



A CLINICAL PROSPECTIVE STUDY ON NECROTIZING SOFT TISSUE INFECTION

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ABSTRACT **Background:** Necrotizing fasciitis is an uncommon but quickly developing destructive soft tissue necrosis which mainly involves fascia and subcutaneous tissues with a remarkable hospital morbidity and death. Proper surgical intervention along with rational antimicrobial therapy has significantly decreased the death rate in cases of necrotizing soft tissue infection. **Objectives:** This study was conducted to assess the clinical profile of patients presenting with necrotizing soft tissue infection and to plan and undertake debridement and study the clinical improvement in patient along with study of microbiological flora and use of rational antimicrobial therapy. **Materials and methods:** 98 patients attending the General Surgery outpatient department/emergency and Plastic Surgery in our hospital were included in the study. Their demographic details and history were recorded. Structured case reporting form was used to generate data and LRINEC scoring system was used for diagnosis. **Results:** Out of 98 patients, 29 (29.59%) were of age group 41-50 years. Trauma was present in 36 patients and diabetes was present in 39 patients. Farmers were most commonly affected and most of the organisms were sensitive to Linezolid. **Conclusion:** Necrotizing soft tissue infection is a dreaded surgical emergency with a fast duration of spread. A well timed commencement of antibiotics and surgical intervention with proper care of the lesion has significantly decreased mortality in necrotizing soft tissue infection.

KEYWORDS :

INTRODUCTION

Necrotizing fasciitis (NF) is an uncommon but quickly developing destructive soft tissue necrosis which mainly involves fascia and subcutaneous tissues with a remarkable hospital morbidity and death (1). Necrotizing soft tissue infections (NSTI) consists of a wide category of skin infections caused by both bacteria and fungi. There are different terminologies used that depend upon the location, depth, and extent of infection (e.g., Fournier's gangrene [necrotizing perineal infection], necrotizing fasciitis [deep subcutaneous infection])(2). Mainly depending upon the depth of tissue involved, NSTI can lead to excessive tissue death followed by necrosis of the involved tissue with systemic toxicity, ultimately leading to mortality. Although there are many advancements in surgery along with good antibiotic coverage, death rates related to NSTI ranges from 6% to 76%.

NSTI is a disease of early times and has also been narrated by Hippocrates and Galen and also by Pare who was a renaissance surgeon(3,4). Earlier this entity was called as "phagedaenic ulcer, phagedena gangrenous, gangrenous ulcer, malignant ulcer, putrid ulcer, or hospital gangrene" (5). It was Meleny who coined the term hemolytic streptococcal gangrene after the outburst of hospital gangrene in Beijing(6). It was Wilson who first established the term, necrotizing fasciitis in 1952 and this term has stayed in the medical literature and is different from other soft tissue infections like cellulitis and erysipelas(7).

Mainly it is followed by systemic inflammatory response syndrome and multiorgan dysfunction for which an aggressive and extended treatment is required(8). NF is mainly identified by extensive necrosis of fascia and subcutaneous tissue(9).

It has also been seen that the patient describes loss of sensation over the region of erythema in NF which is mainly attributed to the infarction of cutaneous nerve in necrotic subcutaneous fascia and soft tissue (10).

There are some specific types of necrotizing fasciitis with characteristic features like necrotizing cellulitis, streptococcal myositis, clostridial cellulitis, progressive bacterial synergistic gangrene or Meleny's gangrene and Fournier's Gangrene.

A fast and rapidly increasing along with a potentially dangerous necrotizing infection that mainly affects the genitals, perineum and the anal region is Fournier gangrene which is seen in males but can also affect females and children. Wong et al. (11) devised a scoring system (LRINEC score) to differentiate necrotizing from non-necrotizing tissue infections.

Use of CT scan and MRI images is quite useful in patients with doubtful diagnosis. It has been seen that CT scan have eighty percent sensitivity for the detection of NSTI(12).

There is also a remarkable amount of fluid loss along with loss of protein before any surgery which causes inadequate tissue oxygenation.

Proper nutritional support is very essential in all of the cases of NSTI post debridement. Cases should be administered double their basic calorie requirement.

Aggressive treatment is required in cases infected with group A streptococcal species and clostridium organisms. Single antibiotics regimen mainly consists of imipenem, meropenem, ertapenem, piperacillin/tazobactam, and tigecycline. In combination antibiotics include triple or double drug regimen, like increased dose of clindamycin or increased dose of penicillin along with an aminoglycoside or a fluoroquinolone to cover gram negative species. If NF is confirmed urgent intervention through surgery is required. Excision of the affected tissue should be done at the earliest.

In many centers hyperbaric oxygen therapy is being considered as an essential mode of treatment especially in patients with gas gangrene.

This present study is intended to know the clinical profile of patients presenting as NSTI, confirmation of their diagnosis by imaging and adjunct investigations, also to study the microbiological flora and rational antimicrobial therapy and study clinical improvement of the patient by debridement.

AIMS AND OBJECTIVES

1. To study the clinical profile of patients presenting as NSTI.
2. To confirm diagnosis by imaging and adjunct investigations.
3. To plan and undertake debridement and study clinical improvement of the patient.
4. To study the microbiological flora and rational antimicrobial therapy.

MATERIALS AND METHODS

"The study was conducted in the Department of General Surgery, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Swami Ram Nagar, Dehradun, over a period of 12 months. Patients were recruited from the General Surgery and Plastic Surgery OPD/ IPD of this institute after approval from the ethics committee and obtaining written informed consent."

Study Design

Type of study: Observational study.

Sample size and Sampling methods: All consecutive patients of Necrotizing Soft Tissue Infection (NSTI) presenting in over 1 year by Convenient Sampling.

Selection of subjects

Inclusion criteria

- Patients of all age groups who present with Necrotizing Soft Tissue Infection .
- Giving informed consent.
- Exclusion criteria
- Patients presenting with non-necrotising soft tissue infections and those refusing to give consent for this study.

Study Tools

- Structured case reporting form was used to generate data.
- LRINEC scoring system was used for diagnosis.

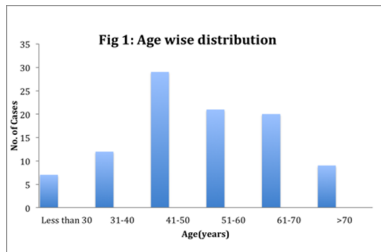
Study protocol

All patients clinically diagnosed as necrotizing soft tissue infection fulfilling the inclusion and exclusion criteria were included in the study.

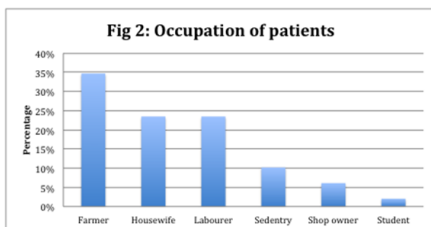
The study was described to the participants as an investigation of management and outcome of their condition and their written consent to participate in the research was sought. After the informed consent, the demographic information was recorded on the data collection form. Complete history was taken and the management and outcome of the NSTI recorded and followed up during the hospital stay of the patient and three months thereafter.

RESULTS

Incidence of NSTI was seen “highest” in age group 41 to 50 years; out of 98 patients 29 patients (29.59%) were present in this group, followed closely by age group 51 to 60 years (Fig.1)



Based on Occupation, out of the 98 patients, most of the patients were farmers, which included 34 patients, followed by housewives and laborers (Fig.2).



Based on history of trauma out of 98 patients, 36 patients had history of trauma (Table 1).

Table 1: History of Trauma (n=98)

	No. of Patients	Percentage
None	62	63.27%
Yes	36	36.73%
Total	98	100.00%

Diabetes was seen in 39 patients out of 98 patients (Table 2).

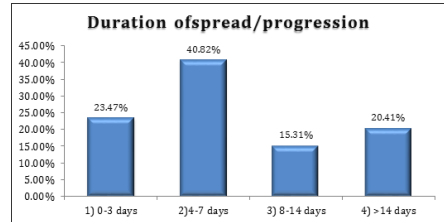
Table 2: History of Diabetes (n=98)

	No. of Patients	Percentage
No	59	60.20%
Yes	39	39.80%
Total	98	100.00%

Of the 98 patients, most commonly the duration of spread was between

4 to 7 days, seen in 40 patients, followed by 0-3 days in 23.47% patients.

Of the 98 patients, 32 patients developed shock during their management phase and signs of organ failure were present in 33 out of 98 patients in the hospital stay (Table 4).

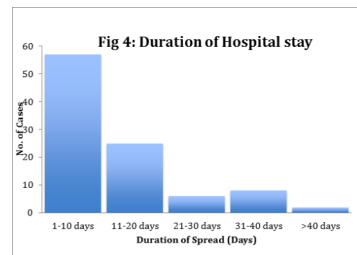


Amongst 98 patients, Staphylococcus Aureus was “most common” and was present in twenty eight cases, followed by mixed growth in 19 patients (Table 5).

Table 5: Micro floral growth pattern (n=98)

Clinical presentation	No. of Patients	Percentage
Acinobacter baumannii	2	2.04%
Acinobacter baumannii complex	1	1.02%
Citrobacter freundii	1	1.02%
E.coli	8	8.16%
Enterobacter aerogenes	1	1.02%
Enterobacter cloacae complex	1	1.02%
Enterococcus	1	1.02%
Enterococcus faecalis	3	3.06%
Enterococcus faecium	1	1.02%
Enterococcus species	1	1.02%
Klebsiella pneumoniae	1	1.02%
Kocuria Kristinae	1	1.02%
Mixed growth	19	19.39%
No growth	17	17.35%
Proteus vulgaris	1	1.02%
Pseudomonas Aeruginosa	3	3.06%
Pseudomonas Putida	2	2.04%
Staph. Aureus	28	28.57%
Staph. Epidermidis	1	1.02%
Staph.hemoliticus	2	2.04%
Yeast	3	3.06%
Total	98	100.00%

Most of the patients were discharged before 10 days, while 25 patients had hospital stay of 11-20 days (Fig. 4).



DISCUSSION

In our study, most of the patients were of age group 41-50 years, which included 29 patients (29.53%) followed by age group of 51-60 years, which included 21 patients (21.43%).

Looking at the occupations of the patients, most of them were farmers (agriculture related) accounting to 34.69%, and then equal incidence of housewives and laborers, which was 23.47%. In a study by Nischal et al, approx. 66.6% patients were agriculturalists by profession (14).

In our study, approx. 60% patients had a history of trauma. This can be justified “by the fact that it” most “commonly affects” individuals from the “working age group”, who usually walk “barefoot”, and hence there are increased chances of trauma to the lower limbs.

Amongst the co-morbidities, diabetes was most commonly seen, which was present in 60% patients, amongst which 4 patients were on

irregular medical management followed by peripheral vascular disease patients. In study by HariKrishnan CP, Diabetes mellitus is the most common co morbidity found in association with necrotizing soft tissue infections followed by hypertension and peripheral vascular disease.

In our study, the duration of spread was 4-7 days in 40.82% cases, followed by 0-3 days in 23% cases and more than 14 days in 20% cases. In a study by HariKrishnan et al, most of the patients (15) arrived with a delay in intervention of more than 3 days.

In our study, approx. 97% cases required surgery. In a study by Nischal et al., significant figure of operative intervention was 2.5. Three cases (10%) underwent amputation which included one above knee and two below knee amputation and diabetes was present in all three patients(14).

Evaluating the micro-biological flora, in our study we found that the highest incidence was for Staphylococcus Aureus, followed by E.Coli. Mixed growth was seen in 19% of the cases. There was no growth in 17.35% cases. In study by Harikrishnan CP, microbiological flora that was commonly seen was Escherichia coli (n = 21). In our study, around 24 patients, had a hospital stay of 4-7 days, 23 patients had a hospital stay of 8-14 days while around 2 patients had a hospital stay of more than 14 days, depending on the type of surgical procedures performed. In our study, as per the culture sensitivity, most common anti-microbiological drug was Linezolid seen in 48% cases, followed by Clindamycin in 29% cases. In a study by YH Tsai, use of clindamycin in combination with imipenem, meropenem, ampicillin/sulbactam, tigecycline, and piperacillin/tazobactam are recommended as the initial antibiotic regimen for treating necrotizing fasciitis.

Being “a surgical emergency that requires a high degree of suspicion”, one must always be vigilant for necrotizing soft tissue infection so as to intervene at the earliest and avoid dreaded complication like multi organ dysfunction syndrome.

CONCLUSION

We conclude that:

Middle and elderly age group, most males of 41-50 years, 51-60 years and 61-70 years were most commonly affected. Co-morbidities like diabetes mellitus, peripheral vascular disease plays in major role. It is a dreaded surgical emergency with duration of spread mostly within 4-7 days and arriving at the diagnosis is one of the challenging tasks in treating patients, which requires a high index of suspicion. Organ failure is also common, mostly renal and if not properly treated ICU stay for patient is inevitable. The common micro-biological flora in our study were Staphylococcus aureus, E.Coli. A well timed commencement of antibiotics and surgical intervention with proper care of the lesion has drastically decreased the death rate in cases of NSTI.

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