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Pit bull attack: case report and literature review

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An 83-year-old man was attacked by two pit bulls. The injuries sustained included significant soft-tissue losses in both upper extremities. Such intensity of bites and the magnitude of soft-tissue trauma may be characteristic of a pit bull attack. The development and use of this breed of dog and its current population in the United States suggest that further injuries and deaths will occur.

KEY WORDS: DOG BITE, PIT BULL, FATALITIES.

Dog bite is an increasingly common problem in the United States (1–5). It is estimated that at least 1 million persons are bitten per year (3). Dog bites account for 80% to 90% of all animal bites requiring medical care (6), and approximately 1% of all the visits to emergency rooms (4). Although about 50% of the bites are minor, more than 10% require suturing and follow-up visits, and 1% to 2% require hospitalization (2). Twenty deaths from dog bites were reported between October 1983 and November 1986 (7–10). The most common concern in the treatment of a dog bite is the threat of infection. The bite wounds resulting from a pit bull, however, are more commonly characterized by a greater degree of soft-tissue trauma and loss. A disproportionately high number of fatalities are also attributed to the pit bull when compared to other breeds of dogs. We describe a case which involves examples of such soft-tissue loss and death.

1. Massive soft-tissue trauma and loss on the dorsal (a) and palmar (b) aspects of the right arm of an 83-year-old man attacked by pit bulls.



Case report

An 83-year-old man, despite a history of congestive heart failure and an indwelling permanent cardiac pacemaker, was active and independent, living alone, and caring for himself. One afternoon he passed by a neighbor's pair of pit bulls and their two puppies. He was attacked by the female, and immediately the male joined in the assault. A passerby witnessed the incident, but approximately 15 minutes passed before he could free the elderly man from the onslaught.

The man was taken to the emergency room at The University of Texas Medical Branch in Galveston. Upon arrival he was alert and oriented. Clinical examination revealed significant soft-tissue losses of both upper extremities. The right arm was degloved from the wrist to the elbow. The extensors of the wrist and digits were absent from the proximal forearm to the wrist. The ulnar nerve and the flexor carpi ulnaris muscle were absent from the elbow to a level 5 cm proximal to the wrist flexor crease. There was also an irregular soft-tissue loss (10 cm in diameter) at the posterior aspect of the right upper arm and extending down to the triceps muscle (Fig 1a,1b).

The left upper arm also was void of extensor muscles in the same distribution. There was also soft-tissue loss (8 cm in diameter) at the palmar aspect of the proximal forearm extending down to the level of the profundus muscle belly. Soft-tissue loss at the posterior aspect of the left upper arm was similar to that on the right arm (Fig 2a,2b).

In addition to these wounds, there were several puncture wounds to the hands and bite wounds to the left side of the chest, the upper part of the left thigh, and the left side of the neck.

The patient's wounds were irrigated and debrided on the day of admission. Additional debridements were performed on the third, fifth, and seventh hospital days. Despite these aggressive and regular debridements and triple antibiotic coverage, the wounds had become septic and cultures of *Pseudomonas aeruginosa*, *Pseudomonas maltophilia*, and *Staphylococcus epidermidis* were obtained. On the eighth hospital day, further soft-tissue necrosis required additional debridement of both extremities and elbow disarticulation on the left. Hyperbaric oxygen therapy was initiated on the ninth day. On the 13th hospital day, a delayed primary closure of the left arm and coverage of the right arm with

meshed split-thickness skin grafts were performed. Hyperbaric oxygen therapy was discontinued on the 21st hospital day. The left arm amputation stump had healed well at this point (Fig 3), and the right upper extremity was clean and healing well (Fig 4a,4b). On the 23rd day the patient developed oliguric renal failure. Antibiotics were discontinued on the 25th day and hemodialysis was begun on the 26th hospital day. Regular blood, urine, and tracheal aspirate cultures were obtained, all of which were negative except for a blood culture which was found to be positive for yeast on the 35th day. Amphotericin B therapy was begun on the 39th day. The patient remained in the surgical intensive care unit where he required continual medical and respiratory support until the 42nd hospital day when he died during hemodialysis. The postmortem report attributed the final cause of death to cardiac arrhythmia.

Discussion

With an estimated 50 million dogs in the United States, dog bites continue to be a problem (10). The majority of these bite wounds are trivial; however, a number of them are significant. Bite wounds involve



2. Massive soft-tissue trauma and loss on the dorsal (a) and palmar (b) aspects of the left arm of an 83-year-old man attacked by pit bulls.

the face, head, and neck 12% to 15% of the time; the upper extremity 25% to 33% of the time; and the trunk and lower extremities just over 50% of the time (2,11).

Dog bite wounds commonly become infected. A dog's mouth typically harbors more than 64 different species of bacteria including *Staphylococcus aureus*, *Pasteurella multocida*, and *Mycobacterium fortuitum*. Various species of *Streptococcus*, *Actinomyces*, *Escherichia*, *Corynebacterium*, *Caryophanon*, *Mycoplasma*, *Acinetobacter*, *Moraxella*, *Neisseria*, *Enterobacter*, and other species of *Staphylococcus* and *Pasteurella* are also found in the gingival flora of dogs (3,12–16).

A number of risk factors increase the likelihood of infection in a dog bite wound. A patient more than 50 years old faces significant increased risk, as does a person whose wound remains untreated for more than 24 hours. Puncture wounds have a greater propensity to become infected than do other types of bite wounds. The location of the bite wound also affects the likelihood of infection. Facial wounds generally have an infection rate of only 4%, while hand wounds have a 28% chance of becoming infected (17).

3. Left upper extremity
18 days following
amputation at the
elbow.



Hyperbaric oxygen has been used along with antibiotics and surgery for the treatment of necrotizing soft-tissue infections and infected ischemic wounds. The pathophysiology and mechanisms of hyperbaric oxygen therapy explain these beneficial effects. Hyperbaric oxygen has a direct bactericidal effect on anaerobic organisms through the production of toxic oxygen radicals (18). Hyperbaric oxygen increases the oxygen tension in infected tissues and thus provides oxygen to the polymorphonuclear leukocytes to kill aerobic organisms (19). Hyperbaric oxygen provides oxygen to the fibroblast to allow new collagen formation and subsequently angiogenesis which allows hypoxic infected wounds to heal (20). Finally, hyperbaric oxygen potentiates the aminoglycoside class of antibiotics (21).

Fourteen of the 20 recorded fatal dog attacks on people between October 1983 and November 1986 were from pit bulls or pit bull mixtures (22). During the one-year period between June 1986 and June 1987, 14 people were killed by dogs in the United States. Ten of those 14 deaths are attributed to pit bulls. Thus, 71% of the deaths during that period were attributed to a type of dog that accounts for 1% of the US dog population (8,10,22). Five of the pit bull owners whose dogs have been involved in fatal attacks have been charged with involuntary manslaughter. A sixth owner, whose three pit bulls killed a 4-year-old child, was convicted of involuntary manslaughter and is serving a five-year sentence, to be followed by a five-year period of probation (8).

Most breeds do not repeatedly bite their victims; however, a pit bull attack has been compared to a shark attack and often results in multiple bites and extensive soft-tissue loss (3,10). Although the teeth of dogs are not very sharp, they can exert a force of 200 to 450 psi. Pit bulls inflict more serious bite wounds than do other breeds because they tend to attack the deep muscles, hold on, and shake (3,10).

There is controversy as to whether these dogs have been misused, or whether they are inherently bad, or even whether they have become bad due to misuse. The pit bull is not a specific breed but a kind of dog. All the dogs that are commonly referred to as pit bulls are believed to have a common ancestry that can be traced back to the early 19th century in England, to the bull-and-terrier dog. These dogs were the product of crosses between the early bulldog and a type of terrier. They were also called "the butcher's dog" because they were used to separate one cow from its herd by biting and holding the nose of the animal until the butcher arrived to slaughter it (10,23). These dogs were also matched against each other for "sport." The first pit bull is believed to have come to the United States in 1870. In 1898 the United Kennel Club began registering the American Pit Bull Terriers. In

1935 the American Kennel Club recognized the American Pit Bull Terrier as a breed, but called it the Staffordshire Terrier and later in 1972 renamed it the American Staffordshire Terrier. The American Staffordshire Terrier holds a special place in Americana, since its ranks include such famous canines as Pete from the TV show *Our Gang*, Tige of Buster Brown's comic strip, and Stubby, a real-life hero decorated for bravery in World War I. It is important to qualify the fact, however, that none of the fatalities in the past two years have been attributed to registered American Staffordshire Terriers (10,23).

The pit bull, it is said, is becoming the dog of choice for drug dealers. The San Diego Police Department has stated that in two out of three drug raids, officers encountered pit bulls being used as guard dogs (10). Law enforcement officials have noted a similar misuse of the breed all across the country with the increase in pit bull population.

Conclusion

With this trend and the increasing population of dogs in general, and pit bulls in particular, the occurrence of cases similar to the one reported in this article may increase.

The treatment for these injuries should follow the standards of care for soft-tissue trauma, which has a high potential for a mixed bacterial infection, with particular attention to the various risk factors associated with bite wound.

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4. Dorsal (a) and palmar (b) aspects of the right upper extremity 18 days after debridement and split-thickness skin grafting.

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