

NECROTIZING FASCIITIS; DIAGNOSTIC PARAMETERS FOR EARLY DETECTION AND SUBSEQUENT IMPROVED SURGICAL OUTCOME

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Introduction

Necrotizing fasciitis (NF) is a rare soft tissue infection characterized by rapid spread of inflammation and necrosis starting from the fascia and extends to muscles and subcutaneous fat with subsequent necrosis of the overlying skin. ⁽¹⁾ Incidence of NF in adults was reported to be 0.40 cases per 100,000 population ⁽²⁾ ,while in children, it was reported to be double fold incidence with fulminant course and high mortality rate. Diabetes mellitus is the most common co morbidity for NF that represents 18% – 60% of cases. ⁽²⁾ The two commonest pitfalls in management of NF are failure of early diagnosis and inadequate surgical debridement.

NF is often misdiagnosed as non-necrotizing soft tissue infection (e.g. cellulites or simple abscess) and this is responsible for delay in diagnosis and subsequent management. Beside the clinical signs, simple laboratory parameters including leucocytic count (WBCs) >15.4×10⁹ , serum sodium (Na) <135mmol/L and band form leucocytes percentage ≥ 10 % may help in early recognition from non necrotizing soft tissue infections (non- NF). ⁽²⁾

1-Lancerotto L, Tocco I, Salmaso R, et al., (2012): Necrotizing fasciitis: classification, diagnosis, and management. J Trauma Acute Care surg. Mar;72(3):560-6.

2- Hakkarainen TW, Burkette Ikebata N, Bulger E, et al., (2014): Necrotizing soft tissue infections: Review and current concepts in treatment, systems of care, and outcomes Current Problems in Surgery 51:344–362.

Materials And Methods

NF was diagnosed clinically and confirmed by intraoperative findings including grayish necrotic skin, subcutaneous fat and fascia and a purulent foul-smelling discharge beside the histopathological study to confirm the diagnosis. On the other hand, non-NF was defined intraoperatively as infection without evidence of necrotic fascia or muscles.

The objective criteria for each patient were recorded; vital signs, presence of bullae, crepitation , purplish skin discoloration and skin necrosis in association to laboratory values e.g. total leucocytic count and band leucocytes percentage and serum Na. According to these criteria, patients were classified into 2 groups:- group A; 26 patients with objective criteria of NF and group B; 136 patients with objective criteria of non-NF infection (control group).

Both groups were compared by demographic data, etiology , site of infection , concomitant medical conditions , time of admission to surgery, number of operative debridements and postoperative surgical outcome.

The protocol for management of group (A) was urgent and aggressive debridement until fresh bleeding occurs from adjacent viable subcutaneous tissues and underlying muscles aiming to reduce the bacterial load, facilitate recovery and proper aeration of tissues (Fig. 1,2). Repeated operative debridement was performed to all cases of group A. Amputation was done when debridement of necrotic and gangrenous tissues leaves non salvageable limb.

Empirical parenteral broad spectrum antibiotics was used until antibiotic culture and sensitivity was carried out. Reconstructive surgery was applied when the general condition became stabilized and the infection was fully eradicated .

Postoperative histopathological study was done routinely for all cases to prove the diagnosis by deep fascia necrosis and heavy infiltration with suppurative inflammatory cells; neutrophils, pus cells and macrophages.



Figure (1) : Diabetic patient with necrotizing fasciitis. (a) before management, (b) after surgical debridement, (c) Limb reconstruction by split thickness skin graft .



Figure (2) :Chronic renal failure patient with NF over medial aspect of right foot and ankle (a) before, (b) after debridement .

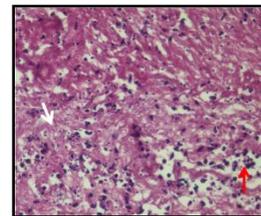


Figure (3) :-Histopathological examination of necrotizing fasciitis showing necrotic area of the deep fascia (white arrow) and infiltration by neutrophils and pus cells (red arrow)

Results

Table (1): Demographic data and patients criteria.

	Group A No.(26)	Group B No. (136)
Age (years)	46.15	38.26
Sex M/F	13/13	72/64
Underlying medical diseases.		
- Diabetes mellitus	15 (57.69%)	52 (38.24%)
- Peripheral vascular disease	3 (11.54%)	12 (8.82%)
- Chronic insufficiency	2 (7.69%)	10 (7.35%)
- Renal insufficiency	1 (3.85%)	7 (5.15%)
- Hypertension	1 (3.85%)	11 (8.09%)
- Abnormalities	1 (3.85%)	4 (2.94%)
- No underlying medical disease	3 (11.54%)	32 (23.53%)
Site of infection		
- Lower extremity	12 (46.15%)	63 (46.32%)
- Upper extremity	5 (19.23%)	20 (14.71%)
- Perineum	4 (15.38%)	16 (11.69%)
- Abdomen	2 (7.69%)	10 (7.35%)
- Head and neck	1 (3.85%)	10 (7.35%)
- Multiple sites	2 (7.69%)	3 (2.2%)
Management of infection.		
- Conservative	0 (0%)	46 (33.82%)
- Surgical wound	2 (7.69%)	27 (19.85%)
- Amputation	2 (7.69%)	27 (19.85%)
- Histopathological treated	6 (23.08%)	47 (34.56%)

Table (2): Clinical findings and laboratory studies.

	Group A No. (26)	Group B No. (136)	P- value
Admission vital signs			
- Mean systolic BP(mmHg)	95	120	0.001
- Mean heart Rate (beat/ minute)	100	95	0.007
- Mean respiratory rate (breath/ min)	22.2	18.4	NS
- Mean temperature	39.2	38.6	NS
Admission "hard" clinical manifestations			
- Pain out of proportion to other criteria	23 (88.46%)	10 (8.14%)	0.04
- Tense edema	6 (23.08%)	7 (5.15%)	0.01
- Bullae	4 (15.38%)	2 (1.47%)	0.012
- Purplish skin discoloration	1 (3.85%)	2 (1.47%)	0.22
- Skin necrosis	1 (3.85%)	8 (5.9%)	NS
- Crepitation	4 (15.38%)	2 (1.47%)	0.045
Significance p < 0.05	8 (30.77%)	124 (90.4%)	0.001
Admission laboratory values			
- WBC > 12.4 × 10 ⁹ /L	1 (3.85%)	1 (0.73%)	0.0001
- Band leucocytes percentage > 10 %	6 (23.08%)	6 (4.41%)	0.001
- Serum Na < 135 mmol/ L	2 (7.69%)	14 (10.3%)	0.0001

NS: non significant

Table (3): Surgical results of both groups

Category	Group A No. (26)	Group B No. (136)	P- value
Mortality:			
- In early surgical treatment <12hours	3 (11.54%)	0	Early & late surgical intervention (p<0.05)
- In late surgical treatment >12hours	4 (15.38%)	0	
- Overall mortality	7 (26.92%)	0	A & B 0.0001

Conclusions

NF is a potentially fatal disease. Early diagnosis of NF remains the cornerstone in achieving reasonable surgical outcome. In patients with clinical suspicious, laboratory parameters on admission including WBCs >15.4×10⁹/L, serum Na < 135 mmol / L and band form leucocytes percentage ≥ 10% may be helpful in early diagnosis .