CASE REPORT

Necrotising fasciitis caused by *P aeruginosa* in a male patient with chronic lymphocytic leukaemiaChristopher Emmett,¹ Grant Kane²

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SUMMARY

A 53-year-old man with chronic lymphocytic leukaemia and multiple comorbidities presented with a 2-day history of increasing pain and swelling in his left leg following a minor trauma, associated with signs of systemic sepsis and worsening multiorgan failure. The clinical picture was consistent with necrotising fasciitis and he was taken to the theatre for an above-knee amputation. Blood and tissue cultures grew *Pseudomonas aeruginosa* only, which is very rare as a monomicrobial infection, with relatively few cases being reported in the literature. The combination of aggressive timely surgical intervention, broad-spectrum antibiotics and treatment on the intensive care unit yielded a successful outcome from this acute episode.

BACKGROUND

Necrotising fasciitis is a severe soft tissue infection with a high morbidity and mortality.^{1 2} Good outcome depends on early diagnosis and aggressive surgical excision of necrotic tissue.¹ Clinical diagnosis can be challenging due to the paucity of early skin signs, and therefore, it is important to have a high index of suspicion in at-risk patients.¹ We report a case of pseudomonal necrotising fasciitis that was successfully treated. This case also adds to the relatively small number of reported cases of necrotising fasciitis secondary to monomicrobial pseudomonal infection.

CASE PRESENTATION

A 53-year-old man presented with a 2-day history of increasing pain and swelling in his left leg following a minor trauma sustained while having a shower. On admission, he was systemically unwell. His leg had become very swollen and he was unable to weight-bear. He had an extensive medical history including chronic lymphocytic leukaemia, deep venous thrombosis (DVT) and pulmonary embolism (on warfarin therapy), restrictive lung disease, obstructive sleep apnoea, ischaemic heart disease, transient ischaemic attacks, chronic cerebral ischaemia and chronic cholecystitis.

At presentation, he was haemodynamically unstable with a pulse of 105 and blood pressure of 85/50. The patient's condition continued to deteriorate rapidly, and he began to develop multiorgan failure, requiring haemofiltration and non-invasive ventilation. The intensive care team was concerned about the persistent leg swelling and contacted the surgical team on day 4. On examination, the left leg was swollen and tense with a significant bullous rash, with pain on passive movement. The clinical picture was consistent with necrotising fasciitis.

INVESTIGATIONS

Blood tests showed a C-reactive protein (CRP) of 185, white cell count of 47.8, urea of 12.1 and creatinine of 182 on the day of presentation. By that evening, this had worsened, with a creatinine now of 245 and CRP of 269.

Ultrasound examination showed gross oedema of the soft tissues of the leg but no DVT. Plain radiographs did not show any abnormality of the tibia or fibula.

Blood cultures grew *Pseudomonas aeruginosa*, which was also isolated from wound swabs and a tissue sample taken at the time of the surgery. This was sensitive to gentamycin and Tazocin but resistant to amoxicillin and co-amoxiclav. Histology demonstrated loss of surface epithelium, marked oedema of the deep dermis and subcutis, as well as acute inflammation and neutrophil polymorphs. These features are consistent with necrotising fasciitis (figure 1).

DIFFERENTIAL DIAGNOSIS

The alternative diagnoses considered in this case to explain the acutely swollen leg were severe cellulitis, DVT, possible occult bony injury (pathological fracture) or compartment syndrome secondary to ischaemia/fracture. However, none of these explain the systemic deterioration and multiorgan dysfunction observed, in the absence of another source of sepsis. It is essential to exclude necrotising fasciitis in cases such as this as the morbidity and mortality increase greatly the longer it is left.³ Misdiagnosis in this case would have grave consequences for the patient.

TREATMENT

The patient was transferred to the intensive treatment unit and broad-spectrum intravenous antibiotics were started (co-amoxiclav and Tazocin). In addition, his worsening organ dysfunction required haemofiltration and non-invasive ventilation. In view of the patient's continuing deterioration despite maximum medical and intensive care management, a decision was made to proceed to surgery immediately following surgical review on day 4.

Initial fasciotomies revealed that although the superficial layers of skin and subcutaneous fat were actively bleeding, the muscles of the posterior leg compartment did not respond to electrical or physical stimulation, suggesting ischaemia. Incisions over the widespread skin blisters revealed patchy areas of necrotic tissue. This strongly suggested a clinical diagnosis of necrotising fasciitis, and an above-knee amputation was performed, leaving the stump open. The patient was returned to the intensive therapy unit (ITU).

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Figure 1 Pathology slide demonstrating the features of necrotising fasciitis.

Table 1 Taken to the theatre on day 4. Table shows improvements in renal function and CRP following surgery

Days since admission	1	2	3	4	5	6	7
Haemoglobin	11.5	10.8	9.3	8.4	8.5	8.4	8.3
Urea	12.1	18.5	24.6	29.7	20.2	15.7	13.0
Creatinine	182	265	237	383	252	204	164
CRP	185	385	394	357	380	285	114

CRP, C-reactive protein.

Postoperatively, his renal function and inflammatory markers began to improve rapidly (table 1). He was taken to the theatre 3 days later for inspection of the wound; this revealed that the infection had not spread further and closure of the stump was performed.

OUTCOME AND FOLLOW-UP

The patient had a prolonged recovery with a long ITU stay, complicated by pneumonia. However, no further debridement was necessary and he slowly recovered, being discharged to a community hospital for rehabilitation 2 months after admission.

Six months later, he was managing well, given the nature of his disability and comorbidities, and was engaging with the rehabilitation services. However, he was admitted several times on account of his chronic illnesses; on one occasion 9 months postsurgery, he presented in multiorgan failure with chronic obstructive pulmonary disease and pneumonia. Sadly, he passed away as a result of this.

DISCUSSION

Numerous pathogens may cause necrotising fasciitis; most commonly, it is a polymicrobial infection,^{4 5} and pseudomonas is frequently one of the organisms isolated in such infections.⁵ Monomicrobial pseudomonal necrotising fasciitis, however, is very rare,^{2 5 6} but it has been described in patients with

underlying malignancy,⁵ including children with acute lymphoblastic leukaemia,⁷ and in immunocompromised patients.^{1 5}

A recently published case report and review article found 37 case reports of monomicrobial pseudomonal necrotising fasciitis in the literature.⁵ This article reported a mortality of 30%. Fifty-seven per cent of cases were children and 50% had haematological malignancy, the majority of whom were undergoing chemotherapy at the time of onset of infection.⁵ Regardless of the causative organism, early diagnosis and rapid surgical excision are associated with better outcomes.³⁻⁵ The factors pointing to this diagnosis in this patient were as follows:

1. Clinical features: minor trauma, pain disproportionate to visible signs, later development of tense overlying skin and bullous rash with underlying soft tissue necrosis.⁴
2. Systemic toxicity, shock and progression to multiorgan failure despite ITU management.
3. Patient comorbidities (haematological malignancy, cardio-respiratory disease).³⁻⁵

The diagnosis remains a clinical one, as signs such as soft tissue gas are not always present on plain radiographs, and diagnostic tests such as tissue biopsy and MRI may delay diagnosis inappropriately.⁴

Learning points

- In any patient presenting with the above features, necrotising fasciitis should be suspected.
- Patients with comorbidities or haematological malignancy and older patients and those in whom surgery is delayed by more than 24 h have an increased mortality.³
- A high index of suspicion is vital^{1 4 5} and early surgical referral should be made.⁴

Competing interests None.

Patient consent Obtained.

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