

A PROSPECTIVE STUDY ON OUTCOME OF NECROTISING FASCIITIS IN RELATION TO CLINICAL FEATURES AND BACTERIOLOGICAL PATTERN

Ajit Kumar Vidhyarthi¹, Kumar Abhishek²

¹Senior Resident, Department of General Surgery, NMCH, Patna, Bihar, India.

²Senior Resident, Department of General Surgery, Atal Bihari Vajpayee institute of Medical Sciences and Dr. RML Hospital, New Delhi, India.

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Corresponding Author:

Dr. Kumar Abhishek,

Email: kabhishekk105@gmail.com

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Abstract

Background: Necrotising fasciitis is a life-threatening infection involving fascia and necrosis of subcutaneous tissue. The portal of entry usually is trivial trauma. It requires immediate diagnosis and intervention to reduce mortality. The objective of this study was to study clinical profile, predisposing risk factors and to formulate a protocol for management of necrotising fasciitis. **Materials and Methods:** This is a prospective study of 45 patients of necrotising fasciitis over a period of February 2022 to January 2023. The study was conducted in surgery department of a tertiary care hospital in India. Out of 45 patients 3 patients were female and 42 were patients male. Ethical committee clearance was obtained before the study. All the consecutive patients who came to the emergency department (ER) of the institute presenting early with clinical features suggestive of NF were included in the study. The patients who presented late were not included. In total 45 patients were included in the present study. Diagnosis of NF was made by histopathologic examination of tissue samples or surgical findings. In addition, tissue samples were also sent to the microbiology section to isolate the causative organism. **Result:** Of the total 45 patients who were included in the study; 42 (93.33%) were male and 3(6.66%) were female. The most common age group (82.22%) involved was 46-55 years and the least was more than 55 years. The patients with necrotising fasciitis can present with erythema, swelling, pain, indurations, discharge, bullae formation and warmth. In our study, the patients commonly presented with warmth, indurations⁷ and bullae formation (44.44%). Trivial trauma was the commonest cause. **Conclusion:** Necrotising fasciitis is more common in middle aged males with diabetes. Early diagnosis and aggressive treatment is required to reduce the mortality.

INTRODUCTION

Necrotising fasciitis (NF) is also known as “flesh eating disease”. It is an infection of deep fascia and subcutaneous tissue involving any part of body. The portal of entry usually is a trivial trauma or a surgical wound. However, no definitive cause can be found in up to 20-50% cases.^[1-3] Co-morbid conditions associated with necrotizing fasciitis are diabetes mellitus (31-44%), obesity (28%), smoking (27%), alcohol abusers (17%), cirrhosis (8-15%), malignancy (3%), corticosteroid therapy (3%) and chronic renal failure (3%).^[4,5] The documented incidence of NF in literature is reported to be low with 0.4 cases per 100,000 in the United Kingdom, but Indian scenario is not clear owing to paucity of literature in our setting.^[6]

NF is a rare life-threatening condition characterized by rapidly spreading necrosis of the subcutaneous fat and fascia with thrombosis of cutaneous micro-circulation.^[7,8] Clinical symptoms consist of local symptoms like erythema, swelling, and changes in skin colouring, intense.

Pain, bullae and sometimes subcutaneous emphysema and general symptoms such as fever, nausea, vomiting and malaise. NF is mainly classified into four types depending on causative organisms. In Type1 at least one anaerobic species is isolated with one or more facultative anaerobic streptococci (other than group A) and members of the Enterobacteriaceae (e.g., E.coli, Enterobacter, Klebsiella, and Proteus). Type 2 is generally monomicrobial and caused by haemolytic Streptococcus group A. Type 1 is more common, with a relative reported incidence up to 75 %.^[1,4,10]

Early stages of disease are often misdiagnosed as cellulitis or abscess because of the absence of specific clinical features. Wong et al described the “Laboratory Risk Indicator for Necrotizing Fasciitis” (LRINEC) score, which is based on routinely performed laboratory tests.^[11] They found that a score ≥ 6 had a positive predictive value of 92% and a negative predictive value of 96%. However, this test has not been validated in larger, prospective studies.

The treatment of choice NF is early diagnosis and aggressive surgical debridement with supportive broad spectrum antibiotics. The purpose of this study was to study the aetiology, risk factors, clinical features and management of NF.

MATERIALS AND METHODS

This is a prospective study of 45 patients of necrotising fasciitis over a period of February 2022 January 2023. The study was conducted in surgery department of a tertiary care hospital. Out of 45 patients 3 patients were female and 42 were patients male. Ethical committee clearance was obtained

before the study. All the consecutive patients who came to the emergency department (ER) of the institute presenting early with clinical features suggestive of NF were included in the study. The patients who presented late were not included. In total 45 patients were included in the present study. Diagnosis of NF was made by histo-pathologic examination of tissue samples or surgical findings. In addition, tissue samples were also sent to the microbiology section to isolate the causative organism. Data was collected according to study plan that included age, sex, clinical features, results of blood and wound cultures, the number of surgical interventions, total duration of hospitalization and the mortality rate.

RESULTS

Of the total 45 patients who were included in the study; 42 (93.33%) were male and 3(6.66%) were female. The most common age group (82.22%) involved was 46-55 years and the least was more than 55 years [Table 1].

Table 1: Distribution of patients according to age and sex.

Sex	Total no. of cases	Percentage
Male	42	93.33%
Female	3	6.66%
Total	45	100%

Table 2: Distribution according to age group.

Age group	Number of cases	Percentage
<45 years	6	13.33%
46-55 years	37	82.22%
>55 years	2	4.44%
Total	45	100%

Table 3: Distribution of patients according to the site involved.

SITE	Number of cases	Percentage
Lower extremity	29	64.44%
Scrotum	8	17.77%
Upper extremity	5	11.11%
Face	3	6.66%
Total	45	100%

Table 4: Signs and symptoms.

Signs and symptoms	Number of cases	Percentage
Erythema	7	15.55%
Abscess	10	22.22%
Bullae	20	44.44%
Edema	9	20%
Pain	12	26.66%
Warmth	25	55.55%
Indurations	20	44.44%
Skin necrosis	10	22.22%

Table 5: Various associated co - morbid conditions.

Co - morbid conditions.	Number of cases	Percentage
Alcohol	8	17.77%
Diabetes	16	35.55%
Alcohol and diabetes	16	35.55%
Total	45	100%

Table 6: Various surgical procedures.

Surgical procedures	Number of cases	Percentage
Debridement and skin grafting	27	60%
Amputation	9	20%
Debridement	9	20%
Total	45	100%

Lower extremity was commonly (64.44%) involved followed by scrotum (17.77%). Face was involved in (6.66%) [Table 3].

More than two-thirds (66.66%) of the patients presented with history of trivial trauma. The other common cause was post insect bite. When assessed clinically; most of the patients (55.55%) presented with warmth, indurations' (44.44%) and bullae(44.44%) formation of the involved organ, patients presented only with erythema (15.55%), with abscess(22.22%), (22.22%) with skin necrosis and (26.66%) patients complained only of pain.

Diabetes mellitus (35.55%) followed by alcohol abuse (17.77%) were the two commonest co-morbid conditions associated in our cases of NF. (35.55%) patients were suffering from diabetes mellitus and were chronic alcoholics [Table 5].

On microbiological cultures; the commonest organism isolated was Escherichia coli followed by beta haemolytic Streptococcus and Staphylococcus aureus.

After stabilization of patient in ER, the patients were taken up for debridement where necrotic tissue was excised and pus drained. Out of 45 patients on 27 patients (60%) debridement and skin crafting was performed within 8 hours. Debridement was done in first 24 hours. (50%) patients needed repeated debridements. In 27 (60%) patients after regular dressings raw areas were covered with SSG. In 9 (20%) patients we had to amputate the limb [10].9(20%) patients suffered from septicaemia and multiorgan failure and we could not save them [Table 6].

The total hospital stay ranged from 25 days - 45 days. Follow up ranged from 2 months to 2 years.

DISCUSSION

Necrotising fasciitis has been recognized for centuries dating back to Hippocrates in the 5 th century BC.7 It was first described as "hospital gangrene" in 1871 by confederate Army surgeon Joseph Jones during the American civil war and then as 'haemolytic streptococcal gangrene' by Meleny.^[12] A fulminating genital gangrene affecting healthy men was described by Fournier in 1883 and he named the process 'idiopathic gangrene of the scrotum'.^[13] The term necrotising fasciitis was used by Wilson In 1952 to describe the same disease in other parts of the body.^[14] NF commonly known as 'flesh eating disease' and is rapidly progressive characterized by extensive necrosis of subcutaneous fat and fascia.^[15]

Secondary necrosis of the overlying skin is common but generally underlying muscle is spared. The most

common sites involved are perineum and lower extremity. The co morbid factors associated with necrotising factors include diabetes, chronic alcoholism, drug abuse, corticosteroid use, immune-suppression, malignancy, peripheral vascular disease.^[1] In our study the most common age involved is middle age which is in correlation with other studies.^[7,9,16,17] Males were more involved, the reason could be males are more involved in outdoor activities. In our study diabetes was the commonest co-morbid condition associated which is in correlation with other studies in literature.^[15] Higher blood sugar in these patients produces a good medium for bacterial growth and predisposes to an environment of low oxygen tension and rich substrate for bacterial growth. Diabetes also cause defective phagocytosis, decreased cellular immunity and micro-vascular disease with resultant ischemia.^[18,19]

In our present study out of 45 patients 42 (93.33%) were male and 3(6.66%) were female. [Table 1]. In our study, there was predominance of male over female which shows similar result to other study.

[Table 2] reflect distribution according to age group. Out of 45 patients 6(13.33%) patients were in the age group of < 45 years, 37(82.22) patients were ion the age group of between 46 to 55 years and 2 patients were in the age group of > 55 years. in our study, majority of the patients of common age group (82.22%) involved was 46-55 years and the least was more than 55 years. It was commonly affected followed by perineum. This was in consistent with study where lower extremity was involved in 74% of cases followed by perineum in 20% of cases.^[20-23] [Table 4] shows that more than two-thirds (66.66%) of the patients presented with history of trivial trauma. The other common cause was post insect bite. When assessed clinically; most of the patients (55.55%) presented with warmth, in duration (44.44%) and bullae (44.44%) formation of the involved organ, patients presented only with erythema (15.55%), with abscess(22.22%), (22.22%) with skin necrosis and (26.66%) patients complained only of pain.

The patients with necrotising fasciitis can present with erythema, swelling, pain, in duration, discharge, bullae formation and warmth. In our study, the patients commonly presented with warmth, in duration and bullae formation (44.44%). Trivial trauma was the commonest cause.

[Table 5] shows that diabetes mellitus (35.55%) followed by alcohol abuse (17.77%) were the two commonest co-morbid conditions associated in our cases of NF. (35.55%) patients were suffering from diabetes mellitus and were chronic alcoholics.

The pus was sent for culture and sensitivity in all the cases. The commonest organism was E.Coli, followed by Streptococcus and Staphylococcus. This is in correlation with other studies in literature.^[16] the mainstay of treatment of necrotising fasciitis is rapid surgical debridement followed by appropriate antibiotic therapy after initial resuscitation with fluid and electrolyte replacement/blood transfusion.^[21-24]

According to Wipf et al, the single most important determinant of survival is the amount of time elapsed between initial presentation and surgical debridement.^[21] In a retrospective review of 68 patients, Bilton et al reported 4.2% mortality for patients undergoing early surgical debridement and 38% mortality for those with delayed treatment.^[22]

In our study, all the patients were taken for debridement. Aggressive surgical debridements were done; all necrotic tissues were removed till fresh bleeding. No wound was closed after first debridement. Patients were kept on daily dressing till the wound was covered with healthy granulation tissue. Re-debridement was done whenever required. We observed 20% mortality in our patients due to septicaemia. NF mortality rate as per Evangelis et al is about 32%.^[23] in the literature mortality in NF varies from 3.7%-46%. The mortality increases with delay in treatment.^[24] In this study, we covered raw areas with skin graft when there was healthy granulation tissue in 30 patients. The hospital stay ranged between 25-45 days. The follow up ranged between 2 months to 2 years.

CONCLUSION

NF is a lethal soft tissue infection commonly involving middle aged males with diabetes being the commonest co-morbid condition. Lower extremity is the most common site affected. Most infections are polymicrobial with E.Coli being the most common bacteria isolated. Early and aggressive surgical debridement's often at repeated sittings are the mainstay in the treatment of NF, supplemented by adequate antibiotics and supportive measures.

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