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Necrotizing Fasciitis of the Extremities– A Clinical Study

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Abstract
Necrotizing fasciitis is a rapidly progressive fulminant infection of the deep fascia and subcutaneous tissue commonly involving extremities, perineum, scrotum, penis, abdominal wall. It is associated with significant morbidity and mortality. Trauma is the most commonly identified etiology. Elderly and immunocompromised patients are the most affected. Early diagnosis and differentiation from other non-necrotising skin and soft tissue infections is needed because delay in surgical debridement leads to larger area of necrosis and higher chance of mortality. Diagnosis is dependent on clinical features like disproportionate pain, tenderness beyond skin involvement, systemic signs of toxicity like fever and tachycardia, erythema, edema, presence of bullae etc. We present our experience with 45 cases of necrotizing fasciitis of the extremities with respect to etiology and triggering factors, clinical presentation, laboratory findings and treatment outcomes in the rural Indian setting. This is a retrospective observational study conducted with the aim of analyzing the factors influencing morbidity and mortality of necrotizing fasciitis. Demographic data, presence of co-morbidities, time interval from onset of symptoms to surgical intervention, nature of organisms isolated, derangement of laboratory indicators like haemoglobin, total WBC count, blood urea, serum creatinine, sodium levels were collected and analysed for their influence on duration of hospital stay and area of skin necrosis that needed grafting. It was found that delay in presentation was associated with larger area of necrosis which was statistically significant. However no association was found between age, sex, site of involvement, presence of co-morbidities, history of local application of an irritant and area of necrosis.
Keywords: *necrotizing fasciitis, extremities, area of necrosis, skin grafting.*

Introduction

Necrotizing fasciitis is a rapidly progressive fulminant infection of skin and subcutaneous tissue leading to necrosis of fascial planes accompanied by severe systemic toxicity. It is associated with significant morbidity and mortality. The swift clinical course is attributed to polymicrobial nature of infection and synergy. Commonly involved areas are perineum, scrotum, extremities and abdominal wall, the commonest being the extremities. Early diagnosis and aggressive surgical debridement along with

intensive care in ICU is necessary to limit necrosis, reduce morbidity and mortality. There is a recent increase in the incidence of necrotizing fasciitis possibly due to increasing virulence of micro-organisms in the community. Various studies have described the risk factors for development, clinical and laboratory tests for early diagnosis, factors influencing prognosis and effectiveness of various treatment modalities like vacuum therapy in the management of necrotizing fasciitis. The aim of our study is to analyse these factors in the rural Indian scenario so that early diagnosis and management can be optimized in the above setting.

Materials and Methods

This is a retrospective observational study conducted in Raja Muthiah medical college, chidambaram which serves as a referral centre for the rural districts of cuddalore, nagapatttinam, thiruvarur in east Tamilnadu. All cases of clinically and surgically proven primary necrotizing fasciitis of the extremities admitted in our institution during the period 2014 to 2017 were included in the study. Necrotizing infections of abdomen or perineum extending later to extremities were excluded. Non- necrotizing soft tissue infections like cellulitis, lymphangitis, erysipelas were excluded. Patients with pre-existing vascular disorders that could have caused gangrene were excluded. Demographic data, history of onset, duration and progress of symptoms, presenting symptoms, presence of predisposing factors, clinical examination findings, extent of necrosis, number and extent of wound debridement done, treatment outcomes were recorded in a pre-written proforma and analysed. Area of surgical debridement and area that required grafting was calculated by multiplying length of raw area by breadth in cm.

Results

Total of 45 cases were admitted with necrotizing fasciitis of limbs of which 39 were males, 6 were females. 8 cases involved upper limb, 37 cases involved lower limb. Most common site of involvement was leg and foot. Median age at presentation was 52 years (range 35 to 88 years). 29 cases (65%) had a reason for immunosup-ression mostly diabetes mellitus (25 cases). 2 cases were on steroids, one case had cirrhosis with severe portal hypertension, one case had chronic renal failure. More than 50 % of cases gave history of minor trauma followed by rapid onset swelling, pain and systemic inflammatory signs. Pain was the commonest presenting symptom (100% of cases) followed by swelling (90%), discoloration due to necrosis(60%) and bleb formation with discharge of dish water pus (11 %). Clinical signs present were history of fever in 95% of cases (though fever was present in only 55% cases at the time of admission), tachycardia in 60% cases, hypotension in 4% cases. Local signs at presentation were swelling in 90% of cases, tenderness beyond skin involvement in 83% cases, erythema in 33 %, bullae in 11% cases. Most of our cases presented in the delayed stage after the onset of necrosis, the earlier stages being managed by primary care physicians or by patients themselves with home remedies in the form of local application of an irritant. Frequency of necrosis of skin at the time of presentation was in 60% of cases ranging from focal necrosis of skin to extensive area involving the entire limb. Necrosis did not extend beyond deep fascia in most of the cases except in two cases of lower limb necrotising fasciitis where lateral compartment muscles had to be partially removed. However none of our cases needed amputation of limb as described in other studies.

Characteristically 60% of our cases gave history of local application of an irritant ranging from hot turmeric powder, salt, tamarind, rice paste etc to various oils and ointments following which bulla formation and necrosis of skin got accelerated. Almost all cases had leukocytosis at time of presentation with WBC count >10,000. Count > 15,000 was present in 60% of cases and > 20,000 in 33% of cases. Only 33% of our cases had hyperglycemia at the time of presentation unlike

described in other studies. Hyponatremia was present in less than 10 % of cases. Anaemia with Haemoglobin less than 10 gm% was present in 60% of cases and most of those cases required blood transfusion either before, during or immediately after surgical debridement. Majority of the cases needed multiple transfusions during post operative period when wounds were being prepared for grafting. Creatinine > 1.5 was present in 40% of cases. Frequently isolated microorganisms were E coli, streptococcus species, staph aureus, pseudomonas which together accounted for more than 80% of cases. Less common organisms were proteus, vibrio etc. Most of the cases (75%) underwent surgical debridement within 24 hours of admission, in few cases debridement was delayed beyond 24 hours due to time taken for initial resuscitation. 2 cases died within 48 hours of wound debridement, however there was no mortality beyond 48 hours of surgery. Vacuum therapy was used for management of raw area in 66 % of cases. Average area that required skin grafting was 18 sq. inch. and average duration of hospital stay was 23 days. Delay in presentation was associated with larger area of necrosis (table 1) and this association was statistically significant. Presence of co-morbidities, local application of irritant was associated with higher area of necrosis but this association was not statistically significant, whereas no association was noticed between area of necrosis and age , sex or site involved .

Figure 1 necrotizing Vs non-necrotising infection

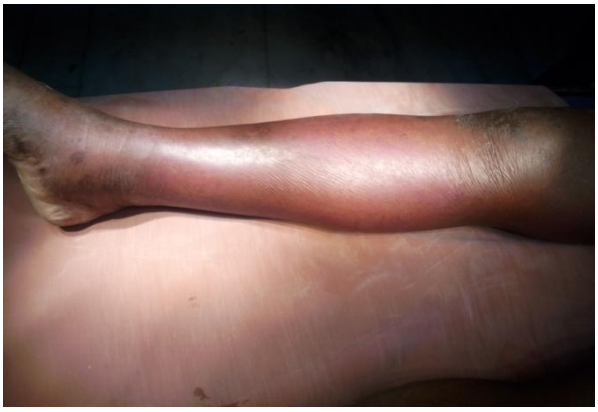

Figure 2: necrotizing fasciitis with established gangrene of skin

Figure 3: raw area after debridement during preparation for grafting

Figure 4: after skin grafting

Table 1

Duration (onset of symptoms to surgery)	Number of patients	Mean Area of necrosis In sq.inch	p-value
< 48 hours	0	8	
2 t0 5 days	12	13	P < 0.05
>5 days	33	21	

Discussion

The term necrotizing fasciitis was first coined by Wilson in 1952[1] though several clinical reports of similar cases were described earlier by several workers dating back to 500 B.C. It is a rapidly progressive fulminant infection of skin and underlying facial planes commonly occurring in the elderly and immunocompromised individuals. Skin may appear normal until late. Trauma is the most common identifiable etiology most often a trivial one. Diabetes and other immunocompromised states like chronic liver and kidney disorders have been identified as risk factors in 40 to 60 % of cases[2]. In our studies a co-morbid risk factor was present in 65 % of cases. Rapid progression and severe systemic toxicity is attributed to polymicrobial nature and synergy between aerobic and anaerobic organisms[4]. It is associated with high morbidity and mortality. The reason for skin necrosis is angiothrombotic microbial invasion and liquefactive necrosis[3]. Clinical diagnosis is by symptoms like fever, disproportionate pain, swelling, bleb formation, discoloration of skin due to necrosis. signs are presence of tenderness and edema beyond skin involvement, discharge of dish water pus, features of systemic toxicity like fever, tachycardia, hypotension etc[5]. Early diagnosis and urgent operative debridement along with fluid resuscitation, correction of acid base and electrolyte imbalance and management of sepsis with broad spectrum antibiotics is required for preventing mortality as well as to limit morbidity[7]. Often the extent of debridement required can be determined only during surgery as the underlying necrosis of subcutaneous tissue, fascia and sometimes muscles extends beyond the visible limits of skin involvement[2,7]. Scoring systems like LRINEC which assigns points for six laboratory values viz. C-reactive protein, WBC count, haemoglobin level, serum sodium level, serum creatinine level and serum glucose level help in diagnosis as well as assessment of prognosis [8,9]. Imaging studies like CT and MRI are adjuncts to diagnosis in equivocal cases. However surgical exploration and histopatho-logical examination are confirmatory investigations and precious time should not be lost in waiting for obtaining laboratory and imaging results[10]. When in doubt a bed side finger probing test can be done under local anaesthesia in which a 2 cm incision is made upto deep fascia to show characteristic dish water pus and lack of resistance[2]. Re-exploration at 48 hours and repeated debridements are necessary until infection is under control. The resultant raw area is managed by vacuum assisted closure and skin grafting[11].

Conclusion

High degree of suspicion is needed for diagnosis and differentiation from other non-necrotising infections of the extremities especially at the primary care level where patients initially seek opinion.

Early diagnosis by clinical criteria and bed side tests should be adopted before waiting for imaging or laboratory tests so that early surgical debridement can be done to prevent or reduce area of necrosis.

Conflict of interest: none.

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