

ORIGINAL ARTICLE

A small 'lick' will sink a great ship: fulminant septicaemia after dog saliva wound treatment in an asplenic patient

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Key words

Capnocytophaga canimorsus; Dog; Gangrene; Immunosuppression; Saliva; Sepsis

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doi: 10.1111/iwj.12752

Morandi EM, Pauzenberger R, Tasch C, Rieger UM, Pierer G, Djedovic G. A small 'lick' will sink a great ship: fulminant septicaemia after dog saliva wound treatment in an asplenic patient. *Int Wound J* 2017; 14:1025–1028

Abstract

Capnocytophaga canimorsus is a bacterium transmitted through the saliva of dogs. An infection can cause severe sepsis with acral necrosis and is potentially fatal. Here, we report the case of a 41-year-old man who was infected through a wound that was licked by his dog. He went into septic shock with disseminated intravascular coagulation and subsequently lost both lower legs, his nose and all the fingers on both hands.

Introduction

Whenever we speak of dogs as 'man's best friend', we are talking about a long history. Domesticated about 15 000 years ago, no pet has become as widespread and popular as dogs.(1) In Austria, about 600 000 dogs live in 3.2 million households, corresponding to 13.2% of households with one or more dogs according to the national institute of demographics. Because of this proximity, the risk of transmission of zoonotic diseases has increased.(2) A rarely known commensal germ, mainly found in the saliva of dogs and cats, was first isolated in 1976 and named 'Centers for disease control group dysgonic fermenter 2' (CDC group DF-2). In 1989, it was renamed *Capnocytophaga canimorsus* (*C. canimorsus*) because of its strong association to dog bites.(3,4) In fact, this gram-negative flavobacterium is transmitted through dogs' saliva not only by an actual bite but may also be transmitted by simple smear infection, as has been described in rare cases.(5,6) *C. canimorsus* may cause severe sepsis with a potentially fatal outcome. A highly specific mechanism that knocks out the immune system promotes the fatal course of this disease; infection of J774.1 mouse macrophages with *C. canimorsus* leads to the release of a soluble factor that decreases the innate, physiological function of macrophages to kill phagocytised bacteria.(7)

However, it is well known and widespread that saliva has a beneficial effect on wound healing. Not only does it create a

Key Messages

- contact of wound surfaces with dog saliva can lead to fulminant septicaemia with *Capnocytophaga canimorsus* in immunocompromised patients
- increased awareness of rare, commensal bacteria is crucial in the care of patients at risk because of immunosuppression

moist wound environment, but it also contains growth factors, leucocyte protease inhibitors and histamine, which is a potent booster of cell migration.(8)

Here, we report the case of a 41-year-old man who suffered from a fulminant infection with *C. canimorsus*. Transmission occurred by a dog licking a small lower extremity wound as he expected a beneficial effect on wound healing.

Case report

A 41-year-old male was transferred to our department after initial emergency treatment in another hospital because of septic shock. His medical history revealed that previous to hospital admission, the patient had suffered from a small lower leg wound. However, neither localisation nor origin of the wound was evident upon presentation. The laceration

had been licked by the patient's dog on several occasions. Later, the patient was in a condition to reveal that he had the dog lick his wounds rather routinely because on previous occasions the dog had licked other wounds, and therefore, the patient had assumed a beneficial effect of dog saliva on wound healing. In fact, the patient presented to our department in the clinical situation of a severe septic shock. He presented with reduced consciousness and disseminated intravascular coagulation (DIC) and was intubated prior to admission to the intensive care unit (ICU) because of respiratory distress. Pre-existent medical conditions included chronic alcohol and nicotine abuse, chronic pancreatitis, mild hypothyroidism and a polytrauma injury with craniocerebral involvement and blunt abdominal trauma with subsequent splenectomy several years ago. In the state of septic shock, the patient suffered several grand-mal epileptic seizures. Because of acral necrosis and critical ischaemia of all four extremities and the face, we conducted a debridement of the nose, upper and lower lip and a complete fasciotomy of the right lower leg (Figure 1). With

ischaemia of the lower extremities deteriorating, both legs had to be amputated below the knee 5 days after first debridement. Blood cultures revealed infection with *C. canimorsus*. A week later, amputations of the middle phalanx of the second to fourth digit and the proximal phalanx of the thumb on both hands and of the fifth digit on the right hand had to be performed. After two more weeks, vacuum-assisted closure therapy was applied after another debridement of both hands. After initiating antibiotic therapy with Ampicillin 150 mg/kg/day, the patient's condition improved dramatically, and he could be extubated and transferred to the plastic surgery general ward. After 10 more days, the final debridement of both hands, including further amputation of the right thumb at the level of the metacarpophalangeal joint, was conducted, and wounds were covered using split-thickness skin grafts from the thighs. Soon after, the patient was transferred to a hospital closer to his place of residence in a good general condition again. Follow-up after 3 months revealed complete healing of all wounds (Figure 2).



Figure 1 Initial presentation of the patient to our department in acute septic shock. During intensive care stay, the patient developed acral necrosis and critical ischaemia of all four extremities and the face, especially the nose.



Figure 2 Follow-up after 3 months with complete wound healing after below-knee amputations of both legs and finger amputations at different levels and after subsequent wound closures by flaps or by split-thickness skin grafts.

Discussion

C. canimorsus is a facultative aerobic, gram-negative, filamentous flavobacterium that is very common in the saliva of dogs.(4,9) Dog bites are very frequent injuries but remain mostly unreported because of their superficial nature and their low severity. Infection rates of dog bite injuries are estimated to be up to 20%, while the overall yearly incidence of infection with *C. canimorsus* in the human population is estimated to be 0.67 per million.(10,11) However, only a small number of strains of *C. canimorsus* are dangerous to humans.(12) To date, about 170 cases have been published in literature, in which only two cases of infection by smear infection through licking by a dog have been reported so far.(5,6) Infections are more common in males than in females, but the most important and most evident risk factors include conditions that are associated with immunosuppression (e.g. splenectomy, chronic alcohol abuse, HIV or immune diseases). However, in 40% of the cases reported, no such risk factor could be identified.(13) Infection with *C. canimorsus* progresses quickly and may end with severe sepsis with DIC and gangrene.(3) In general, mortality in patients presenting with sepsis remains as high as 30%, while the mean age is about 50 years. After an initial incubation period of 1–10 days, patients present with non-specific clinical symptoms that can range from fever of unknown origin (81%), abdominal pain (21%), nausea and headache or even endocarditis, endophthalmitis and meningitis to severe sepsis.(14) Because of this variety of non-specific clinical symptoms and a resulting broad spectrum of differential diagnosis, correct

and quick diagnosis is often delayed. Moreover, infection with *C. canimorsus* is often a primarily clinical tentative diagnosis as the bacteria is very difficult to cultivate.(15) Current literature even describes surgical-site wound infections involving *C. canimorsus*, especially when dog or cat exposure was evident in the clinical history.(16,17) Currently, a polymerase chain reaction (PCR) appears to be the most accurate method for diagnosis.(18,19) Infection with *C. canimorsus* is treated primarily with penicillin, often combined with beta-lactamase-inhibitors as first-line therapy, and clindamycin or imipenem is used as a second-line option.(20) Nevertheless, even in the case of rapid diagnosis and intensive care treatment, the fulminant course of infection may lead to limb and acral loss as amputation is warranted or even mortality in the immunocompromised patient.

Conclusion

Dog bites or even the contact of wound surfaces with dog saliva may lead to life-threatening sepsis and potentially fatal outcomes. Increased awareness, proper surgical wound revision and aggressive antibiotic treatment are crucial components of medical care, especially in immunocompromised patients as shown in our case.

Acknowledgements

The authors have no conflicts of interest or competing financial interests to declare. The authors confirm that informed consent from the patient was obtained to publish his images.

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