Endocarditis due to *Staphylococcus aureus* after Minor Dog Bite

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**Abstract:** Living in a society of animal lovers, the dangers are often not always apparent. Injury from bites and scratches is an occupational hazard for those people who work with animals. Despite the high risk of secondary wound infection as a result of an animal bite, many patients do not receive treatment with an antimicrobial medication. This report describes a case of a previously fit and well 66-year-old female dog handler who, after an apparently minor dog bite to the hand, developed fulminant acute *Staphylococcus aureus* endocarditis and life-threatening aortic regurgitation. This article discusses the microbiology behind dog bites and highlights the need for proper wound hygiene and consideration of prophylactic broad-spectrum antibiotics to prevent potentially fatal outcomes as a result of what initially seem to be minor injuries.

In a lifetime, at least 50% of the population will sustain a dog bite.\(^1\) Statistics show that worldwide each year, more than 330,000 people are admitted to emergency departments after being bitten by a dog.\(^2\) The actual incidence, however, is much higher, because many persons with minor wounds fail to seek medical treatment. The infection rate after dog bite injury is less than 10%,\(^3,4\) and when infection occurs it is normally localized to the tissues surrounding the wound, making it readily treatable with topical antibiotics.\(^5\) Paradoxically, cases in the literature describe previously healthy individuals in whom minor dog bites were complicated by sepsis and acute bacterial endocarditis.\(^6,7\) In those examples, the culprit organism was found to be the Gram-negative *Capnocytophaga canimorsus*, which is a normal part of the canine flora.\(^8\) In the following case, a dog bite to the hand led to acute endocarditis due to *Staphylococcus aureus* in a previously healthy female patient.

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**Case Report**

A 66-year-old woman who was previously in good health was referred by her physician to the medical assessment unit because of a 1-week history of dyspnea, fever, rash, severe lethargy, and loss of appetite, and a 2-day history of declining memory and confusion. She also had a newly diagnosed heart murmur. The patient works as a dog breeder and 2 weeks before admission had been bitten on the right hand by one of her dogs. On questioning, she recalled that the bite was deep, but no signs of infection occurred. She did not seek any medical attention. Approximately 6 days later she woke up in the morning feeling ill. She was feverish and stayed in bed. Over the next few days skin rashes developed on her arms and legs, as well as an increasing dyspnea.

On admission, the patient looked unwell. She had a body temperature of 38.5°C, blood pressure 150/45 mm Hg, and a pulse rate of 78 beats/min, which was regular but collapsing. Oxygen saturation was 92%. She was confused, with a mini-mental test score of 7/10. Splinter hemorrhages were present on the index and little fingers of the left hand, with several nail bed and nail fold infarcts. There was evidence of Osler’s nodes in the finger pads, and several small nodules were found on the palms, consistent with Janeway lesions. The right hand showed palmar erythema and some small, healed cuts (4 × 3-cm bite marks) on the lateral dorsum and palmar surfaces. The metacarpophalangeal joints were red and painful, as was the left knee. Also the skin on her arms (continued next page)

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**Key Points**

- Dog bites are common, and the risk of secondary wound infection can be high.
- Several cases of infective endocarditis after dog bites or scratches have been reported.
- Proper wound hygiene and broad spectrum antibiotics should be considered in all cases of animal bites and scratches, no matter how minor they appear.
and legs had numerous small, blanching, red macules. On examination of the cardiovascular system, a positive Corrigan’s sign (visibly pulsating carotids) was identified, as were pansystolic and early diastolic heart murmurs, consistent with mitral and aortic regurgitation. The abdomen was nontender with no signs of organomegaly, and examination of her respiratory and neuromuscular systems revealed nothing of significance. Funduscopic findings were normal. A chest x-ray film showed cardiomegaly, and electrocardiogram identified mild left ventricular hypertrophy and left axis deviation. Laboratory results showed evidence of infection with an elevated erythrocyte sedimentation rate and C-reactive protein value. Blood cultures grew S. aureus, floxacillin sensitive, from three of three bottles. Transthoracic echocardiography showed a dilated aortic root, but no vegetations, and treatment was started with floxacillin and gentamicin. During the next 36 hours, dyspnea, joint pain, and confusion increased. A lung V/Q scan was done to eliminate the possibility of pulmonary embolism. Transesophageal echocardiography revealed a severely incompetent aortic valve, with overlying septic vegetation. The patient was subsequently sent to the cardiology unit for emergency aortic valve replacement and made a satisfactory recovery.

Discussion

Dog bite wounds are among the most frequent nonfatal injuries. They often occur to the hands, where the numerous small compartments and the thin covering of soft tissue over the bones and joints increase the likelihood of infection, compared with bites elsewhere. Studies show that use of oral antibiotics for all types of dog bite wounds reduces the risk of infection by nearly 50%. Common bacteria isolated from bite wounds include Capnocytophaga canimorsus, Pasteurella multocida, streptococci, and a range of other aerobic and anaerobic pathogens. The broadest prophylactic coverage for these organisms is to administer amoxicillin/clavulanic acid, or erythromycin for individuals who cannot tolerate β-lactams.

Staphylococcus aureus is found mainly on the skin and hair of dogs, and cross-contamination readily occurs between dogs and their handlers. S. aureus is a common cause of infective endocarditis, representing approximately 50% of the acute forms, and is most likely to cause endocarditis in patients with normal heart valves, compared with α-hemolytic streptococci and Enterobacter species, which more commonly infect damaged heart valves, as in patients who have had rheumatic fever. Staphylococcal endocarditis is also common in patients with central venous catheters, PEG feeding tubes, temporary pacemaker electrode catheters, or pulmonary artery (Swan-Ganz) catheters, as well as in drug addicts who mainline. The incidence of S. aureus endocarditis in hospitals is increasing. One case in the literature describes a previously fit and well female patient who had S. aureus endocarditis after a cat bite. Cat bites are three times as likely to get infected as dog bites, and S. aureus endocarditis after a dog bite has not been reported before.

The acute and catastrophic course of our patient’s infection raises concern for the recommendation of appropriate prophylactic antibiotics after even minor dog bites or scratches, even when infection is not usually evident. At this stage, patients who seek medical aid usually do so with inquiries about tetanus vaccination. Furthermore, the role of good wound management, such as proper cleansing and sterile dressing, cannot be underestimated in the prevention of infection.

Even though this example does not directly prove a causal relationship between dog bites and S. aureus endocarditis, it is likely because there was no other invasive procedure or injury and S. aureus is a common canine commensal. It is possible that simple basic wound hygiene and/or antibiotic therapy could have prevented this patient’s infection. This case reemphasizes the need for appropriate antibiotic treatment of animal bite wounds to the hands, no matter how minor they seem.

Acknowledgment

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References

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**Erratum**


On page 1242 of this article published in the November 2002 issue of *Southern Medical Journal*, the correct name of the 1999 recipient of a grant from the Research Base for Cancer Treatment and Control is Dr. Edward Shaw.