ORIGINAL ARTICLE

Clinical features and management of necrotizing fasciitis in a public sector teaching hospital

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Abstract

Objective: To review the clinical features and management of necrotizing fasciitis patients in public sector teaching hospital of Karachi.

Patients and Methods: From January 2005 to December 2005 patients admitted and treated for necrotizing fasciitis in surgical units of Civil Hospital Karachi were included in this case series. All the patients were admitted and resuscitated and was thoroughly evaluated. This included detailed clinical evaluation, relevant microbiological, hematological and radiological investigations. Blood samples, surface swabs and tissues were subjected to culture and sensitivity. Broad-spectrum antibiotics were administered. Major surgical debridements were carried out in the operating room under general anesthesia and subsequently repeated when necessary. Data was analysed by SPSS version 10.

Results: A total of 58 patients, 38 (65.5%) males and 20 (34.5%) females with a mean age of 46 ± 14.25 years. The most common primary sites of infection were limbs in 34 (58.6%) followed by scrotum in 8 (13.8%) patients. The majority of patients 32 (55.1%) had no underlying co-morbid disease. Among the rest of them diabetes was the most common disease in 17 (29.3%) patients. Most common clinical features were pain, tenderness, swelling, erythema, focal splinting and tachycardia over half of patients. The pus culture in 12 (20.6%) patients showed mix growth. Most common single organism isolated was streptococcus pyogenes and staphylococcus aureus in 15 (25.8%) patients each. Nineteen patients (32.7%) had complete recovery. 30 (51.7%) patients required reconstructive procedures and further follow-ups after discharge. 2 (3%) of the patients suffered from permanent disability while there were 7 (12%) deaths during the study period.

Conclusion: Necrotizing fasciitis has multiple etiology and predisposing factors. The bacteriology is mono as well as poly microbial. Early presentation and diagnosis, supportive measures, broad-spectrum antibiotics, prompt and aggressive surgical debridement remains the cornerstone of management.

Keywords: Necrotizing fasciitis, fournier's gangrene, soft tissue infections

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Introduction:

The term necrotising fasciitis (NF) was first coined by Wilson in 1952 to describe the most consistent feature of the infection, necrosis of the fascia and subcutaneous tissue with relative sparing of the underlying muscle.[1] It can progress rapidly to systemic toxicity and even death if not promptly diagnosed and treated. Contrary to the earlier belief that it was caused solely by hemolytic streptococci,[2] NF is now known to be a clinical entity of polymicrobial and synergistic nature without any particular combination.[3] The resultant effect is usually far more fulminant than the usual effect attributable to the single pathogen.[4] Despite many advances in our understanding of this disease and great improvements in medical care, the mortality associated with disease has not changed in the last 30 years and

remains 25% to 35%.[5] Mortality is directly proportional to time to intervention.6 In addition, prevalence of this disease is such that the average practitioner will see only one or two cases in his or her career.[4] Physicians cannot be sufficiently familiar with NF to proceed rapidly with precise diagnosis and the essential management.

Establishing the diagnosis of NF can be the main challenge for treating physicians and knowledge of all available tools is vital for early and accurate diagnosis.[7] Patients in the early stage of the disease usually present with only mild symptoms without systemic toxicity. This resulted in decrease health-seeking behavior of the patients and even upon presentation to physicians, the condition can often be initially misdiagnosed as other less severe conditions. This result in delay of starting the suitable treatment with grave consequences.[8] Recent studies conducted in Pakistan showed mortality rate of around 26%.[9] The cornerstone of management of necrotizing fasciitis is recognized as being aggressive surgical debridement and intensive support, whilst other soft tissue infections do not necessarily require the same amount of aggressive debridement. Therefore it is important that clinicians are able to differentiate between the two.[10]

This study was conducted to find out common clinical features and current management of this fatal disease. This helps in better understanding of this disease in our setup and results in early recognition and appropriate management of the patients suffering from this disease so that morbidity and mortality can be reduced further.

Patients and methods:

From January 2005 to December 2005 patients admitted and treated for necrotizing fasciitis in surgical units of Civil Hospital Karachi were included in this case series. The study included all patients with diffuse necrotizing soft-tissue infections, according to the known standards of classification of soft-tissue infections.11 Patients diagnosed as myositis, gangrene and erysipelas were excluded. All the patients were admitted and resuscitated. Each patient was thoroughly evaluated at initial assessment to determine the exact nature of the infection and ascertain the involvement of other systems. This included detailed clinical evaluation, relevant microbiological, hematological, radiological and histological investigations. Blood samples, surface swabs and tissues were subjected to culture and sensitivity. Broad-spectrum antibiotics were administered pending results of culture and sensitivity along with tetanus toxoid. Wounds were cleaned regularly with hydrogen peroxide, irrigated with normal saline and dressed with pyodine soaked swabs. Major surgical debridements were carried out in the operating room under general anesthesia and subsequently repeated when necessary.

Wound resurfacing was by second intention, direct suturing, split-thickness or skin grafting (SSG) and flaps depending on the nature of the wound and other variables that each patient presented with. Outcome was recorded as: complete recovery, temporary disability requiring rehabilitation or further follow-up, permanent disability and death. Data of each patient was entered into a proforma and later analysis was done by SPSS version 10.

Results:

A total of 58 patients, 38 (65.5%) males and 20 (34.5%) females with a mean age of 46 ± 14.25 years (ranging from 17 to 74) were included in the study. The most common primary sites of infection were limbs in 34 (58.6%) followed by scrotum in 8 (13.8%) patients (Table-I).

The majority of patients 32 (55.1%) had no underlying co-morbid disease. Among the rest of them diabetes was the most common disease in 17 (29.3%) patients. Table-I also shows comorbidity of all patients and predisposing factors identified.

In the surgical causes, one female had undergone caesarian section a week ago and other had a history of hysterectomy and laparotmy a month back, two male patients had an abdomino-perineal resection for rectal malignancy and one had a defunctioning colostomy. Regarding trauma the factors identified were use of intrave-

Table 1: *Site of involvement, co-Morbidities, predisposing factors of patients suffered from necrotising fascitis (n = 58)*

Variable	n (%)
Site of involvement	
Limbs	34 (58.6)
Scrotum	8 (13.8)
Abdomen	7 (12)
Back and buttocks	3 (5)
Cervical area	2 (3.4)
Inguinal area	2 (3.4)
Face	1 (1.7)
Multifocal	1 (1.7)
Co-morbidity	
Diabetes	17 (29.3)
Hypertension	7 (12)
Tuberculosis	1 (1.7)
Diabetes and Hypertension	1 (1.7)
None	32 (55.1)
Predisposing factor	
Trauma	30 (51.7)
Surgery	3 (5)
Surgery with infection	3 (5)
Trauma with infection	3 (5)
Infection	2 (3.4)
Surgery with trauma	1 (1.7)
None	7 (12)

nous and intramuscular injections, penetrating injuries, blunt trauma, catheter insertion, insect bite, human bite, scratch, burn injury, forceps vaginal delivery and one patient was the earth quake victim. Infections found were abscesses, infected wounds and boils.

Clinical presentation of all patients is shown in Table-II. Normal hemoglobin level of 10 mg/dl and above was found in 19 (32.7%) patients while 39 (67.2%) patients had an hemoglobin level of less than 10 mg/dl. White blood count was high (>14,000 cells/mm3) in 48 (82.7%) patients and only in 10 (17.2%) patients below this level. ESR was done in 55 patients with a mean of 49.65 ± 23.96, minimum being 15 and maximum was 105. Random blood sugar level was raised in 24 (41.4%) patients. Renal function was impaired, with 25 (43.1%) patients having raised urea (above 50 mg/dl) and 22 (37.9%) having raised creatinine (≥2 mg/dl).

The pus culture was performed in all cases at the time of initial debridement, which was positive in all except in 6 (10.3%) cases. In 12 (20.6%) cases mix growth (polymicrobial infection) was found and in the rest a single organism was isolated most common being streptococcus pyogenes and staphylococcus aureus in 15 (25.8%) patients each. Table-III.

All patients underwent surgery 0-3 days after presentation. Out of 58 patients 19 (32.7%) had complete recovery, benefiting from multiple debridements and fasciotomy. The number of patients who needed reconstructive procedures and further follow-ups after discharge was 30 (51.7%). Two (3%) of the patients suffered from permanent disability. One earth quake victim developed cavernous sinus thrombosis, panophthalmitis and suffered from total loss of vision. The other patient underwent upper and lower limb amputation. There were 7 deaths,

Table 2: *Clinical presentation of patients suffered from necrotising fasciitis (n = 58)*

Variable	n (%)
Clinical features	
Pain	50 (86.2)
Severe tenderness	50 (86.2)
Swelling	48 (82.7)
Tachycardia	43 (74.1)
Focal splinting *	42 (72.4)
Erythema	39 (67.2)
Fever	37 (63.8)
Toxic appearance	35 (60.3)
Generalized erythematous rash	1 (1.7)

** defined as refusal to use the affected part of the body*

Table 3: *Cultural characteristics of isolated organisms from necrotising fasciitis (n = 58)*

Organisms Isolated	n (%)
Mix Growth	12 (20.6)
Streptococcus Pyogenes	15 (25.8)
Staphylococcus Aureus	15 (25.8)
E-Coli	6 (10.3)
Pseudomonas	1 (1.7)
Klebsiella Spp	1 (1.7)
Proteus Mirabilis	2 (3.4)
No Growth	6 (10.3)

yielding a mortality of 12%.

Discussion:

Our findings suggest that NF is fairly common in our part of the world. The reported annual incidence of NF is 2-3 cases.[4] Our yearly reported cases of 58 patients is a huge number of cases of this rare disease. One reason may be the increase in the incidence of the disease and other reason Civil Hospital Karachi, being one of the largest tertiary care public sector hospital all complicated cases were referred not only from Sindh province but from Baluchistan as well.

Decreasing mortality is directly correlated with establishing the diagnosis and instituting proper therapy quickly.[6] Because of its nonspecific findings, variable time course to fulminant disease, and relative rarity, a high index of suspicion must exist to expeditiously diagnose this disease process. Findings of our study showed that most common clinical features were pain, tenderness, swelling, erythema. These findings are identical to those found in nonspecific cellulitis, possibly making the diagnosis difficult. A retrospective case series showed that more than one fourth of the cases were initially misdiagnosed as simple cellulitis or severe, nonnecrotizing skin infection.[12] Another study that only 14% of patients with NF were admitted with the proper diagnosis - the remainder were initially diagnosed as cellulitis or simple abscess.[13] It is unclear if the admitting diagnosis was correct and the cellulitis progresses to a necrotizing infection. Regardless, NF developed in 86% of patients, a finding that highlights the need for a high index of suspicion with all skin and soft-tissue infections.[13]

The majority of patients with necrotizing fasciitis present with a single focus of disease. In the literature, there are few reports of multi-focal necrotizing fasciitis. Basaran, et al.[14] reported a case of cryptococcal necrotizing fasciitis in a middle-aged renal transplant patient on immunosuppressive therapy. The patient suffered from bilateral lower limb necrotizing fasciitis. We also had one patient who suffered multi focal disease in upper, lower limb and back after burn injury. Craniocervical necrotising fasciitis is an aggressive and potentially fatal infection associated with high morbidity and mortality.[15] In our case series we have one patient who suffered NF of cervical region.

Prompt and aggressive surgery is the basic principle of management along with broad-spectrum antibiotic coverage and aggressive nutritional support. Surgical excisions should be deep and extend well beyond the areas of necrosis until viable tissue is reached. In our study, all the patients underwent surgery within two to three days of admission. Multiple wound debridements were carried out and in some cases fasciotomies alone sufficed. About half of our patients needed skin grafting or skin flaps, which were either done in the parent ward or in plastic surgery department.

Recently, scoring systems have been described to help and accelerate NF diagnosis. Either a white blood cell count >15,400 cells/mm3 or a sodium level <135 mmol/L have a 80% positive and negative predictive value.15 Scoring system "Laboratory Risk Indicator For Necrotizing Fasciitis" (LRINEC) based on admission studies have been described in literature.[16] A score >6 has a positive predictive value or 92% and negative predictive value of 96% for NF. However these score remains unvalidated in larger, prospective studies.

Mortality from necrotizing soft tissue infections still remains very high in the world; it varies from 15-50%, despite the modern and aggressive therapy.[17] Factors associated with mortality in these patients are advanced age, extensive soft tissue involvement and more importantly, delay in seeking treatment. The overall mortality rate in our study was 12%. This is relatively low as compared to western studies. The reason could be the younger age group of patient in our study and probably because of more effective newer generations of antibiotics. We hope in future the permanent disability and mortality from this disease will further decrease.

Conclusion:

Necrotizing fasciitis has multiple etiology and

predisposing factors. High-risk patient populations do exist, but healthy young patients are also susceptible. A high index of suspicion, coupled with appropriate resuscitation and operation are needed to ensure timely intervention. Aggressive surgical debridement and combination, broad-spectrum coverage, intravenous antibiotic therapies are the cornerstones of therapy.

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