowel movement, and should be directed to obtain follow up care. A systemic anti-pruritic agent such as hydroxyzine (Vistaril) 50mg qid may be prescribed.

References:

6.12 Rectal Foreign Body

Presentation

An object is generally inserted by the patient or a partner for sexual stimulation; then it causes pain or bleeding or becomes irretrievable. There may be rectal or lower abdominal pain, obstipation or acute urinary retention. Sometimes the patient will not volunteer that any object has been inserted, or give outlandish explanations such as having sat or fallen onto the object. When interviewed privately, however, the patient will usually give an accurate accounting of the foreign body.

What to do:

- Perform an abdominal and rectal exam. If there are signs of peritoneal inflammation, such as rebound tenderness or pain with movement, a perforation of the bowel should be suspected, and you should start appropriate intravenous lines, draw blood for laboratory analysis, obtain flat and upright abdominal x rays to look for free air, notify surgical consultants and administer intravenous antibiotics.
- If there are no signs of perforation, still obtain flat and upright abdominal films to help define the nature, size, and number of foreign objects (as well as to reveal unsuspected free air).
- Sedate the patient with intravenous benzodiazepines and narcotics to help in the removal of the foreign body. Place the patient on his side in the Sims position. If anal discomfort persists, instill lidocaine jelly for mucosal anesthesia or locally infiltrate 1% lidocaine with epinephrine. The method of removal must be individualized depending on the size, shape, consistency and fragility of the object.
- When the object can be reached by the examining finger and it is of a nature that will allow it to be grasped, a lax anal sphincter may allow you slowly to insert as much of your gloved hand as possible to grab the object and gradually extricate it. Perforate fruit with your fingertips.
- If you are unable to pull out the foreign body with your hand, there are a number of techniques that can be used to get a purchase on the object and break the vacuum behind it:
  - Slide a large Foley catheter with a 30cc balloon past the object, inflate the balloon, and apply traction to the catheter. (This can be used in conjunction with any of the other techniques.) Two catheters may occasionally be needed and air can be instilled through the lumen of the catheter. Picture
  - Under direct visualization with an anoscope or vaginal speculum, you can attempt to grasp the object with a tenaculum, sponge forcep, Kelly clamp or tonsil snare. Picture
  - An open object, like a jar or bottle, can be filled with wet plaster, into which a tongue blade can be inserted like a popsicle stick. When the plaster hardens, traction can be applied to the tongue blade.
• Forceps or soup spoons can be used to "deliver" a round object.

• With an object that is too high to reach, the patient can be admitted and sedated for removal the next day.
• When the object cannot be removed due to patient discomfort or sphincter tightness, then removal must be accomplished in the OR under spinal or general anesthesia.
• When blood is present in the rectum or the object is capable of doing harm to the bowel, then sigmoidoscopy should be performed after removal of the foreign body. When pain persists or there is any lingering suspicion of a bowel perforation, keep the patient for observation.

What not to do:

• Do not pressure the patient into giving you an accurate story. He may be embarrassed and intimidation will not help.
• Do not push the object higher into the colon while attempting to remove it.
• Do not blindly grab for an object with a tenaculum or other such device. This can itself lead to a perforation.
• Do not attempt to remove sharp, jagged objects such as broken glass via the rectum. These should only be removed under anesthesia in the OR.
• Do not send a patient who is having continued pain home. Admit him and observe for peritoneal signs, increased pain, fever, and a rising white count.

Discussion

Most rectal foreign bodies (vibrators, dildos, broom handles, bottles, lightbulbs, balls, fruits, and vegetables) can be removed safely in the emergency department. Some practitioners quite reasonably forego x rays prior to manipulation if the patient is free of pain and fever. The famous gerbil is urban folklore. Consider recommending sexual or psychological counselling.

References:

Presentation

The patient (usually female) complains of urinary frequency and urgency, internal dysuria, and suprapubic pain. There may have been some antecedent trauma (sexual intercourse) to inoculate the bladder, and there may be blood in the urine (hemorrhagic cystitis). Usually, there is no labial irritation, external dysuria or vaginal discharge (which would suggest vaginitis); and no fever, chills, nausea, flank pain, or costovertebral angle tenderness (which would suggest an upper urinary tract infection.)

What to do:

- If available in the ED, dip stick for white cells or obtain a urinalysis or Gram stain a sample of urine. The presence of any white cells or bacteria in a clean specimen on microscopic examination confirms the infection. A positive nitrite on dip stick is helpful, but a negative does not rule out infection because many bacteria do not produce nitrites.
- If the clinical picture is clearly that of an uncomplicated lower UTI, give trimethoprim 160mg plus sulfamethoxazole 800mg (Bactrim DS or Septra DS) one tablet bid for three days or a 3 day regimen of a quinolone such as ciprofloxacin (Cipro) 250mg bid, norfloxacin (Noroxin) 400mg bid or ofloxacin (Floxin) 200mg bid. Single dose treatment with two TMP/SMX DS tablets is also effective in the young healthy female, but does have a higher early recurrence rate. Instruct the patient to drink plenty of liquids (such as cranberry juice) but do not push fluids when treating children or males.
- Extend therapy to 7 days and obtain cultures when treating a patient who is unreliable, pregnant, diabetic, symptomatic more than 5 days, older than 50 or younger than 16. Also extend treatment and obtain cultures on all male patients and those with an indwelling urinary catheter, renal disease, obstructive urinary tract lesions, recurrent infection or other significant medical problems.
- If there are no bacteria or few white cells, no hematuria or suprapubic pain, gradual onset over 7-10 days, and a new sexual partner, the dysuria may be caused by a chlamydia or ureaplasma urethritis. Perform a pelvic exam and obtain samples for culture and microscopic examination. Ask the patient about the use of spermicides or douches, which may irritate the periurethral tissue and cause dysuria.
- If there is external dysuria, vaginal discharge, odor, itching and no frequency or urgency, then evaluate for vaginitis with a pelvic examination.
- If the dysuria is severe, you may also prescribe phenazopyradine (Pyridium) 200mg tid for 2 days only, to act as a surface anesthetic in the bladder. Warn the patient that it will stain her urine (and perhaps clothes) orange.
- Arrange for followup in 2 days if the symptoms have not completely resolved. If necessary, urine culture and a longer course of antibiotics can be undertaken then.

What not to do:
Do not undertake expensive urine cultures for every lower urinary tract infection of recent onset in nonpregnant, normally healthy women with no history of recent UTI or antibiotic use.

Do not follow the single-dose or 3 day regimens for a possible upper urinary tract infection.

Do not rely on gross inspection of the urine sample. Cloudiness is usually caused by crystals and odors result from diet or medication.

Do not require a follow up visit or culture after therapy unless symptoms persist or recur.

Discussion

Lower UTI or cystitis is a superficial bacterial infection of the bladder or urethra. The majority of these infections involve Escherichia coli, Staphylococcus saprophyticus or enterococci. The urine dip stick is a reasonable screening measure that can direct therapy if results are positive. Under the microscope, in a clean sediment (free of epithelial cells) one white cell per 400x field suggests a significant pyuria, although clinicians accustomed to imperfect samples usually set a threshold of 3-5 WBCs per field. In addition, Trichomonas may be appreciated swimming in the urinary sediment, indicating a different etiology for urinary symptoms or associated vaginitis. In a straightforward lower UTI, urine culture may be reserved for cases which fail to resolve with single-dose or 3 day therapy. In complicated or doubtful cases, however, or with recurrences, a urine culture before initial treatment may be helpful.

Risk factors for UTI in women include pregnancy, sexual activity, use of diaphragms or spermicides, failure to void post coitally, and history of prior UTI. Healthy women may be expected to suffer a few episodes of lower urinary tract infection in a lifetime without indicating any major structural problem, but recurrences at short intervals suggest inadequate treatment or underlying abnormalities. Young men, however, have longer urethras and far fewer lower UTIs, and probably should be evaluated urologically after just one episode unless they have a risk factor such as an uncircumcised foreskin, HIV infection or homosexual activity and respond to initial treatment. In sexually active men, consider urethritis or prostatitis as the etiology. In men over 50 years old, there is a rapid increase in UTI due to prostate hypertrophy, obstruction and instrumentation.

References:

7.02 Upper Urinary Tract Infection (Pyelonephritis)

Presentation

The patient has some combination of urinary frequency, urgency, dysuria, flank pain, nausea, fever, and chills. On physical examination, there is tenderness elicited by percussing the costovertebral angle over the kidneys. The urinalysis may help establish the diagnosis with tubular casts of white cells.

What to do:

- Examine urine for presence of gram-positive cocci (presumptively enterococci) or the more usual gram-negative rods, and send for culture and sensitivity.
- If the patient appears toxic, with a high fever or white count, nausea or vomiting to prevent adequate oral medicatication and hydration, or if the patient is pregnant or there is any sign of urinary obstruction or developing sepsis, he or she should be admitted to the hospital for intravenous antibiotics.
- For stable, otherwise healthy patients, start with a first dose of intravenous antibiotics in the ED (ampicillin 1000mg plus gentamicin 80mg, ceftriaxone 1000-2000mg, ofloxacin 200-400mg or ciprofloxacin 200-400mg), then discharge home on oral hydration and two weeks of oral antibiotics (trimethoprim 160mg plus sulfamethoxazole 800mg bid, ciprofloxacin 500mg bid, norfloxacin 400mg bid or ofloxacin 400mg bid x 14d).
- Instruct the patient to return to the ED for re-evaluation in 24-48 hours, and sooner if symptoms worsen. Most patients improve on this regimen, but the others will require hospital admission if they are not improving in two days.

What not to do:

- Do not lose the patient to followup. Although lower UTIs often resolve without treatment, upper UTIs inadequately treated can lead to renal damage or sepsis.
- Do not miss an infection above a ureteral stone or obstruction. Crampy, colicky pain or hematuria with the symptoms above calls for an excretory urogram (IVP). Antibiotics and hydration alone may not cure an infected obstruction.

Discussion

Although oral antibiotics are usually sufficient treatment for upper UTIs, there is a significant incidence of renal damage and sepsis as sequelae, mandating good followup or admission when necessary. By the same token, lower UTIs can ascend into upper UTIs, or it can be difficult to decide the level of a given UTI, in which case it should be treated as an upper UTI.

Studies have shown that a 14 day course of oral therapy is highly effective for the woman with clinical evidence of pyelonephritis without sepsis, nausea or vomiting.
Quinolones such as ofloxacin (Floxin), ciprofloxacin (Cipro) and norfloxacin (Noroxin) are highly effective and probably the drugs of choice in this setting, except for pregnant women, for whom they are contraindicated. Trimethoprim-sulfamethoxazole (Bactrim, Septra) could also be used, although resistance of 5% to 15% of pathogens may be a more important factor in the selection of therapy for pyelonephritis than for cystitis.
7.03 Colorful Urine

Presentation

The patient may complain or be frightened about the color of his urine; color may be one component of some urinary complaint, or the color may be noted incidentally on urinalysis.

What to do:

- Ask about symptoms of urinary urgency, frequency, and crampy pains (suggesting stones), as well as any food colorings, over-the-counter or prescription medications, or diagnostic dyes recently ingested. Ascertain the circumstances surrounding noticing the color: Did the color only appear after the urine contacted the container, or the water in the toilet bowl? Did the urine have to sit in the sun for hours before the color appeared?
- Obtain a fresh urine sample for analysis. Persistent foam suggests protein or yellow foam bilirubin, which should also show up on a dipstick test. A positive dipstick for blood implies the presence of red cells, free hemoglobin, or myoglobin, which can be double-checked by examining the urinary sediment for red cells and the serum for hemoglobinemia. In patients with normal renal function, hemoglobinuria can be distinguished from myoglobinuria by drawing a blood sample, spinning it down, and looking at the serum. Free hemoglobin produces a pink serum which will test positive with the dipstick. Myoglobin is cleared more efficiently by the kidneys, usually leaving a clear serum which tests negative with the dipstick.
- If the urine is red and acidic but does not contain hemoglobin, myoglobin, or red blood cells, suspect an indicator dye such as phenolphthalein (the laxative in ExLax) in which case the red should disappear when the urine is alkalinized with a few drops of KOH. People with a particular metabolic defect produce red urine whenever they eat beets. Blackberries can turn acidic urine red, while rhubarb, anthraquinone laxatives, and some diagnostic dyes will redder urine only when it is alkaline.
- Orange urine may be produced by phenazopyridine (Pyridium) or ethoxazene (Serenium), both of which are used as urinary tract anesthetics to diminish dysuria. Rifampin will also turn urine orange.
- Blue or green urine may be caused by a blue dye such as methylene blue, a component in several medications (Trac Tabs, Urised, Uroblue) used to reduce symptoms of cystitis. A blue pigment may also be produced by Pseudomonas infection.
- Brown or black urine (not due to myoglobin or bilirubin) may be caused by L-dopa, melanin, phenacetin, or phenol poisoning. Metabolites of the antihypertensive methylldopa (Aldomet) may turn black on contact with bleach (which is often present in toilet bowls). Contamination with povidone-iodine (Betadine) solution or douche can turn urine brown. Melanin and melanogen, found in the urine of patients with melanoma, will darken standing urine from the air-exposed surface downward.
What not to do:

- Do not allow the patient to alter his urine factitiously. Have someone observe urine collection and inspect the specimen at once.
- Do not let a urine dipstick sit too long in the sample (allowing chemical indicators to diffuse out) or hold the dipstick vertically (allowing chemicals to drip from one pad to another and interfere with reagents).
- Do not be misled by dye in urine interfering with dipstick indicators. Pyridium can make a dipstick appear falsely positive for bilirubin, while contamination with hypochlorite bleach can cause a false positive test for hemoglobin. Also the urobilinogen dipstick (or Erlich reaction) is not adequate for diagnosing porphyria.

Discussion

Porphyrids or eosin dyes fluoresce under ultraviolet light. Eosin turns urine pink or red but fluoresces green.
Presentation

A male complains of dysuria, a burning discomfort along the urethra, or a urethral discharge. A copious, thick, yellow-green discharge which stains underwear is characteristic of gonorrhea, whereas a thin, white, scant discharge with milder symptoms is characteristic of chlamydia. Urethritis in a female may be asymptomatic or indistinguishable from cystitis or vaginitis, or may be manifest as UTI symptoms with a low concentration of bacteria on urine culture, or tenderness localized to the anterior vaginal wall. In addition to increased vaginal discharge, women may have intermenstrual bleeding, especially postcoital spotting and cervical friability.

What to do:

- Gram stain any urethral discharge, looking for gram-negative diplococci inside white cells, which imply gonococcal infection.
- Order a serologic test for established syphilis. Further antibiotic treatment is required if the RPR or VDRL is positive.
- Examine the urine sediment for swimming protozoa, implying infection with Trichomonas vaginalis, best treated with metronidazole (Flagyl) 250mg qid x 7d, or 2gm po once.
- If there is no sign of gonorrhea or trichomonas causing the urethritis, assume the infection is caused by chlamydia or ureaplasma, best treated with doxycycline 100mg bid for 7 days, or azithromycin 1000mg po once. (If the patient is pregnant, use erythromycin ethyl succinate (EES) 800mg qid x7d or erythromycin base, not estolate, 500mg qid x7d).
- Ask about sexual partners who should also be treated.
- Instruct the patient on the correct use of the condom to prevent reinfection.

What not to do:

- Do not send off a serologic test for syphilis without following up on the results.

Discussion

Cultures and fluorescent antibody tests to diagnose chlamydia are expensive and insensitive, so presumptive treatment remains the best strategy. Many gonorrhea victims develop a rebound urethritis, probably with chlamydia, following single dose antibiotic treatment.

Non-gonococcal urethritis is the most common sexually treated disease in US men. Complications include acute epididymitis, Reiter's syndrome and persistent or recurrent urethritis. More important, failure to identify and treat non-gonococcal urethritis places female sexual partners at risk for mucopurulent cervicitis, pelvic inflammatory disease,
ectopic pregnancy and tubal infertility. Sexually-transmitted infections that produce cervical inflammation in women and urethritis in men facilitate transmission of human immunodeficiency virus (HIV).

References:

7.05 Gonorrhea (Clap)

Presentation

A young man may present with symptoms of urethritis (dysuria, discharge), or perhaps prostatitis (low back pain) or epididymitis (scrotal pain). A young woman may have cervicitis or pelvic infection (low abdominal pain, dysuria, discharge). Both sexes may present with gonococcal proctitis (rectal pain, rectal discharge, tenesmus) or pharyngitis.

What to do:

- Obtain a sexual history and look for rash, arthritis, tenosynovitis, perihepatitis, or pain on moving the cervix. These are signs of disseminated infection, which may require a longer course of treatment or hospital admission.
- Gram stain any discharge or exudate and examine for gram-negative diplococci ingested by polymorphonuclear leukocytes, which corroborate the diagnosis of gonorrhea (their absence does not rule out the possibility).
- Culture the throat, urethra, cervix, anus—wherever the patient is symptomatic or exposed, according to the history. To avoid killing the organism, use a special transport medium or plate immediately on room-temperature Thayer-Martin medium which will be incubated soon.
- With female patients send a urine or blood test to rule out pregnancy.
- Send blood for syphilis serology and be sure someone will review and act upon the results. Incubating primary syphilis with negative serology should be eradicated by the regimens below, but established secondary or tertiary syphilis with positive serology will require a longer course of antibiotics.
- Gonorrhea should be treated with ceftriaxone 125mg im, or for oral treatment, cefixime 400mg, ciprofloxacin 500mg or ofloxacin 400mg.
- For urethritis or pelvic infection where chlamydia is a likely pathogen, cover both possibilities by adding doxycycline 100mg bid for 7 days, or azithromycin 1000mg po once. If the patient is pregnant, use erythromycin ethyl succinate (EES) 800mg qid x7d or erythromycin base, not estolate, 500mg qid x7d.
- Instruct the patient to avoid sexual contact for five days, arrange for a followup re-examination and re-culture to ensure eradication, and report the infection, if required by law.
- Treat sexual partners of patients exposed to gonorrhea with the same antibiotic regimens (you may omit cultures).
- Instruct the patient on the correct use of the condom to prevent re-infection.

What not to do:

- Do not pretend to rule out venereal disease on the basis of a "negative" sexual history. Simply taking cultures during the physical examination is often preferable to badgering patients about intimate details they would rather not reveal.
- Do not be misled by extracellular Gram-negative diplococci, which can be among the
normal flora of the pharynx or vagina. Do not send culture or serology tests unless someone will see and act on the results.

Discussion

Gonorrhea with arthritis and dermatitis requires a week of antibiotic therapy. The Centers for Disease Control update treatment recommendations every few years, incorporating changes in antibiotics and sensitivity.
7.06 Genital Herpes Simplex

Presentation

The patient may be distraught with severe genital pain or just concerned about paresthesias and subtle genital lesions, desirous of pain relief during a recurrence, or suffering complications such as superinfection or urinary retention. Instead of the classic grouped vesicles on an erythematous base, herpes in the genitals usually appears as groupings of 2-3mm ulcers, representing the bases of abraded vesicles. Resolving lesions are also less likely to crust on the genitals. Lesions can be tender, and should be examined with gloves on, because they shed infectious viral particles.

What to do:

- If necessary for the diagnosis, perform a Tzanck prep, by scraping the base of the vesicle (this hurts!), spreading the cells on a slide, drying, and staining with Wrights or Giemsa stain. The presence of multinucleate giant cells with nuclear molding confirms the diagnosis of herpes. Alternatively, use this sample for herpes virus culture, if available.
- Send a serologic test for syphilis and culture any cervical or urethral discharge in search of other infections requiring different therapy.
- Prescribe acyclovir (Zovirax) 200mg q4h (5x daily) for 10 days (dispense 50 tablets) or 5 days (25 tablets) for recurrent infections.
- Prescribe anti-inflammatory analgesics (Motrin to Percodan) for pain.
- Warn the patient that:
  - lesions and pain can be expected to last 2 weeks during the initial attack (usually less in recurrences);
  - although acyclovir reduces shedding, he should assume he is contagious whenever there are open lesions (and can potentially transmit the virus other times as well);
  - he should be careful about touching lesions and washing hands, because other skin can be inoculated, and
  - recurrences can be triggered by any sort of local or systemic stress, and will not be helped by topical acyclovir.

Discussion

Currently there is no role for topical acyclovir in the treatment of genital herpes. Oral prophylaxis has been shown to be effective. Acyclovir is activated by phosphorylation inside infected cells and acts by blocking viral DNA replication, but it is ineffective once viral latency is established. Latent herpes virus DNA already residing in the sensory ganglia can cause recurrences with impunity, and topical acyclovir only decreases the
amount of viral shedding. Famcyclovir is currently being used tid for zoster and is in clinical trials for herpes simplex.

References:

7.07 Epididymitis

Presentation

An adult male complains of dull to severe scrotal pain developing over a period of hours to a day, and radiating to the ipsilateral lower abdomen or flank. There may be a history of recent urethritis, prostatitis or prostatectomy (allowing ingress to bacteria), straining with lifting a heavy object, or sexual activity with a full bladder (allowing reflux of urine). There may be fever, nausea, or urinary urgency or frequency. The epididymis, is tender, swollen, warm, and difficult to separate from the firm, nontender testicle. Increasing inflammation can extend up the spermatic cord and fill the entire scrotum, making examinations more difficult, as well as produce frank prostatitis or cystitis. The rectal exam therefore may reveal a very tender, boggy prostate.

What to do:

• Ascertain that the testicle is normal in position and perfusion. Doppler ultrasound may help pick up a drop-off in arterial flow from spermatic cord to testicle in testicular torsion.
• Palpate and auscultate, the scrotum to rule out a hernia. Gently palpate the prostate once. Culture urine and/or any urethral discharge to identify a bacterial organism.
• On rare occasions, for severe pain, you may infiltrate the spermatic cord above the inflammation with local anesthetic for better palpation and diagnosis (e.g., 1% lidocaine without epinephrine). Lesser pain may respond to antiinflammatory analgesics (e.g., Motrin, aspirin with codeine).
• Prescribe antibiotics for likely organisms. In men under 35, ceftriaxone 250 mg im in the ED and a prescription for doxycycline 100mg bid for 10 days should eradicate N. gonorrhea and C. trachomatis. An alternative treatment is ofloxacin (Floxin) 300mg bid x 10d. In men over 35, ciprofloxacin 500mg bid for 10-14 days may be better for gram negative bacteria.
• Arrange for 2-3 days of strict bedrest, with the scrotum elevated, and urologic followup.

What not to do:

• Do not miss testicular torsion. It is far better to have the urologist explore the scrotum and find epididymitis than to delay and lose a testicle to ischemia (which can happen in only 4 hours).

Discussion

Testicular torsion is more likely in children and adolescents, and has a more sudden onset, although it can be recurrent and is often related to exertion or direct trauma. If the spermatic cord is twisted, the testicle may be high, the epididymis may be in other than its normal posterior position, and there will most likely be no cremasteric reflex. A
testicular scan can help differentiate torsion from the sometimes similar presentation of acute epididymitis. When torsion is highly suspected you may try a therapeutic detorsion by externally rotating the testicle 180 degrees with the patient standing.

References:

7.08 Prostatitis

Presentation

A man complains of fever, chills, perineal or low back pain, and may have urinary urgency and frequency, as well as signs of obstruction to urinary flow ranging from a weak stream to urinary retention. On gentle examination, the prostate is swollen and tender. The infection may spread from or into, the contiguous urogenital tract (epididymis, bladder, urethra), or the bloodstream.

What to do:

- Perform a rectal examination and only once, gently palpate the prostate to see if it is tender, swollen, or edematous.
- Culture the urine to help identify the organism responsible (although there is no guarantee that the bacteria in the prostate will be in the urine).
- For patients 35 years and younger, treat for gonorrhea and other urethritis with ceftriaxone (Rocephin) 125mg im to1000mg iv and azithromycin (Zithromax) 1000mg po.
- For men over 35 years old, begin empirical treatment with ciprofloxacin 400mg iv, then 500mg po bid.
- Arrange for urological followup.

What not to do:

- Do not massage, or repeatedly palpate the prostate. Rough treatment is unlikely to help drain the infection or produce the responsible organism in the urine, but is likely to extend or worsen a bacterial prostatitis, or precipitate bacteremia or septic shock.

Discussion

Not only is it difficult to obtain the organism responsible for prostatitis; it is difficult to identify an antibiotic with the correct spectrum which will also enter the prostate. Trimethoprim/sulfamethoxazole and doxycycline are alternatives.

Blood in the ejaculate may be a sign of inflammation in the prostate and epididymis or, especially in younger males, may simply be a self-limiting sequela of vigorous sexual activity.
7.09 Urinary Retention

Presentation

The patient may complain of increasing dull low abdominal discomfort and the urge to urinate, without having been able to urinate for many hours. A firm, distended bladder can be palpated between the symphysis pubis and umbilicus. Rectal exam may reveal an enlarged and/or tender prostate or suspected tumor.

What to do:

- Delaying only long enough for good aseptic technique, pass a Foley catheter into the bladder and collect the urine in a closed bag. Reassuring the patient and having him breathe through his mouth may help relax the external sphincter of the bladder and facilitate the passage of the catheter.
- If passage remains difficult in a male patient, distend the urethra with lubricant (K-Y jelly; or diluted lidocaine jelly) in a catheter-tipped syringe (Uroject) and try a 16, 18, or 20 French Foley.
- If the problem is negotiating the curve around a large prostate, use a Coude catheter.
- If you still cannot drain the bladder, obtain urologic consultation for stylets, sounds, filiforms, and followers.
- Check renal and urinary function with a urinalysis, a urine culture and serum BUN and creatinine determinations. Examine the patient to ascertain the cause of obstruction.
- If there is an infection of the bladder, give <a class="encyclopedia-link" title="Antibiotics" href="/en/encyclopedia/Antibiotics"'>antibiotics</a>.
- If the volume drained is modest (1-2 liters) and the patient stable and ambulatory, attach the Foley catheter to a leg bag and discharge him, for followup (and probably, catheter removal) the next day.
- If the volume drained is small (100-200ml), remove the catheter and search for alternate etiologies of the abdominal mass and urinary urgency.

What not to do:

- Do not use stylets or sounds unless you have experience instrumenting the urethra--these devices can cause considerable trauma.
- Do not remove the catheter in the ED if the bladder was significantly distended. Bladder tone will take several hours to return, and the bladder may become distended again.
- Do not clamp the catheter to slow decompression of the bladder, even if the volume drained is greater than 2 liters.
- Do not use bethanechol (Urecholine) unless it is clear that there is no obstruction, the only cause of the distension is inadequate (parasympathetic) bladder tone and there is no possibility of gastrointestinal disease.
- Do not routinely treat the bacteria cultured from a distended bladder--they may only represent colonization which will resolve with drainage.
Discussion

Urinary retention may be caused by stones lodged in the urethra or urethral strictures (often from gonorrhea); prostatitis, prostatic carcinoma, or benign prostatic hypertrophy; and tumor or clot in the bladder. Any drug with anticholinergic effects or alpha adrenergic effects such as antihistamines, ephedrine sulfate and phenylpropanolamine can precipitate urinary retention. Neurologic etiologies include cord lesions and multiple sclerosis. Patients with genital herpes may develop urinary retention from nerve involvement. Urinary retention has also been reported following vigorous anal intercourse. The urethral catheterization outlined above is appropriate initial treatment for all these conditions.

Sometimes hematuria develops midway through bladder decompression, probably representing loss of tamponade of vessels injured as the bladder distended. This should be watched until the bleeding stops (usually spontaneously) to be sure there is no great blood loss, no other urologic pathology responsible, and no clot obstruction.
Phimosis is the inability to retract the foreskin over the glans, and is usually due to a contracted preputial opening. Patients with phimosis may seek acute medical care when they develop signs and symptoms of infection, such as pain and swelling of the foreskin and a purulent discharge. Paraphimosis occurs when the foreskin cannot be replaced in its normal position after it is retracted behind the glans. The tight ring of preputial skin which is caught behind the glans creates a venous tourniquet effect and leads to edematous swelling of the glans.

What to do:

- For paraphimosis, squeeze the glans firmly for at least ten minutes to reduce the edematous swelling. Wrap the shaft and swollen glans with a gauze pad followed by a two inch elastic bandage that will produce constant, gentle compression. After ten to fifteen minutes, remove it, then push the glans proximally and slide the prepuce back over the glans. If manual reduction fails, anesthetize the dorsal foreskin and carefully incise the constricting tissue.
- Treating phimosis usually involves the management of acute infection. Frequent hot compresses or soaks are needed along with antibiotics such as cefadroxil (Duricef) for a balinitis.
- In both paraphimosis and phimosis, followup care should be provided. When swelling and inflammation subside, circumcision should be performed.

Discussion

Poor hygiene and chronic inflammation are the usual causes of stenosing fibrosis of the preputial opening. In the case of a neglected paraphymosis, arterial occlusion may supervene and gengrene of the glans develop. When phimosis results in acute urinary retention, the tip of a hemostat can be inserted into the scarred end of the foreskin and gently opened, allowing the patient to void satisfactorily until urologic consultation can be obtained. One common cause of paraphymosis is retracting the foreskin to clean the glans and place a Foley catheter, but forgetting to reduce the foreskin afterwards.
7.11 Blunt scrotal trauma

Presentation

Blunt injuries to the scrotum usually occur in patients less than 50 years of age as a result of an athletic injury, a straddle injury, an automobile or industrial accident, or an assault. Patients present with various degrees of pain, ecchymosis and swelling.

What to do:

- Get a clear history of the exact mechanism of the trauma and the point of maximum impact. Determine if there was any bloody penile discharge or hematuria and whether or not the patient has any pre-existing genital pathology such as prior genitourinary surgery, infection or mass.
- Gently examine the external genitalia with the understanding that intense pain may result in a suboptimal examination. If scrotal swelling is not too severe, try to palpate and assess the intrascrotal anatomy.
- Obtain a urinalysis. If blood is present in the urine (or at the urethral meatus) do a digital examination of the prostate (elevation of the prostate implies injury of the membranous urethra) and obtain urologic consultation.
- When pain or swelling prevent demonstration of normal intrascrotal anatomy, then obtain a doppler ultrasound study or testicular scan to help determine the need for operative intervention.
- When urologic intervention is not required, provide analgesia, bed rest, scrotal support, a cold pack and urologic follow up.

What not to do:

- Do not miss testicular torsion which can be associated with blunt trauma.
- Do not miss the rare traumatic testicular dislocation which results in an "empty scrotum." The testis is found superficially beneath the abdominal wall in about 80% of such cases. Immediate urology consultation is required.

Discussion

The majority of blunt testicular injuries result in either contusions or ruptures. If doppler or testicular scan studies demonstrate a serious injury, then early exploration, evacuation of hematoma, and repair of testicular rupture tend to result in an earlier return to normal activity, less infection, and less testicular atrophy.
8.01 Dysmenorrhea (Menstrual Cramps)

Presentation

A young woman complains of crampy, labor-like pains which began before the visible bleeding of her menstrual period. The pain is focused in the lower abdomen, low back, suprapubic area or thighs, and may be associated with nausea, vomiting, increased defecation, headache, muscular cramps, and passage of clots. The pain is most severe on the first day of the menses, and may last from several hours to several days. Often, this is a recurrent problem, dating back to the first year after menarche. Rectal, vaginal and pelvic examination disclose nothing abnormal.

What to do:

- Ask about the duration of symptoms and onset of similar episodes (onset of dysmenorrhea after menarche suggests other pelvic pathology). Ask about appetite, diarrhea, dysuria, dyspareunia and other symptoms suggestive of other pelvic pathology.
- Perform a thorough abdominal and speculum and bimanual pelvic examination, looking for signs of infection, pregnancy, or uterine or adnexal disease.
- Confirm that the patient is not pregnant with a urine pregnancy test (or serum beta hCG if available stat).
- For uncomplicated dysmenorrhea, try nonsteroidal antiinflammatory medications such as ibuprofen (Motrin) 600-800mg, indomethacin (Indocin) 50mg, or naproxen (Naprosyn) 500mg po initially, tapering to maintenance doses (half the loading dose q6h).
- Arrange for workup of endometriosis or other underlying causes and suggest aspirin or oral contraceptives for prophylaxis.

What not to do:

- Do not treat acute dysmenorrhea with aspirin alone. Aspirin begun three days before the period, 650mg qid, is effective prophylaxis, but it is not as good once symptoms exist.

Discussion

Prostaglandins E and F in menstrual blood appear to stimulate uterine hyperactivity, and thus many of the symptoms of dysmenorrhea.
8.02 Vaginal Bleeding

Presentation

A menstruating woman complains of greater than usual bleeding, which is either off her usual schedule (metrorrhagia), lasts longer than a typical period, or is heavier than usual (menorrhagia) perhaps with crampy pains and passage of clots.

What to do:

- Obtain orthostatic pulse and blood pressure measurements, a hematocrit, and pregnancy test (urine or serum beta hCG). Try to quantify the amount of bleeding by number of saturated pads used.
- If there is significant bleeding, demonstrated by tachycardia, lightheadedness, orthostatic pressure changes, a pulse increase of more than 20 per minute on standing, or a hematocrit below 30%, start an intravenous line of lactated Ringer’s solution, and have blood ready to transfuse on short notice.
- Obtain a menstrual, sexual, and reproductive history. Are her periods usually irregular, occasionally this heavy? Does she take oral contraceptive pills, and has she missed enough to produce estrogen withdrawal bleeding? Is an IUD in place and contributing to cramps, bleeding, and infection? Was her last period missed or light, or this period late, suggesting an anovulatory cycle or an ectopic? Might she be pregnant?
- Perform a speculum and manual vaginal examination, looking particularly for signs of pregnancy, such as a soft, blue cervix, enlarged uterus, or passage of fetal parts with the blood. Ascertain that the blood is coming from the cervical os, and not from a laceration, polyp, or other vaginal or uterine pathology or infection. Feel for adnexal masses, as well as pelvic fluid or tenderness.
- If there is an intrauterine pregnancy, determine whether this bleeding represents an incomplete, inevitable, or threatened abortion. Spread any questionable products of conception on gauze or suspend in saline to differentiate from organized clot. Press an 8mm curette or dilator against the cervix to see whether the internal os is open (indicating an inevitable or incomplete abortion) or closed (threatened abortion, with roughly even odds of survival, and generally treated by bedrest).
- Confirm suspicion of ectopic pregnancy either with a sonogram showing the ectopic gestational sac, a sonogram showing an empty uterus despite a positive pregnancy test, or a culdocentesis, which cannot rule out an ectopic pregnancy, but which can quickly demonstrate blood in the cul-de-sac after an ectopic sac ruptures.
- Discharge the stable patient home on oral contraceptive pills (Ortho-Novum 1/50 or Norinyl 1+50) one qid until the bleeding stops, then finishing the 28-day package one qid, followed by low-dose oral contraceptives for the next two to three months.
- If the cause of the uterine bleeding was missed oral contraceptive pills, the patient may resume the pills, but should use additional contraception for the first cycle. (If the cause is a new IUD, the patient may elect to have it removed and use another contraceptive.)
- The patient should be referred for followup to a gynecologist, and may be evaluated
via endometrial biopsy.

What not to do:

- Do not leap to a diagnosis of dysfunctional uterine bleeding without ruling out pregnancy.
- Do not rule out pregnancy or venereal infection on the basis of a negative sexual history—confirm with physical examination and laboratory tests.

Discussion

The essential steps in the emergency evaluation of vaginal bleeding are fluid resuscitation of shock, if present, and recognition of pregnancy and its complications of spontaneous abortion or ectopic pregnancy. Treatment of more chronic and less severe dysfunctional uterine bleeding usually consists of iron replacement and optional use of oral contraceptives to decrease menstrual irregularity (metrorrhagia) and volume (menorrhagia). Bed rest has not been shown to improve the outcome for a threatened abortion, but is still usually part of the regimen. Medroxyprogesterone (Provera) 10mg po x10d can also be given to stop dysfunctional uterine bleeding, but warn the patient to expect a heavy bleed when it is stopped.

References

Presentation

A woman complains of itching and irritation of the labia and vagina, perhaps with vaginal discharge or odor, vague low abdominal discomfort, or dysuria. (Suprapubic discomfort and urinary urgency and frequency suggest cystitis.) Abdominal examination is benign but examination of the introitus may reveal erythema of the vulva and edema of the labia (especially with Candida). Speculum examination may disclose a diffusely red, inflamed vaginal mucosa, with vaginal discharge either copious, thin, and foul-smelling (characteristic of Trichomonas or anaerobic overgrowth) or thick, white, and cheesy (characteristic of Candida and associated with more intense vulvar pruritis). Bimanual examination should show a non-tender cervix and uterus, without adnexal tenderness or masses or pain on cervical motion.

What to do:

- Take a brief sexual history. Ask if partners are experiencing related symptoms.
- Perform speculum and bimanual pelvic exam. Collect urine for possible culture and pregnancy tests which may influence treatment. Swab the cervix or urethra to culture for N. gonorrhoeae and swab the endocervix to test for Chlamydia. Touch pH indicator paper to the vaginal mucus (a pH>4.5 suggests anaerobic vaginosis, but this is only useful if there is no blood or semen to buffer vaginal secretions).
- Dab a drop of vaginal mucus on a slide, add a drop of 0.9% saline and a cover slip, and examine under 400x for swimming protozoa (Trichomonas vaginalis), epithelial cells covered by adherent bacilli (“clue cells” of Gardnerella vaginalis and other anaerobes), or pseudohyphae and spores (“spaghetti and meatballs” appearance of Candida albicans).
- If epithelial cells obscure the view of yeast, add a drop of 10% KOH, smell whether this liberates the odor of stale fish (characteristic of Gardnerella, Trichomonas and semen) and look again under the microscope.
- Gram stain a second specimen. This is an even more sensitive method for detecting Candida and clue cells, as well as a means to assess the general vaginal flora, which is normally mixed, with occasional predominance of gram-positive rods. Many white cells and an overabundance of pleomorphic gram-negative rods suggests Gardnerella infection. Gram-negative diplococci inside white cells suggests gonorrhea.
- If Trichomonas vaginalis is the etiology, discuss with the patient the options of metronidazole (Flagyl) 500mg bid x 7d, or 2000mg once. The latter has practically as good a cure rate, but obviously better compliance, and shortens the time she must abstain from alcohol for 24 hours after the last dose because of metronidazole’s disulfiram-like activity. Sexual partners should receive the same treatment. In the first trimester of pregnancy, substitute intravaginal clotrimazole 100mg vaginal suppository qhs x7d, which is less effective, but safer than metronidazole vaginal gel. Metronidazole is contraindicated in the first trimester and controversial thereafter. Treatment of asymptomatic patients can be be delayed until after delivery.
- If Candida albicans is the etiology, prescribe miconazole (Monistat) or clotrimazole...
(Gyne-Lotrimin) 200mg vaginal suppositories to be inserted qhs x 3d. These treatments are available without prescription. Prescription alternatives for recurrences, which is active against fungi other than Candida, are butoconazole (Femstat) and terconazole (Terazol) one 5 gram applicator of cream qhs for three days and seven days, respectively. Use of cream also allows its soothing application on irritated mucosa. A single oral dose of fluconazole (Diflucan) 150mg po is at least as effective as intravaginal treatment of vulvovaginal candidiasis, and many patients seem to prefer it. Gastrointestinal side effects are fairly common and serious side effects can occur. In pregnancy, halve the dose and double the course of topical clotrimazole, (the same as the regimen for Trichomonas above).

- If the diagnosis is bacterial vaginosis, which is an overgrowth of Gardnerella vaginalis or other anaerobes, the strongest treatment is metronidazole 500mg bid or clindamycin 300mg bid x 7d. Metronidazole vaginal gel 0.75% 5 grams bid x 7d is an alternative which is more expensive but carries fewer gastrointestinal side effects than the oral form. Sex partners need not be treated unless they have balinitis.
- To prevent rebound Candida vaginitis after antibiotics decimate the normal vaginal flora, or for treatment of mild vaginitis, consider douching with 1% acetic acid (half-strength vinegar) to maintain a normal low pH ecology.
- Remember that any given patient may harbor more than one infection.
- Arrange for followup and instruct the patient in prevention of vaginitis.

**What not to do:**

- Do not prescribe sulfa creams for non-specific vaginitis. The treatments above are more effective.
- Do not miss underlying pelvic inflammatory disease, pregnancy, or diabetes, all of which can potentiate vaginitis.
- Do not miss candidiasis because the vaginal secretions appear essentially normal in consistency, color, volume and odor. Non-pregnant patients may not develop thrush patches, curds or caseous discharge.

**Discussion**

Both Candida albicans and Gardnerella vaginalis (previously known as Hemophilus vaginalis or Corynebacterium vaginale), are part of the normal vaginal flora. A number of anaerobes share the blame in bacterial vaginosis. An alternate therapy uses active-culture yogurt douches to repopulate the vagina with lactobacilli. Candida vaginitis is more common in the summer, under tight or nonporous clothing (jeans, synthetic underwear, wet bathing suits), and in users of antibiotics and contraceptives (which alter vaginal mucus), as well as in diabetes mellitus, steroid-induced immunosupression and use of broad-spectrum antibiotics. Trichomonas can be passed back and forth between sexual partners, a cycle that can be broken by treating both. Ask patients with vulvar pruritis, erythema and edema, but with otherwise normal saline, KOH and Gram stain microscopy, about the use of hygene sprays or douches, bubble baths or scented toilet tissue. Contact vulvovaginitis may result from an allergic or chemical reaction to any one of these or similar products and can be treated by removing the offending substance and prescribing a short course of a topical or systemic corticosteroid.
References:

8.04 Vaginal Foreign Bodies

Presentation

This commonly is a problem of children, who may insert a foreign body and not tell their parents. The patient is finally brought to the emergency department with a foul-smelling purulent discharge with or without vaginal bleeding. Vaginal foreign bodies in the adult may be a result of a psychiatric disorder or unusual sexual practices. Occasionally a tampon or pessary is forgotten or lost and causes discomfort and a vaginal discharge.

What to do:

- Visualize the foreign body using a nasal speculum in the pediatric patient or a vaginal speculum in the adult.
- Pediatric patients may be placed in the knee-chest position and, while performing a rectal examination, you may be able to expell the foreign body from the vagina by pushing with the examining finger in the rectum.
- Friable foreign bodies such as wads of toilet paper may be flushed out using warm water, an infant feeding tube, and a standard syringe.
- Lost or forgotten tampons can be removed with vaginal forceps that are first pierced through the finger of a latex glove, so that when the malodorous foreign body is extracted, the glove can immediately pulled over it to reduce the odor before it is discarded in a sealed plastic bag. The vagina should then be swabbed with a betadine solution.
- In difficult cases, or when large or sharp objects are involved, young and adult patients may require general anesthesia to allow removal under direct vision.
- When general anesthesia is not required, conscious sedation should be considered.
- The patient should empty her bladder and lie in stirrups in the lithotomy position. Insert a Foley catheter to break any suction between the foreign body and the vaginal mucosa. Most objects can then be grasped with ring forceps or the plaster and tongue blade method.
- Reserve x rays for radio-opaque foreign bodies concealed in the bladder or urethra. Objects in the vagina are usually apparent on examination. What not to do:
  - Do not ignore a vaginal discharge in a pediatric patient or assume it is the result of a benign vaginitis. Perform a bimanual or rectoabdominal examination to palpate a hard object and then do a gentle speculum exam to look for a foreign body or signs of vaginal trauma.
  - Do not forget to ask about possible sexual abuse and consult with protective services if it cannot be ruled out.

Discussion

Vaginal foreign body removal is generally not a problem, but when large objects make removal more difficult, use the additional techniques described for rectal foreign bodies.
8.05 Bartholin Abscess

Presentation

A woman complains of vulvar pain and swelling that has developed over the past 2-3 days, making walking and sitting very uncomfortable. On physical exam in the lithotomy position, there is a unilateral (occasionally bilateral), tender, fluctuant, erythematous swelling at 5 or 7 o'clock within the posterior labium minus.

What to do:

- If the swelling is mild without fluctuance (bartholinitis) or if the abscess is not pointing, the patient can be placed on an antibiotic (e.g., ciprofloxacin 500mg and azithromycin 1000mg po once, ofloxacin or doxycycline 100mg po bid x14d) and instructed to take warm sitz baths. Early followup should be provided.
- When the abscess is pointing, an incision should be made over the medial bulging surface and the pus evacuated.
- After drainage a Word catheter should be inserted through the incision. Inflate the tip of the catheter with sterile water to hold it in place and prevent premature closure of the opening.
- After drainage, the patient should be placed on antibiotics and instructed to take sitz baths.
- Provide for a followup exam within 48 hours.

What not to do:

- Do not mistake a nontender Bartholin duct cyst, which does not require immediate treatment, for an inflamed abscess.
- Do not mistake a more posterior perirectal abscess for a Bartholin abscess. The perirectal abscess requires a different treatment approach.

Discussion

The most common organisms involved in the development of a Bartholin abscess are gonococci, streptococci, Escherichia coli, Proteus and Chlamydia, and often more than one organism is present. Bilateral infections are more commonly characteristic of gonorrhea. The Word catheter is a 5 mL balloon on a 5 cm catheter designed to retain itself in the abscess cavity for 4-6 weeks to help insure the development of a wide marsupialized opening for continued drainage, but they seldom stay in place that long. Iodoform or plain ribbon gauze can be inserted into the incised abscess as a substitute. If a wide opening persists, recurrent infections are not likely to occur, but they are common if the stoma closes.
8.06 Contact vulvovaginitis

Presentation

Patients complain of vulvar itching and swelling.Occasionally there will be tenderness, pain, burning and dysuria severe enough at times to cause urinary retention. The vulvovaginal area is inflammed, erythematous and edematous. In more severe cases there may be vesiculation and ulceration and in cases where there is a chronic contact dermatitis there may be lichenification, scaling and skin thickening.

What to do:

- try to identify an offending agent and have the patient stop using it. Most reactions are caused by agents that the patient unknowingly applies or uses for hygenic or therapeutic purposes. Chemically scented douches, soaps, bubble baths, deodorants and perfumes as well as dyed or scented toilet paper, dyed underwear, scented tampons or pads and feminine hygiene products are the most common causative agents. Less commonly, plant allergens such as poison oak or poison ivy may be the inadvertently-applied substances that trigger the reaction.
- Rule out an alternate cause of vulvar puritis such as pinworms or trichomonas. Candida albicans may also be the cause of pruritis but it may present as an overgrowth when contact vulvovaginitis is the primary problem.
- Instruct the patient in the use of cool baths and wet compresses using boric acid or Burow's solution (Domboro).
- Prescribe liberal amounts of topical corticosteroids like fluocinolone (Synalar cream 0.025%) or triamcinolone (Stistocort 0.025% cream) bid to qid (dispense 15-60 grams).
- In more severe cases, also prescribe oral steroids in a tapering dose-pack schedule like prednisone (Sterapred DS or Sterapred DS 12 day), methylprednisolone (Medrol Dosepack) or triamcinolone (Aristo-Pak) for six days of systemic therapy.

What not to do:

- Do not have the patient use hot baths or compresses. This will usually exacerbate the burning and pruritis.
- Do not prescribe antihistamines. They are relatively ineffective in treating contact vulvitis and may increase discomfort by drying the vaginal mucose.

Discussion

The major problem with managing contact vulvovaginitis is identifying the primary irritant or allergen. In many cases, more than one substance is involved or potentially involved and may be totally unsuspected by the patient (such as the use of scented toilet paper). For this reason, a thorough investigative history is very important.
8.07 Genital warts (condylomata acuminata)

Presentation

Patients complain of perineal itching, burning, pain and tenderness or they may be asymptomatic, especially with cervical and vaginal involvement, but noticed distinctive fleshy warts of the external genitalia or anus. Lesions are pedunculated or broad based with pink to gray soft excrescences, occuring in clusters or individually.

What to do:

- External warts seldom require biopsy for diagnosis. The differential diagnosis of anogenital warts includes molluscum contagiosum, verruca vulgaris (common non-genital wart), secondary syphilis (condyloma lata), hypertrophic vulvar dystrophies and vulvar intraepithelial and invasive neoplasias. Consider atypical, pigmented, intravaginal cervical and persistant warts for referral for biopsy.
- Prescribe podofilox 0.5% solution (Condylox) 3.5mL for self-treatment. Patients may apply podofilox with a cotton swab to warts twice daily for three days, followed by 4 days of no treatment. This cycle may be repeated as necessary for a total of 4 cycles. Total wart area treated should not exceed ten square centimeters and total volume of podofilox should not exceed 0.5mL per day. If possible, you should apply the initial treatment to demonstrate the proper application technique and identify which warts should be treated.
- Alternatively, apply 25% podophyllin in tincture of benzoin (Podocon-25) 15mL using the above application technique and with the same dosage restrictions. Have the patient thoroughly wash off in 1-4 hours. This may be repeated weekly if necessary but if warts persist after six applications the patient should be referred for alternative therapy.
- If the patient is pregnant, has severe involvement or has anal or rectal warts, she should be referred for cryotherapy, application of trichloroacetic acid, ablation with carbon dioxide laser, electrocautery or surgical extirpation.
- If the patient's male partner also has visible lesions, he can be treated using the same regimens.
- Counsel both about the unpredictable natural history of the disease and the possible increased risk of lower genital tract malignancy. Infected women should have an annual Pap smear.

What not to do:

- Do not use podofilox or podophyllin during pregnancy. There have been a few cases of toxicity reported when large amounts of podophyllin have been used.
- Do not mistake "pearly penile papules" for warts. These dome-shaped or hairlike projections around the corona of the glans penis are normal variants in up to 10% of men.
Discussion

Genital warts are a result of infection with human papillomavirus (HPV). The virus is currently considered a leading candidate as a causative agent in squamous carcinomas of both the female and male genital tracts. The sexual transmission of HPV is well documented, with the highest prevalence in young, sexually active adolescents and adults. HPV types 6 and 11 are the most prevalent types associated with condyloma accuminata and are not considered to have malignant potential. HPV frequently coexists with other sexually transmitted diseases. HPV lesions are difficult to eradicate, with a very high recurrence rate, and still no definitive therapy.
8.08 "Morning after" contraception

Presentation

A woman has had unprotected sexual intercourse in the last 24 hours and wants to prevent an unplanned pregnancy. This may be part of the prophylactic treatment of a rape victim.

What to do:

• Obtain a urine or serum pregnancy test. If it is already positive, these measures will not be sufficient, and will harm the fetus.
• Prescribe a contraceptive in large doses for a short time to prevent implantation. Examples include:

  • norgestrel and ethinyl estradiol (Ovral) po two now and two in 12 hours. Within 72 hours of intercourse the failure rate is 1.8%
  • diethylstilbestrol 25mg po bid for five days
  • conjugated estrogen (Premarin) 30mg po qd for five days
  • conjugated estrogen (Premarin) 50mg iv qd for two days

• Ask about exposure to sexually transmitted diseases, which might require separate testing and prophylaxis.
• Arrange for follow up if this treatment fails to prevent pregnancy.

What not to do:

• Do not use this emergency rescue technique as a substitute for condoms, which also help prevent sexually transmitted infections.

References:

• Med Letter Drugs Ther: Ovral as a morning after contraceptive 1989;31:93.
• Association of Reproductive Health Professionals hotline (800) 584-9911
• directory of emergency contraception providers
8.09 Pelvic Inflammatory Disease

Presentation

A woman aged 15-30, possibly with a new sex partner, complains of lower abdominal pain. There may be associated vaginal discharge, malodor, dysuria, dyspareunia, menorrhagia or intermenstrual bleeding. Patients with more severe infections may develop fever, chills, malaise, nausea and vomiting. Women with severe pelvic pain tend to walk slightly bent over, holding their lower abdomen and shuffling their feet. Abdominal examination reveals lower quadrant tenderness, sometimes with rebound, and occasionally there will be right upper quadrant tenderness due to perihepatitis (Fitz-Hugh-Curtis syndrome). Pelvic examination demonstrates bilateral adnexal tenderness as well as uterine fundal and cervical motion tenderness.

What to do:

- Always perform a pelvic examination on women with lower abdominal complaints or lower abdominal tenderness. The examination should be thorough, yet performed as gently and briefly as possible to avoid exacerbating a very painful condition.
- Obtain endocervical cultures for Neisseria gonorrhoeae and Chlamydia trachomatis.
- Obtain blood for syphilis serology and recommend HIV testing.
- Obtain urine for urinalysis and blood or urine for pregnancy testing.
- Consider obtaining a leukocyte count, sedimentation rate and C-reactive protein. These are indicators of clinical severity, but normal results do not rule out PID.
- Determine pH of any vaginal discharge and make wet mount examinations and Gram stains of endocervical secretions, looking for Candida, Trichomonas, clue cells and any gram-negative diplococci inside polymorphonuclear neutrophils (almost diagnostic of gonorrhea).
- Perform pelvic ultrasound if there is a suspected mass, severe pain, or a positive pregnancy test.
- Because no laboratory tests are diagnostic for PID, assume a diagnosis when there are lower abdominal pain with tenderness on examination, bilateral adnexal tenderness and cervical motion tenderness plus one of: temperature > 38 C (100.4 F), leukocytosis > 10,500 WBC/mm3, inflammatory mass on pelvic examination or ultrasound, elevated C-reactive protein, erythrocyte sedimentation rate > 15mm/h, or evidence of gonorrhea or chlamydia in the endocervix (by positive antigen test, Gram stain or mucopurulent cervicitis).
- Remove any intrauterine device (IUD).
- Treat suspected cases while awaiting diagnostic confirmation.
- Hospitalize adolescents with salpingitis and all patients with pelvic or tubo-ovarian abscess, pregnancy, fever >38.5 C, nausea and vomiting that preclude oral antibiotics, current use of an IUD, septicemia or other serious disease, high risk of poor compliance, failed follow up and failure on 48 hours of the outpatient therapy below.
- Treat mild to moderate cases as outpatients with one dose of ceftriaxone (Rocephin) 250mg im or cefoxitin (Mefoxin) 2000mg im plus probenecid 1000mg po concurrently,
followed by a prescription for doxycycline 100mg bid for 14 days. For more severe cases with a high probability of resistant anerobic infection, add metronidazole 1000mg po bid or clindamycin 450mg po qid. A completely oral alternative is ofloxacin (Floxin) 400mg bid x14d plus either clindamycin 450mg qid or metronidazole 500mg qid, also for 14 days.

- Provide for follow up examination in three days.
- Provide analgesics as needed.
- Instruct the patient to abstain from sexual intercourse for at least two weeks.
- Unless sexual acquisition can be excluded with certainty, treat the partner for presumptive gonorrhea and chamydia with ceftriaxone 125mg im once or ciprofloxacin 500mg po once plus doxycycline 100mg po bid x7d or azithromycin 1000mg po once.

- Counsel the patient about the sexually transmitted nature of PID and its risks for infertility (15-30% per episode) and ectopic pregnancy. Barrier methods of contraception (condoms and diaphragms) reduce the risk. Vaginal spermicides are also bactericidal.

**What not to do:**

- Do not use ofloxacin in pregnant women or patients under 18.
- Do not miss the more unilateral disorders like ectopic pregnancy, appendicitis, ovarian cyst or torsion and diverticulitis. Early consultation by both general surgeon and obstetrician/gynecologist are sometimes necessary.
- Do not diagnose PID in a patient with a positive pregnancy test without ruling out ectopic pregnancy, usually with a sonogram.
- Do not ignore pelvic symptoms if the patient has perihepatic inflammation.

**Discussion**

Pelvic inflammatory disease (PID) is defined as salpingitis, often accompanied by endometritis or secondary pelvic peritonitis, that results from ascending genital infection. PID related to N. gonorrhoeae and C. trachomatis is more common within the first one or two weeks after the onset of menstruation. There is increased risk for this disease in sexually active adolescents compared with women over twenty years old. There is also increased risk with multiple sex partners, use of an interuterine device (IUD), previous history of PID and vaginal douching. The incubation period for PID varies from 1-2 days to weeks or months. Laparoscopy is indicated in severe cases, if diagnosis is uncertain or if there is inadequate response to initial antibiotic therapy. A diagnosis of PID in children or young adolescents should prompt an evaluation for possible child abuse.
9.01 Cervical Strain (Whiplash)

Presentation

The patient may arrive directly from a car accident, arrive the following day (complaining of increased neck stiffness and pain), or long after (to have injuries documented). The injury occurred when the neck was subjected to sudden extension and flexion, possibly injuring intervertebral joints, discs, and ligaments, cervical muscles, or even nerve roots. As with other strains and sprains, the stiffness and pain may tend to peak on the day following the injury.

What to do:

- Obtain a detailed history to determine the mechanism and severity of the injury. Was the patient wearing a seat belt? Was the headrest up? Were eyeglasses thrown into the rear seat? Was the seat broken? Was the car damaged? Driveable afterwards? Windshield shattered? Intrusion into the passenger compartment?
- Examine the patient for involuntary splinting, point tenderness over the spinous processes of the cervical vertebrae, cervical muscle spasm or tenderness, and for strength, sensation, and reflexes in the arms (to evaluate the cervical nerve roots).
- If there is any question at all of an unstable neck injury, start the evaluation with a cross table lateral film of the cervical spine, while maintaining cervical immobilization with a rigid collar. If necessary, the anteroposterior view and open mouth view of the odontoid can also be obtained before the patient is moved.
- To evaluate the possibility of head trauma, ask about loss of consciousness or amnesia, and check the patient's orientation, cranial nerves, and strength and sensation in the legs as well.
- If any of the above suggest injury to the cervical spine, obtain 3 x ray views of the cervical spine: AP, lateral, and open mouth odontoid. If there is clinical nerve root impairment, or you need to see more detail of the posterior elements of the vertebrae, obliques may also be useful. Flexion and extension views may be needed to evaluate stability of joints and ligaments, but should only be done under careful supervision, so the spinal cord is not injured in the process.
- If x rays show no fracture or dislocation, and history and physical examination are consistent with stable joint, ligament, and muscle injury, explain to the patient that the stiffness and pain are often worse after 24 hours, but usually resolve over the next 3-5 days, and are usually back to normal in a week.
- Treat with one or two days of immobilization (a soft cervical collar), topical ice for the first day, then heat for the later spasm, and anti inflammatory analgesics (aspirin, ibuprofen, naproxyn).
- Arrange followup as necessary.

What not to do:

- Do not forget to tell the patient his symptoms may well be worse a day after the injury.
- Do not skimp recording the history and physical. This sort of injury may end up in
litigation, and a detailed record can obviate your being subpoenaed to testify in person.

- Do not x ray every sore neck. A thousand negative cervical spine x rays are cost effective if they prevent one paraplegic from an occult unstable fracture, but several studies have shown that patients who have no neck pain or stiffness (and are not intoxicated or distracted by other injuries) do not have to be x rayed just because they fell or hit their head.

Discussion

X ray results for whiplash neck injuries seldom add much to the clinical assessment but the sequelae of unrecognized cervical spine injuries are so severe that it is still worth while to x ray relatively mild injuries (in contrast to skull and lumbosacral spine radiographs, which are ordered far less often.) It is often useful to discuss the pros and cons of x rays with the patient, who may prefer to do without, or conversely may be in the ED purely to obtain radiological documentation of his injuries. The term "whiplash" is probably best reserved for describing the mechanism of injury, and is of little value as a diagnosis. Because of the many undesirable legal connotations which surround this term it may be advisable to substitute "flexion/extension injury."
9.02 Torticollis (Wry Neck)

Presentation

The patient complains of neck pain and is unable to turn his head, usually holding it twisted to one side, with some spasm of the neck muscles, with the chin pointing to the other side. These symptoms may have developed gradually, after minor turning of the head, after vigorous movement or injury, or during sleep. The pain may be in the neck muscles or down the spine, from the occiput to between the scapulae. Spasm in the occipitalis, sternocleidomastoid, trapezius, splenius cervicis, or levator scapulae muscles can be the primary cause of the torticollis, or it can be secondary to a slipped facet, herniated disc, or viral or bacterial infection. Picture

What to do:

- Ask the patient about precipitating factors, and perform a thorough physical examination, looking for muscle spasm, point tenderness, and signs of injury, nerve root compression, masses or infection. Include a careful nasopharyngeal examination, as well as a basic neurologic exam.
- When forceful trauma was involved and fracture, dislocation or subluxation are possible, then obtain lateral, anteoposterior and odontoid roentgenographic views of the cervical spine. If there are neurologic deficits, computed tomography or magnetic resonance imaging may be better to visualize nerve involvement (as well as herniated disks, hematomatas or epidural abscesses).
- When there is no suspicion of a serious illness or injury, apply heat (e.g., a Hydrocolator pack wrapped in several thicknesses of towel); give anti inflammatory analgesics (e.g., aspirin, ibuprofen, naproxyn), and perhaps oral cyclobenzaprine (Flexeril) or diazepam (Valium). Alternating heat with ice massages may also be helpful as well as gentle range of motion exercises.
- If the onset was gradual, muscle tenderness and spasm are pronounced, neck motion seems constrained only by muscle stretching, and the symptoms are most severe when certain muscles are stretched, myalgias are probably the cause, and the routine above constitutes the treatment.
- If there is point tenderness posterior to the sternocleidomastoid muscle (over the vertebral facets) and the head cannot turn toward the side of the point tenderness, suspect a facet syndrome, obtain x rays, and gently test neck motion again after a few minutes of manual traction along a longitudinal axis (sometimes this provides some relief).
- If there is any arm weakness or paresthesia corresponding to a cervical dermatome, suspect nerve root compression as the underlying cause, and arrange for x rays and neurosurgical or orthopedic consultation.
- With signs and symptoms of infection (e.g., fever, toxic appearance, lymphadenopathy, tonsillar swelling, trismus, pharyngitis or dysphagia) take soft tissue lateral neck films and consider complete a blood count and erythrocyte sedimentation rate to help rule out early abscess formation. Arrange for specialty consultation.
• For minor causes, discharge the patient with a soft cervical collar for further relief, and arrangements for x rays and followup if the torticollis has not fully resolved in 1 or 2 days.

What not to do:

• Do not overlook infectious etiologies presenting as torticollis, especially the pharyngotonsillitis of young children, which can soften the atlantoaxial ligaments and allow subluxation.
• Do not undertake violent spinal manipulations in the ED, which can make an acute torticollis worse.
• Do not confuse torticollis with a dystonic drug reaction from phenothiazines or butyrophenones.

Discussion

Although torticollis may signal some underlying pathology, usually it is a local musculoskeletal problem--only more frightening and noticeable for being in the neck--and need not always be worked up comprehensively when it first presents in the ED.
9.03 Collarbone (clavicle) fracture

Presentation

The patient has fallen onto his shouldr or outstretched arm or more commonly has received a direct blow to the clavicle, and now presents with pain to direct palpation over the clavicle or with movement of the arm or neck. There may be deformity of the bone with swelling and ecchymosis. An infant or small child might present after a fall, not moving the arm, with a normal examination of the arm, but with the bone findings.

What to do:

- After completing a musculoskeletal examination, evaluate the neurovascular status of the arm.
- Fit a sling or clavicle strap which comfortably immobilizes the arm. Patients probably experience fewer complications and less pain with a simple sling and there is no difference in healing time.
- Prescribe analgesics, usually anti-inflammatories like ibuprofen or naproxen, but narcotics when significant pain is present or anticipated.
- Obtain x rays to rule out other injuries and document the fracture for follow up.
- Arrange for orthopedic follow up in a week, to evaluate healing and begin pendulum exercises of the shoulder. Obtain rapid orthopedic consultation if there is any evidence of neurovascular compromise.

What not to do:

- Do not apply a figure-of-eight dressing or clavicle strap if this form of splinting increases patient discomfort.
- Do not leave an arm immobilized in a sling for more than a week. This can result in loss of range of motion or "frozen shoulder."

Discussion

In children, fracture of the clavicle requires very little force and usually heals rapidly and without complication. In adults, however, this fracture usually results from a greater force and is associated with other injuries and complications. Clavicle fractures are sometimes associated with a hematoma from the subclavian vein, but other nearby structures, including the carotid artery, brachial plexus and lung, are usually protected by the underlying anterior scalene muscle and the tendency of the sternocleido-mastoid muscle to pull up the medial fragment of bone. A great deal of angulation deformity and distraction on x ray are usually acceptable, because the clavicle mends and reforms itself so well and does not have to support the body in the meantime. As with rib fractures, respiration prevents immobilization, so the relief that comes with callus formation may be delayed another week.
References

9.04 Acromio-clavicular joint separation

Presentation

The patient fell on the point of the shoulder. He may come in right away because it hurts even without movement (first or second degree tear), or he may come in days later without pain, having noted that the injured shoulder hangs lower or the clavicle (collar bone) rides higher (third degree).

What to do:

- Examine the shoulder. The diagnosis is supported by tenderness at the lateral end of the clavicle where it joins the acromion process coming up from the scapula and by pain on pulling the humerus down towards the feet, distracting the acromio-clavicular joint. Strength may be decreased because of pain, but other bones, joints, range of motion, sensation and circulation should be documented as intact.
- X ray the shoulder to be sure there is no associated fracture of the lateral clavicle or fracture or dislocation of the humerus.
- Support the injured joint with a sling.
- Provide additional analgesia. Ibuprofen or naproxen usually suffices.
- Arrange for re-evaluation by an orthopedic surgeon and physical therapy to begin shoulder range of motion exercises within a week.

What not to do:

- Do not bother with weight-bearing x ray views to differentiate first, second and third-degree separations based on the widening of the distance between the clavicle and scapula. These are painful and do not change the initial treatment.
- Do not allow the patient to wear a sling and immobilize the shoulder for more than a week without at least beginning pendulum exercises. The shoulder capsule will contract and restrict the range of motion.

Discussion

A partial tear of the ligaments between acromion and clavicle produces pain but no widening of the joint (first degree tear). A second-degree A-C separation shows up on x ray a widened joint, but is otherwise the same on examination and treatment. In a third-degree or complete separation, the ligament from the coracoid process to the clavicle is probably also torn, allowing the collarbone to be pulled superior by the sternocleidomastoid muscle, but often relieving the pain of the stretched A-C joint. Long-term shoulder joint stability and strength remain almost normal, but patients may desire surgical repair to regain the appearance of the normal shoulder or the last few percent of function for athletics.
9.05 Shoulder dislocation

Presentation

The patient was holding his shoulder abducted horizontally to the side when a blow knocked the humeral head anteriorly. He arrives holding the shoulder abducted ten degrees from his side, unable to move it without increasing the pain. The deltopectoral groove is now a bulge (caused by the dislocated head of the hymerus) and the acromion is prominent laterally, with a depression below (where the head of the humerus sits on the undislocated shoulder).

What to do:

- Provide analgesia. Ketorolac (Toradol) 60mg im or 30mg iv is good, but you may need intravenous narcotics. To abolish muscle spasm and provide conscious sedation for a difficult reduction, but have the patient awake enough to go home in an hour, one recommended regimen is intravenous midazolam (Versed) 5mg and fentanyl (Sublimaze) 0.1mg, given ten minutes before the procedure, with continuous pulse oximetry, iv fluids running, and the physician by the bedside with bag-valve-mask and endotracheal intubation kit ready. Many shoulders, however, can be reduced without conscious sedation.
- When analgesia is required, another alternative is the use intra-articular lidocaine. After preparing the skin with povidone-iodine, using a 1.5 inch 20 gauge needle, inject 20 mL of 1% lidocaine 2 cm inferiorly and directly lateral to the acromion, in the lateral sulcus left by the absent humeral head.
- If available, obtain a pre-reduction x ray to rule out fractures or unreducible injuries. This image may be deferred and speed treatment and relief if the injury was recurrent and relatively atraumatic.
- Test and record the sensation over the deltoid to establish if there is an injury of the axillary nerve (rare) and confirm the circulation, sensation, and movement in the elbow, wrist and hand.
- Gain the patient's confidence by holding his arm securely, asking him to relax, telling him that you will not do anything suddenly and that if any pain occurs you will stop. Then in a very calm and gentle manner ask him to let his muscles go loose so his shoulder can stretch out.
- With the elbow flexed at 90 degrees, apply steady traction at the distal humerus. Pull inferiorly and at the same time externally rotate the forearm very, very slowly. If the patient complains of pain, stop rotating, allow him to relax and let the shoulder muscles stretch while you continue to maintain traction along the humerus. Resume external rotation when he is comfortable again. Using this method, full external rotation alone will reduce most anterior shoulder dislocations.
- If you do not feel or see the shoulder joint reduce, then, while maintaining traction and external rotation, slowly and gently adduct the humerus until it is against the chest wall and then slowly internally rotate the forearm against the anterior chest. The vast majority of shoulder dislocations can be reduced comfortably this way, often without the use of any analgesics.
An alternative technique when you can palpate the lateral border of the scapula is reduction by scapular manipulation. With the patient sitting up, place the uninjured shoulder firmly against an immovable support such as a wall or the raised head of the stretcher. Have an assistant face the patient and gently lift the outstretched wrist of the affected arm until it is horizontal. The assistant then places the palm of his free hand against the mid-clavicular area of the injured shoulder as counterbalance, and then gently pulls firmly pulls the patient's arm towards him. At the same time manipulate the scapula by adducting the inferior tip using thumb pressure, while stabilizing the superior aspect with your upper hand.

When the patient is comfortable and range of motion has been restored, secure the reduction in a sling and a swath around the arm and chest. Obtain post-reduction x-rays, and discharge the patient once he is alert, with a prescription of analgesics as needed and an appointment for orthopedic follow up in a week (sooner if any problem).

What not to do:

- Do not use the forearm as a lever to fracture the neck of the humerus.
- Do not redislocate the shoulder by repeating the motions of the mechanism of injury.

Discussion

Your strategy is to relocate the shoulder with minimal damage to the joint capsule and anterior labrum of the glenoid fossa, hoping the patient does not become a chronic dislocator with an unstable shoulder. Chronic dislocators are easier to reduce, and come less often to the ED, because they learn how to relocate their own shoulders.

Posterior dislocations are caused by internal rotation of the shoulder, as during a seizure, and are more subtle to diagnose. Subglenoid dislocation or luxatio erecta is rare and unmistakable, with the arm raised and abducted.
9.06 Acute Lumbar Strain ("Mechanical" Low Back Pain, Sacroiliac Dysfunction)

Presentation

Suddenly or gradually after lifting, sneezing, bending, or other movement the patient develops a steady pain in one or both sides of the lower back. At times, this pain can be severe and incapacitating. It is usually better on lying down, worse with movement, and will perhaps radiate around the abdomen or down the thigh, but no farther. There is insufficient trauma to suspect bony injury (e.g., a fall or direct blow); and no evidence of systemic disease which would make bony pathology likely (e.g., osteoporosis, metastatic carcinoma, multiple myeloma). On physical examination, there may be spasm (i.e., contraction which does not relax, even when the patient is supine or when the opposing muscle groups contract, as with walking in place) in the paraspinous muscles; but there is no point tenderness over the spinous processes of lumbar vertebrae and no nerve root signs such as pain or paresthesia in dermatomes below the knee (especially with straight leg raising), foot weakness, or loss of the ankle jerk. There may be point tenderness to firm palpation or percussion over the sacroiliac joint, especially if the pain is on that side.

What to do:

- Perform a complete history and physical examination of the abdomen, back, and legs, looking for alternative causes for the back pain.
- Consider plain x rays of the lumbosacral spine of those who have suffered injury sufficient to cause bony injury, patients under the age of 20 or over 50 who have had pain more than a month, and patients who are on long term corticosteroid medication or have a history of cancer.
- Order an erythrocyte sedimentation rate (ESR) on patients with a history of cancer or intravenous drug abuse or signs or symptoms of underlying systemic disease (e.g., unexplained weight loss, fatigue, night sweats, fever, lymphadenopathy, and back pain at night or unrelieved by bed rest).
- For point tenderness over a sacroiliac joint with no neurologic findings to suggest nerve root compression, try an intraarticular injection of a local anesthetic mixed with a corticosteroid. Improvement of pain is both diagnostic and therapeutic. Draw up 10 mL of 0.5% bupivacaine (Marcaine, Sensorcaine) mixed with 1 mL (40 mg) of methylprednisolone (DepoMedrol) or 1-2 mL (6-12 mg) of betamethasone (Celestone, Soluspan). Using a 1.5" 25 gauge needle and sterile technique, inject deeply into the sacroiliac joint at the point of maximal tenderness or into the dimple immediately lateral to the sacrum. When the needle is in the joint there should be a free flow of medication from the syringe without causing soft tissue swelling. During the injection, the patient may feel a brief increase of pain, followed by dramatic relief in 5-20 minutes which is usually permanent.
- For point tenderness of the lumbosacral muscles, inject 10-20 mL of 0.25-0.5% bupivicaine (Marcaine, Sensorcaine) deeply into the points of maximal tenderness of the erector spinae and quadratus lumborum muscles, using a 1.5-3.5" 25 gauge
needle. Quickly puncture the sin, drive the needle into the muscle belly and inject the anesthetic, slowly advancing or withdrawing, fanning out the medication. Often one fan block can reduce symptoms by 95% after injection and yield a 75% permanent reduction of painful spasms. Following injection, teach stretching exercises.

- **For severe pain that cannot be relieved by injections of local anesthetic, it may be necessary to provide the patient with one to two days of bed rest, although the majority of patients with acute low back pain recover more rapidly with continuing ordinary activities within the limits permitted by their pain than with bed rest or back-mobilizing exercises.

- **Consider disk herniation when leg pain overshadows the back pain. Back pain may subside as leg pain worsens. Look for weakness of ankle or great toe dorsiflexion and sensory changes over the medial dorsal foot with compression of the fifth lumbar nerve root or weak plantarflexion, diminished ankle reflex and paresthesias of the lateral foot with the first sacral root. Raise each leg thirty degrees from the horizontal and consider the test positive for nerve root compression if it produces pain down the leg along a nerve root distribution rather than pain in the back, increased by dorsiflexion of the ankle and relieved by plantarflexion. Ipsilateral straight leg raising is a moderately sensitive but not a specific test--a herniated intervertebral disk is more strongly indicated when radicular pain is reproduced in one leg by raising the opposite leg. Prescribe short term bed rest and non-steroidal anti-inflammatory analgesics and arrange for general medical, orthopedic or neurosurgical referral. Some consultants recommend short term corticosteroid treatment such as prednisone 50 mg qd x5 days. The patient should try four to six weeks of conservative treatment before submitting to an operation on the herniated disk. Eighty per cent of patients with sciatica recover with or without surgery. The rare cauda equina syndrome is the only complication of lumbar disk herniation that calls for emergent surgical referral. It occurs when a massive extrusion of disk nucleus compresses the caudal sac containing lumbar and sacral nerve roots, producing bilateral radicular leg pain or weakness, bladder or bowel dysfunction, perineal or perianal anesthesia, decreased rectal sphincter tone in 60-80% and urinary retention in 90%.

- **Prescribe a short course of anti-inflammatory analgesics (aspirin, ibuprofen, naprosyn) for patients who are not already taking NSAIDs. Because gastric bleeding and renal insufficiency are common with long-term use of NSAIDs, consider substituting acetaminophen or salsalate.

- **Prescribe ice to the acutely injured area, 20 minutes per hour for the first day. (This therapy is unconventional, but works as well as it does for any other musculoskeletal injury.)

- **Refer patients with uncomplicated back pain to their primary care provider for follow up care in three to seven days. Reassure them that back pain is seldom disabling and that it usually resolves with their return to normal activity. Tell them that cigarette smoking, sedentary activity and obesity are risk factors for back pain. Teach them to avoid twisting and bending when lifting and show them how to lift with the back vertical, using thigh muscles and holding heavy objects close to the chest, to avoid re-injury.

**What not to do:**

- **Do not be eager to use narcotic pain medicines. The sensation of pain from an acute musculoskeletal injury reminds the patient not to use the damaged part and**
exacerbate the injury, but instead to keep it at rest and speed healing. Narcotics are also apt to make the patient constipated, and straining at stool can be especially uncomfortable with a back injury.

- Do not be too eager to use anti-spasm medicines. Many have sedative or anticholinergic side effects.
- Do not apply lumbar traction. It has not been proven any better than placebo for relieving back pain.

Discussion

Low back pain is a common and sometimes chronic problem which accounts for an enormous amount of disability and time lost from work. The approach discussed above is geared only to the management of acute injuries and flareups, from which most people recover on their own, only about 10% developing chronic problems. With acute pain, reassurance plus limited medication may be the most useful intervention.

History and physical examination are essential to rule out serious pathologic conditions which can present as low back pain but which require quite different treatment--aortic aneurysm, pyelonephritis, pancreatitis, pelvic inflammatory disease, ectopic pregnancy, retroperitoneal or epidural abscess.

The standard five-view x-ray study of the lumbosacral spine may entail 500 mrem and only 1 in 2500 lumbar spine plain films of adults below age 50 show an unexpected abnormality. In fact, many radiographic anomalies such as spina bifida occulta, single-disk narrowing, spondylosis, facet joint abnormalities and several congenital anomalies are equally common in symptomatic and asymptomatic individuals. It is estimated that the gonadal dose of radiation absorbed from a five-view lumbosacral series is equivalent to that from six years of daily anterioposterior and lateral chest films. The World Health Organization now recommends that oblique views be reserved for problems remaining after review of AP and lateral films. For simple cases of low back pain, even with radicular findings, both CT and MRI are overly sensitive and often reveal anatomic abnormalities that have no clinical significance.

While adults are more apt to have disk abnormalities, muscle strain and degenerative changes associated with low back pain, athletically active adolescents are more likely to have posterior element derangements like stress fractures of the pars interarticularis. Early recognition of this spondylolysis and treatment by bracing and limitation of activity may prevent nonunion, persistant pain and disability.

Malingering and drug seeking are major psychological components to consider in patients who have frequent ED visits for back pain and whose responses seem overly dramatic of otherwise inappropriate. These patients may move around with little difficulty when they do not know they are being observed. They may complain of generalized superficial tenderness when you lightly pinch the skin over the affected lumbar area. If you are suspicious that the patient's pain is psychosomatic or nonorganic you can use the axial loading test, in which you gently press down on the head of the standing patient. This should not cause significant musculoskeletal back pain. You can also perform the rotation test, in which the patient stands with his arms at his sides. Hold his
wrist next to his hips and turn his body from side to side, passively rotating his shoulders, trunk and pelvis as a unit. This maneuver creates the illusion that you are testing spinal rotation, but in fact you have not altered the spinal axis and any complaint of back pain should be suspect.

References:

9.07 Coccyx Fracture (Tailbone Fracture)

Presentation

The patient fell on his tailbone and now complains of pain which is worse with sitting, and perhaps with defecation. There should be little or no pain with standing but walking may be uncomfortable. On physical examination, there is point tenderness, and perhaps deformity of the coccyx, which is best palpated by a finger in the rectum.

What to do:

- Verify the history (was this actually a straddle injury?) and examine thoroughly, including the lumbar spine, pelvis, and the legs. Palpate the coccyx from inside and out, feeling primarily for point tenderness and/or pain on motion. [Picture]
- X rays are optional. Any noticed variation can be an old fracture or an anatomic variant, and a fractured coccyx can appear within normal limits.
- Instruct the patient in how to sit forward, resting his weight upon ischial tuberosities and thighs, instead of on the coccyx. A foam rubber doughnut cushion may help. If necessary, prescribe anti-inflammatory pain medications or stool softeners.
- Inform the patient that the pain will gradually improve over a week, as bony callus forms and motion decreases, and arrange for followup as needed. Chronic pain is rare but treatable by surgically removing the coccyx.
9.08 Fibromyalgia (Trigger Points)

Presentation

The patient, generally between 25 and 50 years old, will be troubled with the gradual onset of fibromuscular pain that at times can be immobilizing. There may be a previous history of acute strain, muscle spasm or nerve root irritation (e.g., whiplash injury of the neck or low back strain). The areas most commonly affected include the posterior muscles of the neck and scapula, the soft tissues lateral to the thoracic and lumbar spine, and the sacroiliac joints. The patient is often depressed or under emotional or physical stress and often has associated fatigue with disturbed sleep as well as sensations of numbness or swelling in the hands and feet. Cold weather may be one of the precipitating causes of pain. There should be no swelling, erythema or heat over the painful areas, but applying pressure over the site with an examining finger will cause the patient to wince with pain. This tender "trigger point" is usually no larger than your finger tip and when pressed will cause local pain, referred pain, or both.

What to do:

- When you find a trigger point, map out its exact location (point of maximum tenderness) and place an X over the site with a marker or ball point pen. If the trigger point is diffuse there is no need to outline its location.
- Obtain a careful history and perform a general physical exam to help exclude the possibility of a serious underlying disorder such as rheumatoid arthritis or cancer.
- With any suspicion that an underlying problem exists, obtain an x ray or an erythrocyte sedimentation rate. These studies should both be normal in fibromyalgia.
- Where trigger points are diffuse, prescribe a nonsteroidal anti-inflammatory such as naprosen (Anaprox) 275mg two tablets stat then one qid or ibuprofen (Motril) 800mg stat then 600mg qid x 5 days. A muscle relaxant like cyclobenzaprine (Flexaril) may also be helpful.
- When a focal trigger point is present, you can suggest to the patient that he may get immediate relief with an injection. Inject 2-5ml of 1% xylocaine or longer-acting 0.5% bupivacaine along with 20-40mg of methylprednisolone (Depomedrol) or 2-5mg of triamcinolone (Aristospan) through the mark you placed on the skin, directly into the painful site. Be sure you are not in a vessel and then "fan" the needle in all directions while injecting the trigger point. In addition, to insure total coverage, massage the area after the injection is complete. The patient will often get complete or near-complete pain relief, which helps to confirm the diagnosis of fibromyalgia. The beneficial effect of this injection may last for weeks or months. A supplementary five day course of non-steroidal anti-inflammatories is optional.
- Moist hot compresses and massage may also be comforting to the patient after discharge.
- Inform the patient that after trigger point injection there may be a transient painful rebound. Anti-inflammatory analgesics will help to reduce this potential discomfort.
- Provide followup care for patients in the event their symptoms do not clear and they require further diagnostic evaluation and therapy. For example, hypothyroidism and
polymalgia rheumatica coexist with or predispose to fibromyalgia, or the patient may develop dermatomyositis.

What not to do:

- Do not attempt to inject a very diffuse trigger point (more than one square centimeter). Results are generally unsatisfactory.
- Do not prescribe narcotic analgesics or systemic steroids. They are no more effective and add side effects and the risk of dependence.

Discussion

Although the pathophysiology of fibromyalgia is unknown it is a very real syndrome. Treatment may provide only partial symptomatic relief. True fibromyalgia syndrome is a chronic condition requiring long term management that may include physical therapy, exercise, patient education and reassurance along with sleep-enhancing medications like low dose tricyclic antidepressants.

Emergency physicians often see trigger points associated with simple self-limiting regional myofascial pain syndromes which appear to arise from muscles, muscle-tendon junctions, or tendon-bone junctions. Myofascial disease can result in severe pain, but typically in a limited distribution and without the systemic feature of fatigue. When symptoms recur or persist after the basic therapy above, or are accompanied by generalized complaints, refer the patient to a rheumatologist or primary care physician.

When the quadratus lumborum muscle is involved there is often confusion as to whether or not the patient has a renal, abdominal, or pulmonary ailment. The reason for this is the muscle’s proximity to the flank and abdomen as well as its attachment to the 12th rib, which when tender, can create pleuritic symptoms. A careful physical exam, with palpation, active contraction, and passive stretching of this muscle reproducing symptoms, can save this patient from a multitude of laboratory and x-ray studies.
9.09 Acute Monarticular Arthritis

Presentation

The patient complains of one joint which has become acutely red, swollen, hot, painful, and stiff.

What to do:

- Ask about previous, similar episodes in this or other joints, as well as trauma, infections, or rashes, and perform a thorough physical examination looking for evidence of the same. Ask for a history of gout.
- Examine the affected joint, and document the extent of effusion, involvement of adjacent structures, et cetera. Fluid can often be detected by pressing on one side of the affected joint and at the same time palpating a wavelike fluctuance on the opposite side of the joint.
- Cleanse the skin over the most superficial area of the joint effusion with alcohol and povidone-iodine (Betadine), anesthetize the skin with 1% plain buffered lidocaine, and aspirate as much joint fluid as possible through an 18-20 gauge needle, using aseptic technique throughout. Fluoroscopy may be valuable in guiding needle placement for hip or shoulder joint aspiration.
- Grossly examine the joint aspirate. Clear, light yellow fluid is characteristic of osteoarthritis or mild inflammatory or traumatic effusions. Grossly cloudy fluid is characteristic of more severe inflammation or bacterial infection. Blood in the joint is characteristic of trauma (a fracture or tear inside the synovial capsule) or bleeding from hemophilia or anticoagulants.
- One drop of joint fluid may be used for a crude string or mucin clot test. Wet the tips of two gloved fingers with joint fluid, and repeatedly touch them together and slowly draw them apart. As this maneuver is repeated 10 or 20 times, and the joint fluid dries, normal synovial fluid will form longer and longer strings, usually to 5-10 cm in length. Inflammation inhibits this string formation. This is a non-specific test, but may aid decision at the bed side.
- The essential laboratory tests on joint fluid consist of a Gram stain and culture for possible septic arthritis. (The presence of urate crystals may sometimes be detected on the wet prep or Gram stain.)
- A joint fluid leukocyte count is the next most useful test to order. A count greater than 50,000 white cells/mm3 is characteristic of bacterial infection (especially when most are polymorphonuclear leukocytes). In osteoarthritis, there are usually fewer than 2,000 WBCs/mm3, and inflammatory arthritis (such as gout and rheumatoid arthritis) falls in the middle range of 2,000-50,000 WBCs/mm3. If there is more fluid, send to the lab for a glucose level, which will be low in infection compared to serum.
- Obtain x rays of the affected joint to detect possible unsuspected fractures, or evidence of chronic disease, such as rheumatoid, crystal-induced or osteoarthritis.
- If there is any suspicion of a bacterial infection (based on fever, elevated ESR, cellulitis, lymphangitis, or the joint fluid results above) start the patient on appropriate antibiotics which will have a high concentration in the synovial fluid. The most
common, and the most devastating, organism requiring treatment is Staphylococcus aureus, which may be adequately treated with oral dicloxacillin or cephalexin 500mg q6h, but, since patients with this infection must be very closely followed, it is usually more practical to admit them to the hospital on intravenous antibiotics. In sexually-active patients, look for gonorrhea. In nursing home patients with urinary tract infections there could be gram-negative organisms. In intravenous drug abusers both staph and gram-negatives.

- Inflammatory arthritis may be treated with non-steroidal anti inflammatory medications, beginning with a loading dose such as indomethacin (Indocin) 50mg or ibuprofen (Motrin) 800mg, tapered to usual maintenance doses.
- When joint fluid cannot be obtained to rule out infection, it may be a good tactic to treat simultaneously for infectious and inflammatory arthritis.
- Splint and elevate the affected joint and arrange for admission or followup.

**What not to do:**

- Do not tap a joint through an area of obvious contamination such as subcutaneous cellulitis. You may inoculate synovial fluid with bacteria.
- Do not be misled by bursitis, tenosynovitis, or myositis without joint involvement. An infected or inflamed joint will have a reactive effusion, which may be evident as fullness, fluctuance, reduced range of motion, or joint fluid which can be drawn off with a needle. It is usually difficult to tap a joint in the absence of a joint effusion.
- Do not instil local anesthetics in the inflammed joint as an ED procedure. They will mask symptoms transiently without treating the underlying problem.
- Do not use NSAIDs when a patient has a history of active peptic ulcer disease with bleeding. Relative contraindications include renal insufficiency, volume depletion, gastritis, inflammatory bowel disease, asthma and congestive heart disease.
- Do not start maintenance NSAID doses for an acute inflammation. It will take a day or more to reach therapeutic levels and pain relief.

**Discussion**

The urgent reason for tapping a joint effusion is to rule out a bacterial infection, which could destroy the joint in a matter of days. Beyond identifying an infection (with Gram stain, culture, and WBC) further diagnosis of the cause of arthritis is not particularly accurate nor necessary to decide on acute treatment. Reducing the volume of the effusion may alleviate pain and stiffness, but this effect is usually short-lived, as the effusion reaccumulates within hours. Identification of crystals is essential for the diagnosis of gout or pseudogout, but one acute attack may be treated the same as another inflammatory arthritis and exact diagnosis deferred to follow up.

Infants and young children may present with fever and reluctance to walk from septic arthritis of the hip or knee, and arthrocentesis may require sedation or general anesthesia.
Following minimal trauma or repetitive motion, a nonarticular synovial sac, or bursa, protecting a tendon or prominent bone becomes swollen, tender, and inflamed. Because
there is no joint involved, there is no decreased range of motion, but, if the tendon sheath is involved, there may be some stiffness and pain with motion.

**What to do:**

- Obtain a detailed history of the injury or precipitating activity document a thorough physical examination, and rule out a joint effusion (see below).
- Prepare the skin with alcohol and antiseptic solution and 1% lidocaine anesthetic. Puncture the swollen bursa with a #18 or #20 needle, using aseptic technique, and withdraw some fluid to drain the effusion and rule out a bacterial infection.
- Examine a Gram stain of the effusion and send a sample for leukocyte count and culture. If there is any sign of a bacterial infection, prescribe appropriate oral antibiotics. (Bacterial infections tend to be gram-positive cocci and respond well to cephalexin or dicloxacillin 500mg tid x 7d.)
- Bacterial infections may also respond to direct injection of antibiotics. Severe inflammatory bursitis may require injection of local anesthetics (lidocaine, bupivacaine) and corticosteroids like methylprednisolone (Solu-Medrol) 40mg or betamethasone (Celestone Soluspan) 0.25-0.5mg.
- Construct a splint and instruct the patient in rest, elevation, and ice packing. Prescribe nonsteroidal anti-inflammatory medications, and arrange for followup.

**Discussion**

Common sites for bursitis include several bursae of the shoulder and knee, the olecranon bursa of the elbow, and the trochanteric bursa of the hip. Patients with septic bursitis, unlike those with septic arthritis, can often be safely discharged on oral antibiotics because the risk of permanent damage is much less when there is no joint involvement. Some long-acting corticosteroid preparations can produce a rebound bursitis several hours after injection, when the local anesthetic wears off, but before the corticosteroid crystals dissolve. Patients should be so informed.
9.12 Ligament Sprains (Including Joint Capsule Injuries)

Presentation

A joint is distorted beyond its normal anatomical limits (as when an ankle is inverted or a shoulder is dislocated and reduced) The patient may complain of a snapping or popping noise at the time of injury, immediate swelling, and loss of function (suggestive of second- or third-degree sprain or a fracture); or he may come in hours to days following the injury, complaining of gradually increasing swelling and resulting pain and stiffness (suggestive of a first- or second-degree sprain and development of a traumatic effusion).

What to do:

- Obtain a detailed history of the mechanism of injury, and examine the joint for structural integrity, function, and point tenderness. Use the uninjured limb as a control.
- Obtain x rays (these can be deferred if necessary).
- With first-degree and second-degree sprains, gently immobilize the joint using an elastic bandage alone, or in combination with a cotton roll and/or plaster splint, as discomfort demands.
- Consider prescribing anti-inflammatory pain medication when the patient complains of pain at rest and provide crutches when discomfort will not allow weight bearing.
- If there is a fracture or ligament tear with instability, the limb is usually best immobilized in a splint or cast. Splint ankles at 90 degrees, wrists in extension, fingers at slight flexion.
- Instruct the patient in rest, elevation, and application of ice (10-20 minutes each hour) for the first 24 hours.
- Explain to the patient that swelling in acute musculoskeletal injuries usually increases for the first 24 hours, and then decreases over the next 2-4 days (longer if the treatment above is not employed) and that some swelling and discomfort may persist for several weeks and at times for several months.
- Explain the possibility of occult injuries, the necessity for followups, and the slow healing of injured ligaments (usually 6 months until full strength is regained).

What not to do:

- Do not obtain x rays before the history or physical examination. Films of the wrong spot can be very misleading. For example, physicians have been steered away from the diagnosis of an avulsion fracture of the base of the fifth metatarsal by the presence of normal ankle films.
- Do not base the diagnosis on x rays. They should be used as confirmatory evidence.
Discussion

Ligamentous injuries are classified as first-degree, (minimal stretching); second-degree (a partial tear with functional loss and bleeding but still holding); and third-degree (complete tear with ligamentous instability, often requiring a cast). A tense joint effusion will limit the physical examination (and is one reason to require re-evaluation after the swelling has decreased) but also suggests less than a third degree ligamentous injury, which is normally accompanied by a tear of the joint capsule.
9.13 Ankle Sprain

Presentation

The patient inverted the foot and either came in immediately or a day later with pain, swelling, and inability to walk. There is tenderness to palpation of the anterior talofibular ligament (anterior to the lateral malleolus) and on stretching of the ATFL with supination or pulling the talus anteriorly (drawer sign).

What to do:

- If the patient is not already doing this, elevate the foot and apply ice 15 minutes per hour to treat the reactive inflammation.
- Document the mechanism of injury, previous injuries, deformity, swelling, discoloration, circulation, sensation, movement.
- Palpate the prominence on the lateral foot that is the base of the fifth metatarsal, where the insertion of the peroneus brevis can be avulsed by an inversion injury, and which may be better seen on foot views.
- Palpate the fibula on the lateral leg up to the knee, where spiral fractures can propagate when the ankle breaks, and which also do not show on standard ankle views.
- If there is tenderness posterior to the lateral malleolus or the patient cannot take four steps in the ED, obtain ankle x rays to rule out a fracture. Films otherwise are optional and can be deferred.
- Immobilize the ankle in a stirrup (or sugar-tong) splint. Provide the patient with crutches for 3-4 days, anti-inflammatory analgesics, and follow up.

What not to do:

- Do not rule out a fracture based on a negative x ray.
- Do not overlook fractures of the tarsal navicular, talus, or os trigonum, all visible on the ankle view.

Discussion

Although patients continue to visit EDs with ankle sprains, our role remains to rule out other injuries, and teach them how to care for themselves. Patients ask if a bone is broken, but the initial treatment is usually the same regardless of the x ray results. Most ankle sprains could be managed over the telephone, and seen in the office the next day.

References:

9.14 Knee Sprain

Presentation

An athlete may have planted the foot while decelerating, torn the anterior cruciate ligament allowing the tibia to dislocate anteriorly, fallen to the ground where it spontaneously relocated, and not been able to get up. Alternatively, he may have been clipped on the lateral knee, causing a valgus deformity which tore the medical collateral ligament and perhaps the medial meniscus and anterior cruciate as well. An adolescent girl may have dislocated her patella laterally, tearing the medial retinaculum. These sorts of injury tend to come to the ED within an hour or two, in pain, holding the knee flexed ten to twenty degrees, with a tense joint effusion and quadriceps spasm which prevents detailed diagnosis by physical examination.

What to do:

- If the patient has not already done so, ice and elevate the injury.
- Load with anti-inflammatory analgesics like ketorolac (Toradol) 60mg im or ibuprofen (Mortin) 800mg po.
- Examine as permitted by pain. Clear the back and pelvis. Check hip flexion, extension, and rotation. Thump the sole of the foot as an axial loading clue to a tibia or femur fracture. Document any effusion, discoloration, heat, deformity, loss of function, circulation, sensation, movement.
- Document the range of motion, then carry out the rest of the exam with the knee slightly flexed, always comparing to the uninjured knee. Palpate the medial and lateral collateral ligament and test them with varus and valgus stress. Palpate the joint line anteriorly to assess the menisci and tibial plateaux. Drawer the tibia anterior and posterior to test the cruciates (the Lachman test).
- Obtain x rays.
- Aspirate the joint only if you need to rule out infection or obtain a few hours of mobility.
- Discharge the patient with the knee immobilized in a splint or Jones dressing, crutches, a prescription for NSAIDs, and an appointment for orthopedic re-evaluation in 3-4 days.

Discussion

Chronic injuries can also be treated with NSAIDS, immobilization, and crutches. Examples include meniscal tears and joint mice, which may present with a history of the knee catching or giving way, and even flareups of osteoarthritis, degenerative joint disease, and pseudogout.
9.15 Muscle Strains and Tears

Presentation

Strains occur during or after a vigorous overstretching of a muscle bundle that leads to an insidious development of pain and tightness which is worse with use and better with rest. Tears of the muscle belly tend to be partial, with sudden onset of pain and partial loss of function. Often a tear occurs with considerable bleeding which can lead to remarkable hematomas, causing swelling at the site and dissecting along tissue planes to create ecchymoses at distant, uninvolved sites. Complete tears are more likely in the tendinous part of the muscle, and produce immediate loss of function, and retraction of the torn end, creating a deformity and bulge.

What to do:

- Obtain a history of the mechanism of injury, and test individual muscle functions. A complete tear of a muscle merits orthopedic consultation.
- Even for a partial tear of a muscle belly, try to refine the diagnosis to a specific muscle or muscle group, to help exclude other possibilities.
- For muscle strains, provide soft splinting, analgesics and instruct the patient to apply warm moist compresses for comfort.
- For muscle tears, construct a loose splint to immobilize the injured part, and instruct the patient in rest, elevation, and ice.
- Warn the patient that partial tears can become complete, and that blood will change color and percolate to the skin at distant sites, where it does not imply additional injury. Arrange for followup.

Discussion

Some restrict the term "strain" for muscle injuries, and "sprain" for ligament injuries. A complete tear of the plantaris tendon in the leg is difficult to differentiate from a partial tear of the gastrocnemius muscle, but the treatment for both is the same.
9.17 Subluxation of the Head of the Radius
(Nursemaid's Elbow)

Presentation

A toddler has received a sudden jerk on his arm causing enough pain that he holds it motionless. Circumstances surrounding the injury may be obvious (such as a parent pulling the child up out of a puddle); or obscure (the babysitter who reports that the child "just fell down"). The patient and family may not be accurate about localizing the injury, and think that the child has injured his shoulder or wrist. The patient is comfortable at rest, splinting his arm with mild flexion at the elbow and pronation of the forearm. There should be no deformity, crepitation, swelling, or discoloration of the arm. There is also no palpable tenderness except over the radiohumeral joint; the child will start to cry with any movement of the elbow.

What to do:

- Rule out any history of significant trauma, such as a fall from a height.
- Thoroughly examine the entire extremity, including the shoulder girdle, hand and wrist.
- If there is any suspicion of a fracture, get an x ray.
- When subluxation is suspected, place the patient in the parent's lap and inform the mother or father that it appears their child's elbow is slightly out of place and that you are going to put it back in. Warn them that this is going to hurt for a few moments.
- Put your thumb over the head of the radius and press down while you smoothly and fully extend the elbow, and at the same time supinate the forearm. Complete the procedure by fully flexing the elbow while your thumb remains pressing against the radial head and the forearm remains supinated. At some point you should feel a click beneath your thumb. The patient will usually scream for a while at this point. Leave for about ten minutes; then return and re-examine to see that the child has fully recovered. Post-reduction immobilization is usually unnecessary. Picture
- Reassure the parents, explain the mechanism involved in the injury, and teach them how to prevent and treat recurrences.
- Without full recovery, get x rays.
- If x rays are negative, but the child still does not use his arm normally, place the arm in a sling and instruct the family to seek orthopedic followup care if recovery doesn't occur within 24 hours.

What not to do:

- Do not attempt to reduce an elbow where the possibility of fracture or dislocation exists.
- Do not get unnecessary x rays when all the findings are consistent with nursemaid's elbow. The x rays may appear normal even when the radial head is indeed subluxed. The dislocation is subtle, and requires measurement or comparison to appreciate.
(Draw a line down the axis of the radius. It should bisect the capitellum of the lateral humerus.) Associated fractures occur, yet are not common.

- Do not confuse nursemaid's elbow with the more serious brachial plexus injury, which occurs after much greater stress and results in a flaccid paralysis of the arm.

**Discussion**

This injury is an anterior subluxation of the radial head away from the capitellum through the annular ligament, and occurs almost exclusively among children between 18 months and 3 years of age. On occasion, if the subluxation has been present for several hours, edema, pain, and natural splinting will continue even after reduction, or may prevent reduction.

**References:**

9.18 Radial Head Fracture

Presentation

A patient has fallen on an outstretched hand and has a normal non-painful shoulder, wrist, and hand, but pain in the elbow joint. The joint may be intact, with full range of flexion, but there is pain or decreased range of motion on extension, supination and pronation. Tenderness is greatest over the radial head and lateral condyle. X rays may show a fracture or dislocation of the head of the radius. In all views, a line down the center of the radius should point to the capitellum of the lateral condyle. Often, however, no fracture is visible, and the only x ray signs are of the elbow effusion or hemarthrosis pushing the posterior fat pad out of the olecranon fossa and the anterior fat pad out of its normal position on the lateral view.

What to do:

- Obtain a detailed history of the mechanism of injury, and a physical examination, looking for the features described above, and x rays of the elbow, looking for visible fat pads as well as fracture lines.
- If there is any question of a radial head fracture, immobilize the elbow (preventing pronation and supination of the hand) with a gutter splint extending from proximal humerus to hand, or sugar tong splints, or simply a sling, for the next week.
- Explain to the patient the possibility of a fracture, despite negative x rays, and arrange for followup, with re-evaluation and repeat films in 1-2 weeks.

What not to do:

- Do not jump to the diagnosis of "tennis elbow or "sprained elbow" simply on the basis of a negative x ray.

Discussion

Small, non-displaced fractures of the radial head may show up on x rays weeks later or never at all. Because pronation and supination of the hand are achieved by rotating the radial head upon the capitellum of the humerus, very small imperfections in healing of the radial head may produce enormous impairment of hand function, which may be only partly improved by surgical excision of the radial head. Immobilization at the first question of a radial head fracture may help preserve essential pronation and supination. "Tennis elbow" is a tenosynovitis of the common insertion of the wrist extensors upon the lateral condyle, and results in pain on wrist extension rather than on pronation and supination.
9.19 Radial Neuropathy (Saturday Night Palsy)

Presentation

The patient has injured his upper arm, usually by sleeping with his arm over the back of a chair, and now presents holding the affected hand and wrist with his good hand, complaining of decreased or absent sensation on the radial and dorsal side of his hand and wrist, and of inability to extend his wrist, thumb and finger joints. With the hand supinated (palm up) and the extensors aided by gravity, hand function may appear normal, but when the hand is pronated (palm down) the wrist and hand will drop.

What to do:

- Look for associated injuries. This sort of nerve injury may be associated with cervical spine fracture, injury to the brachial plexus in the axilla, or fracture of the humerus. Picture
- Document in detail all motor and sensory impairment. Draw a diagram of the area of decreased sensation, and grade muscle strength of various groups (flexors, extensors, etc.) on a scale of 1-5.
- If there is complete paralysis or complete anesthesia, arrange for additional neurological evaluation and treatment right away. Incomplete lesions may be satisfactorily referred for followup evaluation and physical therapy.
- Construct a splint, extending from proximal forearm to just beyond the metacarpophalangeal joint (leaving the thumb free) which holds the wrist in 90 degree extension. This and a sling will help protect the hand, also preventing edema and distortion of tendons, ligaments, and joint capsules which can result in loss of hand function after strength returns.
- Explain to the patient the nature of his nerve injury, the slow, rate of regeneration, the importance of splinting and physical therapy for preservation of eventual function, and arrange for followup.

What not to do:

- Do not be misled by the patient's ability to extend the interphalangeal joints of the fingers, which may be accomplished by the ulnar-innervated interosseous muscles.

Discussion

This neuropathy is produced by compression of the radial nerve as it spirals around the humerus. Most commonly it occurs when a person falls asleep, intoxicated, held up by his arm thrown over the back of a chair. Less severe forms may befall the swain who keeps his arm on his date’s chair back for an entire double feature, ignoring the growing pain and paresis. If the injury to the radial nerve is at the elbow or just below, there may be sparing of the wrist radial extensors as well as the radial nerve autonomous sensation. The deficient groups will be the wrist ulnar extensors as well as the
metacarpophalyngeal extensors. A high radial palsy in the axilla (e.g., from leaning on crutches) will involve all of the radial nerve innervations, including the triceps.
9.20 Cheiralgia Paresthetica (Handcuff Neuropathy)

Presentation

The patient may complain of pain around the thumb while tight handcuffs were in place. The pain decreased with handcuff removal, but there is residual paresthesia or decreased sensation over the radial side of the thumb metacarpal (or a more extensive distribution). The same injury may also be produced by pulling on a ligature around the wrist, or wearing a tight watchband.

What to do:

Picture
· Carefully examine and document the motor and sensory function of the hand. Draw the area of paresthesia or decreased sensation as demonstrated by light touch or two-point discrimination. Document that there is no weakness or area of complete anesthesia.
· Explain to the patient that the nerve has been bruised, that its function should return as it regenerates, but that the process is slow, requiring about two months.
· Arrange for followup if needed. Bandages, splints, or physical therapy are usually not necessary.

What not to do:

· Do not overlook more extensive injuries, such as a complete transection of the nerve (with complete anesthesia) or a more proximal radial nerve palsy (see above). Do not forget alternative causes, such as peripheral neuropathy, DeQuervain's tenosynovitis, carpal tunnel syndrome, scaphoid fracture, or a gamekeeper's thumb (see).

Discussion

A superficial sensory cutaneous twig of the radial nerve is the branch most easily injured by constriction of the wrist. Its area of innervation can vary widely (see figure). Axonal regeneration of contused nerves proceeds at about 1 mm per day (or about an inch a month); thus recovery may require two months (measuring from site of injury in wrist to end of area of paresthesia). Patients may want this injury documented as evidence of "police brutality," but it can be a product of their own struggling as much as too-tight handcuffs.
9.21 Carpal Tunnel Syndrome

Presentation

The patient complains of pain, tingling, or a "pins and needles" sensation in the hand. Onset may have been abrupt or gradual but the problem is most noticeable upon awakening or after extended use of the hand. The sensation may be bilateral, may include pain in the wrist, or forearm and is usually ascribed to the entire hand until specific physical examination localizes it to the median nerve distribution. More established cases may include weakness of the thumb and atrophy of the thenar eminence. **Picture.** Physical examination localizes paresthesia and decreased sensation to the median distribution (which may vary) and motor weakness, if present, to intrinsic muscles with median innervation. Innervation varies widely, but the muscles most reliably innervated by the median nerve are the abductors and opponens of the thumb.

What to do:

- Perform and document a complete examination, sketching the area of decreased sensation and grading (on a scale of 1-5) the strength of the hand.
- Hold the wrist flexed at 90 degrees for 60 seconds, to see if this reproduces symptoms. This is known as Phalen's test, and is more sensitive than the reverse (hyperextending the wrist) and more specific than tapping over the volar carpal ligament to elicit paresthesia (Tinel's sign).
- Explain the nerve-compression etiology to the patient, and arrange for additional evaluation and followup. Borderline diagnoses may be established with electromyography (EMG), but cases with pronounced pain or weakness may require early surgical decompression. Anti-inflammatory medication, elevation of the affected hand, ice, immobilization with a volar splint, and rest may all help to reduce symptoms.

What not to do:

- Do not rule out thumb weakness just because the thumb can touch the little finger. Thumb flexors may be innervated by the ulnar nerve. Test abduction and opposition: can the thumb rise from the plane of the palm and can the thumb pad meet the little finger pad?
- Do not diagnose carpal tunnel syndrome solely on the basis of a positive Tinel's sign. Paresthesia can be produced in the distribution of any nerve if one taps hard enough.

Discussion

There is little space to spare where the median nerve and digit flexors pass beneath the volar carpal ligament, and a very little swelling may produce this specific neuropathy. Trauma, arthritis pregnancy, and weight gain are among the many factors which can precipitate this syndrome. Less commonly, the median nerve can be entrapped more
proximally, where it enters the medial antecubital fossa through the pronator teres. Symptoms of this cubital tunnel syndrome may be reproduced with elbow extension and forearm pronation.
Presentation

The patient, usually a middle-aged woman, has difficulty with tasks like opening jars because of pain at the base of the thumb, which may also be present upon awakening. On examination, there is little or no swelling and no deformity, just tenderness on palpating or stretching the extensor pollicis brevis and abductor pollicis longus tendons bordering the palmar side, or less commonly, the extensor pollicis longus tendon bordering the dorsal side of the anatomic snuffbox.

What to do:

- Document normal circulation, sensation, movement. Compress the thumb metacarpal onto the scaphoid to see if it is fractured. Look for carpal tunnel syndrome with Phalen's test.
- Have the patient fold the thumb into the palm, close the fingers over it into a fist, then ulnar deviate the wrist. This is known as the Finklestein test, and reproduces the pain of DeQuervain's tenosynovitis of the extensor pollicis brevis and abductor pollicis longus tendons.
- Prescribe anti-inflammatory analgesics and a radial gutter splint to immobilize the thumb to the intraphalangeal joint.
- Arrange for rehabilitation.
9.23 Scaphoid (Carpal Navicular) Fracture

Presentation

The patient (usually 14-40 years old) fell on an outstretched hand, with the wrist held rigid and extended, and now complains of pain, swelling, and decreased range of motion in the wrist, particularly on the radial side. Physical examination discloses no deformity, but pain with motion and palpation and often swelling, especially in the anatomic snuff box (on the radial side of the wrist, between the tendon of the extensor pollicis longus and the tendons of the abductor pollicis longus and extensor pollicis brevis). A good sign is axial loading along the proximal phalanx of the thumb, eliciting pain at the base.

What to do:

- Apply ice and a temporary splint, check for distal sensation and movement and other injuries; and order x rays of the wrist, with special attention to the scaphoid bone and its fat pad.
- Regardless of whether a scaphoid fracture shows on x ray, splint or cast the wrist in extension, with the thumb out in opposition, and immobilized to its interphalangeal joint.
- Explain to the patient the frequent difficulty of visualizing scaphoid fractures on x rays, the frequent difficulty in healing of scaphoid fractures due to variable blood supply, and the resultant necessity of keeping this splint or cast in place for a week.
- Arrange for re-evaluation and further treatment within the next few days.

Discussion

Because fractures of the scaphoid bone are common, because they are often invisible on x ray until weeks later, because the blood supply to the fractured area may be tenuous and non-union or avascular necrosis likely, and because the resultant pain and arthritis may severely limit hand function, it is prudent practice to splint or cast all potential scaphoid fractures with a thumb spica until orthopedic re-evaluation in 1-2 weeks.

References:

9.24 Third Degree Tear of Ulnar Collateral Ligament (Skipole or Gamekeeper's Thumb)

Presentation

The patient fell while holding onto a ski pole, banister, or other fixed object, forcing his thumb into abduction. (This same lesion may be produced by the repeated breaking of the necks of game birds—hence the name.) The metacarpophalangeal joint of the thumb is swollen, tender, and stiff; but, when tested for stability, can be deformed towards the radial (or palmar) aspect more than the metacarpophalangeal joint of the other thumb. The patient's power pinch between the thumb and index finger, if possible at all, is less strong than with the other hand.

What to do:

- Examine thoroughly and obtain x rays, which should be negative or show a small avulsion fracture at the insertion of the ulnar collateral ligament.
- Treat with ice, elevation, rest, anti-inflammatory medications, and immobilization in a radial gutter splint, including the thumb.
- Explain to the patient that this particular injury may not heal with closed immobilization, but sometimes requires operative repair; and arrange for re-examination and orthopedic referral after a few days, when the swelling is decreased.

Discussion

The ulnar collateral ligament of the metacarpophalangeal joint of the thumb, once completely torn, may retract its torn ends under other structures, where they are no longer apposed and cannot be depended upon to heal. An operation may be required to reappose the two ends of the ligament or reattach an avulsed insertion, but this is not usually done immediately. Left unrepaired, a gamekeeper's thumb remains unstable, and weak in pinching and holding. For minor sprains or partial ligament tears, an elastic wrap that incorporates the thumb may be all that is required to reduce mobility and provide comfort.
9.25 Ganglion Cysts

Presentation

The patient is concerned about a rubbery, rounded swelling emerging from the general area of a tendon sheath of the wrist or hand. It may have appeared abruptly, been present for years, or fluctuated, suddenly resolving and gradually returning in pretty much the same place. There is usually little tenderness, inflammation, or interference with function, but ganglion cysts are bothersome when they get in the way and painful when repeatedly traumatized.

What to do:

- Undertake a thorough history and physical exam of the hand to ascertain that everything else is normal. X rays are of no value unless there is some question of bony pathology.
- Explain to the patient that this is a fluid-filled cyst, spontaneously arising from bursa or tendon sheath, and posing no particular danger. Treatment options include: hitting it with a large book to rupture the cyst, with a fair chance of recurrence; draining the contents of the cyst with an 18-gauge needle to reduce its size and then injecting corticosteroid, also with good chance of recurrence; arranging for a surgical excision, which will provide definitive pathologic diagnosis, but the dissection is sometimes unexpectedly extensive, and still allows some chance of recurrence; and doing nothing, in which case the cyst may spontaneously drain and may recur.
- Follow the wishes of the patient regarding above and arrange for followup.

Discussion

Ganglion cysts are outpouchings of bursae or tendon sheaths, with no clear etiology and no relation to nerve ganglia. Perhaps they got their name because their contents are like "glue." Reassurance about their insignificance is often the best we can offer patients.
9.26 Finger (PIP Joint) Dislocation

Presentation

The patient will have jammed his finger, causing a hyperextension injury that forces the middle phalanx dorsally and proximally out of articulation with the distal end of the proximal phalanx. An obvious deformity will be seen unless the patient or a bystander has reduced the dislocation on his own. There should be no sensory or vascular compromise.

What to do:

- Unless a shaft fracture is suspected, x rays may be deferred and joint reduction can be carried out first. Picture
- If there has been significant delay in seeking help or the patient is suffering considerable discomfort, a digital block over the proximal phalanx will allow for a more comfortable reduction
- To reduce the joint, do not pull on the fingertip; instead, push the base of the middle phalanx distally, using your thumb until it slides smoothly into its natural anatomical position.
- Now test the finger for collateral ligament instability and avulsion of the central extensor tendon slip. The patient should be able to extend his finger at the proximal interphalangeal (PIP) joint. Testing for avulsion of the volar carpal plate, you will be able to hyperextend the PIP joint more than that of the same finger on the uninjured hand. If any of these associated injuries exist, orthopedic consultation should be sought and prolonged splinting and rehabilitation will be required.
- Post-reduction x-rays should be taken. "Chip fractures" may represent tendon or ligament avulsions.
- Splint in extension for 3-4 days and provide followup for active range of motion exercises to restore normal joint mobility.
- Inform the patient that joint swelling and stiffness may persist for months after the initial injury.
- Remind the patient to keep the injured finger elevated. Recommend ice application for the next 24 hours and aspirin for pain

Discussion

If there is any doubt as to the competence of the central extensor slip or the volar carpal plate, the joint must be splinted in full extension for 3 weeks.
9.27 Extensor Tendon Avulsion - Distal Phalanx (Baseball or Mallet Finger)

Presentation

There is a history of a sudden resisted flexion of the distal interphalangeal (DIP) joint, such as when the finger tip is jammed or struck by a ball, resulting in pain and tender ecchymotic discoloration over the dorsum of the base of the distal phalanx. When the finger is held in extension the injured DIP joint remains in slight flexion.

What to do:

Picture

- Obtain an x ray. It may or may not demonstrate an avulsion fracture. Apply a finger splint that will hold the DIP joint in neutral position or slight hyperextension, and firmly tape it in place.
- Instruct the patient to keep the splint in place continuously and seek orthopedic followup care within one week.
- Prescribe an analgesic as needed.

What not to do:

- Do not assume there is no significant injury just because the x ray is negative. With or without a fracture the tendon avulsion requires splinting.
- Do not forcefully hyperextend the joint. This can result in ischemia and skin breakdown over the joint.

Discussion

Adequate splinting usually restores full range and strength to DIP joint extension, but the patient will require 6 weeks of immobilization, and should be informed that healing might be inadequate, requiring surgical repair. A wide variety of splints are commercially available for splinting this injury (e.g. Stack, "frog") but, in a pinch, a tape-covered paper clip will do. A dorsal splint allows more use of the finger, but requires more padding and may contribute to ischemia of the skin overlying the DIP joint.
9.28 "Plantaris" Tendon Rupture

Presentation

The patient will come in limping, having suffered a whip-like sting in his calf while stepping off hard on his foot or charging the net during a game of tennis, or similar activity. He may have actually heard or felt a "snap" at the time of injury. The deep calf pain persists and may be accompanied by mild swelling and ecchymosis. Neurovascular function will be intact.

What to do:

- Rule out an Achilles tendon rupture. Test for strength in plantar flexion (can the patient walk on his toes?). Squeeze the Achilles tendon and palpate for a tender deformity that represents a torn segment. If pain does not allow active plantar flexion, squeeze the gastrocnemius muscle with the patient kneeling on a chair and look for the normal plantar flexion of the foot. This will be absent with a complete Achilles tendon tear. With any Achilles tendon tear, orthopedic consultation is necessary.
- When an Achilles tendon rupture has been ruled out, provide the patient with elastic support (e.g., ACE, TEDs stocking, Tibigrip) from foot to tibial tuberosity.
- Provide the patient with crutches for several days. Permit weight bearing only as comfort allows.
- Have the patient keep the leg elevated and at rest for the next 24-48 hours, initially applying cold packs, and after 24 hour alternately with heat every few hours.
- An analgesic such as codeine may be helpful initially and heel elevation should be provided for several weeks.

What not to do:

- Do not bother getting x rays of the area unless there is a suspected associated bony injury. This is a soft tissue injury that is not generally associated with fractures.

Discussion

The plantaris muscle is a pencil-sized structure tapering down to a fine tendon which runs beneath the gastrocnemius and soleus muscles to attach to the Achilles tendon or to the medial side of the tubercle of the calcaneus. The function of the muscle is of little importance and, with rupture of either the muscle or the tendon, the transient disability is due only to the pain of the torn fibers or swelling from the hemorrhage. Clinical differentiation from complete rupture of the Achilles tendon is sometimes difficult to make. Most instances of "tennis leg" are now felt to be due to partial tears of the medial belly of the gastrocnemius muscle or to ruptures of blood vessels within that muscle. The greater the initial pain and swelling, the longer one can expect the disability to last.
9.29 Broken Toe

Presentation

The patient has stubbed, hyperflexed, hyperextended, hyperabducted, or dropped a weight upon a toe. He presents with pain, swelling, ecchymosis, decreased range of motion and point tenderness, and there may or may not be any deformity.

What to do:

- Examine the toe, particularly for lacerations which could become infected, prolonged capillary filling time in the injured or other toes which could indicate poor circulation, or decreased sensation in the injured or other toes which could indicate peripheral neuropathy, and may interfere with healing.
- X rays are not essential but are often necessary to provide patient satisfaction. They have little effect on the initial treatment, but may help predict the duration of pain and disability (e.g., fractures entering the joint space).
- Displaced or angulated phalangeal fractures must be reduced with linear traction after a digital block. Angulation can be further corrected by using your finger as a fulcrum to reverse the direction of the distal fragment. The broken toe should fall into its normal position when it is released after reduction.
- Splint the broken toe by taping it to an adjacent non-affected toe, padding between toes with gauze or Webril, and using half-inch tape. Give the patient additional padding and tape, so he may revise the splinting, and (if there is a fracture) advise him that he will require such immobilization for approximately one week, by which time there should be good callus formation around the fracture and less pain with motion. Inform the patient that he must keep the padding dry between his toes while they are taped together or the skin will become mace rated and will break down.
- Also treat with rest, ice, elevation, and anti-inflammatory medication. A cane, crutches, or hard-soled shoes which minimize toe flexion may all provide comfort. Let the patient know that in many cases a soft slipper or an old sneaker with the toe cut out may be more comfortable.
- If the fracture is not of a phalanx, but of the metatarsal, buddy taping is not effective. Instead, construct a pad for the sole with space cut out under the fracture site and the distal metatarsal head, either taped to the foot, or, ideally inside a roomy cast shoe used for walking casts.
- Arrange for followup if the toe is not much better within one week.

What not to do:

- Do not tape toes together without padding between them. Friction and wetness will macerate the skin between.
- Do not let the patient overdo ice, which should not be applied directly to skin, and should not be used for more than 10-20 minutes per hour.
- Do not overlook the possibility of acute gouty arthritis, which sometimes follows minor trauma after a delay of a few hours.
Discussion

If there is no toe fracture, the treatment is the same, but the pain, swelling, and ability to walk may improve in 3 days rather than 1-2 weeks. Although patients still come to the ED asking whether the toe is broken, they can usually be handled adequately over the telephone and seen the next day.
10.01 Simple laceration

Presentation

There may be a history of being slashed by a knife, glass shard or other sharp object that results in a clean, straight wound. Impact with a hard object at an angle to the skin may tear up a flap of skin. Crush injury from a direct blow may produce an irregular or stellate laceration with a variable degree of devitalized tissue, abrasion and visible contamination. Wounds may involve vascular areas of the face and scalp where the risk of infection is low, or extremities where infection becomes a greater risk, along with the possibility of tendon and nerve damage. The elderly and patients on chronic steroid therapy may present with "wet tissue paper" skin tears following relatively minor trauma.

What to do:

- Establish the approximate time of injury. After four hours, wounds should be scrubbed to remove the protein coagulum. There is no significant time-related difference in infection rates for wounds closed within 18 hours.
- Determine the exact mechanism of injury, which should alert you to the possibility of an underlying fracture, retained foreign body, wound contamination or tendon or nerve injury.
- Investigate for any underlying factors that may increase the risk of wound infection, like diabetes, malnutrition, morbid obesity, or patients taking chronic immunosuppressive doses of corticosteroids, as well as chemotherapy, AIDS, alcoholism and renal failure.
- Ask about tetanus immunization status and provide prophylaxis where indicated.
- Test distal sensory and motor function. Test tendon function against resistance. If function is intact but there is pain, suspect a partial tendon laceration. Tendon and nerve lacerations deserve specialty consultation.
- Consider imaging studies if there might be a radio-opaque retained foreign body.
- Consider anxiolytic conscious sedation for children, like oral, nasal or rectal midazolam (Versed). Follow your hospital protocol.
- Children may also benefit from a topical anesthetic agent, especially for scalp and facial lacerations. Lidocaine 4% plus epinephrine 1:1000 plus tetracaine 0.55 (LET) is safe, effective and inexpensive. Put 3mL on a 2x2" gauze square and press firmly into the wound for 15 minutes either with tape or the parent's gloved hand. After removing the gauze, test the effectiveness of the anesthesia by touching with a sterile needle. If any sensitivity remains, infiltrate the area with buffered lidocaine as described below.
- Buffer plain lidocaine solution by adding 1mL of sodium bicarbonate solution to 9-10mL and allow it to approximate body temperature in your pocket. Bupivacaine (Marcaine) is slightly slower in onset but has a much longer duration of action and may be useful for crush injuries and fractures where pain is expected to be prolonged beyond closure of the laceration. Epinephrine added to lidocaine is generally not recommended for its short-lived help with hemostasis and duration of anesthesia, and its use should generally be discouraged because of its increased pain on injection and its slower healing and increased infection rate. Bicarbonate inactivates
epinephrine.
- Inject slowly, subdermally, beginning inside the cut margin of the wound, avoiding piercing intact skin, working from the area already anesthetized, using a 27 or 30 gauge needle on a 5 or 10mL syringe.
- Use regional blocks to avoid distorting tissue or where there is no loose areolar tissue to infiltrate, such as the finger tip.
- Clean the wound after anesthesia is complete. Superficial lacerations with little or no visible contamination may be cleaned by gentle scrubbing with a gauze sponge soaked in normal saline or a 1% solution of povidone-iodine (dilute the stock 10% betadine tenfold with 0.9% NaCl). Deeper contaminated lacerations may require pressure irrigation with a syringe and splash shield like Zero-Wet using the same 1% povidone-iodine solution or plain saline if the patient is allergic to iodine. All visible debris and devitalized tissue must be removed, either by scraping with the edge of a scalpel blade or excision with scalpel or scissors. Cosmetic considerations will influence the degree to which you debride facial lacerations, but excision of contaminated, macerated wound edges will often produce a neater scar.
- Hair generally does not need to be removed. When necessary, shorten hair with scissors rather than shaving with a razor.
- Simple lacerations seldom require special techniques for hemostasis. Direct pressure for ten minutes, correct wound closure, and a compression dressing should almost always stop the bleeding.
- Examine the wound free of blood with good lighting. Examine any deep structures like tendons by direct visualization through their full range of motion, looking for partial lacerations. If the wound has been heavily contaminated with debris, crushed, macerated, neglected for a day, exposed to pus, feces, saliva or vaginal discharge, consider excising the entire wound and closing the fresh surgical incision, if practical. Otherwise, provide for open management by packing with sterile fine-mesh gauze covered with multiple layers of coarse absorptive gauze. Unless the patient develops a fever, leave the dressing undisturbed for 4 days. If there are no signs of infection, the granulating wound edges may then be approximated as a delayed primary closure.
- Close the wound primarily only if it is clean and uninfected. Minimize the amount of suture material inside. The less used, the less chance of infection. Wound closure tapes offers the least risk of infection, and are most successfully used on simple superficial lacerations with minimal tension. They are the closure of choice for "Wet tissue paper" skin tears. Prior to application, degrease the skin with alcohol, being careful not to get any into the wound. An adhesive agent such as tincture of benzoin may then be thinly applied to the skin surrounding the laceration (again, avoiding the open wound). Push the wound edges together and apply the stripe to maintain approximation.
- Most scalp lacerations and many trunk and proximal extremity lacerations that are straight without edges that curl under (invert) can be most easily repaired using skin staples. Push edges together and staple so edges evert slightly. Hair does not interfere with this technique and does not cause a problem if caught under a staple.
- For deep or irregular lacerations or on face, hands or feet and skin over joints, use a monofilament non-absorbable suture like nylon or polypropylene either 4-0, 5-0, or 6-0, the smallest diameter with sufficient strength. A good strategy to realign skin and minimize sutures is to begin by approximating the midpoint of the wound and then bisect the remaining gaps. Simple interrupted stitches should be about 1cm apart and 1cm
deep and 1cm back from the wound edge, although these dimensions may be reduced for cosmetic closure on the face. Angle the needle going in and coming out so it grasps more subcutaneous tissue than skin, and the wound edges should evert so the dermis meets and the scar is minimized. Tie each stitch with only enough tension to approximate the edges. A continuous running suture is a more rapid technique of closing a straight laceration. When there is wound edge inversion, the length of the wound edge can be completely excised or vertical mattress sutures can be placed between simple interrupted stitches. Unless deep fascial planes are disrupted, avoid buried sutures because the increase the risk of infection.

- After closing the wound, apply antibiotic ointment and a sterile dressing which will protect the wound and provide absorption, compression and immobilization. Scalp and facial wounds may be covered only with ointment if hemostasis is not required. Splint lacerations over joints. Facial wounds should be cleaned twice a day with half strength hydrogen peroxide on a cotton tipped applicator to prevent crusting between wound edges followed by reapplication of antibiotic ointment.
- Schedule a wound check at two days if the patient is likely to develop any problems with infection, dressing changes, or continued wound care. Instruct patients to return at any time for bleeding, loss of function or signs of infection: increasing pain, pus, fever, swelling, redness, heat. After 48 hours, most sutured wounds can be re-dressed with a simple bandage that can be easily removed and replaced by the patient allowing a shower each day.
- Wound closure strips can be left in place until they fall off on their own. Additional tape can be applied if the original closure falls off prematurely.
- Remove facial sutures in four to five days to reduce visible stitch marks. The epidermis should have resealed by this time, but the dermis has not developed much tensile strength, so reinforce the wound edges with wound closure strips for a few more days.
- Most scalp, chin, trunk and limb stitches should be removed in a week. Sutures may be left in 10-14 days where there is tension across wound edges as on the shin and over the extensor surfaces of large joints. Sutures are easily and painlessly cut with the tip of a scalpel. Cut alternate loops of running sutures.

What not to do:

- Do not prescribe prophylactic antibiotics for simple lacerations. They do not reduce infection rates, and only select for resistant organisms.
- Do not close a laceration if there is visible contamination, debris, non-viable tissue or signs of infection.
- Do not substitute antibiotics for wound cleansing and debridement. Reserve antimicrobials for infections and deep innoculated puncture wounds which cannot be cleaned.
- Do not substitute x rays for meticulous direct wound examination with a foreign body is suspected by history.
- Do not use undiluted skin cleansing solution like 10% povidone-iodine or any skin-scrub containing detergents or soap within an open wound. It kills tissue and increases the infection rate.
- Do not shave an eyebrow. The hair is a useful marker for re-approximating the skin edges, and can take months to years to grow back.
- Do not remove too much skin or underlying tissue when debriding the face and scalp.
• Do not use buried absorbable sutures in a wound with a high risk of infection.
• Do not insert drains in simple lacerations. They are more likely to introduce infection than prevent it.
• Do not use Neosporin ointment. Many patients are allergic to the neomycin and develop allergic contact dermatitis.

Discussion

The most important goal of early wound care is preventing infection. Ointments probably facilitate healing and reduce infection by their occlusive rather than antibiotic properties. Extensive primary excision limits options for later scar revision, and sometimes it reasonable to close a contaminated facial laceration for cosmetic reasons, but this is the exception that proves the rule.

Although not yet available in the US outside of veterinary practice, butyl cyanoacrylate (Histoacryl blue) the less toxic version of SuperGlue, works well for minor pediatric lacerations. The technique is to hold edges together (the same as for tape or staples), drip one drop onto the gap every centimeter, and hold for ten seconds.

References:

10.02 Superficial Finger Tip Avulsion

Presentation

The mechanisms of injury can be a knife, a meat slicer, a closing door, or a falling manhole cover, or spinning fan blades, or turning gears. Depending on the angle of the amputation, varying degrees of tissue loss will occur from the volar pad, or finger tip.

What to do:

- X ray any crush injury or an injury caused by a high speed mechanical instrument, such as an electric hedge trimmer.
- Consider tetanus prophylaxis.
- Perform a digital block to obtain complete anesthesia (see below).
- Thoroughly debride and irrigate the wound.
- When active bleeding is present, provide a bloodless field by wrapping the finger from the tip proximally with a Penrose drain. Secure the proximal portion of this wrap with a hemostat and unwrap the tip of the finger.
- On a less than one square centimeter full-thickness tissue loss, apply a simple non-adherent dressing with some gentle compression.
- Where there is greater than one square centimeter of full-thickness skin loss there are three options that may be followed:

  - Simply apply the same non-adherent dressing used for a smaller wound.
  - If the avulsed piece of tissue is available and it is not severely crushed or contaminated, you can convert it into a modified full-thickness graft and suture it in place. Any adherent fat and as much cornified epithelium as possible must be cut and scraped away using a scalpel blade. This will produce a thinner, more pliable graft that will have much less tendency to lift off its underlying granulation bed as the cornified epithelium dries and contracts. Leaving long ends on the sutures will allow you to tie on a compressive pad of moistened cotton that will help prevent fluid accumulation under the graft. A simple finger tip compression dressing can serve the same purpose.
  - With a large area of tissue loss that has been thoroughly cleaned and debrided and where the avulsed portion has been lost or destroyed, consider a thin split-thickness skin graft on the site. Using buffered 1% xylocaine, raise an intradermal wheal on the volar aspect of the patient's wrist or hypothenar emminence until it is the size of a quarter. Then, with a #10 scalpel blade, slice off a very thin graft from this site. Apply the graft in the same manner as the full thickness one (above) with a compression dressing.

- In infants and young children, fingertip amputations can be sutured back on in their entirety as a composite graft (ie, containing more than one type of tissue). In older children and adults, composite grafts will usually fail, and therefore is is important to "defat" the severed portion as noted above so that it is more likely to survive as a full-thickness skin graft.
• When the loss of soft tissue has been sufficient to expose bone, simple grafting will be unsuccessful and surgical consultation is required.
• Schedule a wound check in two to four days. During that time the patient should be instructed to keep his finger elevated to the level of his heart and maintained at rest.
• Apply a protective four-prong splint for comfort.
• Unless the bandage gets wet, a dressing change need not be done for seven to ten days. Even then, the innermost layers of gauze may be left in place if the wound appears to be clean and not infected. Always have the patient return immediately with increasing pain or other signs of infection.
• If the wound is contaminated, a 3-5 day course of an antibiotic like cephalexin 500 mg tid may be effective prophylaxis, but antibiotics are not routinely required for associated phalanx fracture.
• Prescribe an analgesic such as acetaminophen plus hydrocodone 7.5 mg or 10 mg.

What not to do:

• Do not apply a graft directly over bone or over a potentially devitalized or a contaminated bed.
• Do not attempt to stop wound bleeding by cautery or ligature, which are likely to increase tissue damage and probably unnecessary. Do not forget to remove any constricting tourniquet used to obtain a bloodless field.

Discussion:

The finger tip, being the most distal portion of the hand, is the most susceptible to injury, and thus the most often injured part. Treating small and medium-sized finger tip amputations without grafting is becoming increasingly popular. Allowing repair by wound contracture may leave the patient with as good a result and possibly better sensation, without the discomfort or minor disfigurement of taking a split thickness graft. On the other hand, covering the site with a graft may give the patient a more useful and less sensitive fingertip within a shorter period of time. Unlike the full-thickness graft, a thin split-thickness graft will allow wound contracture and thereby allow for skin with normal sensitivity to be drawn over the end of the finger. The full-thickness graft, on the other hand, will give an early, tough cover which is insensitive but has a more normal appearance. The technique followed should be determined by the nature of the wound as well as the special occupational and emotional needs of the patient. Explain these options to the patient, who can help decide your course of action.
10.03 Nail Root Dislocation

Presentation

The patient has caught his finger in a car door or dropped a heavy object like a can of vegetables on a bare toe, with the edge of the can striking the base of the toenail and causing a painful deformity. The base of the nail will be found resting above the eponychium instead of in its normal anatomical position beneath. The cuticular line that had joined the eponychium at the nail fold will remain attached to the nail at its original position.

What to do:

- Take an x ray to rule out an underlying fracture (which may require reduction as well as protective splinting.)
- Anesthetize the area using a digital block.
- Lift the base of the nail off the eponychium, and thoroughly cleanse and inspect the nail bed. Minimally debride loose cuticular tissue and test for a possible avulsion of the extensor tendon.
- If bleeding is a problem, establish a bloodless field using a Penrose drain to wrap and tourniquet the finger.
- Repair any nailbed lacerations with a fine absorbable suture like 7-0 or 6-0 Vicryl.
- Reinsert the root of the nail under the eponychium.
- Reduce any underlying angulated fracture.
- If the nail tends to drift out from under the eponychium, it can be sutured in place with two 4-0 nylon or polypropylene stitches in the corners.
- Any non-absorbable sutures should be removed after one week.
- Cover the area with a finger tip dressing and splint any underlying fracture.
- Provide tetanus prophylaxis.
- Followup should be provided in 3-5 days. Instruct patients to return immediately if there is increasing pain or any other sign of infection.
- Prescribe an analgesic like acetaminophen and hydrocodone.

What not to do:

- Do not ignore the nail root dislocation and simply provide a finger tip dressing. This is likely to lead to continued bleeding or to a later infection because tissue planes have not been replaced in their natural anatomic position.
- Do not debride any portion of the nailbed, sterile matrix or germinal matrix.

Discussion:

Because the nail is not as firmly attached at the base or lunula as it is to the distal nail bed, impact injuries can avulse only the base (nail root) leaving it lying on top of the
eponychium. It may be surprising that this injury is often missed but at first glance, a dislocated nail can appear to be in place, and without careful inspection, a patient can return from radiology with negative x rays and be treated as if he only had an abrasion or contusion. The attachment of the cuticle from the nailfold of the eponychium to the base of the nail forms a constant landmark on the nail. If any nail is showing proximal to this landmark it indicates that the nail is not in its normal position beneath the eponychium.
10.04 Finger or toenail avulsion

Presentation

The patient may have had a blow to the nail; the nail may have been torn away by a fan blade or other piece of machinery; or a long hard toenail may have caught on a loop of a shag carpet or other fixed object and been pulled off the nailbed. The nail may be completely avulsed, partially held in place by the nail folds, or adhering only to the distal nail bed. On occasion, an exposed nailbed will have a pearly appearance with minimal bleeding making it seem as if the nail is still in place when actually it has been completely avulsed.

What to do:

- Obtain x rays if there was any crushing or high velocity shearing force involved.
- Perform a digital block to anesthetize the entire nailbed.
- Cleanse the nailbed with normal saline and remove any loose cuticular debris. Although it is acceptable simply to cover the nailbed with a non-adherent dressing, the patient is usually more comfortable with a clean nail or surrogate in place while a new nail grows in. No dressing is truly non-adherent over an exposed nailbed. If the nail or artificial stent is not used, then bring the patient back for an early dressing change in one day to prevent adherence.
- If the nail is still tenuously attached, remove it by separating it from the nailfold using a hemostat. Cleanse the nail thoroughly with normal saline, cut away the distal free edge of the nail and remove only loose cuticular debris.
- Inspect the nailbed for lacerations and if present carefully reapproximate with fine (6-0 or 7-0) absorbable sutures.
- Reduce any displaced or angulated fractures of the distal phalynx. If a stable reduction cannot be obtained, consult an orthopedic surgeon for possible pinning.
- Reinsert the nail under the eponychium and apply a fingertip dressing.
- If the nail does not fit tightly under the eponychium, it can be sutured in place at its base.
- If the nail is missing, badly damaged or contaminated, replace it with a substitute. An artificial nail can be cut out of the sterile aluminum foil found in a suture pack or can be cut from a sheet of vaseline gauze. Insert this stent under the eponychium as you would the nail and apply a fingertip dressing after it is in place.
- Leave these stents in place until the nailbed hardens and the stent separates spontaneously.
- Dressings should be changed every three to five days.
- If the wound was contaminated, tissue macerated, pr patient immunocompromised, prescribe three or four days of a first generation cephalosporin as prophylaxis. Fractures of the distal phalynx do not always require antibiotics however.

What not to do:
• Do not dress an exposed nailbed with an ordinary gauze dressing. It will adhere to the nailbed and require lengthy soaks and at times an extremely painful removal.
• Do not ignore nailbed lacerations or fractures of the distal phalanx. The new nail can become deformed or ingrown wherever the bed is not smooth and straight.
• Do not debride any portion of the nailbed, sterile matrix or germinal matrix.

Discussion:

Although the eponychium is unlikely to scar to the nailbed unless there is infection, inflammation, or considerable tissue damage, separating the eponychium from the nail matrix by reinserting the nail or inserting an artificial stent helps to prevent synechia and future nail deformities from developing. The patient's own nail is also his most comfortable dressing. Minimally traumatized avulsed nails can actually grow normally if carefully replaced in their proper anatomic position. A gauze stent left in the nail sulcus will be pushed out as the new nail grows. Complete regrowth of an avulsed nail usually requires four to five months at one millimeter per week.
10.05 Ring Removal

Presentation

A ring has become tight on the patient's finger after an injury (usually a sprain of the proximal interphalangeal or PIP joint) or after some other cause of swelling, such as a local reaction to a bee sting. Sometimes, tight-fitting rings obstruct lymphatic drainage, causing swelling and further constriction. The patient usually wants the ring removed even if it requires cutting it off, but occasionally a patient has a very personal attachment to the ring and objects to its cutting or removal.

What to do:

- Limit further swelling by applying ice and elevating the extremity above the level of the heart.
- When a fracture is suspected, order appropriate x-rays either before or after removing the ring.
- With substantial injuries, a digital or metacarpal block might be necessary to allow for the comfortable removal of the ring.
- Usually, lubrication with soap and water along with proximal traction on the skin beneath the ring is enough to help you twist the ring off the finger.
- When the ring is too tight to twist off this way, exsanguinate the finger by applying a tightly wrapped spiral of Penrose drain or flat rubber phlebotomy tourniquet tape around the exposed portion of the finger, elevate the hand above the head, wait five minutes and then apply a BP cuff inflated to 200-280 mm Hg as a tourniquet around the upper arm. Wrap the cuff with cotton cast padding to keep the Velcro connection from separating under high pressure, and clamp the tubing to prevent any slow air leak. Remove the tight rubber wrapping from the finger and, leaving the tourniquet in place, again attempt to twist the ring off using soap and water for lubrication.
- If the ring is still too tight or there is too much pain to allow for the above techniques, a ring cutter can be used to cut through a narrow ring band. Have the patient grasp a rolled elastic bandage to stabilize the hand and elevate the dorsal side of the ring so it is easier to insert the ring cutter. Once there is one cut completely through the ring, bend the ring apart with pliers placed on either side of this break to allow removal.
- If the band is wide or made of hard metal, it will be much easier to cut out a 5mm wedge from the ring using an orthopedic pin cutter. Then take a cast spreader, place it in the slot left by the removal of the wedge and spread the ring open. Alternatively, two cuts may be made on opposite sides of the ring, allowing it to be removed in halves.
- Another useful device for removing constricting metal bands is the Dremel Moto-tool with its sharp-edged grinder attachment. Protect the underlying skin with a heat-resistant shield.
- Another technique which tends to be rather time-consuming and only moderately effective (but one that can be readily attempted in the field) is the coiled string technique. Slip the end of a string (kite string is good) under the ring and wind a tight
single-layer coil down the finger, compressing the swelling as you go. Pull up on the end of the string under the ring, then slide and wiggle the ring down over the coil.  
- Another string removal technique is to pull a length of string under the ring and tie it into a large loop that you can place around your own wrist. This will allow you to apply traction and slide the string around the circumference of the ring (allowing skin to slip beneath the ring) while you pull the ring off using lubricant as above.  
- Teach patients how to avoid the vicious cycle of a tourniquet effect by promptly removing rings from injured fingers.

**What not to do:**

- When a patient is expected to have transient swelling of the hand or finger without evidence of vascular compromise, and he requests that the ring not be removed, do not be insistent that you must cut the ring off. If the patient is at all responsible, he can be warned of vascular compromise (pallor, cyanosis, or pain) and instructed to keep his hand elevated and apply cool compresses. He should then be made to understand that he is to return for further care if the circulation does become compromised because of the possible risk of losing his finger. Be understanding and document the patient's request and your directions.

**Discussion:**

The constricting effects of a circumferential foreign body can lead to obstruction of lymphatic drainage, which in turn leads to more swelling and further constriction, until venous and eventually arterial circulation is compromised. If you believe that these consequences are inevitable you should be quite direct with the patient about having the ring removed.

**References:**

10.06 Nailbed Laceration

Presentation

The patient has either cut into his nailbed with a sharp edge or crushed his finger. With shearing forces, the nail may be avulsed from the nailbed to varying degrees and there may be an underlying bony deformity.

What to do:

- Provide appropriate tetanus prophylaxis.
- Obtain x rays of any crush injury or any injury caused by machinery.
- Perform a digital block for anesthesia. Use bupivacaine for longer-acting anesthesia if the pain is expected to persist for several more hours.
- With a simple laceration through the nail, remove the nail surrounding the laceration to allow for suturing the laceration closed:
  - Use a straight hemostat to separate the nail from the nailbed.
  - Use fine scissors to cut away the surrounding nail or remove the entire nail intact for re-insertion after the nailbed is repaired.
  - Cleanse the wound with saline and suture accurately with a fine absorbable suture (6-0 or 7-0 Vicryl or Dexon). Close approximation of the nailbed is necessary to prevent nail deformity. Also preserve the skin folds around nail margins.
  - Apply a nonadherent dressing (e.g., Adaptic gauze) and antibiotic antiseptic ointment and plan a dressing change within 24 hours to prevent painful adherence to the nailbed.

- When a crush injury results in open hemorrhage from under the fingernail, the nail must be completely elevated to allow proper inspection of the damage to the nailbed. A bloodless field helps visualization. (A one half-inch Penrose drain makes a good finger tourniquet. Alternatively, you can put the patient's hand in a sterile glove, cut off the tip and roll down the finger to form a tourniquet.) Angulated fractures need to be reduced and nailbed lacerations should be sutured with a fine absorbable suture as above. If the nail is intact, it can be cleaned and reinserted for protection as described in "Fingernail or toenail avulsion". If the nail is ruined, place a stent under the eponychium to prevent adhesion to the nail bed.
  - Apply a fingertip dressing.

What not to do:

- Do not use non-absorbable sutures to repair the nailbed. The patient will be put through unnecessary suffering in order to remove the sutures.
- Do not attempt to suture a nailbed laceration through the nail. It can be done, but precludes the meticulous approximation necessary for smooth nail regrowth.
• Do not do any more than minimal debridement of the nailbed and its surrounding structures. Only clearly devitalized and contaminated tissue should be removed to prevent future nail deformity.

**Discussion:**

Significant nailbed injuries can be hidden by hemorrhage and a partially avulsed overlying nail. These injuries must be carefully repaired to help prevent future deformity of the nail. There are no truly non-adherent dressings for a nailbed, so when it is exposed, arrange to change the dressing in 12 to 24 hours before it adheres to this delicate tissue. Surgical consultation should be obtained when complex nailbed lacerations involve the germinal matrix under the base of the nail. Later nail deformity or splitting can sometimes be repaired electively but often it is permanent.
10.07 Subungual Hematoma

Presentation

After a blow or crushing injury to the fingernail, the patient experiences severe and sometimes excruciating pain, that persists for hours, and may even be associated with a vaso-vagal response. The fingernail has an underlying deep blue-black discoloration which may be localized to the proximal portion of the nail or extend beneath its entire surface.

What to do:

- X-ray the finger to rule out an underlying fracture of the distal phalanx and test for a possible avulsion of the extensor tendon.
- Paint the nail with 10% povidone iodine (Betadine) solution.
- Adhere to universal blood and bodily-fluid precautions (blood is under pressure and may spurt out).
- Perform a trephination at the base of the nail, using the free end of a hot paper clip, electric cauterizing lance or drill. When performed quickly, patients do not feel the heat, just relief from pain. Tap rapidly with the cauter or drill a few times in the same spot at the base of the hematoma until the hole is through the nail. When resistance from the nail gives way, stop further downward pressure to avoid damaging the nail bed.
- Persistent bleeding from this opening can be controlled by having the patient hold a folded 4” x 4” gauze pad firmly over the trephination while holding his hands over his head.
- Apply an antibacterial ointment such as Betadine and cover the trephination with a Band-Aid.
- To prevent infection, instruct the patient to keep his finger dry for 2 days and not to soak it (e.g., go swimming) for 1 week.
- If there is an underlying fracture, instruct the patient to keep his finger as dry as possible for the next ten days and return immediately at the first sign of infection.
- A protective aluminum finger tip splint may also be comforting, especially if the bone is fractured.
- Inform the patient that he will eventually lose his fingernail, until a new nail grows out after two to six months.

What not to do:

- Do not perform a trephination on a subungual ecchymosis (see below).
- Do not perform a trephination using a hot cautery device on a patient wearing artificial acrylic nails, which are flammable.
- Do not perform a trephination when there is an underlying fracture (this theoretically converts a closed fracture to an open one) unless there is sufficient pain to justify it. The patient should also understand the potential risk of developing osteomyelitis, as well as the need for keeping the finger dry.
- Do not perform a digital block. Anesthesia should not be necessary for a simple nail trephination of an uncomplicated subungual hematoma.
- Do not perform a trephination on a patient who is no longer experiencing any significant pain at rest. A mild analgesic and protective splint will usually suffice.
- Do not make such a small opening that free drainage does not occur. The electrocautery tip may have to be bent to the side, widened, or moved around to make a wide enough hole.
- Do not hold a hot paper clip or cautery wire on the surface without applying enough slight pressure to melt through the nail. Just holding the hot tip adjacent to the nail can heat up the hematoma and increase the pain without making a hole to relieve it.
- Do not send a patient home to soak his finger after a trephination. This will break down the protective fibrin clot and introduce bacteria into this previously sterile space.
- Do not routinely prescribe antibiotics. Even when opening a subungual hematoma with an underlying fracture of the distal phalynx, antibiotics have not been shown to be of any value in preventing infection.
- Do not remove the nail even with a large subungual hematoma. It is not necessary to inspect for nailbed lacerations or repair them with a closed injury.

Discussion:

The subungual hematoma is a space-occupying mass that produces pain secondary to increased pressure against the very sensitive nailbed and matrix. Given time, the tissues surrounding this collection of blood will stretch and deform until the pressure within this mass equilibrates. Within 24 hours the pain therefore subsides and, although the patient may continue to complain of pain with activity, performing a trephination at this time may not improve his discomfort to any significant extent and will expose the patient to the risk of infection. If you choose not to perform a trephination explain this to the patient who may be expecting to have his nail drained. There is some risk of missing a nail bed laceration under the hematoma, but, for most underlying lacerations, splinting by its own nail may be superior to suturing. When there are associated lacerations, open hemorrhage or broken nails, a digital block should probably be performed and the nail lifted up for inspection of the nailbed and repair of any lacerations. Keep in mind that not all dark patches under the nail are subungual hematomas. Consider the diagnosis of melanoma, Kaposi's sarcoma and other tumors when the history of trauma and the physical examination are not consistent with a simple subungual hematoma.

References:

10.08 Subungual Ecchymosis

Presentation

The patient will have had a crushing injury over the fingernail; getting it caught between two heavy objects for example, or striking it with a hammer. The pain is initially intense, but rapidly subsides over the first half hour, and by the time he is examined only mild pain and sensitivity may remain. There is a light brown or light blue-brown discoloration beneath the nail.

What to do:

- Get an x ray to rule out a possible fracture of the distal phalangeal tuft.
- Apply a protective fingertip splint, if necessary for comfort.
- Explain that you are not drilling a hole in the patient's nail, because there is not a subungual hematoma to evacuate. Inform the patient that, in time, he may lose the fingernail, but that a new nail will replace it.

What not to do:

- Do not perform a trephination of the nail.

Discussion:

Unlike the painful space-occupying subungual hematoma, the subungual ecchymosis only represents a thin extravasation of blood beneath the nail or a mild separation of the nail from the nailbed. Doing a trephination will not relieve any pressure or pain, and may indeed cause excruciating pain, as well as open this space to possible infection. The patient's familiarity with nail trephination (above) may give him the erroneous expectation that he should have his nail drilled.
10.09 Foreign Body Beneath Nail

Presentation

The patient complains of a paint chip or sliver under the nail. Often he has unsuccessfully attempted to remove the foreign body, which will be visible beneath the nail.

What to do (Paint Chip):

- Without anesthesia, remove the overlying nail by shaving it off with a #15 scalpel blade.
- Cleanse remaining debris with normal saline and trim the nail edges smooth with scissors.
- Provide tetanus prophylaxis if necessary and then dress the area with antibiotic ointment and a bandage.

What to do (Sliver):

- If the patient is cooperative and can tolerate some discomfort, carve through the nail down to the perimeter of the sliver with a #11 blade until the overlying nail falls away. The foreign body can now be cleansed away, antibiotic ointment can be applied to the exposed nailbed, and a Band-Aid dressing can be applied.
- For a more extensive excision of a nail wedge, you will need to perform a digital block.
- Slide small Mayo or iris scissors between the nail and nailbed on both sides of the sliver and cut out the overlying wedge of nail.
- Cleanse any remaining debris with normal saline and trim the fingernail until the corners are smooth.
- Provide tetanus prophylaxis if needed.
- Dress with antibiotic ointment and a bandage. Have the patient redress the area 2-3 times daily until healed, and keep the fingernail trimmed close.

What not to do:

- Do not run the tip of the scissors into the nail bed while sliding it under the fingernail (instead angle the tip up into undersurface of the nail).

Discussion:

It is often not possible to remove a long sliver from beneath the fingernail using the "shaving" technique with a scalpel blade, without injuring the nailbed, and causing the patient considerable discomfort. After providing a digital block, it is sometimes possible
to remove the sliver by surrounding it with a hemostat that has been slipped between the nail and nailbed and then pulling out the entire sliver, but if any debris remains visible, then the overlying nail wedge should be removed so the nailbed can be thoroughly cleansed. It is usually unwise simply to attempt to pull the foreign body from beneath the nail because some debris usually remains and will most likely lead to a nailbed infection.
10.10 Paronychia

Presentation

The patient will come with finger or toe pain that is either chronic and recurrent in nature or has developed rapidly over the past several hours, accompanied by redness and swelling of the nail fold. There are three distinct varieties:

- The chronic paronychia is most commonly seen with the "ingrown toenail" with chronic inflammation, thickening and purulence of the eponychial fold and loss of the cuticle. There may or may not be granulation tissue. This also occurs with individuals whose hands are frequently exposed to moisture and minor trauma.
- The acute paronychia almost always involves fingers and is much more painful. It is caused by the introduction of pyogenic bacteria by minor trauma and results in acute inflammation and abscess formation within the thin subcutaneous layer between the skin of the eponychial fold and the germinal layer of the eponychial cul-de-sac. In its earliest subacute form there may only be cellulitis with no collection of pus.
- The third variety of paronychia is a subungual abscess, which occurs in the same location as a subungual hematoma, between the nail plate and the nail bed.

What to do:

- Perform a unilateral or bilateral digital block and establish a bloodless field with a rubber tourniquet if a significant surgical procedure is anticipated.
- With a chronic paronychia:
  - You may consider conservative treatment or temporizing the condition by sliding a cotton wedge under the corner of an ingrown nail and placing the patient on antibiotics (e.g., cefadroxil (Duricef) 500mg bid) and warm soaks. Because of the slow growth of nails, this wedging may need to be repeated for weeks or months. When candidiasis is suspected, the area should be kept dry and treated with local applications of nystatin or other topical antifungals. A long course of systemic medication may be required. Followup with a podiatrist is important.
  - A more aggressive approach, and one more likely to be successful, is to sharply excise the entire wedge of affected nail, nailbed and lateral skin fold down to the periosteum of the distal phalynx. Instruct the patient to soak the toe in warm water for 20 min bid and arrange for multiple followup visits. Extensive paronychia requires excision of the entire nail.
  - Instruct the patient to cut toenails straight across to prevent any ingrown nails.
- With an acute paronychia:
  - When there is minimal swelling and there appears to be only cellulitis, gently use an 18 gauge needle to separate the cuticle of the lateral nail fold to rule out or drain any collection of pus. Instruct the patient to soak the finger in warm water for
ten minutes qid and consider prescribing antibiotics for three or four days.

- When there is redness and swelling of the nail fold, take an 18 gauge needle or #15 scalpel blade, separate the cuticle from the nail, open the eponychial cul-de-sac and drain any abscess. Keep the needle or scalpel tip flat against the dorsal surface of the nail. There is no need to make an incision through the skin and thus a digital block is usually not necessary. A tiny wick (1 cm of 1/4" gauze) may be slid into the opening to ensure continued drainage. Debride any periungual pustules. Instruct the patient in warm soaks at least qid. When drainage is complete, antibiotics are not routinely required, but where significant cellulitis was present, a short course of antibiotics may be indicated. Clindamycin (Cleocin) 150mg qid or amoxicillin plus clavulanate (Augmentin) 250mg tid have a wide spectrum of activity against most pathogens isolated from paronychia. The patient should be informed that if the paronychia quickly recurs, excision of a portion of the nail might be required.

- A more aggressive approach for the more extensive infection is to excise a portion of the nail. Unlike the more aggressive procedure used with the chronic paronychia, only a portion of the nail need be removed, and no underlying tissue. After establishing a digital block and a bloodless field, simply insert a fine straight hemostat between the nail and the nail bed, along the edge adjacent to the paronychia, and push and spread until you enter the eponychial cul-de-sac. Often it is at this point that pus is discovered. Then using a pair of fine scissors, cut away the quarter or third of the nail bordering the paronychia. Separate the cuticle using the hemostat and pull this unwanted fragment of nail away. A non-adherent dressing is required over the exposed nailbed as well as an early dressing change (within 24 hours).

- With a subungual abscess:
  
  - You may consider conservative treatment not requiring a digital block. Merely perform a trephination using the same "hot paper clip" technique used for a subungual hematoma. The patient must provide frequent warm soapy soaks over the next 36 hours to prevent recurrence.
  - The more effective but more aggressive technique used when there is a proximal collection of pus requires removal of the proximal 1/3 of the nail. A straight hemostat is required to separate the cuticle of the eponychium from the underlying nail. Using the hemostat, the proximal portion of the nail is pulled out from under the eponychium and excised. On occasion an incision will have to be made along the lateral border of the eponychium to allow the proximal nail to be excised. The removal of the proximal portion of the nail allows for the complete drainage of the abscess without any risk of recurrence. A non-adherent dressing is also required in this instance. Extensive damage to the germinal matrix by the infection may preclude healthy nail regrowth.
  - When there is a distal collection of pus, a simple excision of an overlying wedge of nail using iris scissors should provide complete drainage.

**What not to do:**

- Do not order cultures or x rays on uncomplicated cases.
Do not make an actual skin incision. The cuticle only needs to be separated from the nail in order to release any collection of pus.
Do not remove an entire fingernail or toenail to drain a simple paronychia.
Do not confuse a felon (tense tender finger pad) with a paronychia. Felons will require more extensive surgical treatment.

Discussion:

Whenever conservative therapy is instituted, the patient should be advised as to the advantages and disadvantages of that approach. If your patient is not willing or reliable enough to perform the required aftercare or cannot accept the potential treatment failure, then it would seem prudent to begin with the more aggressive treatment modes.

No single antibiotic will provide complete coverage for the array of bacterial and fungal pathogens cultured from paronychias. Theoretically, clincamycin or amoxicillin plus clavulanate should be the most appropriate antibiotics, but because the vast majority of paronychias are easily cured with simple drainage, systemic antibiotics are usually not indicated. In immunocompromised patients and those with peripheral vascular disease, cultures and antibiotics are indeed warranted.

Remain alert to the possible complications of a neglected paronychia such as osteomyelitis, septic tenosynovitis of the flexor tendon or a closed space infection of the distal finger pad (felon). Recurrent infections may be due to a herpes simplex infection (herpetic whitlow) or fungus (onchomycosis). Tumors like squamous cell carcinoma or malignant melanoma, cysts, syphilitic chancrees, warts or foreign body granulomas can occasionally mimic a paronychia. Failure to cure a paronychia within four or five days should prompt specialized culture techniques, biopsy or referral.

References:

10.11 Digital Block

It is necessary to provide complete anesthesia when treating most fingertip injuries. Many techniques for performing a digital nerve block have been described. The following is one that is both effective and rapid in onset. This type of digital block will only provide anesthesia distal to the distal interphalangeal joint, but this is most often the site that demands a nerve block.

What to do:

Picture
- Cleanse the finger and paint the area with povidone-iodine (Betadine) solution.
- Using a 27 gauge needle, slowly inject 1% lidocaine midway between the dorsal and palmar surfaces of the finger at the midpoint of the middle phalanx.
- Inject straight in along the side of the periosteum. Then pull back without removing the needle from the skin and fan the needle dorsally.
- Advance the needle dorsally and inject again. Pull the needle back a second time and, without removing it from the skin, fan the needle in a palmar direction.
- Advance the needle and inject the lidocaine in the vicinity of the digital neurovascular bundle.
- With each injection, instill enough lidocaine to produce visible soft tissue swelling.
- Repeat this procedure on the opposite side of the finger.
- For anesthesia of the proximal finger as well, a similar block may be performed as far proximally as the middle of the metacarpal. There, the connective tissue is looser, and the needle need not be fanned into digital septae as described above. Be prepared to wait three to ten minutes for adequate anesthesia.
- With painful crush injuries or when the pain will be prolonged, substitute bupivicaine for lidocaine.

What not to do:

- Do not use lidocaine with epinephrine. The digital arteries are end arteries that can spasm and provide prolonged anesthesia, ischemia of the finger tip, and potentially, necrosis.

Discussion

Digital nerve blocks are often described as being injected at the base of the proximal phalynx, but it is not necessary to block the whole digit when only the distal tip is injured, and the first technique above provides anesthesia much faster. Toes are difficult to separate and it may be easier to perform a modified ring block at the base. Over the dorsum of the proximal interphalangeal joint the connective tissue is loose enough for direct injection of anesthetic, and a digital block is not required. Some studies have demonstrated digital anesthesia by injecting 2 mL of buffered lidocaine directly into the flexor tendon sheath, using a 25 or 27 gauge needle at a 45 degree angle at the distal palmar crease.
10.12 Finger Tip Dressing

To provide a complete non-adherent compression dressing for an injured finger tip, first cut out an L-shaped segment from a strip of polyurethane or oil-emulsion (Adaptic) gauze. Cover the gauze with antibiotic ointment to provide occlusion and prevent adhesion.

What to do:

**Picture**

- Place the tip of the finger over the short leg of the gauze and then fold it over the top of the finger.
- Take the long leg of the gauze and wrap it around the tip of the finger.
- For absorption and compression, fluff a cotton gauze pad and apply it over the end of the finger.
- Cover with roller or tube gauze and secure with adhesive tape.

What not to do:

- Do not place tight circumferential wraps of tape around a finger, especially if you anticipate swelling. They may act as a tourniquet and lead to vascular compromise. Use caution applying tube gauze: two to four layers will suffice.
10.13 Bicycle Spoke Injury

Presentation

Picture
A small child, riding on the back of a friend's bike, gets his foot caught between the spinning spokes and the frame or fender supports. The skin over the lateral or medial aspect of the foot or ankle is crushed and abraded with underlying soft tissue swelling.

What to do:

- Cleanse the area with a gentle scrub (SurClens, Betadine).
- Provide any tetanus prophylaxis required, apply a temporary dressing of povidone-iodine and normal saline, cover with a cold pack and elevate above the level of the heart.
- Get radiographic studies to rule out any fracture.
- Dress the wound with antibiotic ointment and a non-adherent cover such as Adaptic gauze. Incorporate a bulky compressive dressing consisting of gauze fluffs, Kerlex and a mildly compressive ACE wrap.
- Have the patient keep the foot strictly elevated over the next 24 hours and schedule him for a wound check within 48 hours.
- Inform the parents that the crushed skin is not a simple abrasion and may not survive. They should understand that a slow-healing sore might result or skin grafting might be required, and therefore careful surgical followup is necessary.

What not to do:

- Do not assume that because the x rays are negative you are merely dealing with a simple abrasion.

Discussion:

Bicycle spoke injuries are similar to, but not as serious as, wringer injuries. Fractures are not commonly associated with these injuries but often there is severe soft tissue injury. Consequences of his crush injury can be minimized by the use of compression dressings, elevation and early followup.
10.14 Needle (Foreign Body) in Foot

Presentation

Although a needle could be embedded under any skin surface, most commonly a patient will have stepped on one while running or sliding barefoot on a carpeted floor. Generally, but not invariably, the patient will complain of a foreign body sensation with weight bearing. A very small puncture wound will be found at the point of entry, and, on occasion, a portion of the needle will be palpable.

What to do:

Picture

- Tape a partially opened paper clip as a skin marker to the plantar surface of the foot, with the tip of the opened paper clip over the entrance wound. Instruct the patient not to allow anyone to remove the paper clip until after the needle is removed.
- Send the patient for PA and lateral radiographs of the foot with the skin marker in place.
- Evaluate the x rays. If the needle appears to be very deep you may choose to call in a consultant who can remove the needle under fluoroscopy. If the needle is relatively superficial, inform the patient that removing a needle is not as easy as it appears. Let him know that you are going to use a simple technique for locating and removing the needle, but that sometimes the needle is hidden within the tissue of the foot ("like a needle in a haystack"). If you cannot locate the needle within 10-15 minutes, because you do not want to further damage his foot, you will call in a consultant or arrange for fluoroscopy.
- Establish a bloodless field by elevating the leg above the level of the heart, tightly wrapping an ACE bandage around the foot and lower leg, and then inflating and clamping off a thigh cuff at approximately 200mmHg. This will become uncomfortable within 10-15 minutes and thereby serve as an automatic timer for your procedure.
- Remove the ACE wrap, clean and then paint the area with Betadine solution, and locally infiltrate the appropriate area with plain 1% Xylocaine. (It will be somewhat more comfortable if the needle stick is accomplished from the medial or lateral aspect of the foot rather than directly into the plantar surface.)
- The x rays should give you an idea of the location of the needle relative to the paper clip skin marker.
- With the patient lying prone and the plantar surface of his foot facing upward, make an incision that crosses perpendicular to the needle's apparent position at its midpoint or 1/3 of the way toward the most superficial end of the needle. Do not cut deep to the plantar fascia. With any deep entry into the foot, use iris scissors with the blades open to advance a few millimeters at at time before closing the scissor blades. Continue repeating this process until the needle prevents closure of the scissors. If you are using a scalpel blade, as you cut across the needle, there will be an audible clicking sound. Spread the incision apart, visualize the needle and grasp it firmly with a hemostat or small Kelly clamp.
- Now, push the needle out in the direction from which it entered. Even the eye or back
end of a broken needle is sharp enough to be pushed to the skin surface. If the
needle tents up the skin and will not push through, nick the overlying skin surface with
a scalpel blade until the needle exits. Grab this end with another clamp, let go with the
first clamp, and remove the needle.

- Let the thigh cuff down and suture your incision closed. Apply an appropriate
dressing.
- Provide tetanus prophylaxis if indicated.

What not to do:

- Do not ignore the patient who thinks he stepped on a needle but in whom you can't
find a puncture wound. Get an x ray anyway, because the puncture wound is probably
hidden.
- Do not give the patient the impression that the removal will be quick and easy.
- Do not make your incision near the tip of the needle or directly over and parallel to the
needle. The needle will not be exactly where you think it is, and your incision will miss
exposing the needle.
- Do not persist in extensively undermining or extending your incision if you do not
locate the needle within 10 minutes of beginning the procedure. This is unlikely to be
productive and you may do the patient harm.
- Do not routinely place the patient on prophylactic antibiotics.
- Do not attempt to remove a buried needle by pulling on the attached thread. It usually
breaks, and may create a second foreign body to remove.

Discussion:

Many a young doctor has been found sweating away at the foot of an emergency
department stretcher, unable to locate a needle foreign body. The secret for improving
your chances of success is in realizing that the x ray only gives you an approximate
location of the needle and that your incision must be made in a direction and location
best suited for locating the needle, not removing it.

There are three additional principles to keep in mind. First, the roentgenographic
position of the needle must be correlated with the anatomy of the skin surface rather
than the bony anatomy of the foot. Second is the simple geometric principle that the
surest way to interesct a line (the needle) is to dissect in the plane perpendicular to its
midpoint. Third, the only structures of importance in the forefoot or heel that lie plantar
to the bones are the flexor tendons and they lie close to the bones.

When you let the patient know how difficult it sometimes is to locate the needle and
remove it, you place yourself in a win-win situation. You look especially good if you find
it and you still look experienced and well-informed if you don't.

If you choose to take the patient to fluoroscopy, you or the radiologist can place a
hemostat around the needle under direct vision. It can then be pushed out using the
same technique described above.
Linear foreign bodies such as needles can be removed from the sole of the foot without extensive dissection, complex apparatus or repeated roentgenographic studies. Although blind dissection is generally not a good technique because of the risk of injury, in this particular situation, relative safety can be provided by gentle dissection with iris scissors of insufficient strength to sever tendons, and by setting firm limits of time and depth of exploration.

References:

10.15 Puncture wounds

Presentation

Most commonly, the patient will have stepped or jumped onto a nail. There may be pain and swelling but often the patient is only asking for a tetanus shot and can be found in the emergency department with his foot soaking in a basin of iodine solution. The wound entrance usually appears as a linear or stellate tear in the cornified epithelium on the plantar surface of the foot.

What to do:

- Obtain a detailed history to ascertain the force involved in creating the puncture and the relative cleanliness of the penetrating object. Note the type of footwear (e.g., tennis or rubber-soled shoe) and the potential for a retained foreign body. Ask about tetanus immunizations and underlying health problems that might diminish host defenses.
- Clean the surrounding skin and carefully inspect the wound with the patient lying prone, with good light and adequate time. Examine the foot for signs of deep injury such as swelling and pain with motion of the toes. Although unlikely, test for loss of sensory or motor function.
- If the puncture was created by a slender object like a needle or tack and the patient is positive that it was removed intact, no further treatment may be necessary. If there is any question as to whether the object may have broken off in the tissues, obtain x rays. Most metallic and glass foreign bodies are seen on plain radiographs, but plastic, aluminum and wood can be radiolucent and require ultrasound, CT or MRI.
- Most puncture wounds only require simple debridement and irrigation, but with deep, highly contaminated wounds, seek orthopedic consultation to consider a wide debridement in the operating room to prevent the catastrophic complication of osteomyelitis.
- Saucerize the puncture wound using a #10 scalpel blade to remove the cornified epithelium and any debris that has collected beneath its surface. Alternatively, the jagged epidermal skin edges overlying the puncture track may be painlessly trimmed.
- If debris is found, gently slide a large-gauge blunt needle or an over-needle catheter down the wound track and slowly irrigate with a physiologic saline solution until debris no longer flows from the wound. At times, a small amount of local anesthesia will be necessary to accomplish this.
- Provide tetanus prophylaxis.
- Cover the wound with a bandage, instruct the patient on the warning signs of infection, and arrange follow up in two days. Spend some time educating the patient and documenting the injury. Address the chance of delayed osteomyelitis, the chance of irretrievably deep foreign matter, the impossibility of preventing infection with prophylactic antibiotics and the importance of seeking medical attention for discomfort persisting two or three weeks post injury.
- Patients presenting after a day will often have an established wound infection. In
addition to the debridement procedures described above, they should respond to oral antistaphlococcal antibiotics, non-weight-bearing rest, elevation, and frequent soaking. Culture any drainage and reassess in one to two days.

What not to do:

- Do not be falsely reassured by having the patient soak in Betadine. This does not provide any significant protection from infection and is not a substitute for debridement, saucerization and irrigation.
- Do not attempt a jet lavage within a puncture wound. This will only lead to subcutaneous infiltration of your irrigant and potential spread of foreign material and bacteria.
- Do not get x rays for simple nail punctures except for the unusual case where large particulate debris is suspected to be deeply imbedded within the wound.
- Do not routinely prescribe prophylactic antibiotics. Reserve them for established infections.
- Do not begin soaks at home unless there are early signs of infection developing.

Discussion:

Small, clean, superficial puncture wounds uniformly do well. The pathophysiology and management of a wound is dependent upon the material that punctured the foot, the location, depth, time to presentation, footwear and underlying health status of the victim. Punctures in the metatarsal-phalangeal joint area may be of higher risk of bone and joint involvement. Children brought by a parent, adults with on-the-job injury and patients seeking tetanus shots tend to present earlier and thus have a lower incidence of infection. Patients who present after 24 hours may have an early subclinical infection. Unsuspected fragments of sock or rubber sole are a major source of potential infection.

When the foot is punctured, the cornified epithelium acts as a spatula, cleaning off any loose material from the penetrating object as it slides by. This debris often collects just beneath this cornified layer which then acts like a trap door holding it in. Left in place, this debris may lead to lymphangitis, cellulitis or abscess. Saucerization or excision of wound edges allows for the removal of debris and the unroofing of superficial small foreign bodies or abscesses found beneath the thickly cornified skin surfaces.

Osteomyelitis caused by Pseudomonas aeruginosa remains the most devastating sequela. The incidence of osteomyelitis is estimated to be between 0.4% and 0.6%. Nails through tennis shoes into the metatarsal heads are high risk injuries and should be referred for orthopedic follow up.

References:

- Patzakis MJ, Wilkins J, Brien WM, Carter VS: Wound site as a predictor of complications following deep nail punctures to the foot. West J Med
1989;150:545-547.
10.16 Minor Impalement Injuries

Presentation

A sharp metal object such as a needle, heavy wire, nail or fork is driven into or through a patient's extremity. In some instances, the patient may arrive with a large object attached; for instance, a child who has stepped on a nail going through a board may be brought in with the entire board attached. As minor as most of these injuries are, they tend to create a spectacle and draw a crowd.

What to do:

- If you are dealing with an impaled object attached to some thing that is acting like a lever and causing pain with movement, either immediately pull the extremity off the sharp object (if it is straight and smooth) or quickly cut through it to release the patient. You can usually cut an exposed nail or metal spike with an orthopedic pin cutter.
- Obtain x rays when pain and further damage from a leveraged object is not a problem, and when there is a suspicion of an underlying fracture, fragmentation, or hooking of the impaled object, as might occur with a heavy wire that has been thrown from under a lawnmower. It is not necessary to x ray a penetrating nail, form or other non-malleable, non-fragile object that will remain intact and is easily removed regardless of its radiographic appearance.
- Examine the extremity for possible neurovascular or tendon injury.
- If surgical debridement is anticipated after removal of the object, then infiltration of an anesthetic should be provided prior to removal. Otherwise, consider whether or not the patient wants the transient discomfort of local anesthetic before the object is quickly pulled out. Local anesthesia will usually not give complete pain relief when a deeply imbedded object is removed; inform the patient of this.
- Objects with small barbs, such as crochet needles and fish spines, can be removed by first anesthetizing the area and then applying firm traction until the barb is revealed through the puncture wound. The fibrils of connective tissue caught over the barb can then be cut with a scalpel blade or fine scissors.
- After removal of the impaled object the wound should be appropriately debrided and irrigated, as described for puncture wounds. Tetanus prophylaxis should be provided and, except for contaminated wounds like a fish spine, a prophylactic antibiotic should not be prescribed.

What not to do:

- Do not send a patient to x ray with a leveraged object impaled. This creates further pain and possible injury with every movement and the x ray seldom provides useful information.
- Do not try to hand-saw off a board attached to an impaled object. The resultant movement will obviously cause unnecessary pain and possibly harm.
Discussion:

Simple impalement injuries of the extremities should not be confused with major impalement injuries of the neck and trunk in which the foreign object usually should not be precipitously removed. With major impalement injuries careful localization with x rays is required, and full exposure and vascular control in the operating room is also a necessity to prevent rapid exsanguination when the impaled object is removed from the heart or a great vessel. Large impalement injuries of the extremities also require immediate surgical consultation and thorough consideration of potential neurovascular and musculoskeletal injuries.
10.17 Fishhook Removal

Presentation

The patient has been snagged with a fishhook and arrives with it embedded in his skin.

What to do:

Picture

- Cleanse the hook and puncture wound with povidone-iodine or another antibiotic solution. Provide tetanus prophylaxis as needed. Most patients will benefit from local infiltration of 1% buffered lidocaine using a 27 gauge needle inserted through the hole created by the fishhook.
- For hooks lodged superficially, first try the simple "retrograde" technique. Push the hook back along the entrance pathway while applying gentle downward pressure on the shank (like the downward pressure in the "string" technique below). If the hook does not come out, an 18 gauge needle may be inserted into the puncture hole and used as a miniature scalpel blade. Manipulate the hook into a position so you can cut the bands of connective tissue caught over the barb and release it.
- For more deeply imbedded hooks, a more complex technique of "needling" the hook requires somewhat greater skill but also allows you to work on an unstable skin surface such as a finger or ear. Slide a large gauge (#20 or #18) hypodermic needle through the puncture wound alongside the hook. Now blindly slide the needle opening over the barb of the hook and, holding the hook firmly, lock the two together. Now with the barb covered, remove the hook and needle as one unit.
- When a single hook is superficially embedded in a stable skin surface such as the back, scalp or arm, a simple way to remove it is by using the "string" technique. Align the shaft of the hook so that it is parallel to skin surface. Press down on the hook with your index finger to disengage the barb. Place a loop of string (fishing line or 1-0 silk) over your wrist and around the hook, and with a quick jerk opposite from the direction the shaft of the hook is running, pop the hook out. When done properly, this procedure is painless and does not require anesthesia. The hook may shoot out in the direction that the string is being pulled, so be careful that no one is standing in the path of the fishhook.
- When the hook is deeply embedded, the barbed end of the hook is protruding through the skin, or you are unable to utilize the previous techniques, proceed with the tried and true "push through" maneuver. Locally infiltrate the area with 1% buffered lidocaine and then push the point of the hook along with its barb up through the skin. Now with a pin cutter or metal snip, cut off the tip of the hook and remove the shaft or cut off the shaft of the hook and pull the tip through.
- If a multifaceted (treble) hook is embedded, cover the free hooks with corks or use a pin cutter or metal snips to remove the free hooks and protect the patient as well as yourself from additional harm. When significant manipulation is anticipated, infiltrate first with 1% buffered lidocaine.
What not to do:

- Do not try to remove a multiple hook or a fishing lure with more than one hook without first removing the free hooks or embedding them in a protective material.
- Do not attempt to use the "string" technique if the hook is near the patient's eye.
- Do not routinely prescribe prophylactic antibiotics. Even hooks that have been contaminated by fish rarely cause secondary infection.

Discussion:

With the string, retrograde and needling techniques, there is no lengthening of the puncture track or creation of an additional puncture wound. The quickest and easiest method for removing a fishhook is the string technique. It is a technique you can use in the field because no special equipment or anesthesia is required, but it is not recommended when the hook is positioned on a skin surface that is likely to move when the string is pulled. This movement will cause the vector of force to change and therefore the barb may not release.
10.18 Traumatic Tattoos and Abrasions

Presentation

The patient will usually have fallen onto a coarse surface such as a blacktop or macadam road. Most frequently, the skin of the face, forehead–chin, hands and knees are abraded. When pigmented foreign particles are impregnated within the dermis adventita, tattooing will occur. An explosive form of tattooing can also be seen with the use of firecrackers, firearms, and homemade bombs.

What to do:

- Cleanse the wound with nondestructive agents (e.g., normal saline, SurClens, 1% povidone-iodine in normal saline) and provide tetanus prophylaxis.
- With explosive tattooing, particles are generally deeply embedded and will require plastic surgical consultation. Any particles embedded in the dermis may become permanent tattoos. Abrasions that are both large (more than several square centimeters) and uniformly deep into the dermis or below (so that no skin appendages, such as hair follicles, to provide a reservoir of regenerating basal epithelium remain), may also require consultation and/or skin grafts.
- With abrasions and abrasive tattooing, the area can usually be adequately anesthetised by applying lidocaine jelly, viscous lidocaine or gauze soaked with a mixture of lidocaine, tetracaine and epinephrine directly onto the wound for approximately 5 minutes. If this is not successful, locally infiltrate with 1% buffered lidocaine using a 25-gauge 3” needle for large areas.
- The wound should now be cleaned with a surgical scrub brush, saline and surgical soap. When impregnated material remains, use a sterile stiff toothbrush to clean the wound or use the side of a #10 scalpel blade to scrape away any debris. While working, continuously cleanse the wound surface with gauze soaked in normal saline to reveal any additional foreign particles. Large granules may be removed with the tip of a #11 blade.
- Wounds should be left open with antibiotic ointment applied. The patient should be instructed to gently wash the area 3–4 times per day and continue applying the ointment until the wound becomes dry and comfortable under a new coat of epithelium, which may require a few weeks.
- An alternative to the above when the wound has been adequately cleansed, is to use the same antibiotic ointment with a closed dressing of Adaptic gauze and a scheduled dressing change within 2–3 days.
- Provide wound care instructions that include danger signs of infection.

What not to do:

- Do not ignore embedded particles. If they cannot be completely removed, inform the patient about the probability of permanent tattooing and arrange a plastic surgical consultation.
Discussion:

The technique of tattooing involves painting pigment on the skin, and then injecting it through the epidermis into the dermis with a needle. As the epidermis heals, the pigment particles are ingested by macrophages and permanently bound into the dermis. Immediate care of traumatic tattoos is important because once the particles are embedded and healing is complete, it becomes difficult to remove them without scarring. It is advisable for a patient to protect a dermabraded area from sunlight for approximately 1 year to minimize excessive melanin pigmentation of the site.
10.19 Bites

Presentation

Histories of animal bites are usually volunteered, but the history of a human bite, such as one obtained over the knuckle during a fight, is more likely to be denied or explained only after questioning. A single bite may contain various types of injury, including underlying fractures and tendon and nerve injuries, not all of which are immediately apparent.

What to do:

- Obtain a complete history, including the type of animal that bit, whether or not the attack was provoked, what time the injury occurred, the current health status and vaccination record of the animal, and whether or not the animal has been captured and is being held for observation. Report the bite to police or appropriate local authorities.
- Assess the wound for any damage to deep structures, any need for surgical consultation, and any risk of infection. Look for bone and joint involvement and, if present, obtain appropriate imaging studies (dog bites have caused open depressed skull fractures in small children). Examine for nerve and tendon injury and be aware that crush and puncture wounds as well as bites on the hands, wrists and feet are at higher risk for development of infection and significant complications such as tenosynovitis, septic joints, osteomyelitis and sepsis. Bites from cats, humans, other primates are also associated with higher rates of infection. If tissue damage is extensive, then obtain vascular, orthopedic, otorhinolaryngologic, reconstructive or other consultation.
- For crush wounds and contusions, elevate above the heart and apply cold packs.
- If the wound requires debridement, or will be painful to cleanse and irrigate, anesthetize with buffered lidocaine (epinephrine will slightly increase infection rates).
- If there are already signs of infection, obtain aerobic and anaerobic cultures of any pus.
- Cleanse the wound with antiseptic (10% povidone-iodine solution, diluted 1:10 in normal saline) and sharply debride any debris and non-viable tissue.
- Irrigate the wound, using a 20ml syringe, a 19 gauge needle or an irrigation shield (Zerowet), and at least 200ml of sterile saline or the diluted 1% povidone-iodine solution. This technique demonstrably reduces microscopic debris and bacteria. You can use an intravenous setup to irrigate a large area.
- Prepare every wound as if you were going to suture it.
- For animal bite wounds that are clean, uninfected lacerations located anywhere other than the hand or foot, you may staple, tape, or suture them closed. Prophylactic antibiotics are not necessary. Infection rates in sutured dog bite wounds have compared favorably with those for unsutured wounds and with non-bite lacerations.
- If the wound is infected when first seen, plan either a delayed repair after three to five days of saline dressings or secondary wound healing without closure. Prescribe antibiotics (see below) for seven to ten days. Severe infections require hospitalization.
for elevation, immobilization, intravenous antibiotics and surgical consultation.

- With human bites, animal bites that are punctures or located on the hand, wrist or foot, or bites more than 12 hours old, in most cases, you should leave the wounds open and apply a light dressing or saline dressing and consider delayed primary closure after two to three days. Wounds should also be left open on debilitated and patients with diabetes, alcoholism, chronic steroid use, organ transplants, vascular insufficiency, splenectomy, HIV or other immunocompromising condition.
- Start prophylactic antibiotics in the ED on these wounds (see above) and in patients with artificial or damaged heart valves and implanted prosthetic devices. The most effective dose is the one you can give now. Augmentin 500 mg tid for three to five days is the current CDC recommendation for all bites. Alternatives for prophylaxis include:
  - dog bites: clindamycin (Cleocin) 150-300 mg and ofloxacin (Floxin) 400 mg bid for adults, clindamycin and trimethoprim/sulfamethoxazole for children
  - cat bites: penicillin V 500 mg qid, doxycycline 100 mg bid for adults, or ceftriaxone 500-2000 mg im/iv
  - human bites: cefoxitin 2000 mg q8h iv

- If the patient has had no tetanus toxoid in the past 5-10 years, provide prophylaxis.
- If the patient was bitten by an oddly behaving domestic animal, or a bat, coyote, fox, opossum, raccoon, or skunk, you should start rapid rabies vaccination with 20IU/kg of rabies immune globulin and the first of five 1 mL doses of human diploid strain rabies vaccine. Reassure the patient that bites of rodents and lagomorphs, including rats, squirrels, hamsters, and rabbits, in America do not usually transmit rabies. Such bites also have a low incidence of secondary infection and do not require prophylactic antibiotics.
- Provide hepatitis prophylaxis for patients who have been bitten by known carriers of hepatitis B. Administer hepatitis B immune globulin 0.06ml/kg im at the time of injury and schedule a second dose in 30 days. Follow standard guidelines applicable to contaminated needle sticks.
- Minimize edema (and infection) of hand wounds by splinting and elevation.
- Have patient return for a wound check in two days, or sooner if there is any sign of infection. Explain the potential for serious complication such as septic arthritis, osteomyelitis and tenosynovitis (evident when a finger becomes diffusely swollen, immobile, tender along the flexor surface or painful on passive extension) which will require specialty consultation.

**What not to do:**

- Do not overlook a puncture wound.
- Do not suture debris, non-viable tissue, or a bacteria inoculum into a wound.
- Do not use buried absorbable sutures, which act as a foreign body and cause a reactive inflammation for about a month and increase the risk of infection.
- Do not waste time and money obtaining cultures and Gram stains of fresh wounds. The results of these tests do not correlate well with the organisms that subsequently cause infection.
- Do not routinely suture human bites.
Discussion

Animal bites are often brought promptly to the ED, if only because of a legal requirement to report the bite, or because of fear of rabies. Bite wounds account for 1% of all ED visits in the US, most caused by dogs and cats. Most dig bites are from household pets rather than strays. A disproportionate number of dog bites are from German shepherds.

Bites occur most commonly among young, poorly supervised children who disturb the animals while they are sleeping or feeding, separate them during a fight, try to hug or kiss an unfamiliar animal or accidently frighten it. Malpractice claims and other civil lawsuits often follow bite injuries.

Dog and cat bites both show high rates of infection with staphylococcus and streptococcus species, as well as Pasteurella multocida and many different gram-negative and anaerobic bacteria. In addition to these organisms, 10-30% of all human bites are infected with Eikenella corrodens, which sometimes show resistance to the semisynthetic penicillins, but sensitivity to penicillin. Adequate debridement and irrigation are clearly more effective than prophylactic antibiotics, and except in wounds that are at high risk for developing infection are often all that is required to prevent infection of bites.

Less than 0.1% of all animal bites result in rabies. For questions of local rabies risk, local public health services may be available and valuable support as sources of information regarding the area’s prevalence of rabies in an involved species.

References:

10.20 Tetanus Prophylaxis

Presentation

The patient may have stepped on a nail, or sustained any sort of laceration, abrasion or puncture wound, when the question of tetanus prophylaxis comes up.

What to do:

- If the patient has not had tetanus immunization in the past 5 years, give adult tetanus and diphtheria toxoid (Td) 0.5ml im. Give pediatric diptheria and tetanus toxoid (DT) to children under seven years old.
- If there is any doubt the patient has had his original series of three tetanus immunizations, add tetanus immune globulin (e.g., Hyper-Tet) 250mg im, and make arrangements for him to complete the full series with additional immunizations at 4 to 6 weeks and 6 to 12 months.
- With a history of true hypersensitivity to tetanus toxoid, provide passive immunity with tetanus immune globulin. Instruct the patient that he does not have protection from tetanus from future injuries.

What not to do:

- Do not assume adequate immunization. The groups most at risk in the US today are immigrants, elderly women, and rural southern blacks. Veterans usually have been immunized. Many patients incorrectly assume they were immunized during a surgical procedure. Having had the disease tetanus does not confer immunity.
- Do not give tetanus immunizations indiscriminately. Besides being wasteful, too-frequent immunizations are more likely to cause reactions, probably of the antigen-antibody type. (Surprisingly, the routine of administering toxoid and immune globulin simultaneously in two deltoid muscles does not seem to cause mutual inactivation or serum sickness.)
- Do not believe every story of allergy to tetanus toxoid (which is actually quite rare). Is the patient actually describing a local reaction, the predictable serum sickness of horse serum, or a reaction to older, less pure preparations of toxoid? The only absolute contraindication is a history of immediate hypersensitivity--urticaria, bronchospasm, or shock. Tetanus toxoid is safe for use in pregnancy.
- Do not give pediatric tetanus and diphtheria toxoid (TD) to an adult. TD contains 8 times as much diphtheria toxoid as Td.

Discussion:

There continue to be 50-100 cases of tetanus in the US each year. The CDC recommends everyone receive Td every 10 years, but somehow physicians and patients alike forget tetanus prophylaxis except after a wound. Because tetanus has followed negligible injuries and spontaneous infections, the concept of the
"tetanus-prone wound" is not really helpful. The CDC recommends including a small dose of diphtheria toxin (Td) but, because this is more apt to cause local reactions, you may want to revert to plain tetanus toxoid (TT) in patients who have complained of such reactions.

Diptheria-pertussus-tetanus (DPT) vaccine is given at two, four and six months, with a fourth dose at 12 to 18 months (six months after the last dose), a fifth dose at four to six years, and a sixth dose at eleven to sixteen. Thereafter, tetanus toxoid with a reduced dose of diptheria (Td) is given ever ten years, and boosters within five for "tetanus-prone" wounds.

References:

10.21 Rabies Prophylaxis

Presentation

A possibly contagious animal has bitten the patient, or the animal's saliva, brain tissue or cerebrospinal fluid contaminated an abrasion or mucous membrane.

What to do:

- Clean and debride the wound thoroughly. Irrigate with soap and water or 1% benzalkonium chloride and rinse with norma saline.
- Know the local prevalence of rabies, or ask someone who knows (e.g., local health department).
- If the offending animal was an apparently healthy dog or cat, arrange to have the animal observed for ten days. During that period, an animal affected with rabies will show symptoms and should be sacrificed and examined for rabies using a fluorescent rabies antibody (FRA) technique. If the test is positive, begin prophylaxis with rabies immune globulin and human diploid cell vaccine. If the animal is not available for observation, the decision of whether to provide rabies prophylaxis depends on the local prevalence of rabies in domestic animals, rodents, and lagomorphs.
- If a wild animal (e.g., bat, bobcat, coyote, fox, opossum, raccoon, skunk) capable of transmitting rabies is caught, it should be killed, placed on ice and sent to the local public health department so the brain can be examined with immunofluorescence. If the animal did not appear to be healthy, or if the bite is on the patient's face, the patient should be started on RIG and HDCV in the meantime and stopped only if the test is negative.
- If the offending wild animal was not captured, no matter how normal-appearing, assume it was rabid, and give a full course of RIG and HDCV.
- Provide rapid passive immunity with 20 IU/kg of rabies immune globulin, half im and half infiltrating the area of the bite. This passive protection has a half-life of 21 days.
- Begin rapid immunization with human diploid cell vaccine, lml im.
- Make arrangements for repeat doses of HDCV at 3, 7, 14, and 28 days post exposure.

What not to do:

- Do not treat the bites of rodents and lagomorphs (hamsters, rabbits, squirrels, rats, etc.) unless rabies is endemic in your area. As of 1996, rodent and lagomorph bites have not caused human rabies in the United States.
- Do not treat exposures where contact was limited to petting a rabid animal or where these was only contact with the animal's blood, urine, feces or skunk spray.
- Do not omit rabies immune globulin. Treatment failures have resulted from giving HDCV alone.
Discussion

The older duck embryo vaccine for rabies required 21 injections, and produced more side effects and less of an antibody response than the new human diploid cell vaccine. Sometimes, neurological symptoms would arise from DEV treatment, raising the agonizing question of whether they represented early signs of rabies or side effects of the treatment, and thus whether treatment should be continued or discontinued. It is much easier nowadays to initiate immunization with HDCV and follow through, because side effects are minimal and antibody response excellent. Roughly 25% of patients experience redness, tenderness and itching around the injection site and another 20% experience headaches, myalgia or nausea.

Patients with an immunosuppressive illness or those taking corticosteroids, immunosuppressive agents or antimalarial drugs may have an inadequate immune response to vaccination, and should have assays of serum antibodies. Pregnancy is not a contraindication to postexposure prophylaxis.

The incubation period of rabies varies from weeks to months roughly in proportion to the length of the axons up which the virus must propagate to the brain, which is why prophylaxis is especially urgent in facial bites.

References:

10.22 Marine envenomations

Presentation

After swimming in the ocean and coming into contact with marine life, the patient may seek medical attention because of local pain or swelling or skin discoloration. Marine animal envenomations can be divided into two major categories: puncture wounds and focal rashes. Severe envenomations can be accompanied by systemic symptoms like vomiting, paralysis, seizures, respiratory distress and hypotension, but this review is limited to the more common local injuries.

- **Puncture wounds:**

  - A laceration of the leg with blue edges suggests a stingray attack. There is immediate, local, intense pain, edema of soft tissue, and a variable amount of bleeding. The pain peaks after 30 to 60 minutes, may radiate centrally, and may last 48 hours.
  - A single ischemic puncture wound with a red halo and rapid swelling suggests a scorpionfish envenomation. The pain is immediate, intense and radiating. Untreated, the pain peaks 60 to 90 minutes after the sting, persists for at least 6 to 12 hours, and sometimes for days.
  - Multiple punctures in an erratic pattern with or without purple discoloration or retained fragments are typical of a sea urchin sting. The venomous spines can inflict immediate and intense burning pain with severe muscle aching. The area surrounding the puncture wounds may be red and swollen.

- **Focal rashes:**

  - Contact with a bristleworm is followed by an intense red, itchy rash.
  - Contact with feather hydroids and sea anemones induce a mild reaction, consisting of instantaneous burning, itching and urticaria. The reaction may be delayed and can include the appearance of papules, hemorrhagic vesicles or zoster-like reactions 4 to 12 hours after contact.
  - The sting of the fire coral induces intense burning pain, with central radiation and reactive regional lymphadenopathy.
  - Most of the jellyfish with suspended tentacles create “tentacle prints” or a whip-like pattern of darkened reddish brown, purple or frosted and cross-hatched stripes in the precise areas of skin contact. Vesiculation and skin necrosis may follow.

What to do:

- **Puncture wounds:**

  - To relieve pain and perhaps attenuate some of the thermolabile protein components of the venom, soak the wound in hot (not scalding) water (approximately 45 degrees C or 113 degrees F) for 30 to 90 minutes or longer is
required for pain control.

- During hot water treatment, infiltrate into or around the wound with 0.5% bupivacaine or 1% or 2% lidocaine without epinephrine to provide further pain control. When necessary, add narcotic analgesics.
- Irrigate the wound as soon as possible with normal saline or dilute 1% povidone-iodine solution (add 10% Betadine to 0.9% NaCl in a 1:10 ratio) and remove visible pieces of spine or debris.
- Obtain x rays if there might be any radio-opaque fragments like sea urchin spines retained.
- When anesthesia is complete and pain has been controlled, then thoroughly explore, debride and irrigate open wounds. Remove fragile sea urchin spines using the technique for superficial sliver.
- Suture lacerations loosely or, better, pack open for delayed primary closure.
- Ensure current tetanus prophylaxis.
- Prescribe prophylactic antibiotics except for minor abrasions, superficial punctures and superficial lacerations. Ciprofloxacin 500 mg bid x 3-5 days for adults or trimethoprim-sulfamethoxazole are most appropriate for coverage of pathogenic marine microbes. The genus Vibrio is particularly common in the ocean and poses a serious risk for immunosuppressed patients. Injuries with potential for serious infection include large lacerations, deep puncture wounds (particularly near joints) and retained foreign material. Recommended initial parenteral antibiotics include cefoperazone, cefotaxime, ceftazidime, chloramphenicol, gentamycin and tobramycin.
- For infected wounds obtain both aerobic and anaerobic cultures, and alert the clinical microbiology laboratory that standard antimicrobial susceptibility testing media may need to be supplemented with NaCl to permit growth of marine bacteria. Institute the above antibiotics except for minor wound infections with the classic appearance of erysipelas, which can be treated with erythromycin or cephalexin. Prescribe antibiotics for 7-14 days.
- Follow up all wounds in 1-2 days with periodic revisits until healing is complete.

- Focal rashes:

  - For fire coral, jellyfish, hydroid or sea anemone stings, decontaminate the area with a liberal soaking of 5% acetic acid (vinegar). The leading alternative is 40-70% isopropyl (rubbing) alcohol. Apply continuously for 30 minutes or until the pain disappears.
  - After decontamination, remove any visible large tentacles with forceps or doubly-gloved hands. Remove small particles by applying shaving foam or some equivalent and gently shaving the area with a safety razor, dull knife or plastic card, then clean with an antibacterial soap and flush with water or saline solution.
  - Treat any generalized allergic reactions with antihistamines, corticosteroids and epinephrine.
  - When irritation from sponges, bristle worms or other marine creatures cause erythematous or urticarial eruptions, it usually means tiny spicules and spinules are embedded in the skin. Dry the skin and apply the sticky side of a piece of adhesive tape to the affected area and peel the tape back to remove these particles.
  - Residual inflammation can be treated with topical corticosteroids like Aristocort A
0.1% or 0.5% cream or Topicort emollient cream or ointment 0.25% (dispense 15 grams and apply tid-qid). A topical steroid in combination with a topical anesthetic can be additionally soothing (eg Pramosone cream, lotion or ointment 2.5% or Zone-a-cream 1% tid-qid).

- Check wounds for infection in two and seven days.

**What not to do:**

- Do not use fresh water to decontaminate jellyfish stings. It may cause microscopic cysts to swell and rupture and trigger additional stinging.
- Do not use topical or systemic corticosteroids for puncture wounds unless there is an allergic reaction.
- Do not constrict limbs tightly.

**Discussion**

Any wound acquired in the marine environment can become infected, and this is particularly likely if the wound is large, a puncture, or contaminated with bottom sediment or organic matter.

Stingray victims are generally innocent beach walkers who step on the back of the ray, which reflexively strikes upward with its tail, inflicting a penetrating wound along the upper foot, ankle, or lower leg. The anatomical structure of the stingray's back causes a deep, jagged, painful wound that may contain fragments of barb located proximal to the tail.

Scorpionfish, lionfish and stonefish stings occur in divers and fisherman, and sometimes keepers of marine aquariums or those involved in illegal tropical fish trade. Catfish stings are common when the fish are handled or kicked. Certain catfish species produce a venom in glands at the base of the dorsal spine, but most do not, and catfish venom causes only mild local pain, redness and swelling. Of more concern is the wound caused by the spine and the likelihood of infection.

Sea urchin victims are stung when the step on, handle, or brush up against these sessile creatures. The sea urchin secretes a toxin on the surface of its spines, which is transferred into the wound when they penetrate the skin. The brittle spines also tend to break off and remain in the wound.

**References:**

11.01 Rhus (Toxicodendron) Contact Dermatitis (Poison Ivy, Oak, or Sumac)

Presentation

The patient is troubled with a pruritic rash made up of tense vesiculo-papular lesions on a mildly erythematous base. Typically these are found in groups of linear streaks and may be weeping, crusted, or confluent. If involvement is severe, there may be marked edema, particularly on the face and periorbital and genital areas. The thick protective stratum corneum of the palms and the soles generally protect these areas. The patient is often not aware of having been in contact with poison ivy, oak, or sumac but may recall working in a field or garden from 24 to 48 hours before the onset of symptoms.

What to do:

- Have the patient apply cool compresses of Burow's solution (Domeboro Powder Packets 2 packets in 1 pint of water) for 20-30 minutes every 3-4 hours (more often if comforting).
- Small areas can be treated 2-3 times per day, enhanced at night with an occlusive plastic (Saran) wrap dressing.
- Diphenhydramine (available over the counter as Benadryl) or Hydroxyzine (Atarax) 25mg po q6h will help mild itching between application of compresses.
- Tepid tub baths with Aveeno colloidal oatmeal (one cup in 1/2 tub) or cornstarch and baking soda (1 cup of each in 1/2 tub) will provide soothing relief.
- When there is involvement of the face, in severe reactions or in situations where the patient's livelihood is threatened, early and aggressive treatment with systemic corticosteroids should be initiated. Prednisone (60-80mg a day tapered over 2 weeks) will be necessary to prevent a late flare-up or rebound reaction. One 40mg dose of intramuscular triamcinolone acetonide (Kenalog) will be equally effective.

What not to do:

- Do not try to substitute pre-packaged steroid regimens (Medrol Dosepak, Aristopak). The course is not long enough and may lead to a flare up.
- Do not allow patients to apply fluorinated corticosteroids such as Topsyn or Valisone indefinitely to the face, where they can produce premature aging of the skin.
- Do not institute systemic steroids in the face of secondary infections such as impetigo, cellulitis, or erysipelas. Also, do not start steroids if there is a history of tuberculosis, diabetes, herpes or severe hypertension.

Discussion

Poison oak and poison ivy are forms of allergic contact dermatitis that result from the exposure of sensitized individuals to allergen in sap. These allergens induce sensitization in more than 70 percent of the population, may be carried by pets, and are
frequently transferred from hands to other areas of the body in the first few hours before the sap becomes fixed to the skin. The gradual appearance of the eruption over a period of several days is a reflection of the amount of antigen deposited on the skin and the reactivity of the site, not an indication of any further spread of the allergen. The vesicle fluid is a transudate, does not contain antigen, and will not spread the eruption elsewhere on the body or to other people. The allergic skin reaction usually runs a course of about 2 weeks which is not shortened by any of the above treatments. The aim of therapy is to reduce the severity of symptoms, not to shorten the course.
11.02 Sunburn

Presentation: Patients generally seek help only if their sunburn is severe. There will be a history of extended exposure to sunlight or to an artificial source of ultraviolet radiation, such as a sunlamp. The burns will be accompanied by intense pain and the patient will not be able to tolerate anything touching the skin. There may be systemic complaints that include nausea, chills, and fever. The affected areas are erythematous and are accompanied by mild edema. The more severe the burn, the earlier it will appear and the more likely it will progress to edema and blistering.

What to do:

- Inquire as to whether or not the patient is using a photosensitizing drug (e.g., tetracyclines, thiazides, sulfonamides, phenothiazines) and have the patient discontinue its use.
- Have the patient apply cool compresses of water or Burow's solution (Domeboro Powder Packets-1 pkt in 1 pint of water) as often as desired to relieve pain. This is the most comforting therapy.
- The patient may be helped by applying a topical steroid spray such as dexamethasone (Decaspray) and using an emollient such as Lubriderm.
- With a more severe burn prescribe a short course of systemic steroids (40-60mg of Prednisone qd x 3d). This will reduce inflammation, swelling, pain, and itching.

What not to do:

- Do not allow the patient to use OTC sunburn medications that contain local anesthetics (benzocaine, dibucaine or lidocaine). They are usually ineffective or only provide very transient relief. In addition there is the potential hazard of sensitizing the patient to these ingredients.
- Do not trouble the patient with unnecessary burn dressings. These wounds have a very low probability of becoming infected. Treatment should be directed at making the patient as comfortable as possible.

Discussion

With sunburn, the onset of symptoms is usually delayed for 2-4 hours. Maximum discomfort usually occurs after 14-20 hours, and symptoms last between 24 and 72 hours. Patients should be instructed on the future use of sunscreens containing para-aminobenzoic acid (PABA) (e.g., Pabanol and PreSun). Prophylactic use of aspirin prior to sun exposure has also been recommended.
11.03 Partial Thickness (Second-Degree) Burns and Tar Burns

Presentation

Small, (<6% total body surface) partial thickness (second degree) burns can occur in a variety of ways. Spilled or splattered hot water and grease are among the most common causes, along with hot objects, explosive fumes, and burning (volatile) liquids. The patient will complain of excruciating pain and the burn will appear erythematous with vesicle formation. Some of these vesicles or bullae, may have ruptured prior to the patient's arrival, while others may not develop for 24 hours. Tar burns are special in that tar adheres aggressively to the burned skin.

What to do:

- To stop the pain, immediately cover the burned area with sterile towels that have first been soaked in iced normal saline or an iced povidone-iodine solution. Continue irrigating the burn with the iced solution for the next 20-30 minutes or until the patient can remain comfortable without the cold compresses.
- Provide the patient with any necessary tetanus prophylaxis and pain medication, (e.g., Percodan, Demerol).
- Examine the patient for any associated injuries and check the airway and pulmonary status of any patient with significant facial burns.
- When the pain has subsided, gently cleanse the burn with povidone-iodine scrub and rinse this off with normal saline.
- If the vesicles are not perforated, have a relatively thick wall, and are on a hairless surface such as the palm of the hand, they should be left intact. With small burns such as these, patients can be sent home to continue cold compresses for comfort. Otherwise, these vesicles should be protected from future rupture with a bulky sterile dressing.
- Open vesicles or bullae, large, thin-walled vesicles that are prone to rupture, or vesicles occurring on hairy surfaces that are prone to infection, should be completely debrided. Using fine scissors and forceps, you can easily strip away any loose epithelium from the burn. (With tar burns, debridement should be accomplished in the same manner, removing the tar along with the loose epithelium. Tar adhering to normal epithelium can be left in place, acting as a sterile dressing in itself.) Rinse off any remaining debris with normal saline and cover all the open areas with an oil emulsion gauze (e.g., Adaptic) followed by silver sulfadiazene (Silvadene) cream and a bulky absorbent sterile dressing. The first dressing change should be scheduled in 2 days.
- Small burns and facial burns can often be treated with an open technique of using Silvadene cream only. Patients are instructed to wash the burn 4 times each day, followed by reapplication of the Silvadene cream. Patients can be reassured that unless there are complications (such as infection) they do not have to worry about scarring.
What not to do:

- Do not use ice-containing compresses which might increase tissue damage. Compresses soaked in iced saline should be avoided on large burns (greater than 15% total body surface) because they may lead to problems with hypothermia. When pain cannot be controlled with compresses use strong parenteral analgesics such as morphine sulfate. Do not confuse partial thickness burns with full thickness burns. Full thickness burns have no sensory function or skin appendages such as hair follicles remaining, do not form vesicles, and may have evidence of thrombosed vessels. If areas of full thickness burn are present or suspected, seek surgical consultation because these areas will not grow new skin and may later require skin grafting.
- Do not discharge patients with suspected respiratory burns or extensive burns of the hands or genitalia. These patients require special inpatient observation and management.
- Do not use caustic solvents in an attempt to remove tar from burns. It is unnecessary, painful, and will cause further tissue destruction.

Discussion

Simple partial thickness burns will do well with nothing more than cleansing, debridement, and a sterile dressing. All other therapy, therefore, should be directed at making the patient more comfortable. Silvadene cream is not always necessary, but it is soothing and may reduce the risk of infection. When it is possible to leave vesicles intact, the patient will have a shorter period of disability and will require fewer dressing changes and follow up visits. If the wound must be debrided, the closed dressing technique may be more convenient and less of a mess than the open technique of washings and cream applications.

Some physicians believe it is important to remove all traces of tar from a burn. Removal can be accomplished relatively easily by using a petroleum of petroleum-based antibiotic ointment such as Bacitracin, which will dissolve the tar. Others have found the citrus and petroleum distillate industrial cleanser, De-Solv-It, very effective as well as non-toxic and non-irritating.
11.04 Frostbite and Frostnip

Presentation

Frostnip occurs when skin surfaces such as the tip of the nose and ears are exposed to an environment cold enough to freeze the epidermis. These prominent exposed surfaces become blanched and develop paresthesias and numbness. As they are rewarmed, they become erythematous and at times painful.

Superficial frostbite can be either a partial or a full thickness freezing of the dermis. The frozen surfaces appear white and feel soft and doughy. With rewarming these areas will become erythematous and edematous with severe pain. Blistering will occur within 24-48 hours with deeper partial thickness frostbite.

What to do:

- When there is no longer any danger of re-exposure and re-freezing, rapidly warm the affected part with heated blankets (warm hands in the case of frostnip) or in a warm bath (38-40 degrees C).
- A strong anesthetic such as meperidine (Demerol) or morphine may be required to control pain.
- When blistering occurs, bullae should not be ruptured. If the blisters are open, though, they should be debrided and gently cleansed with povidone-iodine and normal saline. Silvadene cream may be applied, followed by a sterile absorbent dressing.
- Patients should be provided with follow up care and warned that healing of the deeper injuries may be slow and produce skin that remains sensitive for weeks. In addition, there may be permanent damage to fingernails, long term paresthesia, and permanent cold sensitivity.

What not to do:

- Do not warm the injured skin surface while in the field if there is a change that re-freezing will occur. Re-exposing even mildly frostbitten tissue to the cold without complete re-warming can result in additional damage.
- Do not rub the injured skin surface in an attempt to warm it by friction: this can also create further tissue destruction.
- Do not allow the patient to smoke. Smoking causes vasoconstriction and may further decrease blood flow to the frostbitten extremity.
- Do not confuse frostnip and superficial frostbite with deep frostbite. Severe frostbite, when the deep tissue or extremity is frozen with a woody feeling and lifeless appearance, requires inpatient management and could be associated with life-threatening hypothermia.

Discussion
Frostbite is more common in persons exposed to cold at high altitudes. The areas of the body most likely to suffer are those farthest from the trunk or large muscles: ear lobes, nose, cheeks, hands and feet. Touching cold metal with bare hands can cause immediate frostbite, as can the spilling of gasoline or other volatile liquids on the skin at very low temperatures. Of course, prevention is the best “treatment” for frostbite. Heavily insulated, waterproof clothing gives the best frostbite prevention.
11.05 Hymenoptera (Bee, Wasp, Hornet)
Envenomation

Presentation

Sometimes a patient comes to a hospital emergency department immediately after a painful sting because he is alarmed at the intensity of the pain or worried about developing a serious life threatening reaction. Sometimes he seeks help the next day because of swelling, redness, and itching. Parents may not be aware that their child was stung by a bee and be concerned only about the local swelling. Erythema soon after the sting, with varying degrees of localized edema, develops. Often there is a central punctate discoloration at the site of the sting, or, rarely, a stinger may be protruding. A delayed hypersensitivity reaction will produce varying degrees of edema which can be quite dramatic when present on the face. Tenderness and, occasionally, ascending lymphangitis can occur.

What to do:

- Scrape away the stinger with the back edge of a scalpel blade or a long fingernail.
- Examine the patient for any signs of an immediate, systemic, allergic reaction (anaphylaxis), such as decreased blood pressure, generalized urticaria or erythema, or wheezing.
- Apply a cold pack to an acute sting to give pain relief and reduce swelling.
- Observe the patient with an acute sting for approximately an hour to watch for the rare anaphylaxis.
- Reassure patient who has come in after 12-24 hours that anaphylaxis is no longer a problem.
- Prescribe hydroxyzine (Atarax) 50mg qid for itching.
- If an ascending lymphangitis is present, treat the patient with an appropriate antibiotic for 10 days (e.g., cephadryl (Duricef) 1gm qd, cephalexin 500mg tid, dicloxacillin 500mg qid)
- If an extremity is involved, have the patient keep it elevated and instruct him that the swelling may worsen if the hand or foot is held in a dependent position. This swelling may continue for several days. Severe hand swelling may be prevented or reduced by placing the patient in a splint and compression dressing. Promptly remove any rings in cases of hand stings (see).

What not to do:

- Do not belittle the patient’s complaint or make him feel guilty about his visit.
- Do not send the patient with an acute sting out of the ED less than one hour after the sting.
- Do not apply heat, even if an infection is suspected—the swelling and discomfort will worsen.
Discussion

Bee stings are very painful and frightening. There are many misconceptions about the danger of bee stings, and many patients have been instructed unnecessarily to report to an ED immediately after being stung. Many of these people have only suffered localized hypersensitivity reactions in the past and are not at a significantly greater risk than the general public for developing anaphylaxis. Besides the immediate relief of pain for the acute sting, we have little more than reassurance to offer these patients. Although it is most prudent to treat an ascending lymphangitis with an antibiotic, it should be realized that after a bee sting the resultant local cellulitis and lymphangitis is usually a chemically mediated inflammatory reaction. Histamine is one of many components of hymenoptera venom: antihistamines may benefit the sting victim.

References

11.06 Superficial Sliver

Presentation

**Picture**
The patient has caught himself on a sharp splinter (usually wooden) and either cannot grasp it, has broken it trying to remove it, or has found it is too large and painful to remove. The history may be somewhat obscure. On examination, you should find a puncture wound with a tightly embedded sliver that may or may not be palpable over its entire length. There may only be a puncture wound without a clearly visible or palpable foreign body.

**What to do:**

- Obtain a careful history. Find out if the patient has any foreign body sensation. Be suspicious of all puncture wounds (especially on the foot) that have been caused by a wooden object.
- If it is unclear whether a wooden foreign body is beneath the skin, order a high resolution ultrasound study employing a linear array transducer that focuses in the near field of view.
- Locally infiltrate with 1% Xylocaine with epinephrine (use no epinephrine in a digit) and clean skin with povidone-iodine solution.
- Using a #15 blade, cut down over the entire length of the sliver, completely exposing it.
- The sliver can now be easily lifted out and removed.
- Cleanse the track with normal saline or 1% povidone-iodine on a gauze sponge. Debride contaminated tissue if necessary.
- If the sliver is not visible or easily palpable but you feel confident it is relatively superficial and buried within subcutaneous tissue, you may try excising the surrounding tissue. First, when possible, create a bloodless field by using a tourniquet or self-retaining retractors in combination with lidocaine with epinephrine. Make a narrow oval incision on the skin surface surrounding the puncture site. Undermine the outer wound edges and then excise the central skin plug along with the subcutaneous tissue containing the foreign body. Make certain that you have recovered the entire wooden fragment.
- Close the wound with sutures or wound closure strips. Avoid sutures, especially absorbable buried sutures when possible because of the increased risk of infection.
- Give *tetanus* prophylaxis, if necessary.
- Warn the patient about the signs of infection and schedule a 48 hour wound check.

**What not to do:**

- Do not order plain radiographs. Wooden foreign bodies are radiolucent. After one day absorbing water from adjacent tissue, then tend to be isodense on xerography and tomography. Other than wood, plastic, cactus and sea urchin spines, thorns and aluminum may be present, and all tend to be difficult to visualize on plain radiographs.
Do not try to pull the sliver out by one end. It is likely to break.
Do not try to locate a foreign body in a bloody field.
Do not make an incision across a neurovascular bundle, tendon, or other important structure.
Do not attempt to remove a deep, poorly localized foreign body. Those cases should be referred to a surgeon for removal in the operating room, perhaps with fluroscopic or ultrasound guidance.
Do not rely entirely on ultrasound to rule out the possibility of a retained foreign body.
Do not be lulled into a false sense of security because the patient thinks the entire sliver has already been removed. This is often not the case.

Discussion

The most common error in the management of soft tissue foreign bodies is failure to detect their presence. An organic foreign body is almost certain to create an inflammatory response and become infected if any part of it is left beneath the skin. It is for this reason, along with the fact that wooden slivers tend to be friable and may break apart during removal, that complete exposure is generally necessary before the sliver can be taken out. Of course, very small and superficial slivers can be removed by loosening them and picking them out with a #18 gauge needle, avoiding the more elaborate technique described above. When only the outer skin layers are involved, reassuring the patient and gently manipulating the wound can usually obviate the need for anesthesia.

If the foreign body cannot be located, explain to the patient that you do not want to do any harm by exploring and excising any further, and that therefore, you will let the splinter become infected so it will "fester" and form a "pus pocket," when it can be more easily removed. If this procedure is followed, it should always be coordinated with a followup surgeon. The patient should be placed on an antibiotic and provided with followup care within 48 hours.

When making an incision over a foreign body, always take the underlying anatomical structures into consideration. Never make an incision if there is any chance that you may sever a neurovascular bundle, tendon, or other important structure.

When a patient returns after being treated for a puncture wound and there is evidence of non-healing or recurrent exacerbations of inflammation, infection or drainage, assume that the wound still contains a foreign body and refer him for surgical consultation.
11.07 Pencil Point Puncture

Presentation

The patient will tell you that he was stabbed or stuck with a sharp pencil point. He may be overtly or unconsciously worried about lead poisoning. A small puncture wound lined with graphite tattooing will be present. The pencil tip may or may not be present, visible, or palpable. If the puncture wound is palpated, an underlying pencil point may give the patient a foreign body sensation.

What to do:

- Reassure patient or parent that there is no danger of lead poisoning. Pencil "leads" are made of clay and graphite, which is carbon and non-toxic.
- Palpate and inspect for a foreign body. If uncertain, get an x-ray, xerogram or ultrasound to rule out the presence of a foreign body.
- Scrub wound.
- Administer tetanus prophylaxis, if necessary.
- Warn the patient or family about signs of infection, and inform them that there will be a permanent black tattoo that can be removed later if the resulting mark is cosmetically unacceptable.

What not to do:

- Do not excise the entire wound on the initial visit.

Discussion

In order to reduce the amount of tattooing, the wound may be anesthetized and scraped (dermabraded) with the tip of a scalpel blade. It is unwise to excise the entire wound because the resultant scar might be more unsightly than the tattoo. If a superficial pencil-tip foreign body exists, then see subcutaneous foreign body for an easy removal technique. Deep punctures and/or foreign bodies may require exploratory surgery in the operating room.
Subcutaneous foreign body

Presentation

Small, moderate-velocity metal fragments can be released when a hammer strikes a second piece of metal, such as a chisel. The patient has noticed a stinging sensation and a small puncture wound or bleeding site, and is worried that there might be something inside. BB shot will produce a more obvious but very similar problem. Another mechanism for producing radio-opaque foreign bodies includes punctures with glass shards, especially by stepping on glass fragments or receiving them in a motor vehicle accident. Physical findings will show a puncture wound and may show an underlying, sometimes palpable, foreign body.

What to do:

- Be suspicious of a retained foreign body in all wounds produced by a high velocity missile or sharp fragile object. The most common error in the management of soft tissue foreign bodies is failure to detect their presence.
- X-ray the wound to document the presence and location of the suspected foreign body. Explain how difficult it often is to remove a small metal fleck, and that often these are left in without any problem (like shrapnel injuries).
- Inform the patient that, since it is best to remove the foreign body, you will attempt a simple technique, but that in order to avoid more damage, you will not extend your search beyond 15-30 minutes.
- If the foreign body is in an extremity, then it is preferable, and sometimes essential, to establish a bloodless field.
- Anesthetize the area with a small infiltration of 1% Xylocaine with epinephrine (avoid tissue swelling, and do not use epinephrine on digits).
- Take a blunt stiff metal probe (not a needle) and gently slide it down the apparent track of the puncture wound. Move the probe back and forth, fanning it in all directions, until a clicking contact between the probe and the foreign body can be felt and heard. This should be repeated several times until it is certain that contact is being made with the foreign body.
- After contact is made, fix the probe in place by resting the hand holding the probe against a firm surface and then, with your other hand, cut down along the probe with a #15 scalpel blade until you reach the foreign body. Do not remove the probe.
- Reach into the incision with a pair of forceps and remove the foreign body (located at the end of the probe).
- Close the wound with strip closures or sutures.
- If the track is relatively long and the foreign body is very superficial and easily palpable beneath the skin, then it may be advantageous to eliminate the probe and just cut down directly over the foreign body.
- Provide tetanus prophylaxis.
- Warn the patient about signs of developing infection.
- If you are unable to locate the foreign body in 15-30 minutes, inform the patient that in the case of a small metal fleck, the wound will probably heal without any problem. It
may migrate to the skin surface over a period of months or years, at which time it can be more easily removed. Should the wound become infected, it can be successfully treated with an antibiotic, and the foreign body can be more easily removed if a small abscess forms. Patients with glass, sea shell fragments, gravel or other potentially harmful objects imbedded subcutaneously should have them removed as soon as possible, and will require surgical consultation or referral.

- Always provide the patient with a physician who can perform the necessary followup care.
- Schedule a wound check within 48 hours or warn the patient about signs of infection.

**What not to do:**

- Do not cut down on the metal probe if there is any possibility of cutting across a neurovascular bundle, tendon or other important structure.
- Do not attempt to cut down to the foreign body, unless it is very superficial, without a probe in place and in contact with the foreign body.

**Discussion**

Moderate-velocity, metallic foreign bodies rarely travel deeply into the subcutaneous tissue, but you must consider a potentially serious injury when these objects strike the eye. A specialize orbital CT scan should be obtained in these cases. With simple penetration, x rays are needed to document the presence of a foreign body and its location relative to significant anatomic structures. X rays are usually of little value, though, in accurately locating metallic flecks. Even when skin markers are used, because of variances in the angle of the x ray beam to the film, relative to the skin marker and foreign body, the apparent location of the foreign body is often significantly different from the real location. An incision made over the apparent location, therefore, usually produces no foreign body. Needle localization under fluoroscopy may be required for those objects that must be removed and the simple probe technique described above fails to deliver the foreign body. If you are attempting to remove a metallic object and you have a strong eye magnet available, it can be substituted for the probe described above. First, enlarge the entrance wound and then, after contact with the magnet, the object can be dissected out or even pulled out with the magnet. Almost all glass is visible on plain x rays, but small fragments, between 0.5 and 2.0mm, may not be visible, even when left and right oblique projections are added to the standard posterior-anterior and lateral views. Any patient who complains of a foreign body sensation should be assumed to have one even in the face of negative x rays.

**References:**

11.09 Tick Removal

Presentation

The patient arrives with a tick attached to the skin, often the scalp, often frightened or disgusted and concerned about developing Lyme Disease, Rocky Mountain Spotted Fever or "tick fever."

What to do:

- Promptly remove the tick. Grasp the tick with a pair of forceps and slowly pull up until the tick mouth parts separate from the skin.
- If the mouth parts remain embedded, anesthetize the area with an infiltration of 1% Xylocaine and use a # 10 scalpel blade to scrape (dermabrade) these fragments away.
- Instruct the patient or family to record the patient's temperature daily for the next two weeks and to notify a physician or return to the ED at the first sign of a temperature above the baseline.
- If this was a 5mm Ixodes or deer tick, which was attached for more than a few hours, consider prescribing antibiotics to prevent Lyme disease (doxycycline 100mg bid x 10d, amoxicillin 500mg tid x 10d). Instruct the family to watch for a pink patch at the site, which could be the beginning of erythema chronic migrans.
- If this was a 1 cm Dermacentor or Amblyomma tick, reassure the patient and family that the likelihood of developing Rocky Mountain spotted fever is very small (1%) and that if it should occur, prompt treatment will be quite effective upon development of fever. It is counterproductive to give prophylactic antibiotics in an attempt to prevent RMSF.

What not to do:

- Do not use heat, occlusion, or caustics to remove a tick. A multitude of techniques have been promoted, but they may only increase the chance of infection
- Do not contaminate your fingers with potentially infected tick products.
- Do not mutilate the skin attempting to remove the tick's "head." Usually what you see left behind is cementum secreted by the tick, easily scraped off.

Discussion

Ixodes dammini, the tiny deer tick of New England, carries babesiosis and Lyme disease. Dermacentor variabilis, the dog tick, is the major vector of Rocky Mountain spotted fever, which is also carried by D. andersoni, the western wood tick, and Amblyomma americanum, the lone star tick. A. americanum has particularly long mouth parts, and its larvae are also capable of infesting human hosts. Other diseases carried
by ticks include tick paralysis (usually cured by removing the tick), Colorado tick fever, relapsing fever, Q fever, Erlichosis and tularemia.

**References:**

11.10 Cutaneous Abscess or Pustule

Presentation

With or without a history of minor trauma (such as an embedded foreign body) the patient has localized pain, swelling and redness of the skin. The area is warm, firm, and, usually fluctuant to palpation. There is sometimes surrounding cellulitis or lymphangitis and, in the more serious case, fever. There may be an spot where the abscess is close to the skin, the skin is thinned, and pus may break through to drain spontaneously ("pointing"). A pustule will appear only as a cloudy tender vesicle surrounded by some redness and induration, and occasionally will be the source of an ascending lymphangitis.

What to do:

- A pustule may not require any anesthesia for drainage. Simply snip open the cutaneous roof with fine scissors or an inverted #11 blade, grasp an edge with pickups and excise the entire overlying surface. Cleanse the open surface with normal saline and cover it with povidone-iodine ointment and a dressing.
- When the location of an abscess cavity is uncertain, attempt to aspirate it with a #18 gauge needle after prepping the area with povidone-iodine. If an abscess cavity cannot be located, send the patient out on antibiotics and intermittent warm moist compresses and have him seen again in 24 hours.
- When the abscess is pointing or has been located by needle aspiration, prepare the overlying skin for incision and drainage with povidone-iodine solution. Anesthetize the area with regional field block, accomplished by injecting a ring of subcutaneous 1% lidocaine solution approximately 1 cm away from the erythematous border of the abscess. In addition, inject lidocaine into the roof of the abscess along the line of the projected incision.
- The incision should be made with a #11 or #15 blade at the most dependent area of fluctuance. It should be large and directed along the relaxed skin tension lines to reduce future scarring
- In larger abscesses insert a hemostat into the cavity to break up any loculated collections of pus. The cavity may then be irrigated with normal saline and loosely packed with Iodoform or plain gauze. Leave a small wick of this gauze protruding through the incision to allow for continued drainage and easy removal after 48 hours.
- The patient should be instructed to use intermittent warm water soaks or compresses for a few days when there is no packing used or after packing is removed.
- A dressing should be provided to collect continued drainage.

What not to do:

- Do not incise an abscess that lies in close proximity to a major vessel, such as in the axilla, groin or antecubital space, without first confirming its location and nature by needle aspiration.
- Do not treat deep infections of the hands as simple cutaneous abscesses. When
significant pain and swelling exists, or there is pain or range of motion of a finger, seek surgical consultation

**Discussion**

Either trauma or obstruction of glands in the skin can lead to cutaneous abscesses. Incision and drainage is the definitive therapy for these lesions and, therefore, routine cultures and antibiotics are generally not indicated. Exceptions exist in the immunologically suppressed patient, the toxic, febrile patient, or where there is a large area of cellulitis or lymphangitis, in which cases an antibiotic can be selected on the basis of a Gram stain or presumptively based on body location.

It is sometimes not possible to achieve total regional anesthesia for incision and drainage of an abscess, perhaps because local tissue acidosis neutralizes local anesthetics. In such cases, additional analgesia may be obtained by premedication with narcotics or brief inhalation of nitrous oxide.

**References:**

11.11 Erysipelas Cellulitis Lymphangitis

Presentation

The cardinal signs of infection (pain, redness, warmth, and swelling) are present. Erysipelas is very superficial and bright red with indurated, sharply demarcated borders. Cellulitis is deeper, involves the subcutaneous connective tissue, and has an indistinct advancing border. Lymphangitis has minimal induration and an unmistakable linear pattern ascending along lymphatic channels. These superficial skin infections are often preceded by minor trauma or the presence of a foreign body, and are most common in patients who have predisposing factors such as diabetes, arterial or venous insufficiency, and lymphatic drainage obstruction. They may be associated with an abscess or they may have no clear-cut origin. With any of these skin infections the patient may have tender lymphadenopathy proximal to the site of infection and may or may not have signs of systemic toxicity (fever, rigors, and listlessness).

What to do:

- Look for a possible source of infection and remove it. Debride and cleanse any wound, remove any foreign body or drain any abscess.
- When the patient is very sick, or there is discoloration of the entire limb, get medical consultation and prepare for hospitalization. Obtain a CBC and blood cultures and get x rays to look for gas-forming organisms. Hospitalization should also be strongly considered when deep facial cellulitis is present or the patient has a deep infection of the hand.
- If there is low-grade fever, or none at all, you can usually treat on an outpatient basis. Prescribe dicloxacillin 500mg qid x 10d, cephalaxin 500mg tid x 10d or cefadroxil qd x 10d. Instruct the patient to keep the infected part at rest and elevated and to use intermittent warm moist compresses.
- Followup within 24-48 hours to insure that the therapy has been adequate. Infections still worsening after 48 hours of outpatient treatment may require hospital admission for better immobilization, elevation, and intravenous antibiotics.

Discussion

The most common etiologic agents are beta hemolytic streptococci or Staphylococcus aureus. Erysipelas and lymphangitis are often a result of Group A strep alone although S. aureus may produce a similar picture. H. influenzae should be considered in the toxic child with facial cellulitis. It may be easier to evaluate on followup whether a cellulitis is improving or not if the initial margin of redness, swelling, tenderness, or warmth was marked on the skin with a ball point pen. Because response to treatment is often equivocal at 24 hours, reevaluation is usually best scheduled at 48 hours.
11.12 Pyogenic Granuloma (Proud Flesh)

Presentation

Often there is a history of a laceration several days to a few weeks before presentation in the ED. The wound has not healed and now bleeds with every slight trauma. Objective findings usually include a crusted, sometimes purulent collection of friable granulation tissue arising from a moist, sometimes hemorrhagic wound. There are usually no signs of a deep tissue infection.

What to do:

- Cleanse the area with hydrogen peroxide and povidone-iodine solution.
- Cauterize the granulation tissue with a silver nitrate stick until it is completely discolored.
- Dress the wound after applying povidone-iodine ointment and have the patient repeat ointment and dressings 2-3 times per day until healed.
- Warn the patient about the potential signs of developing infection.

What not to do:

- Do not cauterize any lesion that by history and appearance might be neoplastic in nature. These lesions should be referred for complete excision and pathologic examination.
- Do not cauterize a large or extensive lesion. These should also be completely excised.

Discussion

It is not uncommon for a secondary cellulitis to develop after cauterizing the granuloma. It is therefore reasonable to place a patient on a short course (3-4 days) of a high dose antibiotic (dicloxicillin or cephalaxin 500mg tid or cefadroxil 1gm qd) when the wound is located on a distal extremity.
11.13 Zipper Caught on Penis or Chin

Presentation

Usually a child has gotten dressed too quickly and not wearing underpants, accidentally pulled up penile skin into his zipper. The skin becomes entrapped and crushed between the teeth and the slide of the zipper, thereby painfully attaching the article of clothing to the body part involved (most often the penis or less often the area beneath the chin).

What to do:

- Paint the area with a small amount of povidone-iodine and infiltrate the skin with 1% lidocaine (plain). This will allow the comfortable manipulation of the zipper and the article of clothing.
- Cover the area with mineral oil. This lubricates the moving parts and often frees the skin without having to cut the zipper.
- If the mineral oil alone does not work, then cut the zipper away from the article of clothing to leave yourself with a less cumbersome problem.

Picture

- Cut the slide of the zipper in half with a pair of metal snips or an orthopedic pin cutter. The patient is less likely to be frightened if this procedure is kept hidden from his view. If you are unable to break the two halves of the zipper slide apart using a metal cutter, then take two heavy duty surgical towel clamps and place their tongs into the side grooves at both ends of the slide. then grip one clamp firmly in each hand and then twist your wrists in opposite directions. This often will pop the two halves of the zipper slide apart, releasing the entrapped skin.
- Pull the exposed zipper teeth apart, cleanse the crushed skin, and apply an ointment such as povidone-iodine.
- Tetanus prophylaxis should be administered as needed.

What not to do:

- Do not cut clothing if mineral oil releases the zipper.
- Do not destroy the entire article of clothing by cutting into it. You only need to cut the zipper away allowing repair of the clothing.
- Do not excise an area of skin or perform a circumcision; it only creates unnecessary morbidity for the patient.

Discussion

Newer plastic zippers have made this problem less common than in the past, but it still occurs, and it is a very grateful patient who is released from this entrapment.
References:

11.14 Contusions (Bruises)

Presentation

The patient has fallen, has been thrown against an object or has been struck at a site where now there is point tenderness, swelling, ecchymosis, hematoma, or pain with use. On physical examination, there is no loss of function of muscles and tendons (beyond mild splinting because of pain), no instability of bones and ligaments, and no crepitus or tenderness produced by remote stress (such as weight-bearing on the leg or manual flexing of a rib).

What to do:

- Take a thorough history to ascertain the mechanism of injury and perform a complete examination to document structural integrity and intact function.
- Reserve x rays for possible foreign bodies and bony injury. Fractures are uncommon after a direct blow, but are suggested by pain with remote percussion or stressing of bone or an underlying deformity or crepitus. The yield is very low when x rays are ordered on the basis of pain and swelling alone.
- Explain to the patient that swelling will peak in 1 day, then resolve gradually, and that swelling, stiffness and pain may be reduced by good treatment during the first 1-2 days.
- Prescribe:
  - resting the affected part,
  - immobilization (the ultimate in rest, best achieved with a splint),
  - elevation of the affected part (ideally, above the level of the heart), and
  - cold (usually an ice bag, wrapped in a towel, applied to the injury for 10-20 minutes per hour for the first 24 hours).
- Explain to the patient the late migration and color change of ecchymoses, so that green or purple discoloration appearing farther down the limb a week after the injury does not frighten him into thinking he has another injury.
- Large intramuscular hematomas (especially of the anterior thigh) may require drainage or orthopedic consultation.
- Arrange for re-evaluation and followup if there is any continued or increasing discomfort.

What not to do:

- Do not apply an elastic bandage to the middle of a limb, where it may act as a tourniquet. Include all of the distal limb in the wrapping if a compression dressing is necessary.
- Do not confuse patients with instructions for application of heat and exercises to prevent stiffness and atrophy. Concentrate on the here-and-now therapy of the acute
injury; namely, rest, immobilization, elevation, and cold: all designed to decrease acute edema. Leave other instructions to followup and . physical therapy consultants. Patients who confuse today's correct therapy with next week's can complicate their problem.

- Do not take for granted that all of your patients understand rest, immobilization, elevation, and cold. Walking on a fresh foot injury or soaking it for long periods in ice water or Epsom salts are not usually therapeutic.

Discussion

The acute therapy of contusions concentrates upon reduction of the acute edema, and all other components of treatment are postponed for 3-4 days, until the inflammation and edema are reduced. Patients need to know this time course, and must understand that the more the swelling can be reduced, the sooner injuries can heal, function return and pain decrease. Edema of hands and feet is especially slow to resolve, because these structures usually hang in a dependent position, and require much modification of activity to rest.
11.15 Urticaria (Hives)

Presentation

The patient is generally very uncomfortable, with intense itching. There may be a history of similar episodes and perhaps a known precipitating agent (bee sting, food, or drug). Most commonly the patient will only have a rash. Sometimes this is accompanied by edematous swelling of the lips, face and/or hands (angioedema). In the more severe cases, patients may have wheezing, laryngeal edema and/or frank cardiovascular collapse (anaphylaxis). The urticarial rash consists of sharply defined, slightly raised wheals surrounded by erythema and tending to be circular or serpiginous. Each eruption is transient, lasting no more than 8-12 hours, but it may be replaced by new lesions in different locations.

What to do:

- Attempt to elicit a precipitating cause, including drugs, foods, stress, or an underlying infection or illness, (e.g., collagen vascular disease, malignancy, or, when accompanied by arthralgias, anicteric hepatitis).
- For immediate relief of severe pruritis, you can try 0.3cc of epinephrine (1:1000) subcutaneously, but this wears off quickly, and adds a number of side effects the patient may find worse than the itching: tachycardia, shaking, dry mouth, wet palms, hypertension, and even angina and myocardial infarction.
- For continued relief administer diphenhydramine (Benadryl) or hydroxyzine (Vistaril) 50mg po.
- For prolonged relief from itching prescribe diphenhydramine (Benadryl), hydroxyzine (Atarax) 25-50mg, cyproheptadine hydrochloride (Periactin) 4mg qid or terfenadine (Seldane) 60mg bid for the next 48 hours.
- To reduce the rash, prescribe cimetidine (Tagamet) 300mg q6h. Other H2 blockers, such as ranitidine (Zantac) and nizatidine (Axid) also appear to work in similar doses.
- To blunt the entire allergic process, give prednisone 60mg po now and prescribe 20mg qd for 2 days.
- Inform the patient that the cause of hives cannot be determined in the vast majority of cases. Let him know that the condition is usually of minor consequence but can at times become chronic, and, under unusual circumstances, is associated with other illnesses. Therefore, the patient should be provided with elective followup care.

What not to do:

- Do not have the patient take aspirin. Some patients experience a worsening of their symptoms with the use of aspirin. Morphine, codeine, reserpine, and alcohol, as well as certain food additives such as tartrazine dye, are often allergens or potentiate allergic reactions, and benzoates should probably also be avoided.
Discussion

Although the treatment of anaphylactic shock is beyond the scope of this book, when hypotension is present, aggressive intravenous fluid therapy should be instituted, along with the intravenous administration of the medications above. Simple urticaria affects approximately 20% of the population at some time. This local reaction is due at least in part to the release of histamines and other vasoactive peptides from mast cells following an IgE mediated antigen-antibody reaction. This results in vasodilatation and increased vascular permeability, with the leaking of protein and fluid into extravascular spaces. The heavier concentration of mast cells within the lips, face, and hands explains why these areas are more commonly affected. In asthma, the bronchial tree is more affected, whereas with eczema, the skin in knee and elbow creases is most heavily invested with mast cells and the first to develop hives.

References:

11.16 Pityriasis Rosea

Presentation

Patients with this benign disorder often seek acute medical help because of the worrisome sudden spread of a rash that began with one local skin lesion. This "herald patch" may develop anywhere on the body and appears as a round 2-6 cm mildly erythematous scaling plaque. There is no change for a period of several days to two weeks; then the rash appears, composed of small (1-2cm), pale, salmon-colored, oval macules or plaques with a coarse surface surrounded by a rim of fine scales. The distribution is truncal with the long axis of the oval lesions running in the planes of cleavage of the skin (parallel to the ribs). The condition may be asymptomatic or accompanied by varying degrees of pruritis and, occasionally mild malaise. The lesions will gradually extend in size and may become confluent with one another. The rash persists for 6-8 week then completely disappears. Recurrences are uncommon.

What to do:

- Reassure the patient about the benign nature of this disease. Be sympathetic and let him know that you understand how frightening it can seem.
- Draw blood for serologic testing for syphilis (e.g., VDRL). Secondary syphilis can mimic pityriasis rosea. Make a note to track down the results of the test.
- Provide relief from pruritis by prescribing hydroxyzine (Atarax) 50mg q6h or an emollient such as Lubriderm. Tepid corn starch baths (1 cup in 1/2 tub of water) may also be comforting.
- Inform the patient that he should anticipate a 6-8 week course of the disease, but to seek followup care if the rash does not resolve within 12 weeks.

What not to do:

- Do not use topical or systemic steroids. These are only effective in the most severe inflammatory varieties of this syndrome.
- Do not send off a serologic test for syphilis without assuring the results will be seen and acted upon.

Discussion

Pityriasis rosea is seen most commonly in adolescents and young adults during the spring and fall seasons. It is probably a viral syndrome. The "herald patch" may not be seen in 20-30% of the cases and there are many variations from the classic presentation described. Other diagnostic considerations besides syphilis include tinea corporis, seborrheic dermatitis, acute psoriasis, and tinea versicolor.
11.17 Tinea (Athlete's Foot, ringworm)

Presentation

Patients usually seek emergency care for "athlete's foot," "jock itch," or "ringworm" when pruritis is severe or when secondary infection causes pain and swelling. Tinea pedis is usually seen as interdigital scaling, maceration, and fissuring between toes. At times tense vesicular lesions will be present instead. Tinea cruris is usually a moist, mildly erythematous eruption symmetrically affecting both groin and upper inner thigh. Tinea corporis appears most often on the hairless skin of children as dry erythematous lesions with sharp annular and arciform borders that are scaling or vesicular.

What to do:

- When microscopic examination of skin scrapings in KOH is readily available, definite identification of the lesion can be made by looking for the presence of hyphae or spores (resembling microscopic spaghetti and meatballs) in the scabs or hair. Treatment can be started presumptively when microscopic examination is not easily accomplished.
- Clotrimazole (Lotrimin), miconazole (Micatin) haloprogin (Halotex) and tolnaftate (Tinactin) solution or cream applied to the rash bid will cause involution of most superficial lesions within 1-2 weeks.
- With signs of secondary infection, begin treatment first with wet compresses of Burow's solution (2 pkgs of Domeboro powder in 1 pint water) one half hour every 34 hours. With signs of deep infection (cellulitis, lymphangitis) begin systemic antibiotics in addition, like cefadroxil (Duricef) 1gm qd x 5-7 days or cephalexin or dicloxacillin 250-500mg tid x 5-7 days.
- With inflammation and weeping lesions, a topical antifungal and steroid cream such as (Vioform- Hydrocortisone) in addition to the compresses will be most effective. Warn patients that this medication will stain white clothing yellow.

What not to do:

- Do not attempt to treat deep, painful fungal infections of the scalp (tinea capitis) with local therapy. A deep boggy swelling (tinea kerion) or patchy hair loss with inflammation and scaling requires systemic antifungal antibiotics like griseofulvin.
- Do not treat with corticosteroids alone. They will reduce signs and symptoms, but allow increased fungal growth.

Discussion

Tinea versicolor is asymptomatic, and its presentation to an acute care facility usually is incidental with some other problem. There is, however, no reason to ignore this fungal infection, which causes cosmetically unpleasant, irregular patches of varying pigmentation that tend to be lighter than the surrounding skin in the summer and darker
than the surrounding skin in the winter. Prescribe a 25% sodium hyposulfite lotion (Tinver) bid for several weeks or a 2.5% selenium sulfide lotion (Selsun). Superficial scaling will resolve in a few days and the pigmentary changes will slowly clear over a period of several months.
11.18 Herpes Zoster (Shingles)

**Presentation:** Patients complain of pain, paresthesia, or an itch that covers a specific dermatome and then develops into a characteristic rash. Prior to the onset of the rash, zoster can be confused with pleuritic or cardiac pain, cholecystitis, or ureteral colic. Approximately 3-5 days from the onset of symptoms, an eruption of erythematous macules and papules will appear, first posteriorly then spreading anteriorly along the course of the involved nerve segment. In most instances grouped vesicles will appear within the next 24 hours. Herpes zoster most often occurs in the thoracic and cervical segments.

**What to do:**

- Prescribe acyclovir (Zovirax) 800mg q4h (five times a day, skip a dose at night) or famciclovir (Famvir) 500mg tid x7d.
- Prescribe analgesics appropriate for the level of pain the patient is experiencing. Anti-inflammatory medications may help, but narcotics are often required (e.g., Percocet q4h).
- Cool compresses with Burow's solution will be comforting (e.g. Domeboro powder, 2 pkts in 1 pint of water).
- Dressing the lesions with gauze and splinting them with an elastic wrap may also help bring relief.
- Secondary infection should be treated with povidone-iodine (Betadine) ointment or systemic antibiotics.
- Ocular lesions should be evaluated by an ophthalmologist and treated with topical ophthalmic corticosteroids. Although topical steroids are contraindicated in herpes simplex keratitis, because they allow deeper corneal injury, this does not appear to be a problem with herpes zoster ophthalmicus. If the rash extends to the tip of the nose, the eye will probably be involved, because it is served by the same ophthalmic branch of the trigeminal nerve.

**What not to do:**

- Do not prescribe systemic steroids to prevent post herpetic neuralgia, especially for patients at high risk, i.e., with latent tuberculosis, peptic ulcer, diabetes mellitus, hypertension, and congestive heart failure.

**Discussion**

Zoster results from reactivation of latent herpes varicella/zoster (chickenpox) virus residing in dorsal root or cranial nerve ganglion cells. Two-thirds of the patients are over 40 years old. This is a self-limiting, localized disease and usually heals within 3-4 weeks. Postherpetic neuralgia in patients over 60 years old, however, can be an extremely painful, recurrent misery. Before the availability of anti-viral agents, the best prophylaxis was systemic corticosteroids, but these have not been shown to improve outcome when added to a week of anti-viral treatment.
References:

11.19 Pediculosis (Lice, crabs)

Presentation

Patients arrive with emotions ranging from annoyance to sheer disgust at the discovery of an infestation with lice or crabs and request acute medical care. There may be extreme pruritis and the patient may bring in a sample of the creature to show you. The adult forms of head lice (pediculosis) can be very difficult to find but their oval, light gray eggs (nits) can be readily found firmly attached to the hairs above the ears and toward the occiput. Secondary impetigo and furunculosis can occur. The adult forms of pubic lice (pthirus or crab lice) are more easily found, but their light yellow gray color still makes them difficult to see. Small black dots present in infested areas represent either ingested blood in adult lice or their excreta.

What to do:

- Instruct the patient and other close contacts on the use of pyrethrins with piperonyl butoxide (RID), an over-the-counter louse remedy which should be applied undiluted to the hair until the affected area is entirely wet. After 10 minutes the infested area should be shampooed and thoroughly rinsed with warm water. This treatment may be repeated if necessary, but it should not be used more than twice within a 24 hr period and it is advisable to wait a week before repeating treatment should reinfection occur.
- Alternatively, try one application of permethrin 1% cream rinse.
- Families should also be instructed to disinfect sheets and clothing by machine washing in hot water, machine drying on the hot cycle for 20 minutes, ironing, dry cleaning, or storage in plastic bags for two weeks. Combs and brushes should be soaked in 2% Lysol or heated in water to about 65 degrees C for 10 minutes.
- Application of a 1:1 solution of white vinegar and water may help to loosen nits prior to removal with a fine-toothed comb.

What not to do:

- Do not have the family use commercial sprays (R&C Spray or Li-Ban Spray) to control lice on inanimate objects. Their use is no more effective than vacuuming.
- Do not let patients use lindane (Kwell) shampoo on mucous membranes, around the eyes, on acutely inflamed areas, and do not prescribe it for pregnant women and infants. It is absorbed and can be toxic to the central nervous system.

Discussion

Head and pubic lice are obligatory bloodsucking ectoparasites whose eggs are firmly attached to the hair shafts near the skin, and incubate for about a week before hatching. Nits located more than one-half inch from the scalp are no longer viable.
A common alternate treatment for lice is lindane shampoo which is only available by prescription. One ounce is worked into the affected area for four minutes and then thoroughly rinsed out. Because of the very toxic nature of lindane, its use should be reserved for those cases that fail to respond to pyrethrins (RID). Treatment with either substance may not be ovicidal and therefore re-treatment after 7 to 10 days is often recommended.
11.20 Scabies

Presentation

Patients may rush to the emergency department shortly after having gone to bed, unable to sleep because of severe itching. Papules and vesicles (marking deposition of eggs) along thread-like tracks (mite burrows) are chiefly found in the interdigital web spaces as well as on the volar aspects of the wrists, antecubital fossa, olecranon area, nipples, umbilicus, lower abdomen, genitalia and gluteal cleft. Secondary bacterial infection is often present.

What to do:

- Attempt identification of the mite by placing mineral oil over the papule or vesicle at the proximal end of a track and scraping it with a # 15 scalpel blade onto a microscope slide. Examine it under low magnification for either the mite or its oval eggs or fecal concretions.
- If the clinical picture is convincing, treatment should be instituted without the help of microscopic examination, or even in the face of negative scrapings.
- Treat with lindane (Kwell) lotion to the entire body from the neck down. Concentrate on the affected areas. The patient should apply this prescription medication and leave it on for 24 hours before washing it off (60-120ml is required for the average adult). It may be necessary to repeat this treatment after 1 week, but not sooner. Tell the patient that the itching will not go away at once, but that this does not mean the Kwell was ineffective. Dead mites and eggs continue to itch as they are absorbed by the body. An antipruritic agent such as hydroxyzine (Atarax) 25mg q6h can be prescribed for comfort.
- Alternatively, treat with a similar application of crotamiton (Eurax) lotion or cream to the body after bathing, repeated after 24 hours. This treatment can also reduce itching.
- Clothing, bedding, and towels should be washed with hot water or dry cleaned to prevent reinfection.

What not to do:

- Do not use Kwell on infants, young children, or pregnant women. Up to 10% of this pesticide may be absorbed percutaneously, producing seizures or CNS toxicity, and therefore an alternative treatment should be sought. Crotamiton (Eurax) cream applied twice during a 48 hr period will be effective and also acts as an antipruritic agent.

Discussion

Scabies is caused by infestation with the mite Sarcoptes scabiei. The female mite, which is just visible to the human eye, excavates a burrow in the stratum corneum and
travels about 2mm a day for about 1-2 months before dying. During this time she lays eggs which reach maturity in about 3 weeks. Scabies is transmitted principally through close personal contact, but may be transmitted through clothing, linens, or towels. Severe pruritis is probably caused by an acquired sensitivity to the organism and is first noted 2-4 weeks after primary infestation. Sometimes nonspecific, pruritic, generalized maculopapular excoriated rash, turns out, after a therapeutic trial of Kwell, to have been an atypical case of scabies.
11.21 Impetigo

Presentation

- Parents will usually bring their children in because they are developing unsightly skin lesions, which may be pruritic and are found most often on the face or other exposed areas. Streptococcal lesions consist of irregular or somewhat circular, red, oozing erosions, often covered with a yellow-brown crust. These may be surrounded by smaller erythematous macular or vesiculopustular areas. Staphylococcal lesions present as bullae which are quickly replaced by a thin shiny crust over an erythematous base.

What to do:

-Prescribe mupiricin 2% ointment (Bactroban) to the rash tid for 3-5 days. Have parents soften and cleanse crusts with warm soapy compresses before applying the antibiotic ointment.
-For severe or resistant cases, add a 10 day course of erythromycin or penicillin VK (250mg qid), or one intramuscular injection of benzathine penicillin (600,000 units im for children 6 years and younger, 1.2 million units im for children over 7 years.) For suspected staphylococcal infections use dicloxacillin (250mg qid) in place of penicillin (or prescribe erythromycin or cefadroxil).

What not to do:

-Do not routinely culture these lesions. This is only indicated for unusual lesions or lesions that fail to respond to routine therapy.

Discussion

Impetigo is usually self-limiting and it is believed that antibiotic treatment does not alter the subsequent incidence of secondary glomerulonephritis. Impetigo is very contagious among infants and young children and may be associated with poor hygiene or predisposing skin eruptions such as chicken pox, scabies, and atopic and contact dermatitis.
11.22 Diaper Rash

Presentation

An infant has worn a wet diaper too long, and has developed an uncomfortable rash, which may range from simple redness to macerated and superinfected skin. Hallmarks of Candida (monilia) infection are often present, including intensely red, raw areas, satellite lesions, and white exudate.

What to do:

• Instruct the parents that it is imperative that the child go "bare" and wear no diaper until the rash has healed. This may increase the laundry load, but it allows the skin to dry, avoid physical trauma, and restore its natural defenses. This is usually all that is necessary to clear up a diaper rash in 2-3 days, but . . .
• To speed recovery from the frequent superinfection of Candida (present in the feces) and less-frequent superinfection with other dermatophytes, you may add topical treatment with clotrimazole (Lotrimin) or nystatin (mycostatin) cream, applied 3 or 4 times daily until the rash has been healed for 2 days.
• Make sure the family has a pediatrician for further followup.

What not to do:

• Do not let the parents be distracted by drying or emolient medications. Going bare is the basis of treatment.
• Do not recommend talcum powder or "talcum free" powders for use when diapers are changed. They add little in terms of medication or absorbency, and are occasionally aspirated by infants as their diapers are being changed.

Discussion

Superinfection with Candida is common enough to treat presumptively in every case of diaper rash severe enough to be brought to the ED.
4.01 Temporomandibular Joint (TMJ) Pain-Dysfunction Syndrome

Presentation

Patients usually complain of poorly-localized facial pain or headache that does not appear to conform to a strict anatomical distribution. The pain is generally dull and unilateral, centered in the temple, above and behind the eye, in and around the ear. The pain may be associated with instability of the temporomandibular joint (TMJ), crepitus, or clicking with movement of the jaw. It is often described as an earache. Other less obvious symptoms include radiation of pain down the carotid sheath, tinnitus, dizziness, decreased hearing, itching, sinus symptoms, a foreign body sensation in the external ear canal, trigeminal, occipital and glossopharyngeal neuralgias. Patients may have been previously diagnosed as suffering from migraine headaches, sinusitis or recurrent external otitis. Predisposing factors include malocclusion, recent extensive dental work, or a habit of grinding the teeth (bruxism), all of which put unusual stress upon the TM joint. Clinical signs include tenderness of the chewing muscles, the ear canal or the joint itself, restricted opening of the jaw or lateral deviation on opening, and a normal neurological examination.

What to do:

Examine the head thoroughly for other causes of the pain, including visual acuity, cranial nerves, and palpation of the scalp muscles and the temporal arteries. Pain and popping on moving the TMJ is a useful but not infallible sign. Look for signs of bruxism, such as ground-down teeth. If there is a headache, perform a complete neurologic examination, including fundoscopy. If the temporal artery is tender, swollen or inflamed, send blood for an erythrocyte sedimentation rate. If pain is severe, you may try injecting the TMJ, just anterior to the tragus, with 1 ml of plain lidocaine or bupivicaine, along with 10mg of DepoMedrol. If this helps, you may have made the diagnosis, and possibly provided long-term relief. Explain to the patient the pathophysiology of the syndrome: how many different symptoms may be produced by inflammation at one joint, how TMJ pain is not necessarily related to arthritis at other joints, and how common it is (some estimates are as high as 20% of the population). Prescribe anti-inflammatory analgesics (e.g., aspirin, ibuprofen, naproxen), a soft diet, heat, and muscle relaxants (e.g., diazepam) if necessary for muscle spasm. Refer the patient for followup to a dentist or otolaryngologist who has some interest in and experience with TMJ problems.

Long-term treatments include orthodontic correction, physical therapy and sometimes psychotherapy and antidepressants.

What not to do:

Do not rule out TMJ arthritis simply because the joint is not tender on your examination. This syndrome typically fluctuates, and the diagnosis often is made on history alone. Do not omit the TMJ in your workup of any headache. Do not give narcotics unless there is going to be early follow up.
Discussion

The relative etiologic roles of inadequate dentition, unsatisfactory occlusion, dysfunction of the masticatory muscles and emotional disorders remain controversial. To stress the role played by muscles, it has been suggested that the term "myofascial pain-dysfunction (MPD) syndrome is more accurate than "TMJ arthritis." There is also much debate as to the indications for and the efficacy of treatment modalities aimed at the presumed etiologies. At the least, irreversible treatments such as surgery should be replaced by more conservative therapy. The use of bite blocks for bruxism was based on outdated information and may only serve to alter normal dental occlusion with deleterious effects.

Perhaps everyone suffers pain in the TMJ occasionally, and only a few require treatment or modification of lifestyle to reduce symptoms. In the ED the diagnosis of TMJ pain is often suspected, but seldom made definitively. It can be gratifying, however, to see patients with a myriad of seemingly unrelated symptoms respond dramatically after only conservative measures and advice.

References:

11.18 Herpes Zoster (Shingles)

Presentation: Patients complain of pain, paresthesia, or an itch that covers a specific dermatome and then develops into a characteristic rash. Prior to the onset of the rash, zoster can be confused with pleuritic or cardiac pain, cholecystitis, or ureteral colic. Approximately 3-5 days from the onset of symptoms, an eruption of erythematous macules and papules will appear, first posteriorly then spreading anteriorly along the course of the involved nerve segment. In most instances grouped vesicles will appear within the next 24 hours. Herpes zoster most often occurs in the thoracic and cervical segments.

What to do:

Prescribe acyclovir (Zovirax) 800mg q4h (five times a day, skip a dose at night) or famciclovir (Famvir) 500mg tid x7d. Prescribe analgesics appropriate for the level of pain the patient is experiencing. Anti-inflammatory medications may help, but narcotics are often required (e.g., Percocet q4h). Cool compresses with Burow's solution will be comforting (e.g Domeboro powder, 2 pkts in 1 pint of water). Dressing the lesions with gauze and splinting them with an elastic wrap may also help bring relief. Secondary infection should be treated with povidone-iodine (Betadine) ointment or systemic antibiotics. Ocular lesions should be evaluated by an ophthalmologist and treated with topical ophthalmic corticosteroids. Although topical steroids are contraindicated in herpes simplex keratitis, because they allow deeper corneal injury, this does not appear to be a problem with herpes zoster ophthalmicus. If the rash extends to the tip of the nose, the eye will probably be involved, because it is served by the same ophthalmic branch of the trigeminal nerve.

What not to do:

Do not prescribe systemic steroids to prevent post herpetic neuralgia, especially for patients at high risk, i.e., with latent tuberculosis, peptic ulcer, diabetes mellitus, hypertension, and congestive heart failure.

Discussion

Zoster results from reactivation of latent herpes varicella/zoster (chickenpox) virus residing in dorsal root or cranial nerve ganglion cells. Two-thirds of the patients are over 40 years old. This is a self-limiting, localized disease and usually heals within 3-4 weeks. Postherpetic neuralgia in patients over 60 years old, however, can be an extremely painful, recurrent misery. Before the availability of anti-viral agents, the best prophylaxis was systemic corticosteroids, but these have not been shown to improve outcome when added to a week of anti-viral treatment.

References:
6.03 Swallowed Foreign Body

Presentation

Parents bring in a young child shortly after he has swallowed a coin, safety pin, toy, etc. The child may be asymptomatic or have recurrent or transient symptoms of vomiting, drooling, dysphagia, pain or a foreign body sensation. Disturbed adults may be brought from mental health facilities to the hospital on repeated occasions, at times accumulating a sizeable load of ingested material.

What to do:

Ask about symptoms and examine the patient, looking for signs of airway obstruction (coughing, wheezing) or bowel obstruction or perforation (vomiting, melena, abdominal pain, abnormal bowel sounds). Obtain two plain x-ray views of throat to at least the mid abdomen to determine if indeed anything was ingested or if the foreign body has become lodged someplace or produced an obstruction. A barium swallow may occasionally be necessary to locate a nonopaque foreign body in the esophagus. A foreign body with sharp edges or a blunt FB lodged in the esophagus for more than a day should be removed endoscopically, because it is likely to cause a perforation, and is still accessible. When a coin or other smooth object has been lodged in the upper esophagus for less than 24 hours, it can usually be removed using a simple Foley catheter technique. When available, it should be performed under fluoroscopy, although it can be done as a blind procedure. With the patient mildly sedated (e.g., midazolam (Versed) 0.5mg/kg per rectum, intranasally or po, with half an hour allowed for absorption) position with the head down (Trendelenberg) to minimize aspiration. Restrain uncooperative patients. Have a functioning laryngoscope, forceps and airway equipment at hand. Test the balloon of an 8 to 12 French Foley catheter to ensure that it inflates symmetrically. Lubricate the catheter with water-soluble jelly and insert it through the nose into the esophagus to a point distal to the FB. Inflate the balloon with 5ml of air and apply gentle traction on the catheter until the FB reaches the base of the tongue. While encouraging the patient to cough or spit out the FB, further traction will cause involuntary gagging and expectoration. Immediately deflate the balloon and remove the catheter. If a first attempt at removal fails, make a second and third try, then consult an endoscopist. When removal is successful, discharge the patient after a period of observation. When a FB has passed into the stomach and there are no symptoms which demand immediate removal, discharge the patient with instructions to return for reevaluation in seven days (or sooner if he develops nausea, vomiting, abdominal pain, rectal pain, or rectal bleeding). Pediatricians have a saying that objects larger than two inches will not pass the second portion of the duodenum in a child under two years old. Having parents sift through stools is often unproductive (one missed stool negates days of hard work). It may be helpful to give a bulk laxative to help decrease the intestinal transit time.

What not to do:
Do not use ipecac for FB ingestions. Emesis is effective for emptying the stomach of liquid and dissolved drugs, but not for removing FBs from the esophagus or stomach. Do not forcefully remove an esophageal FB, especially if it is causing pain. This may lead to injury or perforation. Do not automatically assume that an ingested FB should be surgically removed. The vast majority of potentially injurious FBs pass through the alimentary tract without mishap. Operate only when the patient is actually being harmed by the swallowed FB or when there is evidence that it is not moving down the alimentary tract. Do not attempt to push an foreign body blindly down the esophagus with a nasogastric tube or other such device. Use an endoscope. Do not miss additional coins after removing one from the proximal esophagus. Take a repeat x ray after removal of one.

Discussion

The narrowest and least distensible strait in the gastrointestinal tract is usually the cricopharyngeus muscle at the level of the thyroid cartilage. Next narrowest is usually the pylorus, followed by the lower esophageal sphincter and the ileocecal valve. Thus, anything which passes the throat will probably pass through the anus as well. In general, foreign bodies below the diaphragm should be left alone. A swallowed foreign body can irritate or perforate the GI tract anywhere, but does not require treatment until complications occur.

A significant portion of children with esophageal foreign bodies are asymptomatic and therefore any child suspected of ingesting a foreign body requires an x ray to document whether or not it is present and if so where it is located. Children with distal esophageal coins may be safely observed up to 24 hours before an invasive removal procedure, since most will spontaneously pass the coins. Even safety pins and razor blades usually pass without incident.

Large button batteries (the size of quarters) have become stuck in the esophagus, eroded through the esophageal wall, and produced a fatal exsanguination; but the smaller variety, and batteries which passed into the gut, have not been such a danger.

References:

- Ginaldi S: Removal of esophageal foreign bodies using a Foley catheter in adults.
OPPOSITION OF THUMB AND LITTLE FINGER PADS

MEDIAN NERVE

VOLAR CARPAL LIGAMENT

TYPICAL MEDIAN SENSORY INNERVATION

PHALEN'S TEST

FLEXING BOTH WRISTS TO 90 DEGREES TO REPRODUCE SYMPTOMS
10.20 Tetanus Prophylaxis

Presentation

The patient may have stepped on a nail, or sustained any sort of laceration, abrasion or puncture wound, when the question of tetanus prophylaxis comes up.

What to do:

If the patient has not had tetanus immunization in the past 5 years, give adult tetanus and diphtheria toxoid (Td) 0.5ml im. Give pediatric diphtheria and tetanus toxoid (DT) to children under seven years old. If there is any doubt the patient has had his original series of three tetanus immunizations, add tetanus immune globulin (e.g., Hyper-Tet) 250mg im, and make arrangements for him to complete the full series with additional immunizations at 4 to 6 weeks and 6 to 12 months. With a history of true hypersensitivity to tetanus toxoid, provide passive immunity with tetanus immune globulin. Instruct the patient that he does not have protection from tetanus from future injuries.

What not to do:

Do not assume adequate immunization. The groups most at risk in the US today are immigrants, elderly women, and rural southern blacks. Veterans usually have been immunized. Many patients incorrectly assume they were immunized during a surgical procedure. Having had the disease tetanus does not confer immunity. Do not give tetanus immunizations indiscriminately. Besides being wasteful, too-frequent immunizations are more likely to cause reactions, probably of the antigen-antibody type. (Surprisingly, the routine of administering toxoid and immune globulin simultaneously in two deltoid muscles does not seem to cause mutual inactivation or serum sickness.) Do not believe every story of allergy to tetanus toxoid (which is actually quite rare). Is the patient actually describing a local reaction, the predictable serum sickness of horse serum, or a reaction to older, less pure preparations of toxoid? The only absolute contraindication is a history of immediate hypersensitivity--urticaria, bronchospasm, or shock. Tetanus toxoid is safe for use in pregnancy. Do not give pediatric tetanus and diphtheria toxoid (TD) to an adult. TD contains 8 times as much diphtheria toxoid as Td.

Discussion:

There continue to be 50-100 cases of tetanus in the US each year. The CDC recommends everyone receive Td every 10 years, but somehow physicians and patients alike forget tetanus prophylaxis except after a wound. Because tetanus has followed negligible injuries and spontaneous infections, the concept of the "tetanus-prone wound" is not really helpful. The CDC recommends including a small dose of diphtheria toxin (Td) but, because this is more apt to cause local reactions, you may want to revert to plain tetanus toxoid (TT) in patients who have complained of such
reactions.

Diptheria-pertussis-tetanus (DPT) vaccine is given at two, four and six months, with a fourth dose at 12 to 18 months (six months after the last dose), a fifth dose at four to six years, and a sixth dose at eleven to sixteen. Thereafter, tetanus toxoid with a reduced dose of diptheria (Td) is given ever ten years, and boosters within five for "tetanus-prone" wounds.

References:

CUTICULAR LINE (FRINGE OF TORN EPONYCHIUM)

NAIL STILL ADHERING TO BED

DISLOCATED NAIL BASE

ONE TECHNIQUE OF SUTURING NAIL BASE UNDER EPONYCHIUM
10.11 Digital Block

It is necessary to provide complete anesthesia when treating most fingertip injuries. Many techniques for performing a digital nerve block have been described. The following is one that is both effective and rapid in onset. This type of digital block will only provide anesthesia distal to the distal interphalangeal joint, but this is most often the site that demands a nerve block.

**What to do:**

*Picture* Cleanse the finger and paint the area with povidone-iodine (Betadine) solution. Using a 27 gauge needle, slowly inject 1% lidocaine midway between the dorsal and palmar surfaces of the finger at the midpoint of the middle phalanx. Inject straight in along the side of the periosteum. Then pull back without removing the needle from the skin and fan the needle dorsally. Advance the needle dorsally and inject again. Pull the needle back a second time and, without removing it from the skin, fan the needle in a palmar direction. Advance the needle and inject the lidocaine in the vicinity of the digital neurovascular bundle. With each injection, instill enough lidocaine to produce visible soft tissue swelling. Repeat this procedure on the opposite side of the finger. For anesthesia of the proximal finger as well, a similar block may be performed as far proximally as the middle of the metacarpal. There, the connective tissue is looser, and the needle need not be fanned into digital septae as described above. Be prepared to wait three to ten minutes for adequate anesthesia. With painful crush injuries or when the pain will be prolonged, substitute bupivicaine for lidocaine.

**What not to do:**

Do not use lidocaine with epinephrine. The digital arteries are end arteries that can spasm and provide prolonged anesthesia, ischemia of the finger tip, and potentially, necrosis.

**Discussion**

Digital nerve blocks are often described as being injected at the base of the proximal phalynx, but it is not necessary to block the whole digit when only the distal tip is injured, and the first technique above provides anesthesia much faster. Toes are difficult to separate and it may be easier to perform a modified ring block at the base. Over the dorsum of the proximal interphalangeal joint the connective tissue is loose enough for direct injection of anesthetic, and a digital block is not required. Some studies have demonstrated digital anesthesia by injecting 2 mL of buffered lidocaine directly into the flexor tendon sheath, using a 25 or 27 gauge needle at a 45 degree angle at the distal palmar crease.
10.12 Finger Tip Dressing

To provide a complete non-adherent compression dressing for an injured finger tip, first cut out an L-shaped segment from a strip of polyurethane or oil-emulsion (Adaptic) gauze. Cover the gauze with antibiotic ointment to provide occlusion and prevent adhesion.

**What to do:**

[Picture] Place the tip of the finger over the short leg of the gauze and then fold it over the top of the finger. Take the long leg of the gauze and wrap it around the tip of the finger. For absorption and compression, fluff a cotton gauze pad and apply it over the end of the finger. Cover with roller or tube gauze and secure with adhesive tape.

**What not to do:**

Do not place tight circumferential wraps of tape around a finger, especially if you anticipate swelling. They may act as a tourniquet and lead to vascular compromise. Use caution applying tube gauze: two to four layers will suffice.
PEDICULOSIS CAPITUS
(head or body louse)

PHTHRUS PUBIS
(crab louse)

VIABLE EGG (nit) ON HAIR