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Case report: Necrotizing fasciitis of the thigh with peripheral involvement of the hip joint

Fascitis necrosante del muslo con afección periférica de la articulación coxofemoral. Reporte de caso

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Key words: Fasciitis, thigh, hip, soft tissue infections, anti-bacterial agents.

Palabras clave: *Fascitis, muslo, cadera, infección de tejidos blandos, agentes antibacterianos.*

ABSTRACT

Introduction: Necrotizing fasciitis is a rare, rapidly progressive infection of subcutaneous tissue and fascia, characterized by widespread fascial necrosis. **Clinical case:** A 62-year-old female, with diabetes mellitus. Two week prior to consultation she presents with a progressive perimeter augmentation of the left thigh and fever. In the physical examination of the lower extremities: left thigh and knee with augmentation of the perimeter, erythema, hyperthermia, pain and subcutaneous emphysema. In the "X" rays and CT shows gas in the subcutaneous tissue in the knee, thigh and around the hip joint. We drain the accumulated pus, and debride devitalized tissue and placed a negative pressure therapy. Later we performed two more exchanges of the system. We closed the anterior and lateral wound. Three days after the last surgery, we dismissed the patient and was referred to physical rehabilitation. **Conclusion:** Negative pressure therapy provides rapid wound healing for a tertiary closing or skin graft. Prompt rehabilitation and early ambulation helps patients return to their daily activities.

RESUMEN

Introducción: *La fascitis necrosante es una infección rara y rápidamente progresiva del tejido subcutáneo y la fascia, caracterizada por necrosis generalizada.* ***Caso clínico:*** *Mujer de 62 años de edad con diabetes mellitus 2, inicia padecimiento con aumento progresivo de volumen en muslo izquierdo. A la exploración de las extremidades inferiores en el muslo y rodilla izquierda se aprecia aumento de volumen y de temperatura, eritema doloroso a la palpación y enfisema subcutáneo. En las radiografías y TAC se detecta gas en tejido subcutáneo en rodilla, muslo y alrededor de la articulación coxofemoral. Se drena el material purulento, se desbrida el tejido necrosado y se coloca la terapia de presión negativa. Posteriormente se realizan dos nuevos recambios. Se cierra la herida anterior y lateral. Se da de alta al tercer día y comienza terapia de rehabilitación física de forma ambulatoria.* ***Conclusión:*** *El uso de la terapia de presión negativa proporciona una rápida cicatrización de la herida para realizar un cierre terciario o injerto de piel. Iniciar una rehabilitación y deambulación temprana ayuda a los pacientes a volver a sus actividades cotidianas.*

INTRODUCTION

Necrotizing fasciitis is a rare and rapidly progressive infection of the subcutaneous tissue and fascia, characterized by generalized necrosis. It is associated to a high mortality rate, ranging between 6 and 76%; 15 to 24% of patients will require the amputation of an extremity.[1] The treatment of choice of necrotizing fasciitis is prompt surgical debridement and broad-spectrum antibiotic therapy, since treatment delays may lead to major soft tissue loss and even loss of the extremity.[2] We present the case of a 62-year-old woman with necrotizing fasciitis of the thigh that was treated with surgical debridement, broad-spectrum antibiotics, negative pressure therapy and wound closure by tertiary intention.

CLINICAL CASE

A 62-year-old female with diabetes mellitus for nine years developed progressive swelling of the left thigh two weeks prior to admission, followed by pain and erythema in the previous

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three days, as well as a spiking fever of 38 ºC, for which she was admitted to the emergency department. Upon questioning, she denied any traumatic event. On examination, she was conscious and oriented, her blood pressure was 120/80 mmHg, heart rate was 85 beats per minute and respiratory rate was 20 breaths per minute. Examination of the lower extremities revealed no wounds, but the left thigh and knee were swollen and warm, with painful erythema on palpation and subcutaneous emphysema in the anterior and lateral areas of the left knee and thigh. The femoral, popliteal, posterior tibial, and pedal pulses were present in both extremities. Laboratory work-up confirmed a hemoglobin value of 10 g/dl and a total leukocyte count of 21.6 K/µl. X-rays of the lower left extremity revealed gas in the subcutaneous tissue of the anterior and lateral thigh and around the coxofemoral joint. A CT scan also revealed the presence of gas in the subcutaneous tissue of the anterior and lateral aspects of the knee and thigh and around the coxofemoral joint, in the area of the femoral vessels and adductor muscles. Given the extent of the disease, surgical treatment was planned *(Figure 1)*. The patient was operated on, performing a longitudinal incision on the anterior aspect of the thigh down to the knee, and a second incision on the lateral aspect. Muscle groups and compartments were separated, purulent material was drained, and necrotic tissue was debrided. The femoral vessels were identified and a collection in the neighborhood of the coxofemoral joint was drained *(Figure 2)*. Surgical washout was performed with plenty of water. Negative pressure therapy was placed, and dual empiric antibiotic therapy was initiated with vancomycin and piperacillin/tazobactam *(Figure 3)*. Cultures yielded Streptococcus agalactiae, whereby specific antibiotic therapy was initiated with ceftriaxone alone. Two exchanges of the negative pressure system were performed in the operating room, revealing granulation tissue; during the second one, the lateral wound was partially closed *(Figure 4)*. The patient was operated on for the last time to remove the negative pressure therapy system and close the lateral wound. Although the recommended drainage is a closed system, none was available, so a Penrose drain was placed and the remaining segment of the anterior wound was closed *(Figure 5)*. The drain in the lateral wound was subsequently removed. The patient was discharged and began outpatient physical therapy. One month after the operation, the patient's wounds were healed and she was walking with no complications *(Figure 6)*.

DISCUSSION

Necrotizing fasciitis is a life-threatening surgical emergency. It is a severe, potentially deadly condition that rapidly extends from the subcutaneous tissue along the superficial and deep fasciae, leading to vascular obstruction, ischemia, and tissue necrosis. Bacterial endotoxins mediate rapid tissue destruction via released cytokines and play a crucial role in disease progression.[3]

Necrotizing fasciitis is caused by injuries, trauma, surgical incisions or minor lesions. Many risk factors may promote the

Figure 1: *CT scan showing gas subcutaneously and around the coxofemoral joint.*

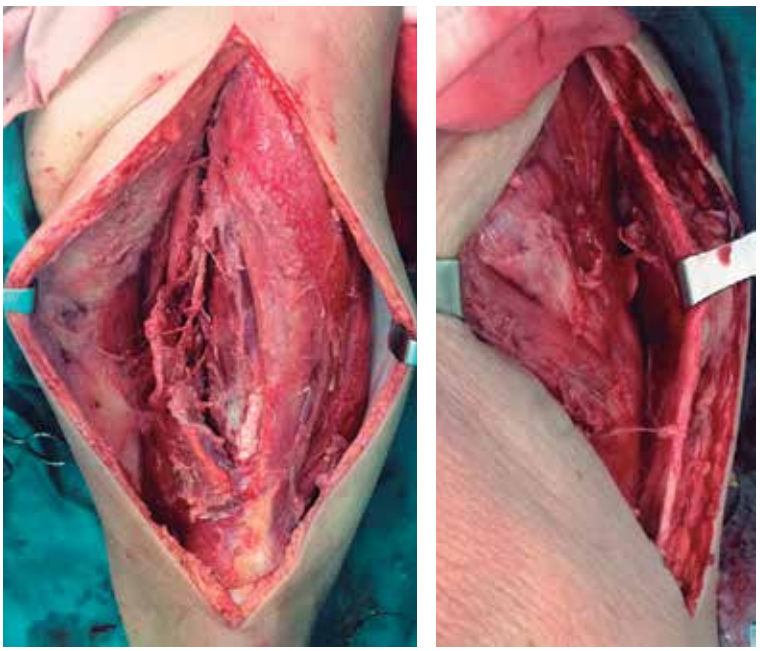

Figure 2: *Debridement of the thigh via anterior and lateral incisions.*

Figure 3: *Negative pressure therapy.*

development of necrotizing fasciitis, such as obesity, immunocompromised conditions (HIV, intravenous drug abuse), corticosteroid therapy and peripheral vascular disease. Idiopathic causes are very often seen in younger populations.[4] Between 21 and 64% of patients with necrotizing fasciitis have diabetes mellitus.[5]

The recent clinical classification recognizes four types of necrotizing fasciitis: type I (70 to 80% of cases, polymicrobial/synergistic), due to *Streptococcus* and *anaerobes*; type II (20% of

Figure 4: *Partial wound closure with granulation tissue.*

Figure 5: *Complete wound closure.*

Figure 6: *Healed wounds.*

cases and, generally, monomicrobial), due to *Streptococcus* or *Staphylococcus aureus*; type III (monomicrobial, Gram-negative, including marine organisms); and type IV *(fungi)*. Even methicillin-resistant *Staphylococcus aureus* (MRSA) or *Escherichia coli* have been reported as causative agents.[4,5]

The most common early signs are erythema, local warmth, skin induration and edema. In the disease's fulminant form, the patient is critically ill, with signs and symptoms of severe septic shock and extensive soft tissue necrosis. Crepitus and gas bubbles may be present in soft tissues.[4] The triad of edema, inflammation and pain are suspicious symptoms suggesting fasciitis.[5] Without immediate and urgent therapeutic intervention, it can rapidly lead to septic shock syndrome, with cyanosis, hypotension and tachycardia, impaired consciousness, multiple organ failure and death.[3] Impetigo, erysipelas and cellulitis are considered differential diagnoses.[6]

Crepitus on palpation and the presence of gas in X-ray images are usually signs of necrotizing fasciitis. In patients with necrotizing fasciitis and diabetic foot, 76.1% of foot X-rays are positive for gas. This is a high percentage when compared with necrotizing fasciitis at other sites (4.9 and 57.4%). The presence of polymicrobial or anaerobic infection may explain the high rate of gas detection in these patients' X-rays.[1] Diagnostic echographic findings in necrotizing fasciitis include thickening of the fascia and subcutaneous tissue, abnormal fluid accumulation in the deep fascia and, in advanced cases, subcutaneous air.[7] Computed tomography aids surgeons in making an early decision to explore and debride the involved area.[8] In CT scans, the suspicious area may reveal increased attenuation of subcutaneous fat, the presence of gas in soft tissues and edema. Magnetic resonance imaging is very sensitive (93%) in the detection of necrotizing fasciitis.[5]

Nowadays, there is general agreement on the following algorithm: resuscitate patients in shock; begin broad-spectrum antibiotics that will cover polymicrobial infection; transfer the patient to surgery for the debridement of necrotic tissue –any doubts on the diagnosis may be solved by histologic analysis of frozen sections–; and obtain Gram-stain and culture of the wound. Debridement must be repeated every 24 to 48 hours until the infection is controlled. Antibiotic therapy should be adjusted to adequately cover the organisms detected in the initial culture. Treatment with hyperbaric oxygen, if available, may be considered in hemodynamically stable patients.[4]

A combination of antibiotics covering a broad spectrum of microorganisms is recommended, i.e., anaerobes (clindamycin) and aerobes, Gram-positive (penicillin G or extended spectrum penicillin, imipenem, and teicoplanin), and Gram-negative (aminoglycosides, cephalosporins, and carbapenems).[4]

The IDSA 2014 guidelines for the diagnosis and management of skin and soft tissue infections recommend that empiric treatment of necrotizing fasciitis must begin with vancomycin and piperacillin/tazobactam before the definitive culture results are obtained, and that antimicrobial therapy must be administered until no further debridement

is required, the patient has clinically improved and fever is absent for 48-72 hours.[9]

Amputation of the lower extremity is indicated if the wounds fail to heal after appropriate treatment (antibiotic control, wound debridement and revascularization), infection is not controlled or there are associated systemic comorbidities that hinder treatment.[4] The rate of extremity amputation is significantly high in diabetic patients (28.6%) compared to non-diabetics (13.6%).[10] The most frequent amputation sites are toes/feet (44.1%) and above the knee (22.8%).[2] Amputation should be considered mandatory if the infection reaches a large joint and most muscle groups, or if the infection is rapidly extending to the torso.4 In our_patient, we avoided the extremity's amputation by separating the muscle groups and compartments in addition to adequate surgical debridement.

Although necrotizing fasciitis is uncommon, its mortality rate is high, between 6 and 76%.[4,5] Serum albumin level is a marker of nutritional status as well as an inflammation marker. A low serum albumin has been associated to greater mortality in these patients.[1] A delay in recognizing the condition and inadequate surgical debridement have a significant negative impact on the outcome and are associated with an increase in morbidity and mortality.[3]

Negative pressure therapy is a widely known wound care system for the treatment of complex wounds. The technique consists in placing a sponge dressing in the wound cavity, with a vacuum pump that generates negative pressure.[11] Using this system in our patient promoted rapid healing and granulation of the wound, with no difficulties during tertiary closure.

The 2014 guidelines for the management of soft tissue and skin infections in the World Journal of Emergency Surgery recommend that any patient with extensive necrosis or who has not been adequately debrided in the initial surgery must be reevaluated within 24-48 hours for re-operation, and that surgical debridement must be continued until the infection site is under control. Furthermore, they point out the usefulness of vacuum assisted closure (VAC) therapy in the management of patients with necrotizing fasciitis, although its use should be limited to cases in which the infection source has been adequately controlled.[12]

CONCLUSION

Necrotizing fasciitis is a potentially fatal infectious disease if it is not promptly diagnosed and treated. Wide debridement of the involved tissues must be performed early, as well as abscess drainage, culture, administration of broad-spectrum antibiotic therapy initially and specific therapy once the culture results are obtained. The separation of muscle groups and compartments and appropriate surgical debridement may be a conservative treatment to avoid major amputation. The use of negative pressure therapy promotes rapid wound healing and granulation, in order to perform tertiary closure or skin grafting. Early physical therapy and ambulation help patients return to their daily activities.

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