



## Case Report

## *Klebsiella pneumoniae* Causing Necrotizing Fasciitis in a Patient With Thalassaemia Major

### 一個患有重度地中海型貧血病人因克雷白氏肺炎菌引發壞死性筋膜炎

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## ABSTRACT

We present a case of *Klebsiella pneumoniae* necrotizing fasciitis in a patient with thalassaemia major. *Klebsiella* sp. is known to cause severe infections in patients with thalassaemia, with high mortality rates.

## 中文摘要

我們敘述一個患有重度地中海型貧血病人因克雷白氏肺炎菌引發壞死性筋膜炎的病例。克雷白氏菌屬已知會對地中海型貧血的病人造成嚴重的感染並有很高的死亡率。

## Case Report

A 26-year-old man with a history of diabetes mellitus, beta thalassaemia major (Cooley's anaemia), and transfusion-related iron-overload cardiomyopathy and atrial fibrillation, was admitted to our hospital with progressive left forearm tenderness after insertion of an intravenous cannula, which was then promptly removed. Within 12 hours after admission, he developed a fever and intense pain of forearm. Examination showed minimal swelling, no erythema, no crepitus, and no neurovascular deficit. Laboratory findings were as follows: haemoglobin, 9.9 g/dL; white cell count,  $4.5 \times 10^9/L$ ; platelet count,  $156 \times 10^9/L$ ; C-reactive protein, 10.1 mg/dL; erythrocyte sedimentation rate, 80 mm/hr; and glucose, 24 mmol/L.

A computed tomography scan of the forearm demonstrated swollen flexor carpi ulnaris but no abnormal gaseous density. Aspiration at the site of maximal tenderness on the anterior aspect of the forearm yielded serous fluid, which subsequently revealed gram-negative rods. Parenteral antibiotics, including ciprofloxacin, and subsequently, meropenem were administered. Emergency surgery revealed necrotizing fasciitis of the forearm from the cubital fossa to the carpal tunnel (Figure 1A). This was confirmed subsequently on histological examination of the tissue specimen. Intra-operative cultures resulted in pure growth of *Klebsiella pneumoniae* susceptible to ceftriaxone, gentamicin, and piperacillin/tazobactam.

The antibiotic regimen was converted to intravenous tazocin. Forty-eight hours later, he developed a swelling in his left flank, and aspiration revealed frank pus. He underwent an emergency incision and drainage, which revealed subcutaneous necrotic tissue although cultures did not yield any growth.

He underwent six further surgical procedures for surgical debridement and wound coverage using partial-thickness skin graft. He was discharged after 66 days in our hospital, and the wound had completely healed (Figure 1B). Antimicrobial treatment was administered for a total of 48 days.

## Discussion

Monomicrobial (Type II) necrotizing fasciitis is commonly caused by Group A streptococci, with more than 25% of cases caused by *Streptococcus pyogenes*. *K pneumoniae* is a common co-pathogen in polymicrobial (Type I) disease, but it is very rarely the sole organism causing this infection.<sup>1</sup> To our knowledge, only 15 cases have been reported in the literature. With the exception of one case occurring in Turkey<sup>2</sup> and one in Canada,<sup>3</sup> all the remaining cases occurred in Asian countries, with 11 cases reported in Singapore, Hong Kong, Taiwan, Japan, and Malaysia; one in a native Indian who had recently travelled to Singapore; and one in a Cambodian man treated in North America.<sup>4–10</sup> Twelve of the 15 cases were associated with diabetes mellitus or chronic liver disease.

The clinical features of *Klebsiella* sp. necrotizing fasciitis are similar to those caused by other organisms, but it tends to occur as a result of haematogenous seeding rather than direct inoculation,

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**Figure 1.** (A) Intra-operative findings of extensive necrotizing fasciitis spanning the volar aspect of the forearm. (B) Complete recovery with skin graft well healed on discharge.

with rapid spread causing multifocal infection. The pathogenicity of different virulent strains of *K pneumoniae* is determined by their polysaccharide envelope. It has been recognised that the most virulent K1 serotype is more prevalent in the East.<sup>11</sup> They tend to cause disseminated infection with multiorgan involvement. A high index of suspicion is required in all patients with soft tissue infections, but necrotizing fasciitis needs to be excluded actively, particularly if *Klebsiella* sepsis is established in this group of patients.

Thalassaemic patients have underlying immune abnormalities and immune deficiencies caused by splenectomy and multiple blood transfusions. They are often in a state of iron overload, both from the excessive iron absorption normally present in such cases and from regular blood transfusions. Such patients are often on oral chelating agents to reduce their iron load. Iron is an essential growth factor for bacteria, and many common gram-negative bacteria secrete high-affinity Fe chelators called siderophores. Some pathogens, such as *Yersinia enterocolitica*, *Klebsiella* sp., and

*Pseudomonas aeruginosa*, are so impaired in iron acquisition ability that their virulence is increased in the presence of excess iron. Interestingly, *Y enterocolitica* predominantly affects thalassaemic patients in Western countries, whereas *Klebsiella* sp. infections have only been reported from Asia.<sup>12</sup> High rates of morbidity and mortality are associated with cases of *Klebsiella* sp. infections. Oral chelating agents have also been demonstrated recently to enhance the growth of *Klebsiella*.

Both diabetes and thalassaemia predisposed our patient to severe bacterial infection. It is not possible to determine if our patient had contracted the infection by direct inoculation from the intravenous cannula. The propensity for *Klebsiella* sp. to infect hosts with iron-loading conditions resulted in this rare but serious case of monomicrobial *K pneumoniae* necrotizing fasciitis. Early recognition and prompt radical surgical debridement resulted in successful eradication of the infection.

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