International Journal of Community Medicine and Public Health
Mendem S et al. Int J Community Med Public Health. 2020 Sep;7(9):3689-3692
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20203945

Case Report

A case report on necrotizing fasciitis in a hemiplegic patient following an intra-muscular injection

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Received: 06 July 2020
Accepted: 07 August 2020

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ABSTRACT

Necrotizing fasciitis (NF) can be defined as a surgical emergency causing the necrosis of the skin, subcutaneous fat, and superficial fascia. It spreads along the fascial planes with or without the presence of cellulitis. It is characterized by the destruction of tissue, systemic toxicity, and may even lead to morbidity and mortality. Higher rates of prevalence were observed in the obese, diabetic, alcoholic, patients with peripheral vascular diseases and immunocompromised populations. There are no definite diagnostic criteria for NF and the laboratory findings may lead to misdiagnosis as cellulitis or abscess. It is usually developed from an injury to the skin, which may occur during trauma, IV drug use, drug administration (via injection), skin infections, ulcer, insect bites, visceral-cutaneous fistulas, surgical complications, percutaneous catheter insertion, abscesses and can even have idiopathic causes. Early diagnosis of the condition, surgical debridement, and optimal antibiotic therapy leads to the improvement in the condition and desired outcomes in the patient. The present study is focused on the successful treatment of necrotizing fasciitis in a hypertensive and hemiplegic patient, following an IM injection of an analgesic, which caused an ulcer and rapidly progressed, leading to necrosis of the affected regions.

Keywords: Necrotizing fasciitis, Surgical debridement, Skin grafting, Hemiplegia, IM injection

INTRODUCTION

Necrotizing fasciitis (NF) refers to the necrotizing infection in the soft tissue, which spreads along the fascial planes with or without the presence of cellulitis.[1] It was first described by Jones in 1871 with the term 'hospital gangrene'. The terminology of necrotizing fasciitis was coined by Wilson in the 1950s, describing the necrosis of the fascia and the subcutaneous tissue. This infection is characterized by the destruction of tissue, systemic toxicity, in severe cases, gross morbidity, and mortality.[2] Necrotizing fasciitis of the soft tissue is typically caused by toxin-producing bacteria. Rapid progression of the disease with significant local tissue destruction is commonly observed. The early or late systemic toxicity depends on the strain of bacteria and the toxins produced. Once the symptoms are observed, the progression of the infection is measured in hours, where early diagnosis and treatment become crucial. Higher rates of prevalence were observed in the obese, diabetic, alcoholic, patients with peripheral vascular diseases and immunocompromised populations. It is also observed in young and otherwise healthy patients with no risk factors.

NF may occur anywhere in the body but is frequently reported in the extremities, perineum, and genitalia. In some cases, it may occur on the chest or the abdomen. For the infection to occur, the pathogen is to be inoculated into the subcutaneous tissue, which may occur through any break in the epithelial or the mucosal surface. This may happen during trauma, IV drug use, insulin administration (via injection), skin infections, ulcer,

insect bites, visceral-cutaneous fistulas, surgical complications, percutaneous catheter insertion, abscesses, and can even have idiopathic causes.[3] The patient who develops this condition is often immunocompromised due to pre-existing diseases which render them susceptible to the infection. Immunosuppression may occur with advancing age, chronic renal failure, peripheral vascular disease, diabetes mellitus, and drug abuse.[4]

Clinical characteristics of necrotizing fasciitis are classified into 3 stages. It is difficult to distinguish the early stage of NF from other soft-tissue infections like erysipelas or cellulitis. Helpful clinical features for NF include poorly defined margins, tenderness beyond the involved area, warmth, swelling, and induration. Blisters or bullae are often observed in the intermediate stages, along with serous fluid. Purpura may be absent or present and cannot be determined as a diagnostic criterion. The areas around the lesions may be erythematous in the advance stage along with skin discoloration, duskiness, necrosis, and eschar tissue formation can also be observed at times.[5]

As the infection progresses rapidly, a delay in the diagnosis may prove to be fatal. Early diagnosis should be obtained in the first 4 hours of admission; surgeons are to evaluate the laboratory results thoroughly. This is helpful in the determination of the diagnosis and the severity of the condition. Following the diagnosis, the patients are to be managed with aggressive fluid resuscitation, antibiotic treatment, and emergency surgical debridement.[6]

CASE REPORT

A 55 years old male patient presented to the surgical ward with the symptoms of pain, swelling, and black discoloration in the right limb for 12 days before admission. The patient was normal before 12 days, but later, he developed a small ulcer, following intramuscular injection of an analgesic in the vastus lateralis area. The wound later progressed into a necrotic region. The vitals of the patient upon admission are depicted in Table 1.

Table 1: Vitals of the patient upon admission.

Temperature	98.4º F
BP	120/90 mmHg
Respiration rate	22 bpm
Pulse rate	78 bpm

The patient has a significant history of hemiplegia for 20 years on the right side of the body and hypertension for 15 years. The patient had irregularly been on anti-hypertensive medication before switching to ayurvedic medication for a year, about 5 years ago. The patient is currently not on any medication for his hypertensive condition. The patient is also a recovering alcoholic for a month before which, about 90 ml daily consumption of alcohol was noted. He had also quit smoking about 20 years ago.

Studying the laboratory investigations and other diagnostic tests that have been mentioned in Table 2, Table 3, Table 4 and Table 5 describing the complete blood picture, serum biochemistry, other diagnostic tests and 24 hour urine protein results respectively , the patient was started on a treatment regimen (Table 6) and was scheduled for a surgical debridement procedure. Skin grafting was performed a month after the surgical debridement schedule on the patient. The graft was prepared from the left thigh which was not infected in the patient. The post-operative medications are depicted in Table 7. The patient had a favourable outcome and was discharged after 45 days from the date of admission.

Table 2: Complete blood picture.

Hemoglobin	10.3 gm%
Total WBC	9,600 cells/cu.mm
Differential count	
Neutrophils	62%
Lymphocytes	28%
Eosinophils	4%
Monocytes	6%
Basophils	00
Platelet count	2.3 l/cu.mm
ESR	32 mm/h

Table 3: Serum biochemistry.

Blood urea	35 mg/dl
Serum creatinine	0.7 mg/dl
Sodium	139 meq/dl
Potassium	4 mEq/dl
Chloride	102 mEq/dl

Table 4: Other diagnostic tests.

2D ECHO	Normal
ECG	Normal
Chest X-ray	Normal
RBS	80 mg/dl
HBsAg test	Non-reactive
US abdomen	An anechoic focus noted in the mid pole of the left kidney measuring 1.5x1.4 cm
	Impression: simple renal cortical cyst observed

Table 5: 24 hours urine protein results.

The total volume of urine	1.2 l
24 hours of urine protein	27.6 mg/24 hours
Protein per liter	23 mg/l

Table 6: Drug therapy.

Piperacillin and tazobactam	4.5 gm IV BD
Pantoprazole	40 mg IV OD
Paracetamol	2 amps IV BD
Metronidazole	100 ml IV TD
Amikacin	50 mg/ml IV BD

Table 7: Post-operative drug therapy.

Ciprofloxacin	200 ml IV BD
Tramadol	1-amp IM SOS
Trypsin and chymotrypsin	Oral TD
Multivitamin	500 mg oral OD
Pantoprazole	40 mg IV OD
Vitamin C	Oral OD
Aceclofenac	100 mg BD

Figure 1: Pre- and post-operative condition of the infected leg. (a and c) Illustrate the pre-operative condition of the infected leg and (b and d) illustrate the post-operative condition of the infected leg.

DISCUSSION

Necrotizing Fasciitis is a surgical emergency, as the infection of the soft tissue progresses rapidly. Primarily affected parts include the skin, subcutaneous fat, and superficial fascia which leads to the destruction of blood supply to the skin leading to necrosis.[7] NF is usually accompanied by systemic inflammatory response syndrome (SIRS) and requires prolonged intensive care treatment. Monomicrobial infection usually occurs in immunocompromised patients with cancer, diabetes mellitus, vascular insufficiencies, organ transplantation, or alcohol abuse. Pathogens causing the infection may include *Bacteroides, Clostridium, Pepto streptococcus, Enterobacteriaceae, Proteus, Pseudomonas,* and *Klebsiella*. The infections typically affect the extremities, abdomen, and perineum.[8] NF can be classified into three types according to the causative organisms type I infections account for about 80% infections and is polymicrobial, type II infections are monomicrobial and caused by group A *Streptococcus*, and type III infections are caused by *Vibrio* or *Aeromonas spp*. and occur in people who come in contact with contaminated food or water, and present with fulminant sepsis. Despite all the necessary improvements in surgical techniques and intensive care, the mortality rate remains high and ranges from 12% to 43% in reported studies.[9]

In the present study, the patient had developed an ulcer on the skin following intramuscular injection of an analgesic, before admission to the surgical department. According to a study by Abbate et al, only 19 cases of NSTIs (necrotizing soft tissue infection) were reported after intramuscular injections, in 10 years. The study also concluded the average age of the patients to be 57 years with the majority of the patients being women, who are immunosuppressed due to diabetes, drug addiction, etc. The primary site of injection was the gluteus medius, which was also the area for infection. Majority of the cases included NSAID injections, followed by antibiotics.[10]

No definite diagnostic criteria are available for necrotizing fasciitis. The early stages of the disease can be challenging to diagnose for the physicians due to the lack of typical cutaneous features. Laboratory findings may lead to misdiagnosis as cellulitis or abscess. Disproportionate pain, extreme inflammation, ecchymosis are indicative symptoms of NF.[11] Laboratory risk indicator for necrotizing fasciitis (LRINEC) score uses white blood cell count, hemoglobin, sodium, glucose, serum creatinine, and serum C-reactive protein to develop a scoring system for assessing the risk of NF. A score of ≥6 yields a positive predictive value of 92% for predicting the severity of skin and soft tissue infection.[12]

In the current study, for the management of the infection, a surgical debridement procedure was scheduled upon the admission of the patient. Surgical debridement of the affected tissues is indicated as the primary management of NF. It is aimed at the removal of all the necrotic tissues, which include muscle, fascia, and skin, to preserve the viable skin.[13] A combination of surgical debridement, appropriate antibiotics, and optimal oxygenation of the infected tissues is necessary for the successful treatment of the condition. Broad-spectrum antibiotic combinations against anaerobic, gram-negative, and gram-positive bacilli are to be administered in the patient.[14] An approach for the closure of a wound is guided by surgical management with split-thickness skin

grafting, delayed surgical closure, or healing by secondary intention.[15] As there was an extensive loss of skin, the procedure of skin grafting was performed to minimize damage. The skin graft was prepared from the left functional thigh of the patient. The patient was also found to have, in addition to necrotizing fasciitis, a simple renal cortical cyst, which was detected upon radiology examination. A 24 hours urine protein test, which was performed to assess the damage to the kidney, revealed normal results.

CONCLUSION

The study highlights the importance of immediate management of necrotizing fasciitis in the patient who is hemiplegic and suffers from hypertension. These factors affect the optimal immunity of the patient. As a result of this, a skin ulcer was developed upon IM administration of an analgesic, which ultimately led to the necrosis of the tissue of the right leg. Treatment immediately through surgical debridement and antibiotics was necessary to reduce the fatality of the condition. The patient was maintained on an optimal antibiotic therapy before the procedure of skin grafting was performed to minimalize loss.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Mendem S, Faraz MAA, Rao KL. A case report on necrotizing fasciitis in a hemiplegic patient following an intra-muscular injection. Int J Community Med Public Health 2020;7:3689-92.