



Postoperative Necrotising Fasciitis of the Lower Limb as an Unexpected Complication of Vascular Surgery Procedure - Case Report

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Abstract

Necrotising fasciitis is a rare and severe disease, acute infection, often life-threatening, characterised by rapid and progressive spread through the subcutaneous tissue and superficial fascia. It can occur on any part of the body, mostly affecting the perineum, limbs and abdominal wall. A 76-year-old male patient with the development of lower limb necrotising fasciitis after a vascular procedure femoral-popliteal bypass, performed due to chronic ischaemia is presented. Patient previously had several different vascular procedures on other blood vessels, with diabetes and cardiovascular disease as leading comorbidities. Treatment included urgent surgical necrotomy, with all measures of conservative treatment. During the treatment, there was no need for a new vascular procedure, arterial flow was preserved. It is necessary to constantly remind surgeons about this rare but life-threatening disease so that they can recognise it in time and adequately treat it.

Key words: Necrotising fasciitis; Severe infection; Lower limb; Urgent surgery.

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Introduction

Necrotising fasciitis (NF) is a rare and severe soft tissue infection that is characterised by rapid and progressive spread through the subcutaneous tissue and along the fascia, often manifesting with a severe clinical picture that can lead to shock and sepsis with multiorgan failure and death.¹ The incidence of this infection is 1–4/100.000 persons per year.² Even though knowledge about NF has been growing lately, as well as the availability of better treatment with more available drugs of the newer generation, mortality remains relatively high and, according to data from the literature, reaches up to 70 %.¹⁻⁴

According to the literature, NF occurs more often in men and older patients usually have a poorer disease outcome and more severe clinical picture, probably due to more frequent comorbidities. The most common comorbidities in patients with NF are diabetes mellitus, obesity and hypertension.¹⁻⁴ The disease usually involves the anterior abdominal wall, the scrotum and perineum and the lower limb but it can occur on any other part of the body.^{5,6}

Due to the rapid progression, aggressive surgical debridement of the infected area as early as pos-



sible along with other supportive measures is the gold standard in the treatment of this disease.

Here is presented a rare case of NF of the lower extremity after femoral-popliteal bypass, in a 76-year-old patient. According to the author's knowledge, there are very few published papers about NF of the lower extremities after vascular procedures.

Case History

The patient's consent to publish the case report was obtained. This article was planned in compliance with the Patient Rights Directive and ethical rules by considering the principles of the Helsinki Declaration.

A 76-year-old man, a former smoker, was admitted to the surgery department of the General Hospital Novi Pazar as a continuation of treatment after the femoral-popliteal bypass of the right leg was performed in a tertiary health institution. Among the comorbidities present were diabetes mellitus, heart weakness and chronic obstructive pulmonary disease, along with a penicillin allergy. Patient also had a history of performed carotid artery surgery on both sides and coronary angioplasty 9 years ago. Three months before this operation, an endovascular procedure (percutaneous transluminal angioplasty (PTA) and stenting *a. iliacaе externaе lat. sin.*) was performed on the left leg due to ischaemic changes in the foot caused by atherosclerosis of the main blood vessels. Two weeks after that intervention, due to ischaemic pain in the left leg and occlusion of the deep and superficial femoral artery of the left leg and the impossibility of revascularisation of the extremity, an above-knee amputation of the left leg was performed. The postoperative course was normal and the wound healed *per primam intentionem*.

One month after the amputation of the left leg, interdigital ulcerations appeared on the right foot (between the 3rd and 4th toe) and the initial gangrene of the 5th toe of the right foot. Due to the revascularisation of the right leg, a femoral-popliteal bypass was performed in a tertiary health institution. The early postoperative course was normal and on the 4th postoperative day, he was transferred to our institution for a continuation of

treatment. On the second day of hospitalisation, the patient was febrile, with a body temperature of up to 39.5 °C. Increase of inflammatory parameters was present (Table 1), local swelling, redness, pain and tissue fluctuation below the skin on the right upper leg. The patient was in poor general condition, septic, languid, with present dyspnoea, tachycardia and arrhythmia. Pulses on *a. dorsalis pedis* and *a. tibialis posterior* were present.

Table 1: Laboratory parameters during the hospitalisation

Parameter	Day of hospitalisation		
	2nd	5th	8th
WBC (x 10 ⁹ /L)	21.00	19.00	12.00
RBC (x 10 ¹² /L)	2.43	2.88	3.12
HGB (g/L)	101.00	109.00	119.00
Creatinine (μmol/L)	174.00	161.00	101.00
Na ⁺ (mmol/L)	137.00	136.00	138.00
CRP (mg/L)	306.00	285.00	77.00
Procalcitonin (ng/mL)	2.10	-	0.23
Glucose (mmol/L)	23.00	19.00	12.00

WBC - white blood cells; RBC - Red blood cells; HGB - Haemoglobin; CRP - C-reactive protein; Na⁺ - sodium;

The operative wound on the right leg, above and below the knee, was opened and a large amount of green-brown liquid with an unpleasant smell was evacuated. Signs of NF of the right upper leg, with the spread of the infection upwards towards the groin and downwards across the fascia of the right leg were present (Figure 1A and 1B). Extensive debridement of the affected tissue was performed. Laboratory Risk Indicator for Necrotising Fasciitis (LRINEC) score was 10.

Treatment with antibiotics (Ceftriaxone, Gentamicin and Metronidazole), infusion solutions, analgesics, Nadroparin Calcium and other supportive therapy was initiated. The patient did not respond to the prescribed therapy as it was expected, so the treatment with reserve antibiotics (Vancomycin and Meropenem) was continued. Forty-eight hours after the first surgical intervention, repeated necrotomy surgical reintervention was performed. Diarrhoea occurred, which subsides in 2 days with symptomatic therapy. *Clostridioides difficile* toxins A and B, as well as other pathological substrates, were not isolated in the stool sample. Cardiac decompensation and the development of pulmonary oedema and pneumonia also develop. Wounds were treated daily with antiseptic solutions with regular dressings. The prescribed therapy resulted in a decrease in



Figure 1: Postoperative lower extremity necrotising fasciitis

biochemical inflammatory parameters. *Staphylococcus aureus*, sensitive to the applied antibiotics, was isolated from the wound swab. There was no need for new surgical interventions. During hospitalisation, the patient was treated by a multi-disciplinary team (pulmonologist, cardiologist, surgeon and infectious disease specialist). Due to the comorbidities present, the patient was not treated with hyperbaric oxygen therapy (HBOT).

The patient responded well to the prescribed therapy (Figure 2). There was no ultrasound and



Figure 2: Condition after a month of treatment of postoperative necrotising fasciitis

clinically verified graft occlusion, the flow was satisfactory. After 48 days of hospitalisation, the patient was discharged with good general condition and satisfactory local findings with advice for outpatient wound dressing and follow-up by a general surgeon and a vascular surgeon under the supervision of a cardiologist and pulmonologist.

Discussion

NF belongs to the group of aggressive skin and soft tissue infections, usually spreading along the fascial plane, which is less vascularised, while the tissues above initially appear healthy, which can delay diagnosis and surgical intervention. Secondly, the infection can spread to the subcutaneous tissue, skin and muscles. NF represents a rare, but often life-threatening infection and requires prompt surgical and medical treatment. In the literature, there are different data on the frequency of NF, probably due to the lack of large studies and usually published smaller case series. In the United States NF affects about 0.4 in every 100,000 people per year⁷ and an incidence goes up to 15 cases per 100,000 population in some areas of the world,⁷⁻⁹ but due to underreporting, the number is certainly higher. According to Das et al and Bodansky et al, there is an increase in the frequency of NF in their countries.^{10, 11} The incidence in children is 0.08 to 0.13 per 100,000 per year, with a mortality of 10 %.¹² Literature

data indicate that mortality in adults ranges up to over 75 %.^{1,5} NF occurs slightly more often in males than in females. Studies show that patient survival was significantly associated with younger age. NF is more likely to occur in middle-aged patients as well as those older than 50, they have a worse prognosis, especially if they have accompanying comorbidities.^{5,13} The study of Czymek et al stated that the female gender is a risk factor associated with higher mortality, but this claim was not confirmed in other studies.¹⁴

Based on the causative agent of the disease, NF can be classified as Type 1-polymicrobial (caused by anaerobic and aerobic microorganisms, more prevalent in older adults with chronic diseases), Type 2 – monomicrobial, Type III is caused by *vibrio* species and Type IV is caused by fungal infection.¹⁵ Literature data show the prevalence of monomicrobial NF from 60–80 %.⁵ Tsai et al state that the infections have a more rapid and fulminant form if they are caused by Gram-negative microorganisms.^{16,17}

Skin or mucous membrane damage and various surgical procedures are some of the factors that put patients at higher risk for NF. Necrotising fasciitis can occur post-surgery, any invasive or even a minor procedure.⁷ The disease usually involves the perineum, the scrotum and the anterior abdominal wall. Lower extremity NF is a limb and life-threatening condition with published mortality rates from 10-30 %. The amputation rate of 20.4 % in the study of Park et al and 23.5 % in the study of Irmak et al was similar to the rates in other studies.^{15,18-21}

Presented patient was elderly, in his 8th decade of life. The infection occurred after a surgical intervention and the incision on the skin was the likely site of infection entry. *S aureus* was isolated from the wound swab.

The diagnosis of NF was made primarily by clinical examination. Usually, symptoms are local pain, malaise, fever, hypotension and poor general condition with local erythema, tissue swelling, ecchymosis changes to the skin, subcutaneous emphysema and crepitations and skin necrosis. What needs to be paid special attention to, is that the finding on the surface of the skin, which is visible from the outside, often does not correspond to the true stage of the infection that spreads under the skin.¹⁻²¹

There are multiple predisposing factors for NF. Diabetes mellitus is a dominant comorbid disease for NF in most studies. Other comorbidities such as arterial hypertension, peripheral arterial disease, systemic disorders, chronic renal failure, cardiovascular disease, immunosuppression, alcoholism and local trauma also have an important role in the development of NF.^{5,10,11,22} In addition to all the complications caused by diabetes mellitus, the literature data shows a higher incidence of peripheral arterial disease and poor prognosis in the diabetic patient population. Arterial revascularisation in patients with critical limb ischaemia is a limb-saving procedure. Literature data show that more than 50 % of patients with NF have at least one predisposing comorbidity and the most common comorbidity factor was diabetes mellitus.¹

In presented case, the general symptomatology and local signs of the infection coincide with the data from other studies. There are no laboratory parameters specific only to the diagnosis of NF. As it was mentioned, a diagnosis was based on a clinical presentation. Laboratory tests and imaging had a role in the prediction of the severity of infection and treatment outcome. That's why the LRINEC scoring system was developed to help clinicians screen for NF. A score of 8 or higher represents a 75 % risk of necrotising infection.⁷ The LRINEC score in presented patient was 10, which places him in the group of high-risk patients.

Treatment involves urgent surgical intervention, which involves the removal of necrotic and devitalised tissue, with fluid replacement, the use of broad-spectrum antibiotics and after isolating the causative agent, targeted antibiotic therapy according to the antibiogram, as well as other substitution therapy and treatment of comorbidities and complications. Mortality can be increased several times if the primary surgical intervention is performed 24 h or more after the onset of symptoms. Several studies stated that all patients underwent 1–10 radical surgical debridements, with an average of 2.5. The role of HBOT and intravenous immunoglobulin G (IVIG) for the management of NF remains controversial.⁹

In presented case, the first surgical intervention was performed more than 24 h after the onset of symptoms and during the treatment, it had to be repeated once more. HBOT was not applied due to cardiological and pulmonary contraindications.

Conclusion

NF, although rare, is a potentially lethal disease. It is important that surgeons increase awareness about NF and not neglect the possibility of this severe infection. Prompt diagnosis, early operative debridement, appropriate supportive and causal therapy and multidisciplinary treatment are necessary for successful therapy.

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Conflict of interest

None.

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