Reminder of important clinical lesson

Necrotising fasciitis of the thumb

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Summary

Necrotising fasciitis is a rare condition that should be diagnosed early and managed aggressively in order to avoid death. We present a case of necrotising fasciitis of the thumb and discuss the assessment and management of this serious condition. A 44-year-old woman presented with a painful and erythematous right thumb and progressive swelling of her hand following a minor injury to the tip of her thumb 3 days previously. A diagnosis of necrotising fasciitis was made and the patient underwent urgent debridement of non-viable tissue. She required 1 week of supportive therapy in intensive treatment unit and was discharged from hospital after 3 weeks. Necrotising fasciitis is a rapidly progressing life-threatening infection, usually caused by streptococcal organisms. Immediate resuscitation, broad-spectrum intravenous antibiotics and early surgical debridement are necessary in order to avoid significant morbidity and mortality.

BACKGROUND

Although rare, with an incidence of 0.4 cases per 100 000 population,¹ necrotising fasciitis (NF) is a serious condition with a delay in diagnosis almost universally proving to be fatal.

It is imperative for clinicians to be aware of the condition itself and to all potential diagnostic aids so that early treatment can be instigated. Owing to the spectrum of presentation, some indolent forms of NF can resemble a severe cellulitis but clues in this case contributed to an early diagnosis that almost certainly saved this patient's life. Indeed, the authors want to emphasise in this case report the signs and symptoms that may indicate a diagnosis of NF and why such cases must be treated early to prevent an unfavourable outcome. Certainly, although the patient in this case progressed to severe systemic compromise, as do most cases of NF, early surgical debridement in combination with broad-spectrum antibiotics and intensive care involvement ensured a successful outcome.

CASE PRESENTATION

A 44-year-old teacher visited her general practitioner with a painful, erythematous right thumb and increasingly swollen hand and was referred on to her local plastic surgery unit with a referring diagnosis of 'severe cellulitis'. Three days previously, she had sustained an innocuous cut to the tip of the thumb while peeling potatoes. In the 24 h prior to attending hospital she had felt unwell and feverish, and subsequently dark blisters started to develop on the thumb. At presentation, she was systemically stable and cardio-respiratory examination was normal.

She was a non-smoker with no drug allergies and her medical history included mild depression, sinusitis, hypothyroidism and mild asthma for which she took a steroid inhaler.

INVESTIGATIONS

Routine lab investigations revealed a white cell count of 12.5 and C-reaction protein of 54. Arterial blood gas revealed an elevated lactate of 1.8 and pH of 7.3

DIFFERENTIAL DIAGNOSIS

The differential diagnosis included NF and other infections of the hand such as subcutaneous abscess, severe cellulitis or flexor tenosynovitis.

TREATMENT

Although the patient had been referred as a severe cellulitis, a diagnosis that would warrant elevation and intravenous antibiotics, the on-call plastic surgery registrar recognised that the dark blisters and severity of the cellulitis with areas of fixed staining (figure 1) could represent NF and therefore she was taken directly to theatre for urgent debridement of non-viable tissue. Gram staining of tissue excised showed numerous positive cocci, later confirmed as group A β -haemolytic streptococcus. Second and third explorations were carried out in theatres at 24 and 72 h revealing no further extension of the infection (figure 2).

Within minutes of starting her first debridement, the patients' blood pressure fell rapidly as a result of streptococcal pyogenic exotoxins and streptococcal superantigens entering the systemic circulation and this necessitated high level of inotropic support on intensive treatment unit. In addition to requiring cardiovascular support, she later developed adult respiratory distress syndrome. After 1 week of supportive therapy she left the intensive care unit and following three negative swab results, her wounds were skin grafted (figure 3).

OUTCOME AND FOLLOW-UP

The patient was discharged from hospital after 3 weeks. In this case there were few risk factors for developing NF; however, early diagnosis and aggressive surgical management led to a limited resection and undoubtedly saved the patient's life.

DISCUSSION

NF is a life-threatening and rapidly progressing infection that spreads along fascial planes.² It is usually caused by streptococcal organisms, but often a variety of both

Figure 1 Preoperative findings show severe swelling, blisters and erythema with areas of fixed staining suggestive of skin necrosis.

aerobic and anaerobic pathogens are grown from culture.^{3 4} In particular, group A β -haemolytic strains are believed to cause a more profound systemic sepsis. Production of bacterial toxins and enzymes, such as hyaluronidase, cause rapid progression of the infection through the fascia,⁵ which undergoes liquefactive necrosis. As further bacterial proliferation and necrosis occur, occlusion and suppuration of blood vessels lead to evolving skin ischaemia.⁶

Although a history of trauma is usually present such as a scratch or bite,⁴ often no cause can be established. NF

Figure 2 Two weeks following initial debridement note decreased erythema and swelling to hand. The forearm wound has been closed and debrided areas show healthy granulation tissue, although the carpal tunnel incision has not yet been closed.

Figure 3 Some mild stretching of the forearm scar but thumb wounds have all healed following skin grafting and healing by secondary healing.

can occur following surgery, intravenous drug use, burns and childbirth, and can complicate soft tissue infections.⁷ Factors that render patients susceptible to NF include any chronic disease or co-morbid condition that could suppress the immune system including malignancy, malnutrition, obesity, immunosuppressive drugs and renal failure.⁷

NF can develop in any part of the body with the perineum, extremities and trunk most commonly affected. Difficulty can arise distinguishing between NF and severe cellulitis, both often presenting with signs of inflammation. However, early subtle signs such as extreme pain or disproportional tenderness and systemic upset with rapid progression should alert the clinician to the possibility of NF. As the infection evolves, patients become increasingly septic and unstable, developing signs more indicative of NF including crepitus (37% of patients⁷), severe oedema, fluctuance and blistering of the skin, later progressing to the presence of necrotic patches. The early, often non-specific signs of NF therefore require a high index of suspicion for diagnosis, as a delay in treatment until the diagnosis is more apparent is more likely to result in increased morbidity and mortality.⁸

Although routine blood tests and plain radiographs can help the clinician to differentiate from other conditions, the diagnosis of NF is primarily based on clinical findings. If a high suspicion exists then additional tests should be avoided so as not to delay treatment. Certain scoring systems such as the LRINEC (laboratory risk indicator for necrotising fasciitis) utilise routine blood tests including white cell count, glucose, sodium, haemoglobin and creatinine to aid diagnosis as these markers are often altered in NF. However, the markers can be abnormal in other infective or inflammatory conditions and are therefore neither sensitive nor specific enough to replace the more reliable approach of making the diagnosis according to clinical findings.⁹ Additional simple tests such as blood gas analysis showing an acidosis and high lactate levels are strongly associated with NF.⁷ Several forms of NF involve gas-forming bacteria and plain radiography can be useful to demonstrate gas in the soft tissues. In cases where diagnosis is not certain CT, ultrasound and MRI have also been used as diagnostic aids.¹⁰⁻¹²

To summarise, NF is a life-threatening condition where the symptoms and signs are often non-specific and may

include swelling, erythema, pain and tachycardia. As the infection progresses, more typical findings such as disproportionate pain, skin ecchymosis, blisters/bullae and necrosis with subcutaneous crepitus predominate as do systemic features such as fever, tachycardia and hypotension.⁸ If the clinician recognises some of these symptoms and signs then immediate resuscitation and broad-spectrum intravenous antibiotics should be initiated alongside urgent surgical debridement. The early recognition of NF using these symptoms and signs, followed by urgent referral to surgeons, microbiologists and intensive care and subsequent prompt surgical intervention has helped to decrease the mortality from over 70% to approximately 20% and certainly ensured the survival of the patient in this example.^{3–4} Aggressive debridement aims to excise all necrotic tissue up to healthy bleeding margins. The presence of a 'murky dishwater fluid' is sometimes seen on incising the deep fascia from which urgent microbiological analysis of tissue and fluid can help to tailor antibiotics. Postoperatively patients should be managed on the intensive care unit where they often require physiological support from the ensuing overwhelming systemic compromise. Further debridement is often carried out in theatres after 24–48 h to ensure excision of all necrotic tissue. Once fully recovered from the infection, closure and reconstruction of the wound can be planned.

Learning points

- ▶ Necrotising fasciitis is a rapidly progressive severe infection of the fascia that requires a high index of suspicion in order to make a prompt diagnosis and instigate rapid treatment.
- ▶ Although certain imaging and laboratory tests may be useful, diagnosis is largely based on clinical findings.
- ▶ The principal symptom is severe pain, often out of proportion to skin changes.
- ▶ The main sign is of a rapidly spreading severe cellulitis, soon followed by severe blistering and skin necrosis.
- ▶ Early surgical referral and involvement of microbiology and intensive care teams are pivotal in ensuring a favourable outcome.

Competing interests None.

Patient consent Obtained.

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