

Necrotizing Fasciitis of the Lower Limb and Factors Affecting its Outcome: Case Series



Medical Science

KEYWORDS : Factors , Lower limb , Necrotizing fasciitis , outcome

V.Agarwal	Professor, Department of Surgery, Subharti Medical College, Meerut, India
Dhanesh Kumar	Asst. Professor, Department of Surgery, Subharti Medical College, Meerut, India
* Ritin Malik	Resident, Department of Surgery, Subharti Medical College, Meerut, India * corresponding Author
Aman Singhal	Department of Surgery, Subharti Medical College, Meerut-250005, india
Gopal	Department of Surgery, Subharti Medical College, Meerut-250005, india

ABSTRACT

Necrotizing Fasciitis is a rapidly spreading, lethal, infective gangrene of the subcutaneous tissues. Early surgical debridement is the key to a favorable outcome. A retrospective study was done on 30 patients presenting to our hospital over 2 years. Etiology, Age, Sex, Stage of disease on presentation, were analyzed and the factors affecting outcome were sought. The data collected was compared to previous studies and statistically tabulated. In our study, 16(53.3%) patients were in the age group of 41-60 years, Males to females ratio was 19:11. Most common etiology was trivial trauma. Patients presenting with comorbidities were 60%, with diabetes mellitus being the most common. Average time to onset of symptoms to hospital presentation was 2.86 days, and time to first surgery was 3.46 days. Most common site involved in the lower limbs was the left leg in 26.67% patients and the most frequent pathogen isolated was coagulase positive Staphylococcus in 20% cases. Definitive management as split skin grafting was done in 25 patients. The mortality in our study was 13.3%. We concluded that time of presentation, timing of first surgery, patients with advanced age and multiple comorbidities have poorer prognosis.

Introduction

This disease has bewildered physicians for centuries. Hippocrates in the fifth century BC gave the first description of this dreaded disease [1]. The first report of this disease in the United States was by a Confederate Army surgeon, Joseph Jones in 1871 and he named this entity 'hospital gangrene' [2]. Meleney [3] in 1924 reported an outbreak of hospital gangrene in Beijing and coined the term hemolytic streptococcal gangrene. The term necrotizing fasciitis was first introduced by Wilson [4] in 1952 and is the preferred term today describing the most consistent and key feature of this disease, fascia necrosis.

The media in the 1990s popularized this disease as "flesh eating bacteria syndrome"[5]

The term Necrotizing fasciitis (NF) is used to describe a group of life threatening conditions of the skin, soft tissues, muscles which rapidly progress through the fascia planes causing destruction of the fascia at rates of 2-3cm/hour[6]. The extremities are often affected and limb viability threatened. The clinical course is swift in a matter of days from a easily distinguishable erythema to widespread skin and fascial necrosis. Prompt diagnosis is imperative, and a delay could prove fatal as the disease progresses towards systemic inflammatory response syndrome and eventually multiorgan failure at a rapid pace.

METHODS

This retrospective study was conducted during July 2014-July 2016 on patients admitted with signs and symptoms of Necrotizing Fasciitis of the lower limb. Sample size was 30 patients (n=30). Patients were dually informed of this study and a consent was taken from all patients participating.

A diagnosis of necrotizing fasciitis was confirmed in each patient on the basis of clinical symptomology and stage of disease presentation was evaluated. Routine laboratory work was done and history of the patient thoroughly studied to determine the cause of necrotizing fasciitis. Patients

were followed up and the factors affecting outcome were retrospectively analyzed.

PROCEDURES

Each patient gave written, informed consent to participate in this study and the study protocol was approved by the institutional review board including ethical issues. A detailed history was obtained from each patient. This included age, gender, comorbid conditions, initial event leading to symptoms, duration of symptoms, time interval between symptom onset and presentation to hospital as well as progression of the disease.

Laboratory routine investigations including Hemoglobin, Total Leucocyte count, S.Cretinine, S.Electrolytes, C-Reactive Protein were analyzed.

Microbiological work up to determine responsible pathogen and culture/sensitivity of the same were obtained and appropriate broad spectrum antibiotics were given.

Patients requiring wound debridement were taken up for the same on urgent basis and followed up with meticulous wound care.

Definitive management after initial debridement and vacuum assisted dressings included split skin grafting, secondary closure and amputation.

Statistical Analysis

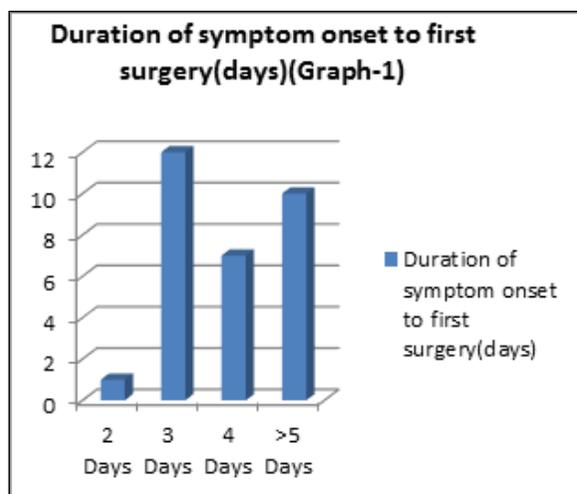
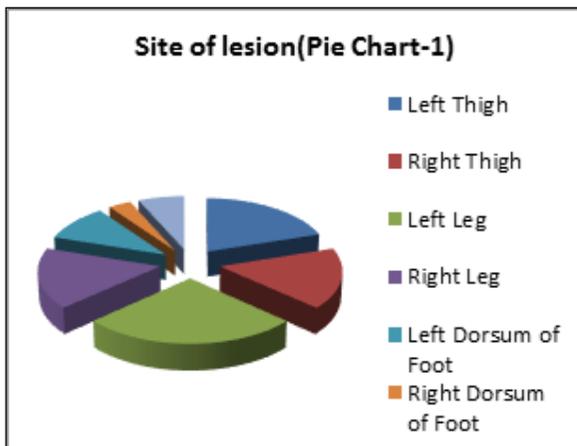
The results obtained in the study were obtained in a tabulated manner, and were analyzed with statistically.

Table 1:

VARIABLE	FAVOURABLE OUTCOME (n=26)	MORTALITY (n=4)	P VALUE
Age (years)	41.8 ± 13.1	64.8 ± 4.9	0.002
SEX M:F	19:11 (63.3%)	3:1 (75%)	0.034
Co-morbid with diabetes	8	3	

Duration of symptom onset to hospital(days)	2.86 ± 1.26	5 ± 0.81	0.003
Duration of symptom onset to first surgery(days)	3.46 ± 1.17	5.5± 0.57	0.002

*only statistically significant factors (P<0.05) have been tabulated



RESULTS

Out of the total 30 patients included in this study, the maximum incidence of patients, 16(53.3%) were in the 41-60 age group (Table-1).A higher number of mortality (n=4) was seen in patients above 60. Males: Females ratio was 19:11.The most common site involved was the left leg which was seen in 8 (26.67%) patients (Pie chart-1).The etiology was studied retrospectively and most patients 14(46.67) had a history of a trivial minor trauma.Co-morbidities were seen in 18 patients and diabetes mellitus was the most common co-morbidity (11 patients) encountered in our study.

Most patients presented who to us with a 2-3 day history (mean=2.86) (Graph-1) and wound debridement was done either on the day of admission or the next day(mean=3.46).Out of the patients (n=4) who expired the presented to us with an average of 5 days since the onset of symptoms and debridement was usually carried out immediately.

Staphylococcus was the most common single isolated organism grown on culture seen in a total of 6 patients. Sensitivity was done and Amikacin was the most sensitive and responsive drug.

Definitive management in the form of split skin grafting was done in 25 patients and most patients ended up with a total hospital stay of 11-20 days.

Septicemia was the most common complication seen in 6 patients (20%).The outcome of our study was that we had a mortality of 13.3%

DISCUSSION

Necrotizing fasciitis of the lower limbs is a rare but lethal condition of the subcutaneous tissue and fascial planes with a extremely high mortality rate that approaches 100% if not promptly treated as noted in a 1924 study by Meleny in 20 patients [3].The mortality rate noted in our study approached as high as 13.3%.Singh et al [7] in their series of 55 patients reported a mortality of 27.2%. Out of the total 30 patients included in this study mostly 16(53.3%) were in the age group of 41-60 years with a M:F ratio of 19:11.Several authors [8,9,10,11] reported that patients above the age of 60 were associated with a higher mortality. In our study sex did play a role as a factor affecting mortality ,with 75% of mortalities being male, similar to results reported by Elliot et al [11].Numerous etiologies have been encountered ,but by far a minor trivial trauma which goes unnoticed initially is the most common etiology , with 14 patients, 46.67% presenting with the same in our study. The disease progression is worse in the presence of multiple co-morbidities, such as diabetes mellitus and renal failure as they are immunologically compromised.11 patients had accompanying diabetes and had a worse outcome with longer hospital stay and higher rate of complications and mortality. Diabetes mellitus has been identified as a co-morbidity that greatly affects the outcome as described by Brand et al [8] and Elliot et al.[11].

The diagnosis of Necrotizing fasciitis is difficult and the differential diagnosis of other soft tissues infections even more so. A delay in diagnosis could prove lethal and hence it is imperative that timely intervention is undertaken. Our study showed a significantly better outcomes in patients who presented early (within 2-3 days of symptom onset) and underwent subsequent debridement. Eckmann et al. [11] noted those with a duration of initial symptoms of more than 5 days were associated with higher mortality rate. In our study 2 out of the 4 mortalities we encountered presented on day 6.The characteristics of necrotizing fasciitis changes with time and every attempt must be made to retard disease progression in the form of broad spectrum antibiotics and surgical debridement .The early picture includes erythema, edema and tenderness with local warmth, once the infection develops the infection site presents with blisters and bullae with eventual skin ischemia and gangrene. In our study patients presenting in a Stage 3 of the disease, 53.3% had the worst prognosis. The diagnosis of NF can be secured faster by using laboratory based scoring systems such as the LINREC score which was developed by Wong et al [13]as a screening system for necrotizing fasciitis with a high predictive value and helpful in making an early diagnosis warranting urgent intervention and better outcomes. The important factor in determining the outcome in our study was the time between onset of symptoms and hospital presentation (average of 2.86 days) as well time to first surgery (average of 3.46 days).

Approach to management

The management of necrotizing fasciitis irrespective of stage is empirical antibiotics with surgical debridement. Post debridement patients antibiotics were tailored as per culture sensitivity of the isolated organism. Daily dressing with hydrogen peroxide and betadine were undertaken. Vacuum assisted dressing was done to achieve healthy granulation once the infection had subsided. Split skin grafting was carried out in most cases and graft uptake was good. No cases of graft failure were encountered. In a few cases that had presented early with immediate wound debridement, due to less area of involvement secondary suturing was possible.

As a life-threatening condition, NF demands new management strategies. Unfortunately, there are no single new therapies that can manage NF; they all seem to play an assistive role. Undoubtedly, the use of VAC has many benefits in wound healing, and it will be adopted by more physicians in the future. A study by Anaya et al. [14] highlighted the role of IVIG in the treatment of Necrotizing soft tissue infections (NSTI), especially if NSTI is associated with group A streptococcal infection. However, relevant studies investigating its use are contentious and difficult to compare because of the small number of patients and the different methodologies used .

CONCLUSION

Necrotizing fasciitis remains an enigmatic disease and the key to management is prompt diagnosis and early surgical intervention. Patient who present in the early stage of the disease albeit within a few days on onset of symptoms fare much better. The most important prognostic factor besides age is time of presentation and early debridement. The mortality of this disease has decreased over the years but patient awareness and the acute progression leading to delayed admission of this disease remains the single most important factor contributing to the outcome.

REFERENCES

1. Trent JT, Kirsner RS. Diagnosing necrotizing fasciitis. *Adv Skin Wound Care* 2002; 15(3): 135-8.
2. Quirk WF Jr, Sternbach G. Joseph Jones: infection with flesh eating bacteria. *J Emerg Med.* Nov-Dec 1996;14(6):747-53.
3. Meleney FL. Hemolytic streptococcus gangrene. *Arch Surg.* 1924;9:317-364.
4. Wilson B. Necrotizing fasciitis. *Am Surg.* Apr 1952;18(4):416-31.
5. Stevens DL, Tanner MH, Winship J. Severe group A streptococcal infections associated with a toxic shock-like syndrome & scarlet fever toxin A. *N Engl J Med* (1989) 321:1-10.1056/NEJM198907063210101.
6. Evangelos P. Misiakos, George Bagias, Paul Patapis, Dimitrios Sotiropoulos, Prodromos Kanavidis and Anastasios Machairas; Current concepts in the management of necrotizing fasciitis; doi: 10.3389/fsurg.2014.00036
7. Singh G, Ray P, Sinha SK, Adhikary S, Khanna SK. Bacteriology of necrotizing infections of soft tissues. *Aust N Z J Surg* 1996;66(11): 747-50
8. Brandt MM, Corpron CA, Wahl WL. Necrotizing soft tissue infections: a surgical disease. *Am Surg* 2000; 66(10): 967-70; discussion 70-1.
9. Childers BJ, Potyondy LD, Nachreiner R, Rogers FR, Childers ER, Oberg KC, et al. Necrotizing fasciitis: a fourteen-year retrospective study of 163 consecutive patients. *Am Surg* 2002; 68(2): 109-16.
10. Eckmann C, Kujath P, Shekarriz H, Staubach KH. Clostridium myonecrosis as a sequelae of intramuscular injections—description of 3 fatal outcomes. *Langenbecks Arch Chir Suppl Kongressbd* 1997; 114: 553-5.
11. Elliott DC, Kufera JA, Myers RA. Necrotizing soft tissue infections. Risk factors for mortality and strategies for management. *Ann Surg* 1996; 224(5): 672-83.
12. Eckmann C K, P, Psathakis D. Results of standardized therapy of necrotizing fasciitis. *Br J Surg* 1997; 88.
13. Su Wong CH, Khin LW, Heng KS, Tan KC, Low CO. The LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score: a tool for distinguish-

ing necrotizing fasciitis from other soft tissue infections. *Crit Care Med* 2004; 32(7): 1535-41. supplement 2.

14. Anaya DA, Dellinger EP. Necrotizing soft-tissue infection: diagnosis and management. *Clin Infect Dis* (2007) 44:705–10. doi:10.1086/511638