CASE REPORT

Successful management of a 24-year-old pregnant woman with necrotising fasciitis of the forearm

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SUMMARY

A 24-year-old woman who was 24 weeks pregnant presented to the emergency department with septic shock and an elbow wound that had become infected. She sustained an injury to the tip of the right elbow on a light switch 4 days prior. In the space of 1 day, she developed a necrotising soft tissue infection, which was rapidly spread to the forearm with florid sepsis. Her initial serum C reactive protein was 392 mg/L, and white cell count was $32 \times 10^9/L$. The patient was treated promptly with aggressive surgical debridement and broad-spectrum antibiotics. An early multidisciplinary approach including orthopaedic surgeons, anaesthetics, intensive care, obstetrics, microbiologists and paediatrics was taken. Ultimately, both mother and child had an excellent outcome, the former of whom only had minimal soft tissue resection and primary wound closure. Emphasis is made on first treating the mother as the patient and priority.

BACKGROUND

Necrotising fasciitis was first described by Wilson in 1952.¹ His description literally describes a rapidly progressive infection spreading across the fascial plane. However, the more modern definition has evolved. The old term fasciitis implies the disease process involves the fascial layer only, which it does not. The new term 'necrotising soft tissue infection' (NSTI) is more appropriate, which describes a relatively uncommon but rapidly progressive soft tissue infection, which can occur in any tissue plane.² The incidence is 0.24–0.4 per 100 000.³ This condition requires urgent aggressive surgical debridement and broad-spectrum antibiotics. If either of these are delayed, it has been shown that mortality increases dramatically.^{4,5} Mortality from this condition has been quoted to be from 6% to 76%.⁶

Delay in diagnosis is clearly one of the key issues in the management of this condition. The key issue is that initially the disease process is indistinguishable from cellulitis or abscess early on. Clinical features are localised erythema, pain disproportionate to clinical signs, fevers, chills, rigours, skin bullae, swelling, oedema and subcutaneous oedema.² Early input of a consultant surgeon in the management of this disease is of paramount importance and has been shown impact the outcome.⁵

Risk factors relate to host immune suppression and bacterial introduction. Immune suppression can occur, for example, from diabetes mellitus, AIDS or malignancy. Bacterial introduction risk is

increased through intravenous drug use, insect bites or skin abrasion.

Diagnosis is mainly clinical. Biochemical markers, imaging and other adjuncts can support the diagnosis. Aiding the diagnosis can be made on visualising necrotic tissue planes, which can be seen on ultrasound or MRI; however, these investigations should not delay the patients' attendance to theatre. If there is any doubt, a 'finger sweep' test can be performed. This can be employed in the emergency department, the ward or in theatre. A 2 cm incision is made after administration of local anaesthetic. A finger sweep down to the level of the fascia can be performed. If tissue separates from the fascia with ease, then this is diagnostic. Other features highly suspicious of a necrotising infection are absence of normal bleeding, dirty 'dishwater' fluid and discolouration of fat.⁷

There have been biochemical scoring systems devised for diagnosing NSTI, notably the Laboratory Risk Indicator for Necrotizing Fasciitis, published in Singapore.⁶ This includes looking at markers for C reactive protein, white cell count (WCC), haemoglobin, sodium, creatinine and glucose. The scoring system has had mixed acceptance, and others have shown the scoring system to be unreliable. Criticisms of this system are that it is not validated, and the original work was performed on a retrospective observational cohort within a Singaporean population.³

Sepsis can cause preterm labour, fetal infection and preterm delivery. The prevention of these complications is through early recognition and targeted therapy. This should include aggressive rehydration and broad spectrum antibiotics, with an emphasis on stabilisation of the mother as a priority, as in doing so the fetal status will likewise improve.⁸

CASE PRESENTATION

A 24-year-old woman who was 24 weeks pregnant presented to the emergency department with septic shock. She had knocked the tip of her right elbow 4 days previously, causing a 0.5 cm laceration. This had since been discharging pus in the previous day. She had also become systemically unwell with fevers and vomiting in this time period. She had no significant medical history, lived with her three other children (all fit and well) and partner and smoked 10 cigarettes per day. She did not take any other significant medications and had no allergies.

On presentation to the emergency department, the patient looked well, but her blood pressure was

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Figure 1 Erythema and swelling can be seen across the entire length of the forearm distally past the line marked. This line was marked approximately 2 hours previously, and the patient had already had broad-spectrum antibiotics with elevation in a Bradford sling.

84/45 mm Hg, heart rate was 110 beats per minute (bpm) and temperature of 34.8°C. Fetal heart rate was 142 bpm (normal). The elbow showed a wound with a large area of surrounding erythema and swelling. The area was hot to touch. She was able to move the elbow but with loss of 20° of flexion and extension.

The emergency department team with an intravenous 500 mL bolus of crystalloid fluid and broad-spectrum antibiotics managed her initially. As per microbiology advice, she was given tazocin, gentamicin and clindamycin. Prompt referrals to the obstetric and orthopaedic teams were made initially. Of importance, the doctor seeing the patient had marked the area of erythema with a skin marker. The erythema spread 6 cm proximal to the elbow and 5 cm distally initially.

On review by the orthopaedic team, her blood pressure had risen to 99/44 mm Hg. She was noted to have no neurovascular compromise. At this time swab samples of the wound were sent for microscopy and culture. The obstetric team simultaneously reviewed the patient and deemed high risk for preterm labour because of the sepsis and septic shock. Notably at this stage the erythema and oedema on the arm had spread past the marking on the arm. At this stage, it was agreed she should be taken to a high dependency setting and a slot organised for theatre. She was given a Bradford sling for elevation also. Her initial CRP was 393, WCC was 32, lactate was 1.19, pH was 7.39 and glucose was 5.1.

In theatre, pictures of her arm were taken after written consent was taken, as shown in [figures 1 and 2](#). After general anaesthetic, a large dorsal forearm incision was made. Extensive pus (around 20 mL) was noted around the entry point of injury. This was cleaned. Dirty dishwater fluid was noted around 15 cm distal to the elbow between the fat and the fascia. The fat

Figure 2 A close-up of photograph of the tip of the elbow showing the entry point of infection.

Figure 3 A photograph of the wound after debridement on the 'second look'.

layer separated very easily from the fascia up to 7 cm proximal to the wrist, again, confirming the diagnosis. Further microbiology samples were sent. The fat was also grey in the 10 cm distal to the elbow and as such debrided. The wound was washed with 6 L of normal saline. Of note, aside from immediately adjacent to the entry wound, no other skin was debrided. Small areas of 'stab test' were performed with needling, and the rest of the skin adjacent to the incision was still bleeding, which was thought at the time to be a good prognostic indicator and that the infection had been caught just in time. The wound was closed via mass wide interrupted suture. The patient also dropped her blood pressure during the procedure, requiring inotropic support, implying she had a 'septic shower'.

The patient was monitored closely on high dependency unit thereafter, by the intensive care, orthopaedic, obstetric and paediatric teams. Day 2 postoperatively she was noted to be completely stable and no longer on inotropic support and therefore transferred to ward care. Subsequent HIV screening and immunoglobulin screening was negative.

On serial wound review, it was noted on postoperative day 4 that there was more pus collecting centrally, and it was not healing in this area. There was also a small area of necrotic skin adjacent to this. She was taken back to theatre for a repeat debridement and excision of the necrotic area of skin. Again the wound was washed extensively with normal saline. Image of the wound at this stage can be seen in [figure 3](#). The wound was closed in a similar fashion. Four days later, she was taken to theatre again, as there was a central area of wound with a small amount of pus and delayed healing. This showed a small area of fat necrosis and required minimal debridement.

Figure 4 A photograph of the wound approximately 1 month after the initial admission, all but healed centrally.

Around 1 week after discharge and around 3 weeks after the initial presentation, she was seen in the clinic and the wound was examined (see [figure 4](#)). At this stage, we can see the wound is all but healed and there is still a central area of slough. She was brought back subsequently to clinic, and eventually the wound had fully healed. Prior to discharge, she was given a further course of oral antibiotics (clindamycin and coamoxiclav) after microbiological discussion. She had also grown beta haemolytic streptococcus from several wound cultures, which had sensitivities.

Approximately 3 months (38 weeks term) later, the patient gave birth by spontaneous vaginal delivery to a healthy baby without any complications or issues.

DISCUSSION

We have presented a case of necrotising fasciitis in a 24-year-old pregnant woman who had extremely early broad-spectrum antibiotics and radical surgical debridement. We feel this patient was prioritised by several teams, and her efficient, early, coordinated management led to an excellent outcome for both mother and child.

Necrotising fasciitis is a uncommon condition with a high morbidity and mortality. From a literature search, there are comparatively few other reported individual cases, but none reporting in the upper limb.^{9–13} Oud and Watkins¹⁴ report a population-based study looking at necrotising fasciitis during pregnancy and postpartum. They state of approximately 4 million patients, 148 over a 10 year period were pregnant and had necrotizing fasciitis, however this is only statistical data.

Our patient had no risk factors for necrotising fasciitis aside from pregnancy. This may imply as McHenry *et al*⁹ suggests that pregnancy itself may cause an immunosuppressive state enough for it to be considered a risk factor for the disease.

Of the seven patients, one died. A common theme in these cases is early radical surgical debridement. Pregnancy should not delay the surgical management. One key element we felt important is the 'bleeding test' that indicates if tissue is viable. A clear, conscientious decision was made on the initial debridement not to excise wide areas of skin but to clear all dead or necrotic areas of soft tissue. This meant the patient did not need subsequent skin grafting, and ultimately the cosmetic appearance was better.

Beta-haemolytic streptococcus is further classified by Lancefield grouping, a serotype classification, including group A streptococcus.¹⁵ In recent years, rates of maternal death from sepsis attributed to community-acquired group A streptococcal disease have been increasing, which has caused concern. As a result, the centre for maternal and child enquiries has published information for the general public and healthcare providers in order to prevent infection. This advice regards to preventing transmission, early diagnosis and timely treatment of group A streptococcal disease. It is specifically worth mentioning that in treating group A streptococcus, our microbiologists recommended high-dose clindamycin initially. This is because it is more effective than penicillin as it inhibits exotoxin production (which allow the bacterium to spread through tissue planes with ease).¹⁶

Learning points

- ▶ Necrotising fasciitis/necrotising soft tissue infection is a clinical diagnosis.
- ▶ Management in pregnancy is the same.
- ▶ Management includes broad spectrum antibiotics and very early aggressive surgical debridement.
- ▶ Senior surgical input should be sought early.

Contributors SN, mainstay of written paper. AM, review of paper and administrative elements. AI, paper review.

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Reminder of important clinical lesson

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