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A study on necrotizing fasciitis with the etiological factors and microbiological aspects with its prevalence

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Abstract

Background: To study the etiological factors and microbiological aspects with its prevalence in Necrotizing Fasciitis.

Materials and Methods: A prospective study was conducted in 120 patients admitted in the Dept of General Surgery, Victoria Hospital, Bangalore Medical College for a period of one year.

Results: In our study majority 48.3% were in the age group 41-60 years and majority being males 65%. Trauma 39.1% being the most common etiological factor followed by spontaneous 28.3% occurrence. Most common organism isolated being Staphylococcus aureus being 64.1% followed by Pseudomonas and E coli.

Conclusion: Necrotizing fasciitis is a life threatening condition, with a high mortality rate only if not treated in time. One must diagnose the NF at the earliest, as a delay in diagnosis can be fatal. This study attempts to analyze, in more detail, the incidence of these necrotizing infections and also to find the predisposing factors, bacteriological profile and prevalence of disease.

Keywords: Necrotizing fasciitis, microbiology, phagedaenic ulcer, LRINEC

1. Introduction

Necrotizing fasciitis (NF) is a rare, potentially lethal bacterial infection characterised by widespread necrosis of the skin, subcutaneous tissue, and superficial fascia and necrotizing soft tissue infection spreading along fascial planes with or without overlying cellulitis. It is a progressive infection. The diagnosis of necrotizing fasciitis is usually clinical and is important to find it early as it is a fast spreading infection. Early clinical suspicion of necrotizing fasciitis is crucial because patient survival is inversely related to the time interval between onset of infection and initiation of appropriate treatment. In addition to early diagnosis and treatment, several risk factors influence the morbidity and mortality of necrotizing soft tissue infections ^[1].

The first English description for necrotizing soft-tissue infection was by British surgeon Leonard Gillespie and British physicians Gilbert Blaine and Thomas Trotter in the 18th century. At that time, necrotizing soft-tissue infection was known as Phagedaenic ulcer which means biting or chewing which gradually make a hole or destroying it ^[2].

Necrotizing fasciitis can occur anywhere in the body. But it is most commonly seen in lower limb, upper limb, abdominal wall and genitals. Inoculation of organisms into the disrupted mucosa, skin by trauma, burns, or other modes of injury result in development of local infection followed by necrotizing fasciitis. Though development of necrotizing fasciitis is usually due to direct local site infection it also results from infection in the distant site like pharyngitis ^[3]. Necrotizing fasciitis occurs as a result of necrosis of skin and subcutaneous layer. In some cases there will be necrosis of underlying muscles causing necrotizing myositis. Necrotizing fasciitis often spreads by direct spread. Any major or minor trauma compromising skin integrity such as needle puncture, insect bites, burns, lacerations, surgical wound, blunt trauma etc. may develop this insidiously advancing soft-tissue condition. In severe cases, the microorganisms can spread via blood vessel and lymphatics resulting in sepsis and shock ^[4].

The incidence of NF has been estimated to lie between 0.4 and 0.53 cases per 100.000 populations. Recently an increasing incidence of NF has been reported, attributed to a better reporting system and an increase in strains associated with NF due to antibiotic abuse. Not only patients who present with pre-existing factors but also young individuals may be affected.

In fact approximately half of the cases of streptococcal NF occur in young and previously healthy patients even though necrotizing fasciitis more frequent in elderly age group >50 years of age [5]. Male to female ratio is 3:1. In about 13 to 31% there has been no initiating factor for development of necrotizing fasciitis. It has been thought in these cases there has been undetected break in skin with inoculation of organism. Rarely the spread may be haematological in origin [6].

Polymicrobial infections tend to be more common finding in necrotizing infections. Rates of bacteraemia as high as 60% have been noted in necrotising fasciitis [7] and only in 10% of cases is a single organism isolated from wound cultures [8].

Depending on the causative organisms, necrotizing fasciitis is

categorised as Type I, II, III and IV

Type I is a mixed infection caused by aerobic and anaerobic bacteria.

Type II is caused by anaerobic group A Streptococci possibly with co-infection by Staphylococcus aureus.

Type III is caused by the Marine Vibrios (Gram-negative rods).

Type IV is fungal NF infections, specifically Candida species and Zygomycetes infections, most commonly found in immune-compromised individuals [9].

This study attempts to analyze, in more detail, the incidence of these necrotizing infections and also to find the predisposing factors, bacteriological profile and prevalence of disease.

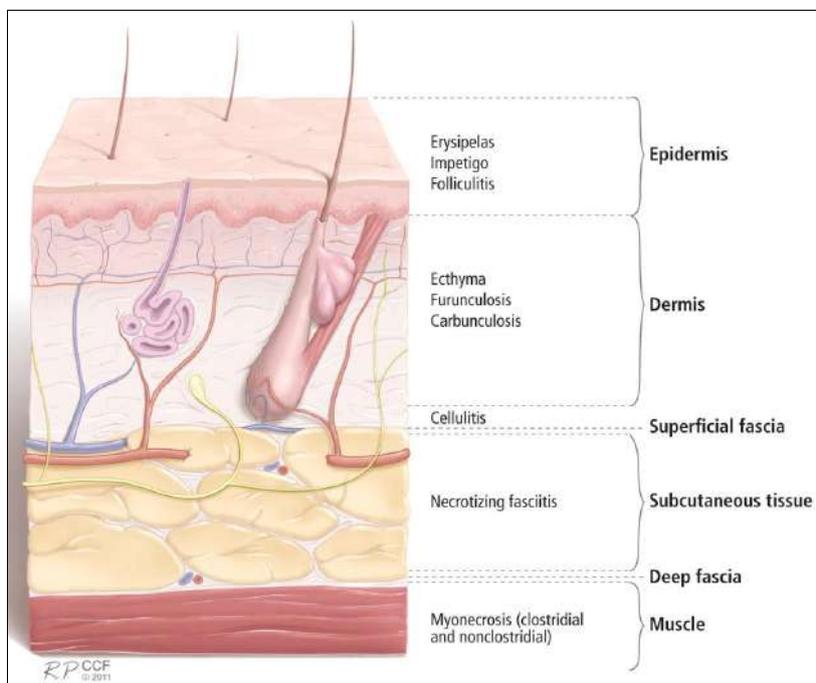


Fig 1: Layers of skin

2. Methods

2.1 Aims and Objective

To study the etiological factors and microbiological aspects with its prevalence in Necrotizing Fasciitis.

2.2 Materials and Methods

2.2.1 Type of study

A prospective study was conducted in the Dept of General Surgery, in hospitals attached to Bangalore Medical College, Bangalore.

2.2.3 Study Period

Conducted for a period of one year from January 2018 to January 2019.

2.2.4 Study population

Patients presenting with clinical features of Necrotizing Fasciitis admitted in Victoria hospital attached to Bangalore medical college and research institute, Bangalore with a sample size of 120 cases satisfying the inclusion criteria.

2.2.5 Inclusion criteria

- The patients who are clinically diagnosed as Necrotizing Fasciitis and admitted to the surgical wards in Victoria Hospital.

- Age group above 18 years.
- The patients who give consent for study.

2.2.6 Exclusion criteria

- The patients who develop necrotizing fasciitis following polytrauma, skeletal injury and burns.

2.2.7 Methodology

After obtaining written informed consent, the in patients attending the department of General Surgery fulfilling the inclusion/exclusion criteria will be enrolled in the study. Medical history, clinical examination, physical examination including recording of vital signs and investigations will be recorded in the case record form at baseline visit. Data will be analyzed prospectively and will be presented in the form of tables, graphs, figures, and diagrams wherever necessary.

Follow up: Patients will be followed for a period of six months postoperatively and will be asked to come in case of any complication arises which is related to the procedure performed.

2.2.8 Statistical analysis

Data will be analyzed by descriptive statistics, chi square test used for the association of categorical variables. Microsoft Excel and Epi-info used for data analysis.

3. Results

3.1 Age wise distribution

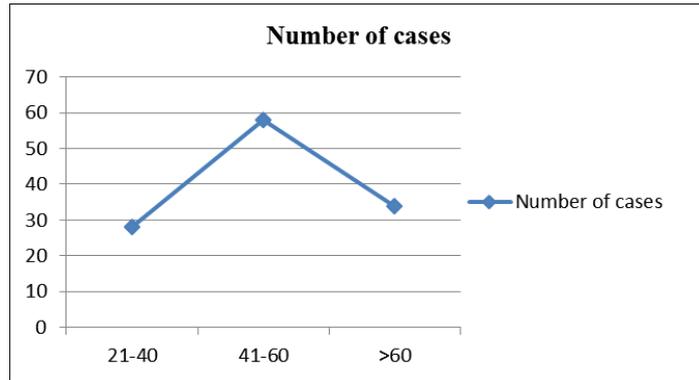


Fig 2: Age wise distribution of cases

3.2 Gender distribution

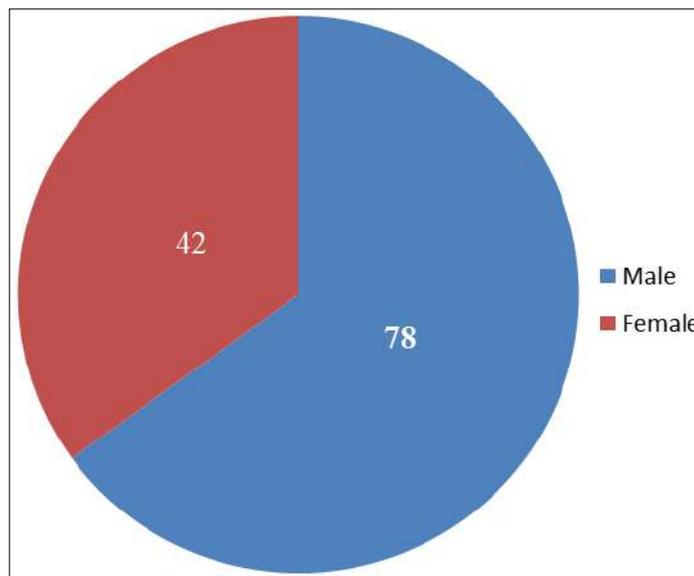


Fig 3: Gender Distribution

3.3 Etiology

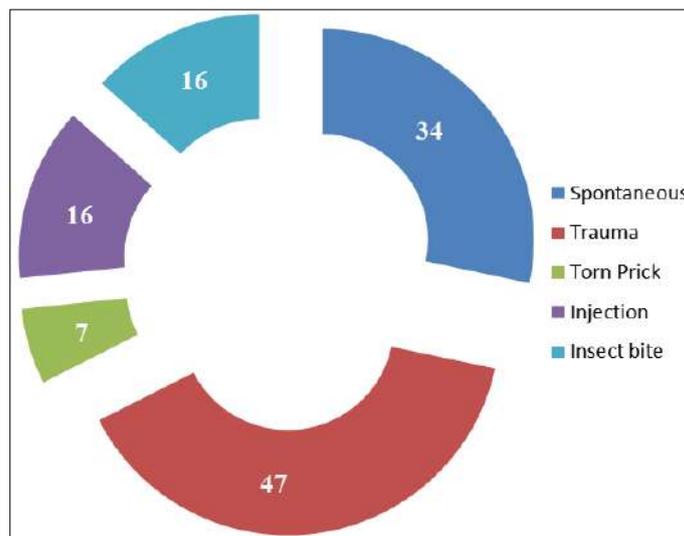


Fig 4: Various etiological factors

3.4 Distribution of Micro organisms

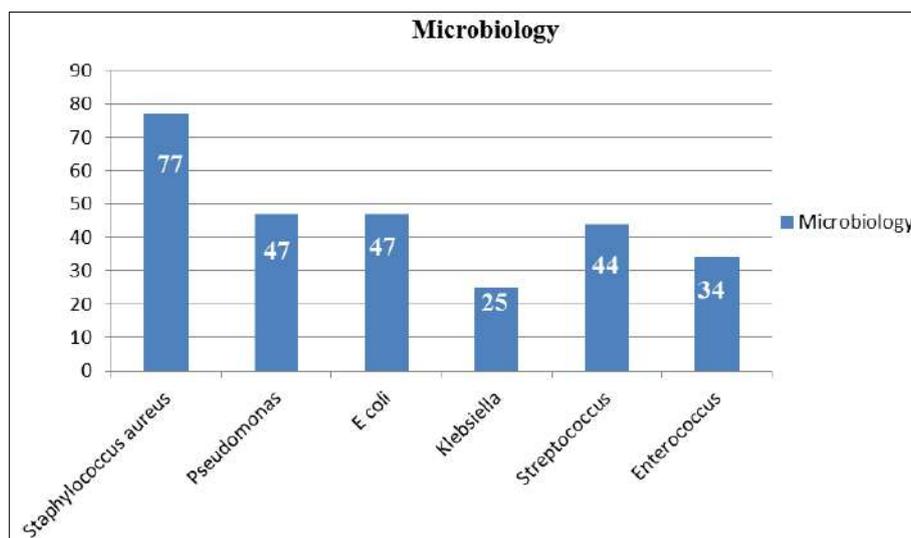


Fig 5: Microbiological aspects

4. Discussion

Current literature proposes several signs and symptoms indicative of NF infections for clinicians to consider when diagnosis is suspected. It is important to analyze the signs of NF beyond only laboratory tests. It is evident both through the most recent analyses and past literature that certain physical exam signs are consistent among patients with NF. By properly educating clinicians on the implications of this serious infection and the signs and symptoms that come along with it, it is possible to lessen the rate of mortality in NF.

In our study majority 48.3% were in the age group 41-60 years and mortality rate was more among age group >60 years ie 26.4% with significant p value of 0.00013. The number of cases, severity and complications were significantly higher with the advancing age. According to study done by Kaul R *et al.* [11] the median age of cases was 57.5 years and the rate of disease increased with increasing age.

Majority being males 65% as compared to 35% are females who were affected with NF.

Trauma 39.1% being the most common etiological factor followed by spontaneous blebs 28.3% occurrence seen especially in case of Fournier's gangrene with p value 0.0001. It signifies the association of NF with low socio economic status and who are more prone to trauma.

Most common organism isolated being Staphylococcus aureus being 64.1% followed by Pseudomonas and E coli with ap value of 0.00021 which is significant. According to study done by O'Loughlin *et al.* [11] the most common organisms isolated included Streptococcus 65.1 %, and Staphylococcus 34.2 %. The study done by Singh *et al.* [29] shows Escherichia coli 77.08 %, Streptococcus 72.9 % and Staphylococcus 50 %.

5. Conclusion

Necrotizing fasciitis is a life threatening condition, with a high mortality rate only if not treated in time. Various co morbid conditions are associated with this pathology. One must diagnose the NF at the earliest, as a delay in diagnosis can be fatal, and septic shock is inevitable if the disease remains untreated. The characteristic of NF is the clinical status change over time with a very rapid progression within hours to days. The diagnosis of NF mainly clinical based on symptoms and signs. In addition to this diagnosis and severity of the disease

can be secured faster with the use of laboratory based scoring systems, such as the LRINEC score or the FGSI score. Any risk factor that results in disruption of mucosa or skin integrity it causes necrotizing fasciitis. Risk factors like skin trauma, intravenous drug abuse and needle prick/thorn prick injury results in necrotizing fasciitis. Sometimes mucosal injury in gastrointestinal or genitourinary tract can result in necrotizing fasciitis. The extent of microbial involvement in these tissues may range from simple contamination and self limited bacterial contamination to an unpredictable clinical course and finally to septicaemia, multiple organ failure and death [9]. Broad spectrum antibiotics, aggressive surgical debridement and intensive care unit support are essential [4].

This study attempts to analyze, in more detail, the incidence of these necrotizing infections and also to find the predisposing factors, bacteriological profile and outcome of the patients and to provide optimal surgical and medical care and direct most appropriate antimicrobial therapy and to study the outcome after effective management.

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