

Orthopedic Pitfalls in the ED: Fight Bite

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Clenched fist injuries to the mouth ("fight bite") are notorious for being the worst human bites. These are often treated as minor injuries, without the recognition that the joint capsule, the extensor tendon, or the deep fascial spaces may have been violated and contaminated with oral bacteria. Significant morbidity can result from late presentation or inadequate initial management. The emergency physician needs to remain vigilant for complications associated with closed fist injury. This review article examines the clinical presentation, diagnostic techniques, and management options applicable to the emergency physician in the treatment of fight bite. (Am J Emerg Med 2002;20:114-117. Copyright 2002, Elsevier Science (USA). All rights reserved.)

Clenched fist injuries are notorious for being much more serious than they initially appear. Closed fist injuries result from the patient's practice of striking another individual in the mouth region with the fist. Such blunt impact on the aggressor's hand can produce both soft tissue and bony injury. Although the bony injuries are usually readily apparent on x-ray film, the presence of a fight bite injury can be much more subtle. The teeth of the victim generally produce a small (3-5mm) laceration over the dorsal metacarpophalangeal (MCP) joint that appears innocuous to the patient and unwary examiner. After contact is made, the patient is likely to extend the hand, which creates a deep inoculum of oral bacteria that enter the wound. This can involve the soft tissues, the joint space, and even the tendon sheath, extending to the wrist and dorsum of the hand.¹⁻⁴

These injuries are not uncommon in the emergency department (ED),^{5,6} and should be approached with thoroughness and great respect by the emergency physician. Potential for mismanagement of these injuries results from a number of factors. The patients who suffer these injuries are often intoxicated, making an adequate history and thorough examination difficult. They are also frequently reluctant to admit to the cause of the injury, providing misleading histories.^{1,2,7-9} Additionally, an inadequate exploration in the ED can easily miss a significant injury to the joint, the

tendon, or deep spaces. All these factors combine to make fight bite a serious potential pitfall in the ED.^{7,9,10}

EPIDEMIOLOGY

Establishing the true incidence of human bite injuries is difficult because many patients who have suffered such injuries may not seek treatment for various reasons, such as embarrassment, prompt resolution of the bite injury, or fear of legal repercussions.^{9,11,12} One study from New York City determined the incidence to be 11.8/100,000 population/year.¹¹ A number of studies have found that the incidence peaks in the ages 10 to 34 years, is a male-predominated injury (4:1), and occurs most frequently in the summer months.^{9,11,13} Fight bite injury has been reported to occur not only from fistfights, but also accidentally during sporting events, and even during rough sexual activity.^{4,9} Sixty to seventy-five percent of all bite wounds are to the hand and upper extremity.¹⁴ The overall infection rates for human bites is estimated to be about 10%.^{9,15}

PATHOPHYSIOLOGY

These fight bite wounds have the highest incidence of complications of any closed fist injury and of any type of bite wound.^{9,16} These injuries usually occur over the dorsal aspect of the third, fourth, or fifth MCP joints, an area which is susceptible to deep infection because the thin skin overlying the joint provides little protection to the underlying ligaments, synovium, and cartilage.² The classic injury pattern is tooth penetration of the dorsum of the hand over the third MCP joint, with violation of the soft tissue, the extensor tendon and its sheath, and potentially even the joint capsule into the MCP joint itself. The fist is subsequently opened, and the bacterial inoculum is dragged with the extensor tendon and soft tissue proximally into the dorsum of the hand.^{2,3,9,17}

The patient can present acutely, before clinical infection occurs, but more typically presents once a significant infectious process has begun. The infection can involve just the skin (cellulitis), the deep soft tissues, the extensor tendon and its sheath, and even the joint space itself. Joint space infections resulting from a human bite wound are particularly aggressive and rapidly destructive. The resulting destructive changes of pyogenic arthritis to the MCP joint can be devastating, as there is no good surgical option to reconstruct the MCP joint of a young person. One study docu-

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FIGURE 1. Obviously infected right hand subsequent to fight bite injury. The patient was in an altercation 6 days before presentation, and now presents with swelling, pus at the laceration site, and pain with range of motion.

mented that full rehabilitation of normal hand function after MCP joint pyogenic arthritis was possible in only 10% of patients.⁸

The reason these injuries are so prone to infection is 2-fold. First, the extensor tendon and the joint are relatively avascular structures, and as such, have very limited ability to fight infection.^{2,3,7,9} The second factor is the high concentration of pathogenic organisms in the human mouth. Human saliva contains as many as 50 species of bacteria with a microbe concentration of 1×10^8 organisms per milliliter.^{8,17,18} *Staphylococcus aureus* is the most common bacterial species isolated from human bite wounds, followed by *Streptococcus sp*, *Corynebacterium sp*, and *Eikenella corrodens*.¹⁹⁻²¹ Anaerobic bacteria are isolated in 50% to 55% of such wounds.²² In addition to bacterial infection, human bites have been documented to transmit hepatitis B and C, actinomycosis, syphilis, herpes, and tetanus.⁶ Polymicrobial infection is the rule with these injuries.^{23,24}

DIAGNOSIS

Clinical Presentation

Symptoms of human bite wounds to the MCP will vary based on factors such as time elapsed before treatment, severity of wound, and associated complications (eg, fracture). Typically, patients with fight bite are seen 5 to 7 days after the injury with an infected wound, swelling, erythema, pain, and a limited range of motion in the hand (Fig 1).^{3,17} Additionally, they may have lymphadenopathy, fever, and even signs of systemic toxicity.^{4,9} When presenting in this state, these patients do not usually represent a diagnostic

dilemma. Earlier in the course of the disease process, however, the presentation is likely to be more subtle, ranging from benign-appearing abrasions or seemingly superficial lacerations over the dorsal MCP joint, to mild erythema, and signs of simple cellulitis.^{4,9} For the emergency practitioner, the safest course is to consider all injuries dorsal to the MCP joint to be fight bite wounds until proven otherwise.^{9,16,17}

Radiographic Findings

Radiographs should be strongly considered in patients presenting with potential fight bite wounds. Bony injury to the metacarpal head is possible, as is proximal phalanx fracture. If the infection has progressed for some time without treatment, evidence of osteomyelitis may also be visualized on plain radiographs. Finally, radiographs can also be of value in fight bite to detect tooth fragments remaining in the wound or joint.^{8,9,17}

TREATMENT

Treatment for the patient with a delayed presentation and clinically obvious infection is straightforward for the emergency practitioner. Hand surgery consultation should be obtained, and the patient brought to the operating room for open irrigation and debridement, with subsequent admission for intravenous antibiotics.^{2,9,15,20} The decision regarding antibiotics before surgical debridement should be made in concert with the hand surgeon, as they may prefer to obtain intraoperative cultures before the start of antimicrobial treatment.

There is more debate regarding the treatment of noninfected closed fist injuries. Some investigators recommend

admission and debridement in the operating room for all human bite wounds to the hand, regardless of their clinical status.^{3,16} A more selective approach, however, is advocated by many other investigators.^{4,7,8,9} Such an approach is predicated on careful ED care of such wounds, and a thorough wound exploration is the cornerstone of such an approach. Adequate lighting, hemostasis, and exposure are all necessary to visualize the potentially injured structures. The hand must be examined through the entire range of motion, paying particular attention to examine in the closed fist position when the fingers are passively flexed, as extensor tendon injuries and cartilage damage may well not be evident in any other position. Patients in whom the exploration shows injury to the joint or joint capsule, tendons, or deep spaces should be consulted to a hand surgeon for consideration of admission for intravenous antibiotics and open debridement and irrigation in the operating room.^{7,9}

If careful exploration excludes tendon or joint involvement and radiographs rule out foreign bodies, conservative management is warranted. The wound should be copiously irrigated and, as with all bite or contaminated wounds to the hand, left open to heal by secondary intention. The tetanus status of all patients with bite wounds should be determined and tetanus prophylaxis given to those who are in need. For discharge, patients should be splinted in the position of function, and instructed to elevate the affected limb.

Prophylactic antibiotics for clenched fist bite wounds should be initiated in all but the most superficial wounds. Recommended regimens are numerous and include amoxicillin/clavulanic acid, a combination of penicillin and dicloxacillin, or a combination of penicillin and a first-generation cephalosporin.⁹

Outcome from these injuries is dependent on a number of factors. A retrospective study of fight bite injuries determined that the most significant risk factors for development of pyogenic complications included delayed initial treatment, inadequate initial debridement, and initial suturing of the wound.²⁵

As with so many areas of emergency medicine, the discharge instructions and follow-up procedure are nearly as important as the initial care. Patients that are managed expectantly need to be told of the significant chances of subsequent infection, despite aggressive, early intervention in the ED. Follow-up with a hand specialist must be assured within 24 to 48 hours. If this is not feasible, ED follow-up should be arranged for a wound check at 24 to 48 hours. If follow-up by the patient is not assured, strong consideration needs to be given to admitting the patient for observation and antibiotics.

SUMMARY

All human bite wounds are potentially serious injuries and at risk for significant complications. Nowhere is this truer than with fight bite injuries to the hand. The emergency physician should aggressively seek out these wounds when evaluating patients with clenched fist injuries. Appropriate management of early wounds includes thorough exploration, irrigation, antibiotic prophylaxis, splinting, and early follow-up. Once an infection is detected, aggressive management includes consultation of a hand surgeon for debridement, intravenous antibiotics, and hospital admission.

To avoid missing this injury, the emergency physician should consider all open wounds over the MCP joints to be probable fight bites; such an approach will ensure that all patients will receive appropriate therapy.

KEY POINTS FOR FIGHT BITE

Maintain a high index of suspicion for a fight bite wound in any patient who presents with a laceration over the dorsal MCP joint.

Do not rely on a negative history, as the patient may not be honest regarding the circumstances of the wound.

Uninfected wounds that do not violate the extensor tendon or the joint capsule may have expectant management after copious irrigation and debridement in the ED. Outpatient antibiotics and definite follow-up within 24 to 48 hours must be assured to safely discharge such a patient.

Infected fight bite wounds need a hand surgeon consultation for operative debridement and irrigation, and hospital admission for intravenous antibiotics.

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