

Bark for Dogmentin: Bite injuries

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Introduction: bite injuries are common encounters in the ED. In North America alone, 2-5 million animal bites occur annually, making up 1% of all ED visits. The most common cause overall of bites are due to canines (90% of cases), followed by cats, then humans, then rodents. Among animal bites, the animal is often provoked. Perhaps most shocking, ~30% of dog bites fatality victims are infants and young children.

Pathophysiology

So, what's the big deal? Well, a bite is a puncture wound that allows for deep contamination. Due to the force associated with the bite and its penetrating nature, there is injection into deep tissue spaces. Even seemingly innocuous-looking wounds are the "tip of the iceberg" so to say, and it is difficult to appreciate how deep foreign material was injected.

Feline bites have a much higher risk for puncture wounds and injecting bacteria deep into a wound. In the hand or foot this can put the patient at high risk for osteomyelitis or septic arthritis.

Organisms from animal bites: *Pasteurella* > *Staphylococcus* spp, *Streptococcus*, anaerobes, *Capnocytophaga*, *Bartonella henselae* (cats only).

Organisms from human bites: *Eikenella corrodens*, aerobic/anaerobic gram positive cocci mix

The most classic organism they are looking for on tests would be *Pasteurella* for "most common causative organism" in animal bites, and *Eikenella* in human bites.

Critically, *Capnocytophaga* is associated with bacteremia and septic shock in asplenic patients as it lacks a capsule. Look for the question stem describing an asplenic patient or someone who has sickle cell disease!

Human bites are special.... and gross.

Human bite injuries are not-so-much a true bite, but more of a fist-meets-mouth injury. Clenched fist injuries, known as "fight bites", result in a closed fist meeting teeth. Skin can be broken, resulting in the inoculation of a wound with human oral flora.

The most common locations of fight bites are the 3rd and 4th MCP or PIP joints. These are deceptive! They can appear as shallow lacerations or abrasions. They look harmless, but they are right above a joint space and all have a high risk of deep space infection.

Patients will often delay medical attention until infection starts.

Look for these injuries in prisoners, as they will often say in front of the guard standing next to them: "I punched a wall because I was angry", instead of admitting they got into a brawl.

Wound management:

- 1) General inspection: how deep it appears, signs of other puncture wounds or other injuries
Disclaimer! If there is evidence of a life-threatening injury, treat this as a penetrating trauma and follow ATLS.
- 2) Stabilization: direct pressure if actively bleeding, assess neuromuscular status
- 3) Locally anesthetize prior to looking deeper into the wound
- 4) Remove any foreign bodies
- 5) Aggressively wash out with 1% iodine mixture or soap and water. Wash the wound for several minutes!
- 6) Debride dead tissue and remove all foreign bodies (both can serve as a nidus for infection)

When is primary closure allowed?

Most cat and human bites should not be repaired, at least not in the ED. *Only* when cosmesis is paramount (i.e. the face, especially in children), one can consider repair.

Criteria for primary closure (*all* must be met): clinically uninfected, <12 hours old, not on hand or foot.

Out of the three criteria above, the latter is the most commonly forgotten.

If suturing is performed, subcutaneous and deep sutures should be avoided. Cyanoacrylate (Dermabond®) should be avoided. Keep it simple and only use nonabsorbable suture. This is also helpful because if the wound becomes infected one will need to remove these sutures without difficulty.

Absolute contraindications to primary closure: even if the above criteria are met, none of the following should be sutured. Some of this is common sense.

- Crush injuries
- Bites in immunocompromised patients.

In these situations, aggressively irrigate, appropriately dress, and leave the wound open to drain. Patients or caretakers should be monitoring the wound daily.

When to call in a surgeon for bite injuries is really the same as any other injury: any neurovascular compromise, deep wounds with suspected or clear fascia violation, complex facial lacerations, deep foreign body impaction (must be removed due to contamination), concern for necrotizing fasciitis.

Antibiotic prophylaxis:

In real life, we give antibiotics to all patients with bite injuries. On boards however, it is not always indicated, and you will absolutely be tested on this stuff!

Absolute indications:

- deep puncture wounds
- crush injury
- wounds closely overlying a joint or bone
- wounds on hands, face, genitalia, feet
- any wounds that undergo primary closure
- any patient that is immunocompromised

Outpatient prophylaxis choices: Amoxicillin/clavulanic acid (i.e. "Dogmentin" as we like to call it) is preferred. If penicillin allergic, doxycycline + clindamycin can be given instead.

Duration of therapy is variable, but 3-5 days is more perfect with scheduled wound follow up preferably in 48 hours.

Bite wound infections

Presentation of bite wound infections are fairly obvious: erythema, swelling, and intense pain.

Local cellulitis begins about >24 hours after injury and can rapidly progress.

If there is concern for infection, blood cultures and wound cultures should be performed prior to antibiotic therapy, along with the CBC, CRP, ESR, and appropriate x-rays of the affected area.

Note: wound cultures of an uninfected bite are not helpful.

Antibiotic choices for wound infection

Amoxicillin/clavulanic acid, piperacillin/tazobactam or ceftriaxone + metronidazole or clindamycin

If **severely** allergic penicillin and/or cephalosporin:

1 fluoroquinolone: Either of these:
Ciprofloxacin or levofloxacin plus metronidazole or clindamycin

Of course, everyone gets a tetanus vaccination. If the last tetanus vaccine had not been given in <5 years ago, the patient will not only need a Td shot but human tetanus immune globulin.

See our [podcast on tetanus vaccinations](#) for more details.

Rabies prophylaxis? Great question, as of writing in October 2020, we are working on a rabies podcast, so check back with us soon on that 😊.

References: got to this topic heading on our website and scroll down for a complete list of references.