

A review of facial injuries due to dog bites

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ABSTRACT

Bite injuries to the head and neck region can result in facial disfigurement with distressing physical and psychological consequences. This article reviewed the causes and management of facial bite wounds due to dog bites. A PUBMED search of the National Library of Medicine from 1995 to December 2005 was conducted. Keywords used in the search were 'facial wound', 'bite wound', 'dog bite'. The results showed that the risk factors for dog attacks include: school-aged children, male, households with dogs, male dogs and certain breeds (german shepherds, bull terriers, blue/red heelers, dobermans and rottweilers). Early management of such complex injuries usually guarantees satisfactory outcome. Most of the cases involve a known dog (friends, neighbors) and family pet. Although animal bites are not the most accounted children injuries, deaths may a result of these attacks. Antibiotic therapy is indicated for infected bite wounds and fresh wounds considered at risk for infection, such as extremely large wounds, large hematoma, and cat bites, that appear be more infected than dog bites. Tetanus immunization status and the risk of rabies infection should be routinely addressed in bite wound management. Prevention strategies should be considered for preventing dog bites.

Key words: Facial wound, bite wound, dog bite.

CONCEPT

Bite wounds have a special position in traumatology because of their high complication rate compared to similar soft tissue wounds caused by other reasons (1). The mammalian bite injuries accounted for 10% of patients managed within soft tissue injuries to the orofacial region (2) and dogs are the most common perpetrators (3). Besides dogs, other animals such as snake (4), cats, horses, donkey may be responsible for these accidents (5). However, we will centralize this review on dog attacks.

Because of the large number of bacteria in the oral cavity, animal bite wounds are generally contaminated, and their treatment is difficult because of the risk of infection, especially in extensive injuries (6). This review, searched of the National Library of Medicine (PUBMED), evaluated the causes, frequency and presentation of bite injuries to the facial region due to dog bites and management of wounds injuries during the period from 1995 to December 2005. Keywords used in the search were 'facial wound', 'bite wound', 'dog bite'.

EPIDEMIOLOGY

Patients with bite wounds account for hundreds of thousands of emergency department, urgent care center, physician and dental office (7, 8). An estimated 1 to 2 million Americans are bitten by cats and dogs each year (9). The types of wounds encountered range from insignificant scratches to life-threatening neck and facial injuries. More than 50% of the victims are infants and schoolchildren. The predominant areas are the nose and the auricles. The tissue defects may be superficial, but they can even cause amputations, including severe vascular and nerve or bony destruction (7).

Among the victims of dog attacks, the studies are controversy in which gender are more at risk of attack (10-12) although most studies showed a male preponderance (2, 8, 13-16). In an epidemiological study of patients with maxillofacial injuries, aged 1-18 years, falls were by far, the commonest cause of injury, but with increasing age, assaults became more common, but a surprisingly high incidence of dog bite injuries was noted, particularly in children under 7 years of age (17). Oginni et al. (18) determined the aetiological factors and pattern of orofacial soft tissue

injuries among children. Falls also were the most common aetiology followed by road traffic accident. The forehead was the most frequently injured site. Although animal bites and burns accounted for only 13.8% of all injuries, all the deaths were a result of these aetiologies. The dog bite death rate in Australian, United States and Canadian are respectively 0.004/100,000, 0.05-0.07/100,000, 0.007/100,000. Children 0-4 years have the highest rate of serious injury, particularly facial (14).

From 1979 through 1998, attacks by dogs resulted at least in 238 deaths of humans in the United States, most occurred among males and children (19). Pit bull-type dogs and Rottweilers were involved in more than half of these deaths. In a study of 174 cases of facial soft tissue injuries in children, two of which resulted in rabies and death of the patients. Ignorance about the risk of uncompleted treatment, financial constraints and scarcity of the vaccine were implicated in the outcome (20).

It is estimated that children were more likely than older persons to be bitten on the face, neck, and head (73% vs 30%) (21). Dog bite of the face is uncommon in adults (22). Adults have longer hospitalizations, most frequently for upper extremity injury (14). The risk of attack from german shepherds, bull terriers, blue/red heelers, dobermans and rottweilers are higher than for other common breeds (8).

CLINICAL PICTURE AND PATHOGENESIS

Dog bites are commonly associated with soft-tissue injury to the face but rarely result in facial fractures. Only one study reported six new cases of facial fractures associated with dog bites and reviewed additional 10 cases reported in the literature (23). Eighty-seven percent of the cases involved children less than 16 years of age. The periorbital or nasal bones were involved in 69 percent of the cases. Lacerations were the most frequently associated soft-tissue injury. Additional injuries included facial nerve damage, lacrimal duct damage requiring stenting and reconstruction, ptosis from levator transection, and blood loss requiring transfusion. Although facial fractures are not commonly considered to be associated with dog bite injuries, the index of suspicion for a fracture should be raised when the injury occurs in a child, particularly when injury occurs near the orbit, nose, and cheek (23).

Certain pathogens commonly found in the canine oral flora may cause severe secondary infections, which may result in sepsis and even death. Without treatment, bite wounds can become infected. Presenting symptoms are usually wound site pain with cellulitis and purulent drainage (7). In addition to local wound infection, other complications may occur, including lymphangitis, local abscess, septic arthritis, tenosynovitis, and osteomyelitis. Rare complications include endocarditis, meningitis, brain abscess, and sepsis with disseminated intravascular coagulation, especially in immunocompromised individuals (24).

Most infections caused by mammalian bites are polymicrobial, with mixed aerobic and anaerobic species (25).

Bacteriology of infected dog and cat bite wounds includes *Pasteurella multocida*, *Staphylococcus aureus*, viridans streptococci, *Capnocytophaga canimorsus*, and oral anaerobes. Infected human bites yield a similar spectrum of bacteria except for *Pasteurellae* and *Capnocytophaga canimorsus*; instead human bites are frequently complicated by *Eikenella corrodens* (26).

MANAGEMENT AND PROGNOSIS

Primary care clinicians must be able to avoid infections. Foundational to immediate wound care is appropriate hemostasis and anesthesia. Antibiotic therapy is indicated for infected bite wounds and fresh wounds considered at risk for infection(26), such as extremely large wounds, large hematoma, and cat bites, that appear be more infected than dog bites (37.5% and 14.9% respectively) (1) and immunocompromised patients. Antibiotic therapy (a combination of amoxicillin and clavulan acid) and other combinations of extended-spectrum penicillins with beta-lactamase inhibitors offer the best in vitro coverage of the pathogenic flora (26). In case of slow recovery or no improvement, simultaneous lymphadenopathy or pneumonia, *Staphylococcus aureus* or *Francisella tularensis* should be suspected; ciprofloxacin is recommended (27). Tetanus and rabies prophylaxis must be evaluated in all dog bites (28).

A retrospective study of children between 1991 and 2000 in Spain registered 654 patients treated for dog bite-related injuries (16). All patients received antibiotic prophylaxis (a combination of amoxicillin and clavulan acid). Sixty-five percent of the bites were located on the head, face and neck. Infectious complications occurred in 32 patients (5%) (16). Another study analyzed 94 animal bite wounds on the face and head (6). Dogs caused 91% of the bite wounds. Infections developed in 4 of 53 patients who underwent primary wound closure with minor edge excision and prophylactic administration of oral penicillin. Without antibiotic administration, 2 of 15 patients had infections, which were treated on an outpatient basis. In view of the low infection rate, routine antibiotic prophylaxis is not justified (6).

Facial injuries may require complex repair and reconstruction with appropriate surgical referral. Initial treatment consists of thorough debridement and irrigation, local wound cleansing, careful excision of necrotic tissue, primary closure where feasible and secondary reconstruction in others (29). The surgical approach to bite injuries includes primary closure of the wound whenever possible. Postoperatively, attention to patient counseling, dressings, ointment, cleaning, and scar revision help assure an optimal outcome for the traumatized tissue. Sometimes the challenges of reconstruction of such defect could be great. Wound management with minimal debridement and closure gives good results on the face (22).

Avulsive injuries with significant tissue loss represent the most difficult cases for definitive management and are also those most likely to require hospitalization (26). Traumatic avulsion involving the lip vermilion and the perioral compo-

site soft tissue, even with injuries including delicate anatomic landmarks, healing by secondary intention can be instituted as the initial treatment of choice in younger patients, often providing optimal results (30).

COMPLEMENTARY EXPLORATION

The results of this review showed that the risk factors for dog attacks include: school-aged children (but highest rate of serious injury from dog bite is to children under 5 years of age) (5), male, households with dogs and certain breeds (german shepherds, bull terriers, blue/red heelers, dobermans and rottweilers), male dogs (14). Early management of such complex injuries usually guarantees satisfactory outcome (28). Most of the cases involve a known dog (friends, neighbors) and family pet. Although animal bites are not the most accounted children injuries, deaths may a result of these attacks (18).

Prompt assessment and treatment can prevent most bite wound complications (7). Prevention strategies include close supervision of child-dog interactions (3), public education about responsible dog ownership and dog bite prevention, stronger animal control laws, better resources for enforcement of these laws, and better reporting of bites. Anticipatory guidance by pediatric health care providers should attend to dog bite prevention (19). The need to improve community knowledge of rabies and the availability and affordability of rabies vaccine must be highlighted (20). The aim of immediate surgical repair is to obtain better cosmetic results and to avoid infections.

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