



Management of bite injuries

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Summary

Most mammalian bites are caused by dogs, cats or humans. Cat and human bites often become infected, so antibiotic prophylaxis should be considered in addition to wound management. Early referral for surgical assessment of human bites to the hand may be required. Amoxicillin with clavulanate is suitable for prophylaxis in most cases. Prophylaxis is usually continued for 5–7 days. Depending on their immunisation status, patients may need vaccination against tetanus.

Key words: antibiotics, wounds, tetanus vaccine.

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Introduction

Bite injuries account for 1% of emergency department visits. Dog bites are the most common, followed by cat and human bites. Management is determined by the species of the biter, assessment of the injury and knowledge of host factors. Risk factors for bite wound infection include comorbid conditions such as diabetes, liver disease (iron-overload states) and asplenia.

The bacteria associated with bite infections may come from the environment, from the victim's skin flora, or most frequently, from the 'normal' oral flora of the biter. The principles of management of bite injuries include cleaning and debriding the wound (often requiring surgical consultation), consideration of prophylactic antibiotics, treatment of infectious complications when they develop and appropriate use of tetanus vaccination.

Presentation

Patients presenting with bite injuries can be separated into two distinct groups. The first group present early, 8–12 hours after a bite, because of concern about infection of the wound or disfigurement as a consequence of the injury. These patients predominantly have a contaminated wound with no signs of infection. It is important to consider the role of prophylaxis in these patients.

The second group presents more than 12 hours after the injury. They usually have signs of a developing infection such as fever, purulent wound discharge, pain and local adenopathy.

Dog bites

Dog bites are the most common bite injury. They account for 80–90% of presentations. The annual incidence of dog bites requiring emergency department treatment is 12.9 per 10 000 persons, with children aged 5–9 (particularly boys) having an incidence of 60.7 per 10 000 persons aged 5–9 years. Face, neck and head bites are more frequent in children.¹

Between 4 and 25% of dog bite wounds become infected. The median time to presentation with the first symptoms of infection is 24 hours.² Factors that may increase the risk of infection include deeper wounds, puncture injuries, crush wounds and wounds on the hand. Although studies do not clearly show that antibiotics prevent infection after a bite, it is common practice to offer antibiotic prophylaxis to patients with more severe wounds or to those with risk factors for infection.

Asplenic patients are at particular risk for infection with *Capnocytophaga canimorsus*. This infrequently diagnosed pathogen can produce meningitis, endocarditis and sepsis.

Penicillin is the treatment of choice for infections with this organism.

Cat bites

Cat bites occur particularly in women and in an older patient group. A large percentage

of cat bites are puncture wounds that are known to have an increased risk of infection. Although cats have less jaw power than dogs, the rate of infection with cat wounds is greater. Without antibiotic prophylaxis around 30–50% of the cat bites seen in emergency departments become infected.²

Human bites

Human bite wounds account for 2–3% of bite presentations. These injuries are commonly infected with human oropharyngeal flora.

Clenched fist injuries are the most severe of human bite injuries. They commonly present as a small wound over the metacarpophalangeal joint of the dominant hand as a result of the patient striking another person's teeth with a clenched fist. Human bite wounds to the hand more commonly develop bacterial infection than human bites at other sites, with clenched fist injuries conferring the highest risk, particularly because of the potential for breaching the metacarpophalangeal joint space to produce septic arthritis or osteomyelitis. Patients with hand

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wounds should be referred early to hand surgeons to evaluate the need for exploration to prevent loss of function. Admission to hospital for intravenous antibiotic therapy may be required.

Antibiotic choice

Bacterial infections from bite wounds are usually polymicrobial and are often mixtures of aerobes and anaerobes.

Dog and cat bites

The oral flora of dogs and cats frequently contain *Pasteurella* species, in contrast to human oral flora. Empirical antibiotic therapy for both prophylaxis and established infection in dog and cat bites should be directed against *Pasteurella*, streptococci, staphylococci and anaerobes. Oral amoxicillin with clavulanate is the most useful drug, but for patients with a penicillin allergy other antibiotic combinations such as clindamycin plus ciprofloxacin, or clindamycin plus trimethoprim-sulfamethoxazole, may be used. Prophylaxis is generally given for 5–7 days, although there are no clear guidelines. Treatment of an established infection is usually for 7–10 days. Longer periods of intravenous therapy are required for more severe infections, especially those involving bones or joints.

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Human bites

Human bite injuries transfer a larger number of bacteria than dog or cat bites due to a greater density of normal oral flora. Other important differences between human bites and dog and cat bites are the presence of *Eikenella corrodens*, the absence of *Pasteurella multocida*, and a higher frequency of beta-lactamase-producing organisms and anaerobes.

The most commonly isolated organisms from human bites include alpha- and beta-haemolytic streptococci, *Staphylococcus aureus*, *Staphylococcus epidermidis*, corynebacteria, and *Eikenella corrodens*.^{2,3} *Eikenella corrodens* should be considered because of its unusual antimicrobial sensitivities; it is sensitive to penicillin and amoxicillin with clavulanate, but resistant to 'first generation' cephalosporins, methicillin and clindamycin.

A Cochrane review of antibiotic prophylaxis after mammalian bites has concluded that the risk of infection is reduced with antibiotic prophylaxis after human bite injuries.⁴ Appropriate prophylactic antimicrobial choices for human bite injuries include amoxicillin with clavulanate. Alternative regimens for patients with penicillin allergy include clindamycin plus either ciprofloxacin or trimethoprim/sulfamethoxazole or doxycycline (to treat *Eikenella corrodens*). Prophylaxis for 5–7 days is reasonable (although not clearly defined in the literature), with longer periods required for infected wounds.

Bites from other animals

Other animal bites are less common in practice but the most frequently encountered are rat bites. Although antibiotic

prophylaxis is not indicated for minor injuries, a clinical syndrome of rat-bite fever should be kept in mind if patients present with malaise, fever and progressive arthralgia following a rat bite. The causative organism in the rare cases reported in Australia is *Streptobacillus moniliformis*.⁵ In Asia the causative organism is *Streptobacillus minor*. The organism may be grown in blood cultures. Treatment is intravenous penicillin for 5–7 days followed by oral penicillin for seven days.

An extremely rare but fatal viral encephalitis may occur after bat bites or scratches in Australia. The causative agent is Australian bat lyssavirus which is nearly identical to rabies virus.⁶ Australian bat lyssavirus infection should be considered in a patient with a history of a bat bite or exposure, who presents with meningoencephalitis. Long incubation periods can occur. The most important initial management of bat bite or scratches is immediate wound care with soap and water (20% soap is viracidal for rabies virus and presumably so for bat lyssavirus). Rabies vaccine and immunoglobulin should be administered as for post-exposure rabies prophylaxis.

Tetanus prophylaxis

Complete management of bite injuries should include consideration of tetanus immunisation. Any wound may be contaminated with tetanus spores, but wounds contaminated with dirt, saliva or certain types of wounds such as crush injuries and puncture wounds are more likely to be associated with tetanus inoculation. Patients presenting with bite wounds who have not been vaccinated in the past five years should be vaccinated. Those who are considered to have impaired immunity, and in whom the wound is considered to be tetanus-prone, should be considered for human tetanus immunoglobulin.

Conclusion

Each bite injury should be individually assessed. Management should take into account the type of animal that has inflicted the bite, any patient risk factors for infection, local and systemic signs of infection, and the patient's vaccination status. If antibiotics are indicated, check the patient's antibiotic allergies. Early surgical consultation for wound debridement is advised, particularly if there is a possibility that the bite has involved deep tissue or bone.

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Conflict of interest: none declared

Self-test questions

The following statements are either true or false (answers on page 27)

1. Human bites transfer more bacteria than bites from other animals.
2. Dog bites become infected more often than cat bites.

Book review

Drugs of abuse. 2nd edition. Simon Wills.
London: Pharmaceutical Press; 2005.
376 pages*

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The aim of this book, now in an extensively revised second edition, is to be a detailed but easily digestible guide for healthcare professionals who work with drug users. As the author notes, the use of psychoactive drugs is long-standing, ubiquitous, often associated with considerable harm and subject to considerable variation over time.

Basic concepts and common complications of psychoactive drugs are covered in two somewhat perfunctory introductory chapters. A chapter is devoted to each major drug category under the following headings: history, effects sought, administration, pharmacology, adverse effects, dependence, drug-drug interactions with therapeutic medications, potential effects on concurrent medical conditions, pregnancy and breastfeeding.

The text is up to date, including material on relatively new illicit drugs (such as gamma hydroxybutyrate) and recent developments (such as use of the internet as an information

resource). Separate chapters are appropriately devoted to tobacco and alcohol. The health and economic costs to individuals and communities from legal drugs dwarf the costs associated with illicit drugs.

The author still refers to drug 'misuse' and 'abuse' although many regard these terms as unscientific and pejorative. Apart from this terminology, judgemental attitudes are (mercifully) avoided. But terminology 'sends a message' and a large part of the problem of healthcare management of people using illicit drugs includes keeping negative attitudes under control. People who 'misuse' and 'abuse' illicit drugs should be just as entitled to excellent health care as people who 'misuse' and 'abuse' cigarettes, red meat or high-fat ice cream.

The strengths of this readable book include its clarity, brevity and practicality. Arcane and academic details are avoided.

The information on drug-drug interactions with therapeutic medications is particularly useful. Perhaps the introductory chapters could have been expanded as clinicians are generally more troubled navigating their way through the vexing framework questions than the more straightforward pharmacological aspects of psychoactive drugs. This is especially true in parts of the world where authorities wage a 'war on drugs', claiming to create a utopian 'drug-free world'.

This book will be a useful reference for busy clinicians managing patients using psychoactive drugs, especially general practitioners and pharmacists, but also some specialist practitioners.

* Available from Pharmaceutical Society of Australia, phone (02) 6283 4783. Price \$154, \$123 PSA members.