

Fasciitis and Streptococcal Toxic-shock Syndrome: The Importance of Early Diagnosis and Surgical Management

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Learning Point of the Article:

Streptococcus Pyogenes can cause a wide range of diseases, including some serious conditions. Early diagnosis is challenging due to unspecific symptoms. When suspected, surgical management should be considered as first-line treatment.

Abstract

Introduction: Fasciitis of the limb and toxic-shock syndrome due to Streptococcus Pyogenes infection is considered a surgical emergency. This condition may occur in previously healthy patients. It is a life-threatening condition with high morbidity rates when treatment is delayed due to poor diagnosis and non-surgical intervention.

Case Report: 17-year-old male patient sustained a minor ankle trauma while skating. Initial findings were a 1 cm wound in relation with his left lateral malleolus and moderate swelling. About 6 h later, the patient was admitted at the emergency room with disproportionate limb pain, increased swelling, persistent fever, paleness, tachycardia, and hypotension. The patient was intubated due to his unstable hemodynamic condition and underwent fasciotomy of the limb. A vacuum-assisted closure device was used. After the first surgical procedure, patient's condition radically improved. He was extubated with good clinical prognosis. He underwent several surgical procedures in a 3-weeks lapse until the wound finally healed.

Conclusion: Streptococcal toxic-shock syndrome and limb fasciitis have no specific early signs or symptoms. It seems that clinical dissociation (disproportionate pain together with a minor wound) should become an alarm sign to trauma surgeons. It is important to contemplate this serious condition as differential diagnosis in every patient undergoing trauma with torpid evolution. Aggressive surgical management is the gold standard treatment and should not be delayed.

Keywords: Case report, lower limb fasciitis, streptococcal toxic-shock syndrome.

Introduction

Streptococcus Pyogenes is the anaerobic bacterium responsible for a variety of diseases including tonsillitis, pharyngitis, scarlet fever, and soft tissue conditions such as streptococcal pyoderma, erysipelas, and cellulitis. Erysipelas is an infection of the superficial dermis with a bright-red area of raised skin. Some authors state that erysipelas is a sharply demarcated variant of cellulitis (chira, raff, and gunderson). Cellulitis is an infection of the deep dermis and subcutaneous layers, presenting as an acute, poorly demarcated area of erythema (raff). Much less common but still lethal is fasciitis caused by this pathogen.

Fasciitis is a severe infection involving superficial fascias and deep dermal layers of the skin. On early stages, fasciitis can mimic cellulitis. This can lead to insufficient treatment. Statistics show that mortality rates have been reported as high as 78%. Toxicity and severe pain increase the likelihood of fasciitis over other soft tissue conditions such as cellulitis [4, 5]. Typical clinical profile refers to a swollen limb in previously healthy patients, with a wound susceptible to outside contaminated environment. Trauma is the most frequent cause [6]. The progression of the disease is rapid, and the whole limb can become affected in a few hours [7]. Initial symptoms can be

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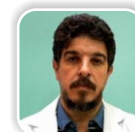
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Figure 1: (a) Lateral malleolus wound. (b) Limb edema without skin necrosis.

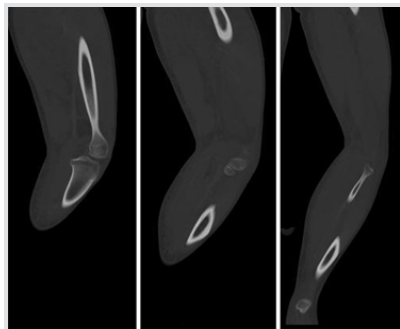


Figure 2: (a, b, c) Diffuse edema with infrapatellarinterfascial collection.



Figure 3: (a and b) Mubarak's double fasciotomy.



Figure 4: (a) Primary closure. (b) Edema is gone.

unspecific, and physicians may tend to relate them to mild infections [8, 9]. Severe streptococcal infection may develop into shock-toxic syndrome. Diagnosis is determined by the fast evolution into shock and multiorganic failure together with the isolation and identification of the microorganism [10].

The diagnostic criteria of shock-toxic syndrome are listed as follows[11]:

1. Sustained arterial hypotension combined with tissue hypoperfusion signs.
2. Acute kidney failure.
3. Disseminated intravascular coagulation or any other coagulation disorder.
4. Hepatic impairment.
5. Respiratory distress.
6. Diffuse erythema.
7. Skin and soft tissue necrosis.

Diagnosis is made with at least two criteria plus sustained arterial hypotension. Wide-spectrum empirical antibiotic therapy alone shows limited action. Surgical debridement and drainage together with antibiotic therapy are considered the gold standard treatment [6, 8]. In this paper, we present the case of a patient that sustained a minor ankle trauma with torpid outcome which develops into lower limb fasciitis and multiorganic failure. We discuss its surgical management and evolution.

Case Report

A 17-year-old male patient sustained a minor ankle trauma while skating. He was first admitted to a local health department. Initial findings were a 1cm long wound in relation with his left lateral malleolus together with moderate swelling. No other sign or symptom was reported. Plain radiographs were performed with no pathological findings. About 6 hours later, the patient was admitted at our emergency room with disproportional limb pain, increased swelling, persistent fever, paleness, tachycardia, and hypotension (Fig. 1a and b). Blood tests showed anemia, leukocytosis, and elevated creatine

phosphokinase (Table 1). The general condition of the patient got worse, with the need of mechanical ventilation and vasopressors due to the hemodynamic instability. Empiric antibiotic therapy was established with a triple scheme (ceftriaxone, vancomycin, and clindamycin). A computed tomography (CT) scan was done to find the presence of collections (Fig. 2a, b, c). The patient underwent his first surgical procedure which consisted of double fasciotomy of the leg, to examine and release the tension of the four compartments involved (Fig. 3a and b). Mubarak and Owen [12] technique was used. Purulent material was obtained with no signs of necrosis. Drainage of the medial thigh compartment was performed at the same procedure. A vacuum-assisted closure device was used. Both leg incisions were primary closed (Fig. 4a and b). Multiple samples were forwarded to cultivation. Culture media demonstrated the presence of *Streptococcus Pyogenes*. The acute toxic-shock syndrome yielded immediately after fasciotomy. Twenty-Four hours later, the patient did no longer need mechanical ventilation and blood tests showed almost normal results. The patient underwent two more surgical procedures with the purpose of vacuum-assisted closure management and thigh wound healing. 1 week later, the patient was discharged from our institution. After 3 years of follow-up, the patient has fully recovered, with a functional limb with no restrictions.

Discussion

Streptococcus Pyogenes can be responsible for very aggressive infections [4] Early and precise diagnosis is the key to good

Table 1: Anemia,leukocytosis with neutrophil predominance, and increased CPK	
Hematocrit (hemoglobin)	29.4% (10.3 g/dl)
Leukocytes (neutrophils)	31700/mm ³ (96%)
Prothrombin time	43 seg
C-reactive protein	203 mg/L
Lactacidemia	6.75 mmol/L
CPK	340 U/L
CPK: Creatine phosphokinase	



clinical outcome and therefore increased survival rates [13]. Cellulitis often shows a slower clinical course than fasciitis and recovery with conservative treatment is possible, without aggressive surgical intervention (Gundeslioglu). It is important to understand that apparently healthy patients with no chronic diseases are also possible targets for these devastating infections. CT scan or magnetic resonance imaging may be useful to find collections and to delimit the deepness of the infection. However, no image study should delay surgical management [15]. Bisno and Stevens [4] described three clinical stages regarding toxic-shock syndrome. Symptoms tend to be unspecific in the first two stages at least. Third stage involves extreme disproportionate pain and multiorgan failure. In this index case, the patient suffered unspecific symptoms (fever, tachycardia, and paleness) according to stages one and two plus the rapid onset of stage three. Patients evolve fast from stage one to stage three, in which survival rates decreased drastically. Antibiotic therapy is still one of the main treatments but hypoxia followed by local ischemia may act as a barrier which prevents the active principle to reach the infection area. Antibiotics alone represent an insufficient treatment [6, 8, 16]. Khanna et al. [17] published a series of 118 lower limb fasciitis. Mortality was 15%, based on early surgical management. Twenty-Four patients suffered amputation of the limb. The authors referred that early diagnosis combined with fast and aggressive surgical procedures are the key to success. Goh et al. [18] performed a systematic review, from which they selected nine works involving more than 1400 patients trying to establish early onset symptoms. They reached the conclusion that disproportionate pain, edema, and erythema were responsible for the majority of cases and also lead to diagnostic errors. Seventy-Five percent of the patients suffered from poor diagnosis leading to inadequate treatment. The authors

concluded that early surgical treatment must be considered even if the diagnosis is unclear. Regarding fasciotomy techniques, Mubarak and Owen proven to be satisfactory to decompress all leg compartments [12]. Vacuum-assisted closure is also a proven method for surgical wounds and post-operative management [6].

Conclusion

Streptococcal toxic-shock syndrome and limb fasciitis have no specific early signs or symptoms. It seems that clinical dissociation (disproportionate pain together with a minor wound) should become an alarm sign to trauma surgeons. It is important to contemplate this serious condition as differential diagnosis in every patient undergoing trauma with torpid evolution. Aggressive surgical management is the gold standard treatment and should not be delayed.

Clinical Message

Streptococcus Pyogenes can cause a wide range of diseases, including some serious conditions. Early diagnosis is challenging due to unspecific symptoms. When suspected, surgical management should be considered as first-line treatment.

All investigations were conducted in conformity with ethical principles of research. Informed consent was obtained from the patient for the use of all images and publication of this report.

All authors certify that their institution has approved the reporting of this case.

All authors declare that there are no competing interests regarding the publication of this paper.

The study was performed at the Italian Hospital of Buenos

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