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Analysis of predictive factors in diagnosis and outcome of Necrotising fasciitis

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Abstract
Necrotizing fasciitis is a rare, life threatening soft tissue infection, primarily involving the fascia and subcutaneous tissue.
We conducted a prospective analytical study in a tertiary care referral hospital over a period of two years, 50 patients were included in the study.
To evaluate the factors for early diagnosis, management, mortality and morbidity.
Necrotizing fasciitis is a life threatening disease with high mortality. Early diagnosis and adequate treatment are necessary to improve the clinical outcome. Clinical awareness remains pivotal.

Keywords: Fasciitis, gangrene, necrotizing fasciitis

1. Introduction
Necrotizing fasciitis (NF) is one of the rare entities in daily surgical practice that still poses a challenge to the surgeon. Though rare, it is notorious for its rapidity in spread of necrosis and inflammation. NF is polymicrobial in general with an exemption of Clostridial infections, that tend to be monomicrobial and often results in myonecrosis [1, 19]. The major risk group for NF are immune-compromised individuals like those who are on immunosuppressants, steroids, patients with peripheral vascular disease (PVD), Diabetes and those who had underwent recent surgeries. The infection trigger the release of a cascade of inflammatory mediators resulting in thrombosis of the blood vessels leading to necrosis. The development of sepsis and multiple organs dysfunction (MODS) determines the course of disease in fulminant NF. The rich loose areolar tissue in the peri fascial plane facilitates the easy and rapid spread of infection. In addition, the avascular nature of the perifascial plane renders the infections in this region least responsive to the antibiotics. Hence an early radical debridement is to be performed to save the patient. All these factors necessitate the analysis of predictive factors in diagnosis and outcome of necrotizing fasciitis.

2. Materials and Methods
A prospective study including 50 pts was conducted in a referral hospital in South India, over two years duration.

Aim of the Study
1. To evaluate factors that helps in early diagnosis of necrotizing fasciitis
2. To identify factors responsible for mortality and morbidity

The patients with a clinical diagnosis of necrotizing fasciitis were included while those patients with non-NF diagnoses like abscess and cellulites were excluded. The predictive factors in diagnosis and outcome were statistically analyzed and expressed in percentages (%). An informed consent is obtained. A detailed clinical history that includes the predisposing as well as precipitating factors, clinical presentation, the investigations done and the details of treatment performed were recorded.
Complete blood cells (CBC) count, serum creatinine and serum electrolytes were analyzed. White blood cells (WBC) count greater than 15400cells/cu.mm and Serum Sodium (Na) levels less than 135mEq/L was considered as adjuvant parameters in diagnosing necrotizing fascitis. Wall and colleagues [18] Microbial analysis for the causative agent was performed by culture and sensitivity method. ----- Prognostic Score suggested by ANANYA et al was used to predict Mortality in Patients with Necrotizing Soft Tissue Infection at the Time of First Assessment. Based on the severity of the condition patients were treated either with only debridement or with both debridement and split skin grafting or by amputation of the limb. Along with these aggressive fluid resuscitation and antibiotics were administered. Dressings were done twice a day along with the treatment of general conditions like anemia, diabetes, hypertension etc.

3. Results
A total of 50 patients with NF were analyzed. The age of the patients range from 23-78y, of which peak incidence is noted in 41-60y group accounting to 58% (figure1). 45(90%) patients of the study group were male patients (figure2). The most common site affected was extremities i.e., 92% (figure 3) (picture 1, 2, 3, 4). Among the 50 patients studied, 20 patients had hypotension at the time of admission. 29 patients were diabetics and smokers. 20 patients were hypertensive, 6 patients had cardiac and respiratory diseases, 4 patients were suffering from PVD, HbsAg is positive in 2 patients and 1 patient had hemiplegia. Among the 34(68%) patients having elevated WBC count, 32 (64%) patients had WBC more than 15,400cells/cu.mm (figure4). Hyponatremia was seen in 35(70%) cases having values less than 135mEq/L (figure5). Of the 50 patients, 34 (68%) patients had both leukocytosis and hyponatremia. The bacteriology of the 50 patients was shown in Table 5. 30 (60%) of the NF was caused by gram negative bacteria among which E.coli affected 11(37%) patients. Of the 50 patients, majority i.e., 30 (60%) patients, were managed with both debridement and split skin grafting whereas 8(16%) patients underwent limb amputation

(figure6). By using the Prognostic Score to Predict Mortality in Patients With Necrotizing Soft Tissue Infection at the Time of First Assessment the 50 patients were grouped into 3 groups of which majority i.e., 33(66%) were in group 2 and among the rest 15 (30%) were in group 1 and 2 (4%) were in group 3. By the end of the hospital stay 38(76%) patients were alive with morbidities. The final outcome is as shown in (figure7).

4. Discussion

Though the description of NF dates back to 5th century BC, the first diagnosis of NF was made in 1783 in France [1]. Necrotizing Fasciitis is well known in the medical world by names like Meleney's cellulitis, Flesh eating disease, Hospital gangrene, Gangrenous erysipelas, Streptococcal gangrene, Synergistic necrotizing cellulites. Even though it is not always mandatory to have predisposing conditions for developing NF, most of the times the patients are immunocompromised either due to chronic illness like carcinoma, diabetes or due to the use of steroids, IV drug abuse etc. [5] NF neither has clear cut boundaries nor palpable findings attributing to the delay in diagnosis and severity of the illness. In general causative agents of NF are polymicrobial but they can be monomicrobial as seen in cases of infection with Clostridium species. The perifascial plane being avascular and rich in loose areolar tissue, aids in the easy and rapid spread of infection and also renders the host unresponsive to antibiotics.

Main features of NF are

- Edema of the area with peau d'orange appearance
- Blistering and necrosis
- Crepitus of the tissues
- Pain out of proportion to the clinical findings
- Signs of systemic infection may be present

In fulminant NF, sepsis and MODS results in the end. In diabetics, both vasculopathy and neuropathy synergizes precipitating the complex infectious process. The expression of excess purulence on applying of pressure and presence of induration indicates the involvement of deeper compartments.

Presence of gas on a leg X-ray helps in diagnosing the involvement of deeper compartments. In cases without obvious clinical signs, ultrasonography (USG) may help in early diagnosis [2]. Though the frozen section and MRI are helpful in diagnosis, they may not be readily available [5, 7]. In a study by Majeski et al, frozen section was found to help in an early diagnosis [22]. Histoligical criteria [21] as described by Stamencovic and Lew includes liqificative necrosis of fascia, PMN lymphocytes infiltration, angiothrombosis of blood vessels and presence of micro-organisms. A score was created by Anaya et al., which helps in assigning the patient to any one of the three groups as shown in Table --- This helps in predicting the outcome during the initial assessment (---)

Only a few cases may require amputation whereas in most of the cases debridement with or without skin grafting will suffice.

In our study [35] 70% cases had hyponatremia i.e., serum Na less than 135mEq/L. This is similar to a study by Wall DB et al., where 90% NF cases had hyponatremia.

In our study mortality rate is 14% and is these deaths were due to: sepsis, Acute Respiratory Distress Syndrome and Multiple Organ Dysfunction Syndrome. Morbidity was 10% in our study which was due to amputations and disarticulations.

By applying the predictive score by Anaya et al., the mortality risk in group 1, 2 and 3 were 7%, 15% and 50% respectively whereas it is 6%, 24% and 88% in the study by Anaya et al.(----)

Prognostic Score to Predict Mortality in Patients with Necrotizing Soft Tissue
Infection at the time of first assessment

Variable (On Admission)	No. of Points
Heart rate >110 beats/min	1
Temperature <36°C	1
Creatinine >1.5 mg/dL	1
Age >50 yr	3
White blood cell count >40,000	3
Hematocrit >50	3

Group Categories	No. of Points	Mortalityrisk
1	0-2	6%
2	3-5	24%
3	6,>6	88%

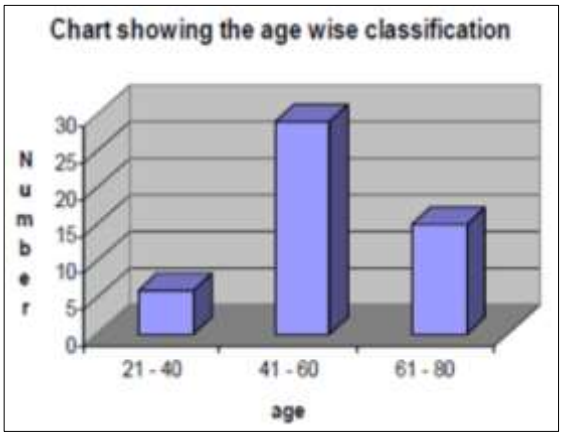

Fig 1: Graph showing the Age wise classification

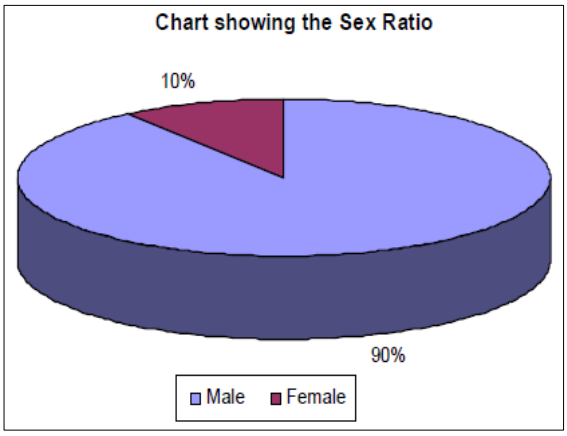

Chart 1: Graph showing the sex ratio

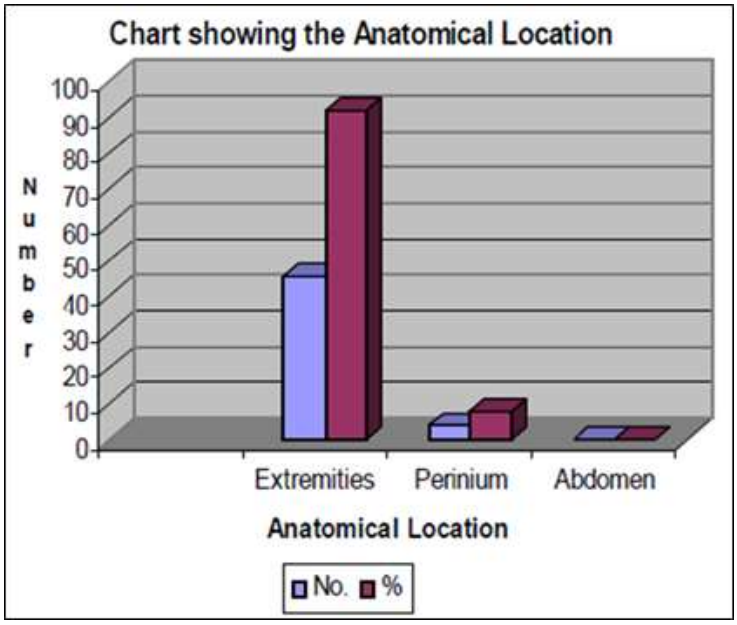

Fig 3: Graph showing the anatomical location

Pic 2

Pic 3

Pic 4

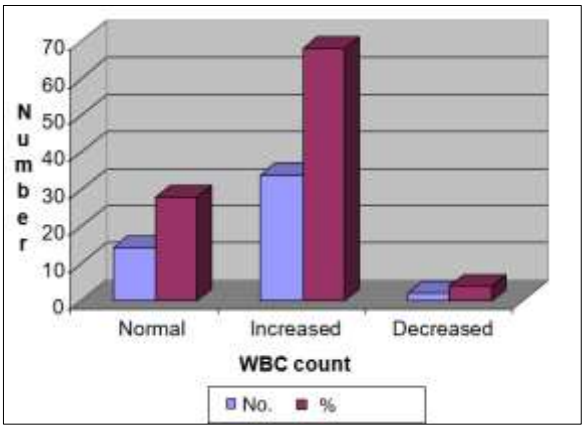

Fig 4: Chart showing the WBC count

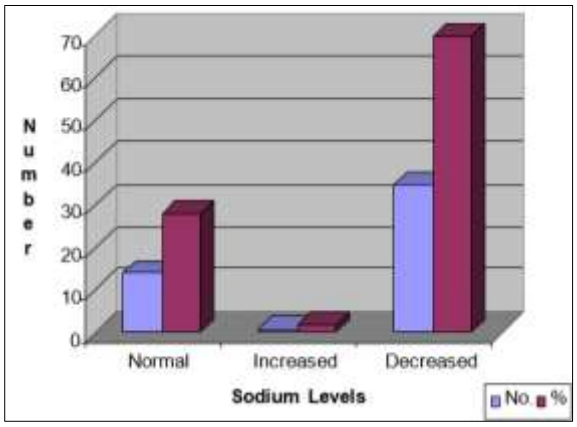

Fig 5: Chart showing Serum Sodium Levels

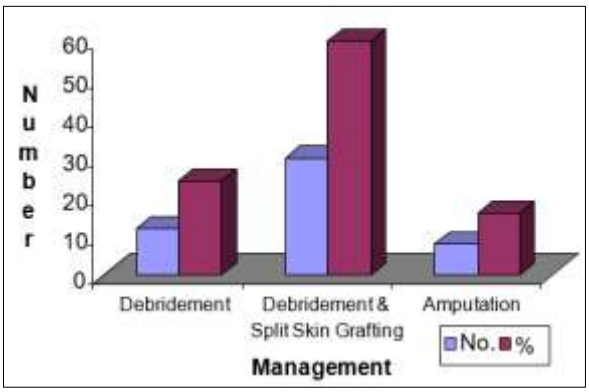

Fig 6: Chart showing the management

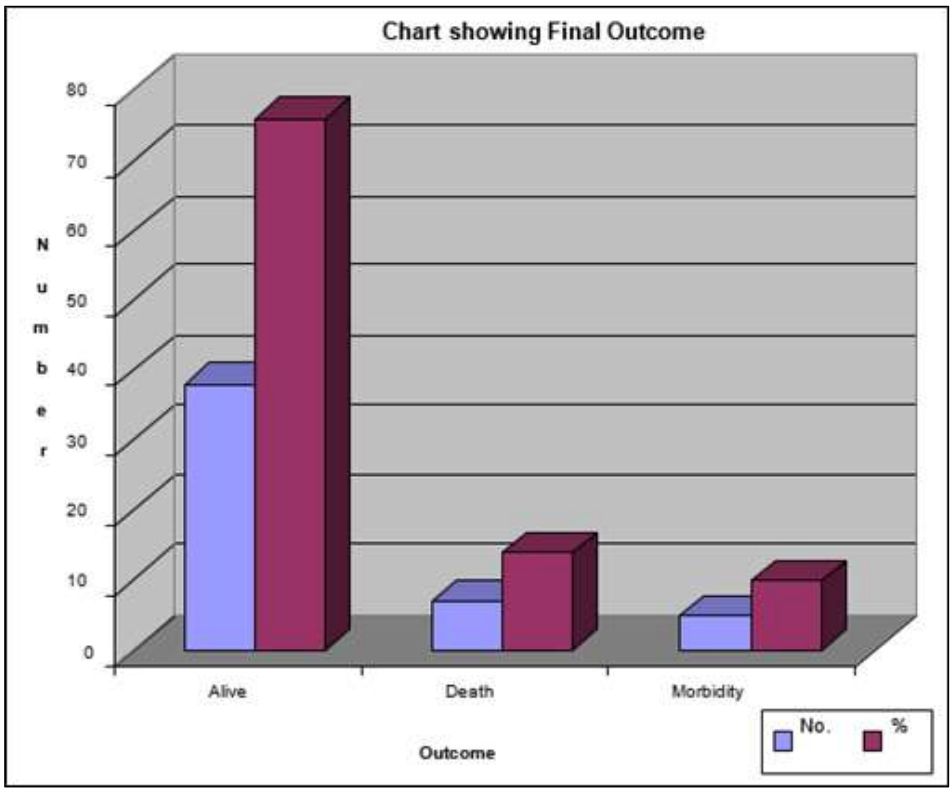

Fig 7: Chart showing Final Outcome

5. Conclusion

Admission , wbc counts greater than 15400/ml and serum Na levels less than 135 mmol/L are useful parameters that help distinguish NF infections from non- NF infections particularly when classic "hard" clinical signs of NF are absent.

Histopathological evidence is the confirmative for diagnosis. The prognostic clinical score used to assess the mortality risk at initial presentation showed that as the level of group increases the mortality risk also increases and the patient should be managed more aggressively.

Any two of the following factors at presentation indicate grave prognosis.

1. Shock at presentation
2. Delay of 24 hours before hospitalization
3. Anemia, hypoproteinemia
4. Increased blood sugar levels

6. Summary and research

Following tests can be utilized for rapidly diagnosing NF from occult soft tissue infection.

- Crepitus
- soft tissue gas on plain film
- Increased wbc counts and decreased sodium levels
- Frozen tissue biopsy and histopathological evidence
- Many studies have shown that Magnetic Resonance Imaging is preferred in early diagnosis by showing fascial thickening, fat infiltration, focal fluid collection along the deep fascial sheaths, homogenous, well defined, dome-shaped, areas with high signal in hypodermis.
- The nature of early NF and its non-specific clinical signs can considerably delay the diagnosis
- Delay in the diagnosis by a matter of hours significantly increases mortality.
- Operative treatment delayed by few hours shown increased mortality
- Risk factors correlated are advanced age, Diabetes Mellitus, anemia, hypoalbuminemia, cardiac/renal disease, anatomic site, Peripheral Vascular disease, immunosuppression, smoking, alcohol.

7. References

1. The diagnosis of necrotizing fasciitis Chin-Ho Wonga and Yi-Shi Wangb Current Opinion in Infectious Diseases. 2005; 18:101-106.
2. Necrotizing soft-tissue infections Eric J. Kuncir, MD, MSa, Areti Tillou, MDb,c, Charles R. St. Hill, BSd, Patrizio Petrone, MDa, Brian Kimbrell, MDa, Juan A. Asensio, MDa,* Emerg Med Clin N Am. 2003; 21:1075-1087.
3. Predicting Death in Necrotizing Soft Tissue Infections: A Clinical Score Daniel A. Anaya, 1 Eileen M. Bulger, 2 Yong S. Kwon, 2 Lillian S. Kao, 3 Heather Evans, 2 and Avery B. Nathens4 Surgical Infections. 2009, 10:6.
4. Imaging of Soft Tissue Infections**,** Radiologic Clinics of North America. 2001; 39:2.
5. Skin and soft tissue infections in injection drug users John R. Ebright, MDa,*, Barbara Pieper, PhD, RNb Infectious Disease Clinics o North America. 2002; 16:697-712.
6. Necrotizing soft-tissue infections Edward K. Chapnick MD Elfatih I. Abter MD Infectious Disease Clinics of North America. 1996; 10:4.
7. Differentiation of Necrotizing Fasciitis and Cellulitis Using Mri Imaging American Journal of Radiology, 1998, 170.
8. Early Recognition of Potentially Fatal Necrotizing Fasciitis - The Use of Frozen-Section Biopsy Ivan Stamenkovic, M.D., and P. Daniel Lew, M.D. N Engl J Med. 1984; 310:1689-1693.

9. Necrotizing Fasciitis the Changing Spectrum Dermatologic Clinics. 1997; 15:2.
10. Necrotizing Fasciitis A Serious Sequela of Omphalitis in the Newborn Kevin P. Lally, M.D., James B. Atkinson, M.D., Morton M. Woolley, M.D., G. Hossein Mahour, M.D. Division of Pediatric Surgery. 1983, 24.
11. Fournier's Gangrene: Diagnostic and Therapeutic Considerations David Kearney Cork University Hospital Ireland.
12. Baxter CR et al. Surgical management of soft tissue infections' surgical clinics of North America. 1972; (52):1483-1499.
13. Fournier's Disease, Urologic Clinics of North America – 1999; 26:4.
14. Clinical image Fournier's gangrene Shin Kobayashi, M.D. The American Journal of Surgery. 2008; 195:257-258.
15. How I Do It Approach to debridement in necrotizing fasciitis Chin-Ho Wong, M.B.B.S., M.R.C.S. (Ed), M.Med. (Surg). The American Journal of Surgery. 2008; 196:e19-e24
16. Patino J et al. necrotising lesions of soft tissues-a review. World Journal of Surgery. 1991; (15):235-239.
17. Outcomes from treatment of necrotizing soft-tissue infections: results from the National Surgical Quality Improvement Program database, The American Journal of Surgery. 2010; 200:790-797.
18. Wall DB, Klein SR, Black S et al. A simple model to help distinguish necrotizing fasciitis from non-necrotizing soft tissue infection. *J Am Coll Surg*. 2000; 191:227-231.
19. Wong CH, Khin LW, Heng KS et al. The LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score: A tool for distinguishing necrotizing fasciitis from other soft tissue infections. Crit Care Med. 2004; 32:1535-1541.
20. Anaya DA, McMahon K, Nathens AB et al. Predictors of mortality and limb loss in necrotizing soft tissue infections. Arch Surg. 2005; 140:151-157.
21. Stamenkovic I, Lew PD. Early recognition of potentially fatal necrotizing fasciitis: The use of frozen section biopsy. N Engl J Med. 1984; 310:1689-1693.
22. Masjeski JA, Alexander JW. Early diagnosis, nutritional support and immediate extensive debridement improve survival in necrotizing fasciitis. Am J Surg. 1983; 145:781-787.
23. Wang TL, Hung CL. Role of tissue oxygen saturation monitoring in diagnosing necrotizing fasciitis of the lower limbs. Ann Emerg Med. 2004; 44:222-228.
24. Wong CH. Tissue oxygen saturation monitoring in diagnosing necrotizing fasciitis of the lower limb: A valuable tool but only for a selected few. Ann Emerg Med (in press). 106 Skin and soft tissue infections.