CASE REPORT

Overwhelming *Capnocytophaga canimorsus* infection in a patient with asplenia

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SUMMARY

Patients with asplenia are prone to overwhelming infections due to encapsulated organisms. We report a 62-year-old man presenting with fever and weakness. His medical history was significant for splenectomy and owning a dog as pet. The patient on examination had evidence of animal bite and scratch marks on his lower extremity and developed dry gangrene of multiple digits of his upper extremity soon after admission. The patient's initial blood cultures were positive for Gram-negative rods, but no organism was identified. *Capnocytophaga canimorsus* was the suspected organism and the patient's antibiotics were tailored accordingly, with good clinical recovery. The patient's blood cultures finally grew *C canimorsus* on day 20 for which the patient had already been treated with prior clinical judgement. Physicians should be aware of this organism in the setting of sepsis in patients with asplenia and use appropriate antibiotics until further results are obtained.

BACKGROUND

The spleen is the largest lymphoid organ in the body and acts as a mechanical filter for particulate antigens and microorganisms. As a part of the immune system, the spleen is involved in production of immune mediators like opsonins. A decrease in these immune mediators responsible for opsonisation occurs in splenectomised patients.^{1 2} The ability of the spleen to remove encapsulated bacteria is especially significant. The antibody response to capsular polysaccharide (in encapsulated bacteria) in normal adults consists of IgM and IgG2. In patients with asplenia, IgM production is impaired, recognition of carbohydrate antigens and removal of opsonised particles containing encapsulated organisms are defective.³ Consequently, patients with asplenia and hyposplenia are susceptible to fulminant infections, for example, overwhelming postsplenectomy infections (OPSIs).⁴⁻⁶

CASE PRESENTATION

We report a case of a 62-year-old man who presented to the emergency room with fever and weakness for the past day. The patient mentioned being in good health; not having any active symptoms prior to this day. He denied having any chronic medical condition and denied taking any medication on a chronic basis. His medical history was significant for splenectomy 40 years ago after a motor vehicle accident. He denied any sick contacts and denied any family medical history of malignancies. The patient worked as a mail man and had a

dog as pet. He was an active smoker with 30-pack-year smoking history. He denied alcohol or illicit drug use.

The patient at the time of initial examination had fever (38.3°C) and signs of dehydration. He was tachycardic (94/min) and hypotensive (108/65 mm Hg) at presentation. On a more detailed examination, animal bite and scratch marks were observed on his lower extremity. On further questioning, it was found that the dog has recently scratched and bit the patient on his leg while the patient was trying to clean the dog. The dog was owned by the patient, had yearly rabies vaccination and had no contact with other animals. The patient was up to date with his tetanus vaccination.

Over the next 24 h the patient's condition deteriorated where he became progressively more hypotensive and had to be started on vasopressors. He also developed respiratory failure and hence was intubated and transferred to the intensive care unit.

INVESTIGATIONS

The patient's laboratory results revealed a marked leukocytosis (WCC=28 400 cells/mm³) with 88% neutrophils. The patient further developed thrombocytopenia (platelet count=18 000 cells/mm³) and acute renal failure with his serum creatinine rising from 1.6 to 6.4 mg/dL during first 48 h of hospitalisation. During the same time the patient had laboratory evidence of disseminated intravascular coagulation with prolonged prothrombin time, decreased fibrinogen level and elevated levels of fibrin degradation product along with his severe thrombocytopenia.

TREATMENT

The patient was recognised to be in sepsis early after his presentation to the hospital. He was started on broad spectrum antimicrobial coverage with vancomycin and piperacillin/tazobactam in the first few hours after his presentation. Blood cultures were drawn appropriately prior to starting antimicrobial therapy and were initially positive for Gram-negative rods, but no organism was identified.

The patient progressed to a multiorgan system failure and required prolonged intubation, haemodialysis for his acute renal failure and continuation of his vasopressor support. An infectious disease consult was requested and in light of a patient with asplenia with possible exposure to canine saliva presenting with sepsis with Gram-negative rod a presumptive diagnosis of fulminant *C canimorsus* infection was considered. Vancomycin was

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discontinued at this time and piperacillin/tazobactam was continued for a total of 14 days. The patient's blood cultures, which had initially demonstrated Gram-negative rods, had still not grown any organism at the time of discontinuing antimicrobial therapy.

OUTCOME AND FOLLOW-UP

The patient had a slow improvement in his clinical symptoms where he was slowly weaned off vasopressor therapy and extubated. His renal functions improved and his serum creatinine stabilised without haemodialysis, and the patient had a resultant good urine output. The patient had developed dry gangrene of multiple digits of his upper extremity which were evident in the first few days after his admission. Once his medical condition had stabilised, he was taken to the operating room in the second week of his hospitalisation for amputation of his digits. He was later transferred to the rehabilitation unit. The patient's blood cultures finally grew *C. canimorsus* on day 20 for which the patient had already been treated with prior clinical judgement. The patient was unaware of his asplenia increasing the risk of various infections and was educated about the same on discharge. He was further educated about the risk of *C. canimorsus* through animal contact.

DISCUSSION

C. canimorsus is a fastidious Gram-negative bacillus, previously referred to as Center for Disease Control group DF-2 (dysgonic fermentor-2), and part of normal oral flora of dogs and cats. The organism is transmitted to humans by exposure to an animal, usually via bite or scratch and can lead to fulminant sepsis.⁷ An illness preceded by a dog bite with manifestations of disseminated intravascular coagulopathy (DIC), symmetrical peripheral gangrene and renal cortical necrosis was first described in 1970 as caused by the organism dysgonic fermenter-2 (DF-2).^{8,9}

Capnocytophaga infection can range from self-limited disease to severe infection characterised by DIC and death. Some of the major clinical features described in previous case reports have included cellulitis, meningitis, Sweet's syndrome, fulminant bacteraemia with septic shock, renal failure, haemorrhagic skin lesions, complicated pneumonias and bacterial endocarditis.^{10,11} Mortality from sepsis secondary to *C. canimorsus* can range from 25% to 60% in patients, with higher mortality among patients presenting in septic shock. The spectrum of clinical features for patients with this infection ranges from mild to fulminant, and the clinical manifestations of sepsis are secondary to a profound inflammatory response leading to microvascular injury of the endothelium, resulting in disseminated intravascular coagulation, acute respiratory distress, gangrene and organ damage. Patients with severe manifestations might develop septic shock that can progress to multiorgan failure and death.^{12,13} Gangrene and purpura fulminans might occur as a consequence of widespread inflammation, endothelial damage, hypoperfusion and disseminated intravascular coagulation.¹⁴

Infections in patients with asplenia can occur with any organism; however, *C. canimorsus* should be considered in light of a risk factor such as canine exposure as seen in our reported patient. Local resistance patterns should be taken into account when selecting an initial presumptive regimen directed towards

the mentioned organisms. Preventive strategies in reducing OPSIs include education, immunoprophylaxis and chemoprophylaxis. The potential seriousness of postsplenectomy sepsis and rapid time course of progression should be explained to patients and also be instructed to seek immediate medical attention in the event of any acute febrile illness.⁵ Further, patients should be educated about the risk of *C. canimorsus* through animal contact.

Learning points

- ▶ Patients with asplenia are more prone to overwhelming infections due to encapsulated organisms which can progress rapidly and can be fatal.
- ▶ *Capnocytophaga canimorsus* is a fastidious Gram-negative bacillus, and part of normal oral flora of dogs and cats. The organism is transmitted to humans by exposure to an animal, usually via bite or scratch and can lead to fulminant sepsis.
- ▶ All patients should be educated about the risks of infections and that both immunoprophylaxis and chemoprophylaxis are used for prevention.

Competing interests None.

Patient consent Obtained.

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