

C A S E R E P O R T

Four-day delay “metachronous” polymicrobial necrotizing fasciitis of lower limbs: A unique case report

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Abstract. Necrotizing fasciitis is a rare soft tissue infection that requires immediate medical attention to prevent its fulminant development that can lead to amputation or death of the patient. In most of reported cases of multifocal necrotizing fasciitis, injuries appear synchronously within hours from the initial diagnosis. It is the only third reported case with metachronous lesions, and the first that involves both *S. pyogenes* and *S. aureus*. Early diagnosis and multidisciplinary treatment is mandatory to prevent fatal outcomes. We present the case of a 58-year-old Caucasian man who developed necrotizing fasciitis of both lower limbs with four days between each one. After initial clinical suspicion, he was treated with intravenous antibiotics and we performed an urgent fasciotomy of the right leg and diagnosis was confirmed. *Streptococcus pyogenes* and Methicillin-Resistant *Staphylococcus aureus* were isolated from intraoperative cultures. Four days later, due to rising signs on the left limb, another fasciotomy had to be performed and the same microorganisms were isolated. Our patient was discharged home one month after his admission and had no complications during the follow-up. In order to prevent the development of metachronous lesions, early multidisciplinary treatment with aggressive and repeated debridement is necessary. We managed to keep our patient alive, without amputation or intervention by Plastic Surgery, and he recovered fully which is an excellent outcome from a very aggressive disease. (www.actabiomedica.it)

Key words: Multifocal necrotizing fasciitis, fasciotomy, *Streptococcus pyogenes*, metachronous

Introduction

Necrotizing fasciitis (NF) is a rare soft tissue infection requiring medical and surgical emergencies. NF can be classified into four types according to its causative microorganism. Type I involves a polymicrobial infection in polypathological or immunodepressed patients. Type II, is caused by *S. pyogenes* alone or in association with *S. aureus* related with skin diseases. Type III involves Gram-negative bacteria and type IV is a fungal infection (2), both associated with fatal prognosis. NF can easily go unnoticed or can be mistaken for cellulitis, more frequently in patients whose

extremities have long-term illnesses like chronic venous insufficiency or lymphedema (3). Redness, swelling or fever are common initial symptoms for both cellulitis and NF. Making a precise diagnosis is essential in these patients (4).

Multifocal NF is an even more uncommon condition. Injuries normally appear synchronously within the first 24 hours and lead to higher rates of patients morbimortality (6). However, injuries can develop days after the initial one, what is known as “metachronous” NF. We present the first reported case of metachronous NF caused by the combination of *S. pyogenes* and *S. aureus*.

Case report

A 58-year-old male with a known history of arterial hypertension, hypercholesterolemia, chronic venous insufficiency (CVI) and scabies diagnosed three weeks earlier and treated since then with methylprednisolone and permethrin, went to the emergency room of our hospital complaining of swelling in the right lower limb, intermittent chest pain and an isolated 38.5°C fever spike that began five days prior to the presentation.

On initial examination, he was not in distress, with a heart rate of 95 lpm and a blood pressure of 112/85, no fever and arterial oxygen saturation higher than 90%. Although CVI signs were present on both legs, severe swelling and ulcers were noticed in the right one, accompanied by higher temperature, diameter and redness from the foot to the proximal tibia. There was no evidence of skin necrosis or fluctuation.

Admission laboratory analysis revealed hemoglobin of 14.6 g/dL, leukocytosis of 20.000/ μ l (neutrophils 97%), elevated C-reactive protein (CRP) (388 mg/L), procalcitonin (16.87 μ g/L), serum creatine kinase (7554 U/L) and creatinine (1.61 mg/dL); decreased sodium (129 mmol/L) and blood glucose of 74 mg/dL. Those analytic values gave us a punctuation of 10 on Laboratory Risk Indicator for Necrotizing Fasciitis score (1). Due to the clinical suspicion of necrotizing fasciitis of the right lower limb (RLL), it was decided to perform a rapid antigen detection test for *Streptococcus Pyogenes* with a positive result. Given these findings, we decided to start empiric antibiotic treatment with on piperacillin-tazobactam (P-T) 4 g/0.5g intravenously (IV) every six hours and linezolid 1g IV every 12 hours, combined with urgent surgery.

During fasciotomy, the diagnosis of necrotizing fasciitis was confirmed. Extensive subfascial serosanguinous fluid was noticed, even though there were neither signs of macroscopic muscle necrosis nor purulent collection. After sufficient debridement and lavage with 0.9% saline solution and hydrogen peroxide (H₂O₂), a 24-hour drainage catheter was inserted, and primary wound closure was performed.

After the surgery, the patient suffered an episode of atrial fibrillation with rapid ventricular response

which was refractory to pharmacological cardioversion. He was admitted to the Intensive Care Unit (ICU) to control hemodynamic response with vasoactive agents.

In the following hours, the patient's condition improved, pain was properly controlled and there were no signs of postoperative bleeding. No new signs of complication were observed in the lower limbs. 36 hours after the surgery, *Streptococcus pyogenes* and Methicillin-Resistant *Staphylococcus aureus* (MRSA) were isolated from intraoperative tissue cultures. After consultation consulted with our Infectious Diseases Unit (IDU), it was decided to maintain the same IV antibiotic regimen.

Forty-eight hours after the intervention, a purulent distal exudate was observed in RLL. The patient was taken to the operation room to complete previous fasciotomy and debridement of new devitalized tissue. Fascia was thickened, although not in high tension, and muscle remained apparently healthy. Sufficient lavage was performed again, new cultures were taken, two drainage catheters were placed and the wound was sutured.

Forty-eight hours after the second surgery (four days from the diagnosis of NF), the operated limb showed no signs of complications. However, the contralateral limb appeared with severe redness on soul foot surface and lateral leg compartment, and seropurulent blisters on posterior surface of the leg accompanied by significant pain (Figure 1). Fasciotomy of LLL was performed and extensive "dishwater" purulent subfascial fluid was found. Leg compartments showed no induration nor muscle necrosis. Intraoperative tissue was sent for microbiological culture and debridement, lavage, drainage catheter placement and skin closure were performed. The same *S. pyogenes* and MRSA pathogens were isolated, even though blood cultures were negative. Due to the IDU recommendation, antibiotic treatment was changed to levofloxacin 750mg IV every 24 hours plus clindamycin 900mg IV every eight hours.

In the following days after LLL fasciotomy, the postoperative course was uneventful and the patient recovered gradually from his infectious and hemodynamic processes. One week after first surgery, he was transferred from the ICU to the Traumatology Unit ward. On his first ward exploration, RLL appearance



Figure 1. Right (left picture) and left (right picture) lower limbs 96 hours after the initial diagnosis. The right limb shows healing process meanwhile the left one presents ecchymosis of the foot and severe redness and swelling.

and pain were improving. On the other hand, LLL presented necrotic skin on surgical wounds and the patient reported severe pain on anterolateral and posterior compartments. Nevertheless, those symptoms were considered to be not sufficiently severe to justify a new surgical debridement (Figure 2). A new analysis revealed normalization in all inflammatory parameters.

We request the evaluation from the Plastic Surgery Unit of these necrotic patches. Surgical debridement was performed and no skin graft was necessary, so it was left uncovered and treated with silver sulfadiazine to promote re-epithelialization. The patient was discharged home three weeks after his admission to the ward. Oral levofloxacin 750 mg every 24 hours and clindamycin 600 mg every eight hours were maintained for four weeks at home. 12 weeks later, he came

back walking with no pain and all wounds healed uneventfully without any further procedure from Plastic Surgery Unit.

Discussion

We introduce a case of multifocal NF, which is an extremely uncommon condition. In a review of the existing literature from 2012 which covered the period of the previous 50 years, only 33 cases were identified (5). Furthermore, these events are frequently caused by Gram-negative microorganisms, occur synchronously and lead to patient's death (6). Multifocal NF tends to be synchronous because there is a common focus of infection from where septic emboli are sent to different



Figure 2. Necrotic skin on and around the wound of left lower limb, one week after the initial diagnosis.

places (7). It is accepted that “synchronous” lesions are those which develop within hours, whereas “metachronous” lesions appear days after (6). Including our report, we could only find three metachronous NF cases in the literature (5). The patient we describe represents the first polymicrobial metachronous NF case so far reported with the additional complication of a multifocal origin and the combination of the two pathogens *S. pyogenes* and MRSA. The most probable pathomechanism was a bacterial spreading to the left limb through direct contact instead of haematogeneous distribution because of the negative blood cultures (8).

In view of the always existing risk of fulminant infection propagation as mentioned above, we would like to highlight some important key messages: Complications such as wound infection, persistence of myofascial infected tissue or appearance of new lesions can involve amputation, septic shock or even death. First of all, it is crucial to make an aggressive debridement and lavage, so as to leave no infected tissue. After initial diagnosis and first surgery, patient monitoring is very important. Admission into ICU and collaboration between intensive care specialists and surgeons can help control this process at an early stage. Equally important is the medical optimization of the patient conditions and complications, in order to facilitate the resolution of the infection (9).

Several authors from clinics claim that a revision surgery at the primary site should be performed in the following 24–48 hours (10). On the other hand, Lancerotto et al. suggested that the patient must be re-operated only if necessary. In our case, distal purulent exudate led us to perform a second intervention and new necrotic tissue was debrided. Furthermore, close monitoring allowed us to treat fast the rising NF in the contralateral limb.

Fortunately, we had the capacity to quickly proceed on both limbs with the outcome that the patient survived without requiring any amputation. In several literature reviews, diabetes mellitus has been found as main preexisting patient condition associated with limb loss (2,11,12). Leiblein et al. (2) reported a mean of seven surgical debridements per patient, meanwhile in our case it was sufficient to resolve the case with two procedures in RLL and only one in LLL.

Conclusion

This case of a complicated necrotizing fasciitis has served as a very valuable lesson for us: in order to prevent the development of metachronous lesions, it is necessary an early multidisciplinary treatment. Furthermore, in the management of NF, a constant and

thorough evaluation of other body areas during the first days after the diagnosis is as important as repeated debridement of initial lesions if it is needed.

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