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Necrotizing fasciitis after abdominal trauma: A case report

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Abstract

A case of a lower extremity necrotizing fasciitis (NF) in a young patient operated for liver trauma, having no visible skin wounds, discussed and correlated to the present literature. The patient was admitted to the Hospital after a road traffic accident (RTA). From the Past Medical History (PMH) he referred a history of lymphoma which was successfully treated. Initially he was diagnosed with a liver rupture and no other concomitant injuries. He was operated and admitted to the Intensive Care Unit (ICU). An abscess complicated the initial operation which was promptly drained. He then developed skin necrosis of the right lower extremity. During the operation the muscles looked viable. The skin, subcutaneous fat and fasciae were extensively necrotized. Lhrinec score was 8 and cultures showed fungal development. Necrotizing fasciitis (NF) was the most probable diagnosis. After having successive operations on the leg, the NF was disseminated and the patient died. Necrotizing fasciitis is rare in young patients with no predisposing factors, such as Diabetes Mellitus, active cancer and renal disease. In the present case the successive operations, massive blood transfusion and possibly the history of a Lymphoma could have played a role in this rare and frequently fatal condition.

Keywords: bowel operation, lower extremity, necrotizing fasciitis, NSTI, trauma

1. Introduction

Necrotic fasciitis (NF) is a rapidly evolving infection of the deep soft tissue and skin and it causes extensive necrosis of the fascia and subcutaneous tissue leading to severe systemic toxicity ^[1]. Distinguishing NF from other soft tissue infections is extremely difficult and is an important alarm that requires timely and aggressive surgical removal.

2. Case Description

A 33 years old male patient was admitted to Hospital after a road traffic accident (RTA) being a passenger of an overruling car. No fractures or visible wounds around the limbs were present. From the past medical history (PMH) the patient reported a successfully treated lymphoma about twenty years ago. No information or records were obtained, since he underwent the treatment in a foreign country. There was pain on palpation of the abdomen and an ultrasound was performed. During the ultrasound, fluid in the Pouch of Douglas was found. The patient underwent an urgent laparotomy and a liver rupture was found. After the operation he was admitted to the Intensive Care Unit (ICU). He was also put under broad spectrum antibiotics. He was transfused to a total amount of 14 units of blood just for the first day of his admission. Few days later the Mikulicz gauzes were removed and the patient continued his ICU treatment. Ten days later he became septic and after surgical evaluation, another operation was decided. During the operation an abscess in the liver was found and drained. He continued the ICU treatment and a couple of days later a skin lesion developed close to the surgical wound. It looked like a subcutaneous hematoma (Figure 1) and due to its small size, observation was decided. The next day the treating surgeon observed several skin necrosis lesions on his right leg, which rapidly expanded to a large necrotic area (Figure 2). He was operated again and the subcutaneous tissues necrosis was found to be more extensive than it

was initially thought. The subcutaneous fat had acquired a brownish color (Figure 3). The fascia and the muscles superficially showed mucous degeneration and necrosis. After excising fasciae and the superficial muscular layers, the muscles looked quite healthy having adequate perfusion (Figure 4). Several tissues samples were sent for cultures. A continuous suction (vacuum) was used to cover the surgical area. The cultures came back suggesting a fungal infection. The patient's laboratory tests during several time intervals are shown in the Table 1. Lhrinec score is calculated for each one of them. It was 8 in most of the days. It is obvious that Necrotizing Fasciitis (NF) was a probable diagnosis, based to the clinical and laboratory findings. Despite the aggressive surgical treatment, the limb necrosis deteriorated and spread all over the leg. The patient's clinical condition deteriorated and an amputation was then decided as a salvage procedure. After patient's parents were informed and their consent was obtained, the patient was brought to the theater. The amputation was performed to the hip level, which was disarticulated, since the soft tissues necrosis was extended just below the hip joint. The remaining truncate was covered by macroscopically viable and healthy-looking tissues. Unfortunately, a couple of days later the patient developed skin lesions in the right thoracic wall and eventually a few days later he died.

Table 1: Patient's laboratory tests during several time intervals

	07/09	14/09	27/09	29/09	04/10
CRP	19.5 (4)	16.7 (4)	29.75 (4)	19.7 (4)	17.33 (4)
WBC	31.6 (2)	15.1 (1)	66.8 (2)	59.9 (2)	33.1 (2)
Hb	8.5 (2)	8.6 (2)	8.6 (2)	9.2 (2)	7.3 (2)
Na	159 (0)	147 (0)	155 (0)	157 (0)	138 (0)
Cr	143	2298	0.8	6987	4192
Kp	0.8	0.9	0.8	0.9	1.8 (2)
Glu	116	126	117	103	63
Lhrinec score	8	7	8	8	8



Fig 1: The initial lesion over the surgical wound



Fig 2: Extensive necrotic crust over the lower limb



Fig 3: Non-viable non-perfused skin, subcutaneous fat and fascia



Fig 4: After superficial tissues excision, the underlying muscles macroscopically looked viable and well perfused

3. Discussion

Hippocrates first in the 5th century BC described a disease which he named "necrotizing erysipelas" since it was a complication of erysipelas, but it took thousands of years to be finally described as necrotizing fasciitis (NF) by Wilson in 1952^[1-3].

NF is very rare and most of the surgeons probably would never face a case of necrotizing fasciitis in their entire career span. In fact, the incidence is 4 cases per 1000000. Thus, diagnosing NF is very difficult and it can be misdiagnosed in over 70% of the cases^[4-6].

Initially it affects mostly the superficial tissues (fat, fasciae) than the deeper lying muscles. It is basically a subcutaneous cellular infection, which spares the muscles, leading to severe systemic toxicity. It spreads along the subcutaneous and fascial layer and it is often of polymicrobial etiology^[6,7].

It affects mainly the lower limb whereas the upper limb is not so often involved. This was the case in the present study. A common clinical characteristic, at least at the first stages of the disease, is the disproportional skin, fat and fasciae necrosis compared to the muscles appearance^[3], in contrast to the acute compartment syndrome (ACS) where the muscles are affected first^[7].

This was also found in our patient, where the soft tissues necrosis was worse at the skin and fat, compared to the muscles. In most of the cases there are one or more predisposing factors. According to one of the largest retrospective series just an 18% out of all NF cases had no previously documented predisposing factors^[4,5].

Diabetes mellitus is the most common predisposing factor, followed by advanced age, abdominal surgery, active cancer, renal disease e.t.c.^[8,9].

Broad spectrum antibiotics can mask the NF and contribute to the misdiagnosis of the disease, leading to catastrophic results, since treatment including only antibiotics leads to 100% mortality^[10,11].

In the present case the patient was still under broad spectrum antibiotics, but obviously it did not help him a lot. This is true since extensive surgical debridement is much more efficient, than just broad-spectrum antibiotics^[12].

Wall *et al.*^[13] proposed a model to contribute to early NF diagnosis; however, its specificity seems to be poor. In 2004 Wong *et al.*^[14] analyzed laboratory parameters in the blood of patients suffering from NF and no necrotizing soft-tissue infection, took into account six independent variables (CRP, WBC, Hb, Na, Cr, Glu), which were associated with necrotizing fasciitis and created the LRINEC (laboratory risk indicator for necrotizing fasciitis) score.

It seems that LRINEC score has a good negative predicting Value (NPV) up to 96%. This is not a definitive diagnostic tool, because few studies have observed an association between LRINEC scoring values and outcomes in patients with NF. Further prospective studies are needed to support the value of this test^[11, 12]. According to LRINEC score the patient had scored a total of 8 which is equivalent to high risk or in other words he was in the high risk and worst prognosis group for NF. There are four types of NF based mainly from the type of microbial colonization (Table 2)^[12].

Table 2: Four types of NF based mainly from the type of microbial colonization

Type I	NF due to polymicrobial infection
Type II	NF due to monomicrobial gram ⁺
Type III	NF due to gram ⁻ (often marine related organism)
Type IV	NF due to fungal infection

Type IV mainly happens in immune compromised patients. In the present case the patient had had two successive abdominal operations, which is a possible predisposing factor. Having a massive blood transfusion (he was totally transfused with 39 Units of blood) was probably another immune suppressor factor. Active cancer has been recognized as a cause of NF. Having a lymphoma even years after the initial onset, the immune response is still not as good as in healthy individuals. The chance of relapse in 10, 15 and 20 years is 2.5, 4.3 and 6.9 respectively. It is obvious there is no a plateau concerning the disease relapse and strangely the chance of relapse increases by the years^[15, 16]. In the above-mentioned patient, there were no evidence of an active lymphoma which could play a role in the Necrotizing fasciitis onset and dissemination.

4. Conclusions

Necrotizing fasciitis is a very rare and difficult to identify disease and in most of the cases, older age and immune predisposing factors could contribute or trigger the disease's onset. Necrotizing fasciitis remains a challenge for surgeons due to risk for unfavorable outcome in patients. However, aggressive and early surgical debridement and wide spectrum antibiotic therapy remain effective tools to contain the evolution of the disease.

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