Necrotizing Fasciitis of Lower Limb: A Surgical Emergency

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Abstract
Background: To determine the morbidity and mortality in patients presenting with Necrotizing Fasciitis.
Methods: In this descriptive study, patients with Necrotizing Fasciitis were included. After resuscitation, the patients underwent emergency exploration and aggressive surgical debridement. Post-operatively, the patients were managed with broad spectrum antibiotics and serial debridements. Patients who recovered with extensive skin loss underwent skin grafting subsequently with follow-up for 6 months to assess morbidity.
Results: Twenty patients with Necrotizing Fasciitis were admitted during the study period. Mean age was 57.4 years. Fever, painful swelling, redness, presence of bullae/blistering, skin necrosis and foul smelling discharge were the main clinical findings. Diabetes mellitus (DM) was the commonest predisposing factor. Sepsis (70%) was the commonest complication. The overall mortality rate was 30% however the most common cause of death was acute Myocardial Infarction (MI). Partial thickness skin grafting was required in 50%. Muscle contractures were noted in 40% patients.
Conclusion: Necrotizing Fasciitis, a rare but life threatening condition carries a definite mortality rate. The risk factors for mortality are missed diagnosis, old age, diabetes mellitus and late presentation.
Key Words: Necrotizing fasciitis, Diabetes Mellitus.

Introduction
Necrotizing fasciitis (NF) is a severe form of soft tissue infection rapidly involving primarily superficial fascia. Bacteria proliferate within the superficial fascia and elaborate enzymes and toxins enabling the organisms to spread through the fascia leading to angiothrombotic microbial invasion and liquefactive necrosis of superficial fascia. The disease is clinically indistinguishable from other severe soft tissue infections such as cellulitis presenting with only pain tenderness and warm skin. In NF margins of the tissue involvement are often poorly defined with tenderness extending beyond the apparent area of involvement. Systemic manifestations include necrotizing soft tissue infection with fever, hypotension and multi organ failure and typical signs and symptoms such as tense edema outside the involved skin, disproportionate pain, blisters/ bullae, crepitus and subcutaneous gas. It was first reported as 'Hospital gangrene' 1,2

On culture of the pus/necrotic tissue, most common organisms identified include gram positive aerobic bacteria (Streptococci, Staphylococci), gram negative anerobic bacteria (E.coli, Klebsiella, Pseudomonas), anerobic bacteria (Clostridia) and fungi (Candida, Aspergillus). Risk factors identified in patients suffering from NF, include diabetes mellitus, arterial occlusive disease, obesity as well as higher percentage of alcohol consumption, drug abuse, immunosuppressant therapy and HIV infections. Viral infection as Varicella Zoster and concomitant use of NSAIDs is incriminated as a risk factor in occurrence of necrotizing fasciitis. Systemic manifestations of necrotizing fasciitis are classically caused by superantigens produced by group A streptococcus, and known as streptococcus toxic shock syndrome.3,4

Patients and Methods
This descriptive study was carried out over a period of one year from January 2010 to December 2010. Twenty admitted patients, with diagnosis of NF, were included in this study. All patients diagnosed as Necrotizing Fasciitis, had complete history and systemic examination recorded with complete baseline investigations . Initial resuscitation was done using intravenous crystalloid fluids.

Empirical broad spectrum antibiotics were administered. All necrosed tissue and slough removed was sent for culture/ sensitivity and histological examination. Wound was irrigated with normal saline and hydrogen peroxide. The post operative treatment included correction of fluid and electrolyte balance, coagulation profile, intravenous antibiotics, daily dressings and nutritional supplementation. The defects in skin created by debridement were closed
with local flap rotation. Few patients underwent partial thickness skin grafting.

**Results**

There were 20 patients enrolled in the study including 18 males and 02 female patients. The mean age was 57 years with the range 40-70 years. Average time duration between onset of symptoms and presentation in hospital was 3.7 days with range of 2-6 days. Fever and bullae/blistering were present in all patients. Foul smelling straw colored discharge from wound was present in 12 patients (60%). Most common predisposing factor was diabetes mellitus (Table 1).

Average TLC of patients was 23.1x10^3/ul ranging from 16,000-37,000x10^3/ul and fever of 100°F. All the patients were managed with aggressive repeated surgical debridements and intravenous broad spectrum antibiotics (combination of Benzyl Penicillin, Gentacin and Flagyl, or Tazobactum or Pipercillin). Common organism was Streptococcus aureus present in 50% patients. Eight patients with haemoglobin level < 8mg/dl had blood transfusions and protein rich diet was provided to all patients.

Average duration of hospital stay and recovery was 27 days ranging from 4-67 days. Most common complication present was sepsis (70%) followed by septic shock (50%) and muscular contracture (40%) (Table 2).

50% patients needed partial thickness skin graft. Overall mortality was 30%. Four them were unwilling for extensive surgical debridement. The most common cause of death was acute MI present in 04 patients (66%) during post-operative period.

**Discussion**

NF describes a life threatening soft tissue infection characterized by a rapid spreading infection of the subcutaneous tissue and in particular the fascia. Various synonyms (Hemolytic streptococcal gangrene, Non-clostridial gas gangrene, Non-clostridial crepitate cellulitis, Necrotizing erysipelas, Gangrenous erysipelas, Bacterial synergistic gangrene, Necrotizing cellulitis, Synergistic necrotizing cellulites) are used, often due to the difficult diagnosis. It has been classified into two types. Type I NF is caused by either aerobic or anaerobic bacteria and occurs most commonly after surgical procedures, diabetic foot infections and peripheral vascular disease while type II necrotizing fascitis is monomicrobial infection due to group A streptococcus. Community-acquired methicillin-resistant Staphylococcus aureus (MRSA) has also been described. In Clostridial cellulitis, gas is invariably found in the skin, but the fascia and deep muscle are spared which helps in distinguishing from myonecrosis by surgical exploration.

Predisposing factors include a history of blunt trauma, varicella (chickenpox), injection drug use, a penetrating injury such as laceration, surgical procedures, childbirth and nonsteroidal antiinflammatory drugs. Association between the use of non-steroidal anti-inflammatory drugs (NSAIDs) and progression or development of gas necrotizing infection has been reported. Studies have shown that area of inflammation more than 70 cm^2^ is a strong predictor for hospitalization.

Diagnosis of NF is very difficult, only with high suspicion one can diagnose NF early because of similarity of symptoms with cellulitis/abscess formation with patients having fever, swelling of area, erythema, tenderness. The laboratory findings generally are nonspecific. Blood tests typically demonstrate a leukocytosis with a marked left shift, coagulopathy and elevations in the serum lactate, creatine kinase and creatinine concentrations.

Severe pain, toxicity, fever and elevated CPK with or without radiographic findings are the main indications for surgical intervention. Repeated explorations and debridement may be necessary on a daily basis until all necrotic tissue has been removed. Early empiric treatment for necrotizing fasciitis is necessary for prevention of complications and possible recovery of patients. Anaerobic coverage is essential for type I disease. Clindamycin or metronidazole should be added to the antibiotic regimen unless a

<table>
<thead>
<tr>
<th>Predisposing Factor</th>
<th>No(%)</th>
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<tbody>
<tr>
<td>Diabetes Mellitus</td>
<td>14 (70)</td>
</tr>
<tr>
<td>Steroid Induced Immunosuppressive States</td>
<td>02 (10)</td>
</tr>
<tr>
<td>Peripheral Vascular Disease</td>
<td>02 (10)</td>
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<tr>
<td>Idiopathic</td>
<td>02 (10)</td>
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<table>
<thead>
<tr>
<th>Complication</th>
<th>No(%)</th>
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<tbody>
<tr>
<td>Sepsis</td>
<td>14 (70)</td>
</tr>
<tr>
<td>Septic Shock</td>
<td>10 (50)</td>
</tr>
<tr>
<td>DIC</td>
<td>02 (10)</td>
</tr>
<tr>
<td>Acute Renal Failure</td>
<td>04 (20)</td>
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<tr>
<td>Acute Respiratory Distress Syndrome</td>
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<tr>
<td>Acute Myocardial Infarction</td>
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<tr>
<td>Pleural Effusion</td>
<td>04 (20)</td>
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<tr>
<td>Muscle contracture</td>
<td>08 (40)</td>
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beta-lactam-beta-lactamase inhibitor (e.g. piperacillin-tazobactam) or carbapenem was selected since these latter agents are active against anaerobes. In present study ticarcillin or combination of benzyl penicillin, gentacin and metronidazole were used. Clindamycin may be more effective because it suppresses toxin production and facilitates phagocytosis of Streptococcus pyogenes. Neutralization of circulating streptococcal toxins through antibodies by the administration of intravenous immune globulin (IVIG) is a desirable therapeutic goal when hypotension is present.

Another important modality in management is dressing of wounds for which many different methods like use of honey, Vacuum Assisted Closure (VAC) therapy, Hyperbaric oxygen, application of 0.05 percent tretinoin solution for 10 minutes a day followed by iodine gel for four weeks and electrical stimulation near the wound are used. In present study we used saline dressing, honey dressing and VAC therapy.

Even with optimal therapy, necrotizing fasciitis is associated with considerable mortality. The mortality rates in different studies is 21 percent in type I necrotizing fasciitis and 14 to 34 percent in type II necrotizing fasciitis.

Conclusions
1. Unhygienic living conditions, poverty, low literacy rate, unawareness and steady rise in diabetes and diabetic foot patients can be considered as important denominators of NF in our set up.
2. Aggressive approach in diagnosing and treating patients with necrotizing fasciitis is required.

References