

Bites & stings

Dog attacks

Simon Young

(Australian Family Physician, Vol 26, No 12, December 1997)

Background. An estimated 100.000 Australians each year will seek medical attention after a dog attack. Such attacks have the potential to cause significant morbidity especially with regard to soft tissue injury and infection. Proper wound assessment and early intervention will reduce this morbidity.

Objective. To review the epidemiology, assessment and treatment of soft tissue wounds caused by dog bites.

Discussion. Any patient who has been attacked by a dog requires a primary survey for any immediate life threatening problem, a careful assessment of tissue wounds and a treatment regimen that will promote tissue healing and reduce the likelihood of infection. Wounds must be carefully examined for skin loss, joint penetration, and tendon, nerve and vascular injuries, and appropriate action taken if any of these points are detected. The chance of a wound infection will be reduced by thorough cleansing of wounds, debridement and/or delayed primary closure of selected wounds and the judicious use of antibiotics.

Despite centuries of coexistence and domestication, dogs still attack humans. One in 20 people questioned in a recent Australian study reported being attacked by a dog at least once in the previous 3 years. Clearly the wounds inflicted during these attacks vary enormously, ranging from minor soft tissue damage through to life threatening injuries, but it is of concern that the more serious injuries tend to occur in vulnerable groups such as the very young. In children aged 1-4 years, the annual average rate of admissions to hospital in Victoria due to dog bites was 42 per 100.000: almost double the admission rate for motor accident injuries in the same age group.

Despite the seemingly 'minor' nature of many injuries, dog bites constitute a significant health problem. Both visible tissue damage and the potential for infection prompt the public to seek medical care. Extrapolating from a study conducted in South Australia, Thompson has estimated that approximately 100.00000 Australians each year will be injured and seek medical treatment as the result of a dog attack.

Pathology

The mechanics of injury during a dog bite involve incising, crushing, tearing and puncturing tissues. Tissues are devitalised and the varied microbiological contents of the dog's oral flora are dispersed through the wound. Organisms such as *Pasteurella multocida*, *Staphylococcus aureus*, *Capnocytophaga canimorsus*, *Streptococcus* species and anaerobes are

common oral canine commensals and are transmitted into the wound. Wound infections can occur with any of these organisms.

Clearly the larger and stronger the dog, the greater the potential tissue damage, although certain breeds have a reputation for more savage attacks. Recent Australian studies have shown that a number of breeds of dog are over represented in dog attacks (*Table 1*).

Initial treatment

The initial approach is to make sure that the patient's survival is not threatened, which means assessing airway, breathing and circulation. Assess the adequacy of breathing by looking, listening and feeling for airflow in and out of the chest. Assess the circulation by taking the pulse and measuring the capillary refill time. Apply direct pressure to any sites that are continuing to bleed. Assessment and treatment of the inflicted wounds can then proceed while taking measures to minimise the risk of infection.

Table 1. Dogs that pose a risk of 4-5 times greater than other breeds

- German shepherds
- bull-terriers
- heelers
- Rottweilers
- Dobermans pinchers.

If you are outside a hospital or the surgery, ensure that the dog poses no immediate threat to you or the victim and there is no other danger present. If the victim has injuries to the face, neck or chest, ensure the airway is patent while stabilising the cervical spine if appropriate.

If blood loss is likely to have been significant, establish intravenous access and commence fluid replacement. The potential for blood loss is considerable in the face, neck, axillae or groin wounds.

Wounds

Once the patient is stable or if the patient has not sustained major injuries, proceed to examine the wounds in detail.

Most wounds in adult patients attending hospital occur on the legs (33%) followed by the fingers and hands (32%) and arms (18%). By contrast most wounds in children occur on the face

and scalp (51%).

A careful survey of the wounds should be made observing the size, site and depth of each. Skin loss, possible joint penetration and areas of crushed or devitalised tissue should be specifically noted. The integrity of muscles, tendons, arteries and nerves close to the wound should be examined. Wounds that may involve these deeper structures must be formally explored under adequate anaesthesia and repaired appropriately.

The wounds should be carefully cleansed and copiously irrigated. Use normal saline in a large syringe to direct a fluid stream at the wound edges. All foreign material should be removed from the wound and devitalised tissue debrided. The combination of irrigation and debridement has been shown to substantially reduce the rate of wound infections.

The decision as to whether to close the wound is based on an assessment of the likelihood of a wound infection developing, the anticipated cosmetic result and the surgical skill of the operator. Where there is any doubt about closure, or where the wound has skin loss or involves joints, tendons, arteries or nerves, plastic surgical expertise may be required.

Once thoroughly cleansed and irrigated, wounds with minimal tissue crushing that are less than 8 hours old in an immunocompetent patient may be closed primarily. Wound to the face and neck which, because of their excellent blood supply, are unlikely to become infected, can similarly be closed once any devitalised tissue is removed. Wounds that are likely to be heavily contaminated, have crushed tissue or present many hours after the incident should in general, be treated with irrigation, debridement and delayed primary closure.

Suitable wound dressings should be applied and the area adequately immobilised.

The current tetanus immune status of the patient should be ascertained and prophylaxis administered as necessary. In some countries prophylaxis against rabies needs to be considered.

Patients should be given clear instructions regarding follow up, wound care and the signs and symptoms of developing infection.

Table 2. High risk wounds

- greater than 8 hours
- crush or puncture wounds
- wounds to the hands or feet.

Antibiotic therapy

The routine use of prophylactic antibiotics for all dog bites is no longer widely advocated. Minor injuries that are not high risk wounds (*Table 2*) and have not occurred to high risk patients (*Table 3*) may be treated without recourse to antibiotics. This approach minimises the number of patients prescribed antibiotics who are unlikely to benefit from them. The utility of prophylactic antibiotics for dog bites was examined by Cummings who performed a meta-analysis of eight randomized trials. He concluded that:

... if 100 patients with dog bite wounds seen in an ED (emergency department) are given oral antibiotics, on average 84 are likely to escape infection regardless of therapy, nine will become infected despite the medication, and seven will avoid infection because of the medication. Thus treating 100 patients is likely to prevent infection in seven...

The characteristics of wounds and patients who are at a higher risk of infection and who therefore should be treated with antibiotics have been identified. Wounds at a higher risk of infection are those over 8 hours old, with tissues that have been crushed or punctured and are situated on the hand or feet. Patients at a higher risk of infection are those over 50, with alcoholic liver disease, with asplenism, and with immunosuppression or immune compromise.

Table 3. High risk patients

- age over 50 years
- alcoholic liver disease
- asplenism
- immunosuppression
- immunological compromise.

When antibiotics are indicated, the regimen recommended by the Victorian Drug Usage Advisory Committee for patients who are not sensitive to penicillin, is: 'procaine penicillin 1 g (50 mg/kg up to adult dose) intramuscularly, as a single dose followed by amoxicillin/potassium clavulanate 500/125 mg (40/10 mg/kg/day up to adult dose in three divided doses) orally, 8 hourly for 5-10 days.

In penicillin sensitive patients the combination of metronidazole with doxycycline, cotrimoxazole or cefotaxime is recommended.

Conclusion

Dog attacks are a relatively common reason for patients to seek medical care. All wounds should be carefully assessed and treated with irrigation and debridement. Selected wounds should be treated with antibiotics and delayed primary closure.

Summary of Important Points

- Careful assessment of wounds for skin loss, joint penetration and tendon, nerve and vascular injuries.
- Thorough cleansing of wounds using copious saline irrigation is essential.
- Identification of wounds and patients at high risk for infection.
- Judicious use of debridement, delayed primary closure and prophylactic antibiotic therapy will reduce the likelihood of wound infections.