Rare disease

'Biting the hand that feeds': fever and altered sensorium following a dog bite

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Summary

Capnocytophaga canimorsus infection is the most severe and rapidly progressive bacterial infection transmitted by dog bite and fortunately is very rare. The authors describe a 68-year-old gentleman who presented in an acute confusional state 2 days after having been bitten on the left hand by a dog. Despite immediate broad-spectrum intravenous antibiotics, he developed significant sequelae including disseminated intravascular coagulopathy, microvascular emboli leading to peripheral necrosis, widespread local tissue destruction and septic arthritis.

Our case illustrates a life-threatening presentation of infection with *C canimorsus*, which is known as 'the dog bite organism'. Early diagnosis and aggressive treatment is key to survival.

BACKGROUND

Dog bites are common and few are associated with life-threatening infections. However, it is critical to consider *Capnocytophaga canimorsus* infection and treat aggressively with appropriate antibiotics in suspected cases, especially as complications may be delayed.

CASE PRESENTATION

A normally fit and well 68-year-old man presented in an acute confusional state – mini mental state exam (MMSE) of 1/10. An acquaintance had discovered him acting irrationally and attempting to put dog food into the washing machine. On arrival to the Accident and Emergency department, he was alert and disorientated and unable to answer any questions coherently. His acquaintance gave the history that the patient had been bitten by a friend's dog 2 days previously but had been well since with no signs of illness until the present. On examination, the most notable finding was fever and that his left hand exhibited two small puncture wounds with mild local swelling and cellulitis. The joints appeared unaffected and an x-ray of his hand showed no bony injury, radio-opaque foreign body or evidence of joint swelling. The remainder of the physical examination with particular emphasis on the cardiovascular and respiratory systems was otherwise unremarkable. Apart from confusion there were no other positive neurological findings.

Sepsis secondary to a dog bite was suspected, and following immediate blood cultures he was administered intravenous antibiotics in the form of clavulanic acid–potentiated amoxicillin (Augmentin[®]) and commenced on aggressive fluid resuscitation. Laboratory investigations revealed a very high C-reactive protein (238), normal white cell count

(6.3) and mild acute renal failure with a high urea (10.3). Chest x-ray was clear. Brain CT was normal.

He remained haemodynamically stable throughout, and 3 h after admission his temperature returned to normal and his mental state improved to an MMSE of 7/10.

For 2 days he remained stable and appeared to be doing well. However, on day 3, he suddenly became very confused and attempted to self-discharge. At this stage, he was found to be feverish at 38.3°C and hypotensive at 87/55 mm Hg, and the blood cultures from admission were reported as growing gram-negative rods. On the advice of the consultant microbiologist he was commenced on intravenous meropenem to cover infection with *C canimorsus* and *Pasteurella* species.

The following morning, he was noted to have developed a non-blanching purpuric rash over both calves (figure 1B) and swollen right 1st metatarsal phalangeal (MTP) joint with a black, ischaemic dorsal surface of the first toe on his right foot (figure 1C).

Laboratory investigations showed thrombocytopenia with the platelet count falling to 32 000.

On day 4, it was apparent that he was improving on the intravenous meropenem. *C canimorsus* was now formally identified from the blood cultures and his antibiotics were changed to a combination of intravenous meropenem, ciprofloxacin and clindamycin. On day 6, he was taken to the operating theatre for aspiration of his right first MTP joint and debridement of his now necrotic left hand (figure 1A). A transthoracic echocardiogram demonstrated normal heart valves but an aortic root abscess could not be excluded. A subsequent transoesophageal echocardiogram showed no evidence of vegetations, abscess or aneurysm. CT showed no mediastinal or chest abnormalities.

Figure 1 Composite slide showing (A) dorsum of hand with progressive local skin necrosis, (B) non-blanching purpuric vasculitic rash on shins, (C) ischaemic changes dorsum of right big toe and painful swollen 1st metatarsal phalangeal joint, (D) gram-negative rods seen in blood culture.

DIFFERENTIAL DIAGNOSIS

Any cause of sepsis in a patient presenting with fever and confusion, including bacterial meningitis, encephalitis, severe pneumonia, acute bacterial endocarditis.

TREATMENT

Treatment of *C canimorsus* is generally with β -lactamases as first line although cephalosporins can also be used.

OUTCOME AND FOLLOW-UP

By day 11, the patient had improved considerably; the meropenem was discontinued and he was continued on ciprofloxacin and clindamycin for a further 6 days intravenously, followed by 7 days of oral treatment. He was discharged well. He will require plastic surgical review and likely grafting to the dorsum of his left hand.

DISCUSSION

C canimorsus infection is the most severe and rapidly progressive bacterial infection transmitted by dog bite.¹ The spectrum of *C canimorsus* infections is very wide ranging and can be potentially fatal. The majority of serious cases are associated with liver cirrhosis¹ or splenectomy^{2 3}; however, 40% have no identifiable risk factors.⁴

Capnocytophaga do not produce endotoxins, and sepsis secondary to infection is extremely rare. The clinical features range from mild to fulminant; after

an incubation period of 1–7 days, patients can experience sudden shortness of breath, confusion and rapid progression to septic shock.⁵ On physical examination, there may be a rash ranging from purpuric to gangrenous. Disseminated infection can lead to injury to the endothelium resulting in disseminated intravascular coagulation.¹ In addition, patients may present with the clinical features of endocarditis or meningitis, and with a history of dog bite this should raise the suspicion of *C canimorsus* infection.¹ A few cases of haemorrhagic adrenal insufficiency and purpura fulminans⁶ have been reported as a consequence of widespread inflammation.

C canimorsus is a fastidious gram-negative rod which may require an extended incubation period to grow in the laboratory.¹ Treatment of *C canimorsus* is generally with β -lactamases as first line although cephalosporins can also be used.

This case also underlines the importance of acute confusion as an adverse prognostic sign in acute infections, particularly in those who are younger and without comorbidities. This is something that is already accounted for in some scoring screens for assessment of severity of infections such as pneumonia. However, it is vital to remember that a toxic confusional state represents a profound change in internal homeostasis and physiology and that this may not be immediately obvious on routine blood tests and clinical examination.

Learning points

- Sepsis can develop quickly after what appears initially as an innocuous bite.
- *C canimorsus* infection should always be considered in cases of dog bite; appropriate antibiotics should be started without delay pending culture results.
- Presentation of any infection with altered mental state is an adverse prognostic sign.

Competing interests None.

Patient consent Obtained.

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