

Case study

Review of necrotising fasciitis of Pfannenstiel incision with a case report

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Abstract

Necrotising fasciitis (NF), which can develop in any part of the body, is a serious and life-threatening rapidly progressive infection. In this case report, a case of NF located at a Pfannenstiel incision is presented and the treatment process of the patient is discussed. A 39-year-old primiparous woman who had a diagnosis of superimposed pre-eclampsia was admitted to the emergency department with an eclampsia attack at 32 weeks of her pregnancy. Her medical history included diabetes mellitus and hypertension. An emergency caesarean section was performed. The patient was discharged on the 3rd day of her caesarean section without complications. On the 7th day of discharge, the patient fell in the bathroom. The patient was admitted to the emergency department on the second day of the fall due to foul-smelling discharge and wound dehiscence at the incision site. The patient was referred to the general surgery clinic and underwent emergency surgery by general surgeons with the diagnosis of NF. All necrotic tissues were removed until clean surgical margins were reached. Daily wound debridement was performed. On the 4th day of debridement, vacuum-assisted closure (VAC) treatment was started. After six sessions of VAC treatment, the patient's wound was completely closed.

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Introduction

Necrotising fasciitis (NF) is a serious and life-threatening infection characterised by rapidly progressive necrosis of the skin, subcutaneous tissues and fascia¹. The synonyms of NF are flesh-eating bacteria, flesh-eating disease, or suppurative fasciitis. The annual incidence of NF varies from 0.3–15 per 100,000 population²⁻⁴. The main factors determining the course of the disease are the virulence of the causative pathogen, the age of the patient, the extent of the infection, the time of the first debridement, concomitant systemic diseases, and malnutrition⁵. Different terms and classifications have been used to describe NF. This variety of classifications and terminology has been based on affected anatomy, microbial cause, and depth of infection⁶.

At onset, NF can be difficult to differentiate from cellulitis and other superficial infections of the skin. In fact, studies have shown that only 15–34% of patients with NF have an accurate admitting diagnosis^{7,8}. The most common reason for the delay in the diagnosis of NF is the inconsistency between clinical findings of the patients and the physical appearance of the lesion. Therefore, there is an area of infection that requires large debridement at the time of diagnosis. Cases with delayed diagnosis and treatment progress have a high morbidity and mortality. Reported mortality rates vary between 30–70% and are often related to causes such as multiorgan failure, respiratory failure, renal failure and sepsis⁹. NF patients with streptococcal infection are associated with an increased risk of complications and mortality of up to 80%¹⁰. Therefore, early diagnosis and surgical debridement are known contributors to improved outcomes in NF patients¹¹. Not only do delayed diagnosis and surgical intervention influence in-hospital mortality, but the development of secondary complications also has an unfavourable impact¹².

Treatment of NF is debridement that reaches healthy tissues and is repeated when necessary, and broad-spectrum antibiotherapy based on wound culture sensitivities.

Vacuum-assisted closure (VAC) is also an important option for treatment in appropriate and accessible cases.

This case report presents a NF case located at a Pfannenstiel incision in a patient with diabetes mellitus and discusses the patient's treatment process.

Case report

In June 2021, a 39-year-old primiparous woman who had a diagnosis of superimposed pre-eclampsia was admitted to the emergency department of the Erzurum Regional Education and Research Hospital, Erzurum, Turkey with an eclampsia attack at 32 weeks of her pregnancy. Her medical history included diabetes mellitus and hypertension. The patient's visual acuity was decreased due to diabetic retinopathy. There was no history of surgery. At first examination of the patient, vital signs of the patient were as follows: blood pressure 185/80mmHg; pulse rate 122 beats per minute; oxygen saturation on room air 94%; and body temperature 38.7°C. The patient's weight was 120kg, and her height was 170cm (BMI 41.79). There was no laboratory pathology except high leukocyte count ($18.1 \times 10^3/\text{mm}^3$), high C-reactive protein (CRP) level (130mg/L), and HbA1C level 6.6%.

At 32w+1 of gestation, an emergency caesarean section was performed and a male neonate with birth weight of 1910g and an Apgar of 8–9 was born. The patient was discharged on postoperative Day 3 without complications. The baby was followed-up at the neonate intensive care unit due to prematurity.



Figure 1. A 39-year-old woman admitted to the emergency department with a 5cm opening on a Pfannenstiel incision and purulent discharge

On the 7th day of discharge, the patient fell in the bathroom. The patient, who only had pain at the incision site, presented to the emergency department on the second day of the fall due to foul-smelling discharge at the incision site. At examination of the wound, there was a purulent discharge and a 5cm wound dehiscence (Figure 1). The patient was referred to the general surgery clinic and underwent emergency surgery by general surgeons. On exploration, there was a partial opening with purulent discharge at the left side of the Pfannenstiel incision. In addition, there was a huge inflamed cellulitic area with crepitation. Abscess drainage was performed under general anaesthesia. Approximately 300cc purulent fluid came from the abscess area. A sample was taken from the abscess material and sent for culture. All the necrotic tissues were removed until the clean surgical margins were reached (Figure 2). The operation area was cleaned with a mixture of hydrogen peroxide and povidone iodine.

Intravenous fluid treatment was started according to the BMI of the patient. Blood sugar level and blood pressure were monitored. A prophylactic antibiotic was commenced using piperacillin-tazobactam 4.5g intravenously (Q.I.D) and teicoplanin 400mg intravenously (B.D). Wound debridement and cleaning were applied to the patient for 3 days (Figure 3). On the 4th day of debridement, VAC treatment was started (Figure 4). Antibiotics were continued because *Citrobacter koseri* had grown in the wound culture and was sensitive to the current antibiotics. After six sessions of VAC treatment, the patient's wound was completely closed (Figures 5 and 6). The patient was discharged on the 13th day of hospitalisation without complications.

Discussion

NF is a rare disease of the superficial fascia and subcutaneous tissue characterised by systemic toxicity and high mortality.



Figure 2. Wound appearance after the first debridement

Although the exact incidence of NF following obstetric surgical procedures is not known, NF is mostly seen after trauma or after surgical procedures¹³. Current literature suggests that NF can occur at any age, but it is mostly reported within the age range of 32–57 years, as in our patient¹⁴.

Although NF is common in elderly and immunocompromised patients, chronic diseases, intravenous drug use, malnutrition, obesity, malignancy, human immune deficiency



Figure 3. Wound appearance after three sessions of debridement



Figure 4. Wound appearance at first VAC therapy



Figure 5. Wound appearance after third session of VAC therapy



Figure 6. Final view of the wound before discharge

virus, and long-term use of nonsteroidal anti-inflammatory and immunosuppressive drugs are also considered among the predisposing factors¹⁵. In the study by Jabbour et al., hypertension, diabetes mellitus and coronary artery disease were more prevalent among non-surviving patients⁹. In the present patient, the patient had uncontrolled diabetes mellitus and hypertension as chronic diseases, and obesity.

NF is mainly classified according to the anatomical region where it occurs, such as Fournier gangrene – gangrene at perineal, genital or perianal regions. Another classification is based on the number of pathogenic microbial factors – Type 1 (polymicrobial) and Type 2 (monomicrobial). Polymicrobial infections are more common, with cultures yielding a mixture of aerobic and anaerobic organisms¹⁶. *Streptococcus pyogenes* and *Staphylococcus aureus* are the usual detected pathogens⁶.

Diagnosis of NF is mainly based on clinical findings. NF often includes a triad of pain, tender local swelling, and fever¹⁷. However, in early period, pain and tenderness are not consistent with the physical appearance of the lesion. Pain may occur hours before infection and may be a later symptom due to diseases such as diabetes mellitus in which sensory neurons are affected. In the following days, oedema, redness, foul-smelling purulent discharge, and temperature increase are observed in the affected areas. Thin-walled haemorrhagic bullae occur in untreated and missed cases¹⁸. In cases of NF, the rate of spread of the infection can be up to 25mm/hour, with minimal changes in the overlying skin¹³. Therefore, early diagnosis and surgical debridement are important in treatment.

Plain x-ray films, ultrasonography (USG), computed tomography (CT) and magnetic resonance imaging (MRI) are useful imaging tools at the time of diagnosis of NF, but they are time-consuming and expensive and may not be readily available in an emergency setting. They might, however, be useful in cases where signs are equivocal, or diagnosis is in doubt. Subcutaneous gas on plain x-ray film can be seen in less than 25% of patients, and absence of gas does not exclude NF¹⁹. CT scans have a sensitivity of up to 80% in detecting necrotising soft tissue infections and deeply located abscess²⁰. A MRI will show subcutaneous thickening with fluid collection during the diagnostic process²¹. However, in the present case, additional imaging methods were not required due to the diagnostic characteristics of the wound.

Treatment of NF includes multiple treatment modalities. First, surgical consultations should be urgently requested with the intention of early wound debridement for collection of tissue cultures, excision of all non-viable tissue, and delineation of the extent of the disease. In addition, until blood culture results are available, broad-spectrum antibiotics should be started to treat *S. pyogenes*, *S. aureus*, Gram-negative aerobes and anaerobic microorganisms. Then, according to the results of the culture antibiogram, the continuation and revision of the current antibiotherapy should be decided.

Other important modalities in the treatment of NF are intravenous fluid replacement therapy and treatment of comorbid diseases, stabilisation of blood glucose level and blood pressure, and treatment of complications such as organ failure and shock²².

VAC therapy can be used to speed up the healing process in the treatment of cases that do not require resection after repeated debridements but have large tissue defects. In our case, VAC treatment was also used after three sessions of repeated debridement. Besides VAC therapy, hyperbaric oxygen is also an option during treatment of NF. Some studies have shown a reduction in mortality and morbidity, and the need for repeated debridement in up to two-thirds of cases with hyperbaric oxygen therapy^{23–25}.

Conclusion

NF is a serious and life-threatening infection. Diagnosis of NF is mainly based on clinical findings. The classic and frequent manifestations associated with NF usually include a triad of pain, tender local swelling, and fever. However, in the early period, pain and tenderness are not consistent with the physical appearance of the lesion.

Treatment of NF includes wound debridement, broad-spectrum antibiotics, intravenous fluid replacement, stabilisation of blood glucose level and blood pressure, and treatment of complications. However, the most important step is early surgical extensive debridement until non-infective tissue is reached. It should be kept in mind that repeated debridements may be required and antibiotic revision may be required according to the antibiogram results.

Conflict of interest

The authors declare no conflicts of interest.

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Contributors

TK proposed the study and wrote the paper. All authors contributed to the design and interpretation of the study and to further drafts.

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