Original Research Paper Volume - 5 | Issue - 6 | November- 2021 | ISSN (O) : 2663-0729 | ISSN (P) : 2663-0710

NECROTIZING FASCIITIS: A TERTIARY CENTRE BASED STUDY

Dr.vishal Shekhar* Senior Resident Department Of Postgraduate Surgery, Jlnmch Bhagalpur

Dr.ranjan Kumar PG Resident Department Of Postgraduate Surgery, JLNMCH Bhagalpur

ABSTRACT

BACKGROUND: Necrotizing fasciitis is a limb or life-threatening, invasive soft-tissue infection, although known since ancient times was first described in 1871. The purpose of the present study is to analyse the clinical presentation, bacterial flora, predisposing and co-morbid conditions, surgical and resuscitative treatment and outcome of this soft tissue infection.**METHODS:** This is a prospective, cross-sectional, clinical study which was conducted from May 2019 until April 2020. This study included 60 consecutive patients. Age, gender, clinical presentation, co-morbid conditions and predisposing factors and pus culture sensitivity, treatment given, and its outcome were recorded.**RESULTS:** With a male female ratio of 2.33:1 and median age of 46, most involves site was lower limb. Most patients presented with history of trauma followed by swelling (100%), pain (91.67%), and pus discharge (48.33%). Group a streptococcus was the most common organism isolated in both mono microbial (53.85%) and poly microbial (63.83%) cultures. Diabetes was the most common co morbidity observed. Fasciotomy and debridement were the mainstay of treatment with amputation rate of 23.33% and a mortality of 25%.**CONCLUSIONS:** Timely surgical intervention in the form of fasciotomy and debridement along with correction of malnutrition and anaemia can be crucial in saving lives and limbs.

KEYWORD

Cellulitis, Gangrene, Infection, Necrotizing fasciitis

Corresponding Author Dr.Vishal Shekhar

Senior Resident Department of Postgraduate Surgery, JLNMCH Bhagalpur.*Corresponding Author Email Id : vshl_shekhar@rediffmail.com

INTRODUCTION

Necrotizing fasciitis is a life-threatening, invasive soft-tissue infection that is characterized by widespread, rapidly developing necrosis of the subcutaneous tissue and fascia with thrombosis of cutaneous microcirculation. Although first description of necrotizing fasciitis dates back to Hippocrates in fifth century BC, first clear description of necrotizing fasciitis was given by Joseph Jones in 1871.[1,2] He described it as hospital gangrene during the civil war. Necrotizing fasciitis terminology was first used by Wilson in 1952 in his series of 22 patients.[3] several terms have been used to describe this condition including hospital gangrene, progressive

Bacterial synergistic gangrene, Fournier's gangrene, streptococcal gangrene and flesh eating bacterial infection. It is more likely to occur in patients with a compromised immune system. In type I necrotizing fasciitis, anaerobes and gram-negative bacteria are predominant; in the type II form, the bacterial ethology is group-A beta-haemolytic streptococci. The diagnosis must be made on the basis of clinical grounds and is characterized by rapidly developing, painful erythema that progresses to bullous formation and gangrenous necrosis.[4] It may present as a low-grade cellulitis that progress to a limb or life-threatening infection.[5] It must be treated as an emergency with repeated surgical interventions and high doses of broad-spectrum antibiotics through parenteral route.[6]

The purpose of the present study is to analyse the clinical presentation, bacterial flora, predisposing and co-morbid conditions, surgical and resuscitative treatment and outcome of this soft tissue infection.

METHODS

This is a prospective, cross-sectional, clinical study which was conducted from May 2019 until April 2020 at JLNMCH BHAGALPUR.

INCLUSION CRITERIA

The patients who were treated for necrotizing fasciitis at JLNMCH BHAGALPUR will be included in this present study present study.

EXCLUSION CRITERIA

Any form of malignancy or superficial cellulitis were not included in this study. This study included 60 consecutive patients of necrotizing fasciitis treated during this period. Age, gender, clinical presentation, co-morbid conditions and predisposing factors were recorded. Pus was cultured, and the isolated organism and their sensitivity identified. Management included fasciotomy, broad-spectrum antibiotics, extensive and frequent debridement along with supportive measures.

The diagnosis of necrotizing fasciitis was based on clinical findings, operative finding of the presence of dull grey, necrotic superficial fascia and subcutaneous tissues with serosanguinous fluid and microscopic demonstration of extensive polymorph nuclear cell infiltration in the dermis and underlying fascia with obliterative thrombosis of arteries and veins.

Data was analysed statistically, to establish relation between mortality or limb loss and risk factors like old age, diabetes, hypertension, malnutrition, peripheral vascular disease and hygiene, using chi-square test. Statistical analysis was done using MedCalc Statistical Software version 14.8.1

RESULTS

Out of the total of 60 patients in this study, 42 were male, i.e., 70% while 18 were female, i.e., 30%, with a male female ratio of 2.33:1 (Figure 1).

The age at diagnosis ranged between 21-80years with mean age of 47.08years and median age of 46 with a standard deviation of 13.40 and sample variance of 179.7.

The majority of studied patients were in the age group 40-49 (n = 16, i.e., 26.67%) followed by age group 50-59 (n = 13, i.e. 21.67%), and age group 30–39 (n = 11, i.e., 18.33%) (Figure 2).

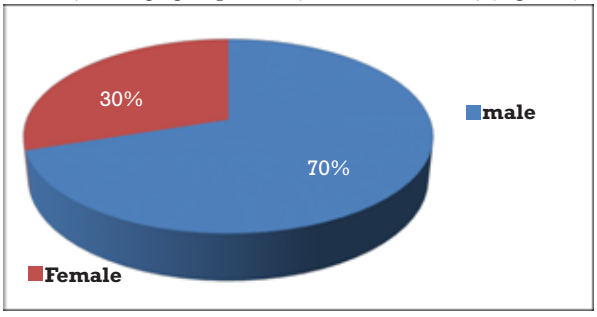

Figure 1: Gender distribution in cases of Necrotizing fasciitis.

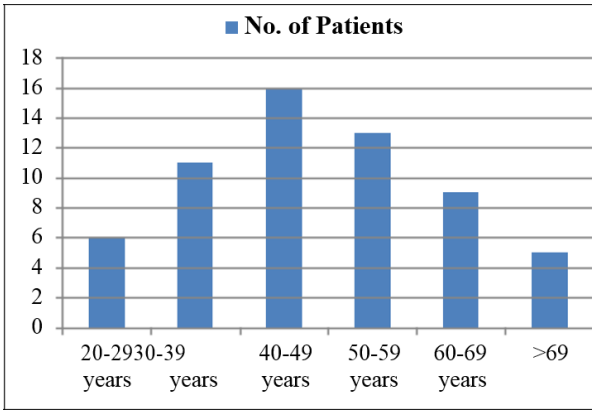

Figure 2: Age distribution of necrotizing fasciitis.

The most common site of involvement was lower extremity (n=35, 58.33%) followed by upper extremity (n=12, 20%). Other sites involved included perineum, chest buttocks, abdomen and neck (Table 1).

Table 1: Site of involvement with lower limb being the site most commonly involved.'

	No Of Patients	Percentage
Lower extremity	35	58.33%
Upper extremity	12	20.00%
Perineum	7	11.67%
Chest	2	3.33%
Buttocks	2	3.33%
Abdomen	1	1.67%
Neck	1	1.67%

Most of the patients in this study had an history of trauma (n=29, 48.33%), there was spontaneous occurrence in 24 patients (40%), in 2 patients fasciitis developed after IM injection, in 2 patients after insect bite while in 1 patient it followed snake bite (Table 2).

Most common presenting complain was swelling (100%), followed by pain (91.67%), pus discharge (48.33%) fever (40%), skin necrosis (36.67%), crepitus (13.33%) and blisters (11.67%) (Table 3).

Table 2: History of trauma present in majority of the patients.

Etiology	n	Percentage
Trauma	29	48.33%
Spontaneous	24	40.00%
H/O Injection	3	5.00%
Insect bite	3	5.00%
Snake bite	1	1.67%

Table 3: The pattern of clinical presentation.

Symptoms	n	Percentage
Swelling	60	100.00%
Pain	55	91.67%
Pus discharge	29	48.33%
Fever	24	40.00%
Skin necrosis	22	36.67%
Crepitus	8	13.33%
Blisters	7	11.67%

Table 4: Analytical data of microorganisms isolated.

Organism	n	Percentage	Organism	n	Percentage
Gr *A Streptococcus*	7	53.85%	Gr A *Streptococcus*	30	63.83%
Staph aureus	4	30.77%	*Pseudomonas*	28	59.57%
Haemophilus aphrophilus	2	15.38%	*Staph aureus*	24	51.06%
			Klebsiella	20	42.55%
			E. coli	19	40.43%
			Bacteroides species	15	31.91%
			Proteus	11	23.40%
			Clostridial species	10	21.28%
Total	13		Total	47	

Table 5: Relation between amputation and different comorbidities.

	Limb Loss	Limb Saved	P=Value
Age			
≥60	4	10	0.83
<60	10	27	
Diabetes			
Yes	12	22	0.02
No	2	24	
Alcoholism			
Yes	7	14	0.3
No	7	32	
Malnutrition			
Yes	4	16	0.6
No	10	30	
Peripheral vascular disease			
Yes	2	2	0.48
No	12	44	
AIDS			
Yes	0	1	0.52
No	14	45	
Poor hygiene			
Yes	9	19	0.22
No	5	27	

Out of total of 60 patients 13 patients (21.67%) had monomicrobial pus culture while 47 patients (78.33%)

had polymicrobial pus culture report. Group A streptococcus was the most common organism isolated in both monomicrobial (53.85%) and polymicrobial (63.83%) cultures. *Straph aureus* was the second most common organism isolated in both monomicrobial and polymicrobial groups. Other organisms isolated included *Klebsiella*, *E. coli* and *Clostridial* species among others (Table 4).

Out of the total of seven co morbidities observed diabetes was most common (n= 34, 56.67%), followed by poor hygiene (n= 28, 46.67%), alcoholism (n=21, 35%), malnutrition (n= 20, 33.33%), old age (n=14, 23.33%), peripheral vascular disease (n=4, 6.67%) and AIDS (n=1, 1.67%).

Fasciotomy and/or debridement were done in all the patients. Anaemia was corrected by blood transfusion and malnutrition by high protein diet with or without parenteral supplementation. Median hospital stay was 14 days. 14 patients (23.33%) required amputation during their treatment, of which 4 didn't survive. Diabetes was the only co morbidity that was found to be significantly associated with limb loss (P=0.02). All of the survivors later received wound covering in form of split skin grafting in most of the cases (n=48, 80%). 12 patients (20%) were treated with secondary suturing (Table 5).

Mortality rate was observed to be 25%. Only old age (P=0.0345) and malnutrition (P=0.0269) were found to be

Significantly associated with mortality in patients of necrotizing fasciitis (Table 6).

Table 6: Relation between mortality and different comorbidities.

	Survivour	Non-Survivour	P=Value
Age			
≥60	7	7	0.0345
<60	38	8	
Diabetes			
Yes	26	8	1
No	19	7	
Alcoholism			
Yes	11	9	0.0269
No	34	6	
Malnutrition			
Yes	4	16	0.6
No	10	30	
Peripheral vascular disease			
Yes	2	2	0.5501
No	43	13	
AIDS			
Yes	1	0	0.6481
No	35	15	
Poor hygiene			
Yes	21	7	0.7651
No	24	8	

DISCUSSION

In this study it was observed that out of 60 patients 70% were male while only 30% were female, with a male female ratio of 2.33:1. Espandar R et al, in their prospective study in 2011 observed male predominance with a male female ratio of 3:1, which was in agreement with current study.[7] Muqim R et al, in his observational descriptive study also observed male predominance similar to present study.[8] Khamnuan et al, in their study in 2015 also observed a slight male predominance with male female ratio of 1.29:1.[9] Present study is in concordance with other studies from around the world.

Shaikh N et al, in his study of 94 patients of necrotizing fasciitis in Qatar in the year 2006 observed mean age of mean age of 48.6 years, which was similar to present study where the mean age was observed to be 47.08years.[10] Stone HH et al, in their study in 1972 also observed similar mean age of 54years.[11] Singh G et al, in their study of 48 cases in 2015 observed that most of the patients were in the age group of 40-60years.[12] In the present study also most of the patients were in the age group of 40-60years.

Singh G et al, in their study observed that most common anatomical sites involved included the lower extremity (56%) followed by the upper extremity (14%) and perineum (8%). This is very similar to present

observation of lower extremity being the most common site of involvement, followed by upper extremity and perineum.[12] Stone et al in their study in 1972 observed perineum as the most common site, followed by lower extremity.[11] In the present study perineum was involved in only 11.67% of cases. This difference may be due to time difference between these studies which is more than 40 years. In these years' causative organisms, lifestyle etc have changed a lot.

Newer and more potent antibiotics have come up on the other hand organisms have developed resistance to many. These all factors may have led to shift of most common site from perineum to lower limb.

In the present study it was observed that majority of patients (48.33%) had a history of trauma and 40% patients had a spontaneous occurrence. Peer SM et al, in their study in 2007 observed that the major cause of infection was idiopathic/primary.[13] Angoules et al, in their review of 451 cases of necrolizing fasciitis observed that such cases were mostly result of trauma, needle puncture or extravasation of drugs.[14]

Singh G et al, in their study observed that the most common symptoms included pain at affected site (100%), fever (100%), and swelling (79.16%), and the most common signs included tenderness (100 %), tachycardia (83.33%), erythema (79.16%), and induration (62.5%). The other notable clinical features included skin discoloration and bulla formation. However, crepitus (12.5 %) was not a common finding.[12]

David et al, in 1996 observed swelling and pain in 75% and 72.9% respectively. Other clinical findings included erythema (66%), foul discharge (46%), induration (45%), crepitus (36.5%), skin necrosis (31%), fever (31%) and blistering (23.7%).[15] Present study had similar observations and in agreement with findings of other authors.

Kwan et al, in their retrospective study observed that *Pseudomonas*, *Staphylococcus*, *Streptococcus* and *Enterobactericae* were the common pathogens isolated.[16] In a study by Shaikh N et al, it was observed that most infections were polymicrobial (87.5%). The most common organisms isolated included Escherichia coli (77.08%), Streptococcus (72.9%), and Staphylococcus (50 %).[12] Shaikh N et al, in his study of 94 patients observed Streptococci to be the most common bacteria isolated (52.1%).[10]

Khamnuan P et al, also observed that the most common causative Gram-positive pathogen from wound culture was *Streptococcus* pyogenes and most common gram negative organism was *E coli*.[9] In the present study, group A *Streptococcus* was found to be the most common organism isolated in both monomicrobial and polymicrobial cultures. *Staphylococcus aureus* was the second most common organism isolated. Present study is in concurrence with the findings by other authors.

In the present study diabetes was found to be the most common co morbidity, followed by poor hygiene, alcoholism. Singh G et al, in their study observed that poor hygiene was the most common predisposing factor (38%), followed by age more than 50 (29%), diabetes (26%), alcoholism (20%).[12]

In present study authors have considered old age to be 60 and above, and this is the reason for relatively low occurrence. In present study too, 45% of subjects were 50 or above. Kwan et al, observed that diabetes mellitus was the most common co-morbid condition.[16] Similar observation was made by Shaikh N et al, that diabetes mellitus was the most common comorbid disease.[10] Present study observations are similar to that made by other authors.

In the present study fasciotomy and debridement were observed to be the main stay of management. 14 patient required amputation (23.33%). Diabetes mellitus was the only

co morbidity that was significantly associated with limb loss (P=0.02). Espandar R et al, in their study observed an amputation rate of 25.9%. They too observed that diabetes was significantly associated with limb loss (P = 0.02).[7]

Elliot DC et al, in 1996 observed the percentage of amputations in patients of necrotizing fasciitis to be as high as 33%.[15] Cheng NC et al, in their study in 2015 observed that the limb amputation rate was significantly higher among the diabetic NF patients (DM, 28.6% vs. non-DM, 13.6%, P <0.05).[17] Present study is in agreement with previous studies.

In the present study mortality rate was observed to be 25%. Only old age (P=0.0345) and malnutrition (P=0.0269) were found to be significantly associated with mortality. Elliot DC et al, compared survivors and non survivors for pre-existing characteristics and medical conditions in 198 patients with necrotizing soft tissue infections. They observed that women were more likely to die than men (P=0.02), and death was associated significantly with age greater than 60years (P=<0.001), and malnutrition (P=0.02).

Other premorbid medical diagnoses that influenced mortality included cardiac disease, carcinoma, intravenous drug abuse, and pulmonary disease. Present study is in agreement with other authors.[15]

CONCLUSION

Necrotizing fasciitis is a life-threatening soft tissue infection which commonly affects middle age men and is commonly polymicrobial. Lower extremity is the most common site of occurrence, while trauma is a most commonpredisposing factor.

Timely surgical intervention in the form of fasciotomy and debridement along with correction of malnutrition and anemia can be crucial in saving lives and limbs.

Funding: *No funding sources*
Conflict of interest: *None declared*
Ethical approval: *The study was approved by the Institutional Ethics Committee*

REFERENCES

1. Decamps V, Atiken J, Lee MG. Hippocrates on necrotizing fasciitis. Lancet. 1994 Aug 20;344(8921):556.
2. Bosshardt TL, Henderson VJ, Organ CH. Necrotizing soft-tissue infections. Arch Surgy. 1996 Aug 1;131(8):846-54.
3. Wilson B. Necrotizing fasciitis. Am J Surg. 1952;18:416-31.
4. Kotrappa KS, Bansal RS, Amin NM. Necrotizing fasciitis. Am Fam Physician. 1996;53(5):1691-7.
5. Ardire L. Necrotizing fasciitis: case study of a nursing dilemma. Ostomy Wound Manage. 1997;43(5):30-4.
6. Harmonson JK, Lobar MY, Harkless LB. Necrotizing fasciitis. Clin Podiatr Med Surg. 1996;13(4):635-46.
7. Espandar R, Sibdari SY, Rafiee E, Yazdanian S. Necrotizing fasciitis of the extremities: a prospective study. Strategies Trauma Limb Reconstr. 2011 Nov;6(3):121-5.
8. Muqim R. Necrotizing fasciitis: Management and Outcome. J Coll Physicians Surg Pak. 2003 Dec;13(12):711-4.
9. Khamnuan P, Chongruksut W, Jearwattanakanok K, Patumanond J, Tantraworasin A. Necrotizing fasciitis: epidemiology and clinical predictors for amputation. Int J General Med. 2015;8:195-202.
10. Shaikh N. Necrotizing fasciitis: a decade of surgical intensive care experience. Indian J Critical Care Med. 2006 Oct 1;10(4):225-9.
11. Stone HH, Martin Jr JD. Synergistic necrotizing cellulitis. Ann Surg. 1972 May;175(5):702-11.
12. Singh G, Bharpoda P, Reddy R. Necrotizing fasciitis: a study of 48 cases. Indian J Surg. 2015 Dec 1;77(2):345-50.
13. Peer SM, Rodrigues G, Kumar S, Khan SA. A clinicopathological study of necrotizing fasciitis--an institutional experience. J Coll Physicians Surg Pak. 2007 May;17(5):257-60.
14. Angoules AG, Kontakis G, Drakoulakis E, Vrentzos G, Granick MS, Giannoudis PV. Necrotising fasciitis of upper and lower limb: a systematic review. Injury. 2007 Dec 1;38(5):S18-25.
15. Elliott DC, Kufera JA, Myers RA. Necrotizing soft tissue infections. Risk factors for mortality and strategies for management. Ann Surg. 1996 Nov;224(5):672-83.