



ANALYSIS OF PREDICTIVE FACTORS IN DIAGNOSIS AND OUTCOME IN NECROTIZING FASCIITIS

General Surgery

Dr. B.V.Amruthavalli	MS General Surgery Assistant Professor, Dept. of General Surgery, Guntur Medical College, Guntur.
Dr. Ratla. N. Bharat Singh Naik	MS General Surgery Assistant Professor, Dept. of General Surgery, Guntur Medical College, Guntur.
Dr. Vemula Premnath	MS General Surgery Assistant Professor, Dept. of General Surgery, Guntur Medical College, Guntur.
Dr. Sunkula Sriharsha*	MS General Surgery Assistant Professor, Dept. of General Surgery, Guntur Medical College, Guntur. *Corresponding Author

ABSTRACT

AIM: To assess factors that will help in clinching the diagnosis of Necrotizing Fasciitis.

To identify factors responsible for morbidity and mortality

METHODS

It is a study of 100 cases of Necrotizing Fasciitis of patients admitted in Government General Hospital, Guntur, Dept of General Surgery, Guntur from June 2017 to November 2019.

RESULTS: Total of 100 patients were included in the study. There were 64 males (64%) and 36 female (36%). Male to female ratio being 1.77. The patients' age ranged from 20 to 85 years. Diabetes mellitus (54%), cardiac or renal disease (45%) & alcohol dependence (40%) cases were most comorbid conditions associated with the disease. The lower limb (62%) was most common site followed by perineum and scrotal, upper limb, trunk and abdomen. The growth was polymicrobial (85%), monomicrobial (15%) cases. E.coli was predominant in 71% cases followed by streptococci, staphylococci, pseudomonas, klebsiella and proteus. The main procedure was debridement with grafting was 41%, debridement with secondary suturing was 21%, amputation was done in 22% cases. Mortality was 11% and morbidity was 50%.

CONCLUSION: Necrotizing fasciitis is a lethal soft tissue infection mostly affecting males in middle age group (40 to 70 years), age more than 50 years and diabetes mellitus. Lower extremity is the most common site affected. Most infections are polymicrobial. Early and aggressive debridement's

KEYWORDS

Necrotizing fasciitis, Soft tissue, Debridement

INTRODUCTION

MATERIALS AND METHODS:-

It is a study of 100 cases of Necrotizing Fasciitis admitted patients in Government General Hospital, Guntur, Dept of General Surgery, Guntur from June 2017 to November 2019.

METHODS OF COLLECTION:-

A) INCLUSION CRITERIA

- 1) All patients admitted with Necrotizing Fasciitis.
- 2) Study of factors like Age, Sex, Blood Pressure on admission, Smoking, Cardiac disease, Cancer patients, Peripheral vascular disease, recent surgery, whether on steroids, immune suppressors, alcoholism, people with diabetes.

B) EXCLUSION CRITERIA

Patients with Non-Necrotizing soft tissue infections excluded from the study (e.g., Cellulitis, abscess). NF lesions are entities not frequently seen in daily surgical practice. These infections are by the absence of clear local boundaries or palpable limits, which is responsible both for their severity and the frequent delay in recognizing their surgical nature. NF continues to challenge the practicing surgeon. NF is characterized by rapidly progressing inflammation and necrosis, ranging from infection of the skin to life-threatening conditions. If it involves the fascia and muscle, then it is called as necrotizing myositis.

The most common organism involved in causing NF is streptococcus pyogenes. Other agents that cause are staphylococcus epidermidis, clostridium perfringens, clostridium septicum, pseudomonas and, Vibrio species. Rarely it may be a result of non-group-A streptococci, streptococcus pneumoniae, or Hemophilus influenza type-B infections. Sometimes bacteria that are anaerobic and aerobic or facultative act together to cause tissue necrosis.

There are several recognized risk factors. Patients who have compromised immunity such as patients with diabetes mellitus, cancer, peripheral vascular disease, intravenous drug users, those who have recently undergone surgery, receiving steroids or other

immunosuppressive treatments are all predisposed. Healthy children, in particular with recent varicella Zoster infection and also whose skin is breached by minor trauma or skin infection, are affected. Some investigators have found that the use of nonsteroidal anti-inflammatory drugs in these children increases the risk of NF.

GENERAL PRINCIPLES OF MANAGEMENT

Firstly requires aggressive resuscitative measures, often assisted by invasive monitoring in surgical ICU. While correction of the metabolic disorder begun, all other organ systems are assessed and supportive measures instituted if necessary. Concomitantly, broad-spectrum antibiotics administered, and the tetanus status is revived and updated as needed. Antibiotic coverage typically entails 4th generation Cephalosporins and possibly aminoglycoside with metronidazole for additional anaerobic coverage.

The wound should be explored expeditiously in the operating room. Even if a patient remains in septic shock, after resuscitation and antibiotics started. Surgical debridement should be done. In such cases, the septic state does not regress until the infected tissue is excised, delay worsens outcome.

The incision is made directly over the area of skin involved or the most indurated region. The skin incisions should be parallel to the neurovascular bundles and carried down to the fascia. The underlying muscle and fascia inspected; all necrotic tissue excised in all directions to viable, healthy tissue. Debridement considered adequate when finger dissection can no longer easily separate the subcutaneous fat from the fascia. Leaving the overlying flaps of skin and subcutaneous tissue hinders the proper evaluation of the wound post-operatively and thereby delays any further debridement.

The tissue biopsy, fluid specimen, has to be taken from intact skin, as well as away from any open wound, and sent for gram stain as well as aerobic and anaerobic culture with sensitivities. The injury is packed free and kept moist with saline. Antibiotic solutions are not necessary, patients should be returned to the operating room every 24 hrs until the progression of the disease is halted. Failure can lead to the progress of the

infection to previously healthy tissue. Daily exploration under G A is especially recommended to truncl infections and for all patients who remain clinically septic.

Postoperatively, these patients often require ICU care, so that cardiac pulmonary (ARDS), renal and metabolic systems can be monitored and optimized. Choice of antibiotics is from the identification and sensitivity of the organisms isolated.

Early enteral nutritional support is beneficial in these patients. If not tolerated, and parenteral nutrition should administer. Many patients benefit from a specialized bed to prevent skin breakdown (water beds).

Once the sepsis has resolved, skin grafts applied to the granulation tissue, and free or rotational soft tissue flaps are used to cover exposed bone, cartilage, tendons, and neurovascular structures. It should be done as soon as possible to preserve function and prevent wound problems.

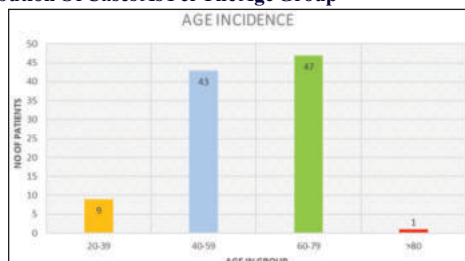
Few Necrotizing infections of the extremities require amputation. A decision to amputate for necrotizing fasciitis decided by the extent and progression of the disease, original injury, vascular status of the limb in conjunction with the functional prospects and the overall condition of the patient, or the infection process progress to a life-threatening situation.

When dealing with the septic extremity, a two-stage procedure recommended. It involves a guillotine amputation followed in 3 to 7 days by the formal operation. In this manner, the incidence of wound complications, which often require revision of higher amputation site, is reduced. Not only is the septic process isolated from the systemic circulation, but the grossly contaminated wound transformed into a clean-contaminated injury. It allows primary closure of the wound at the second operation and has been shown to reduce the duration of hospitalization. The relatively young, otherwise healthy patient can tolerate second anaesthesia. With rare mortality. However, the elderly patient with acute metabolic de-arrangements superimposed on chronic disease states faces a mortality rate of up to 25%.

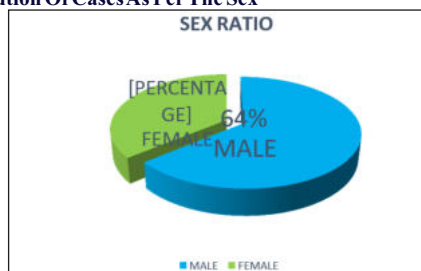
RESULTS

- Total of 100 patients were included in the study
- There were 64 males (64%) and 36 female (36%)
- Male to female ratio being 1.77
- The patients age ranged from 20 to 85 years
- Diabetes mellitus (54%), cardiac or renal disease (45%) & alcohol dependence (40%) cases were most comorbid conditions are associated with the disease.
- The lower limb (62%) was most common site followed by perineum and scrotal, upperlimb, trunk and abdomen.
- The growth was polymicrobial (85%), monomicrobial (15%) cases.
- E.coli was predominant in 71% cases followed by streptococci, staphylococci, pseudomonas, klebsiella and proteus.
- The main procedure was debridement with grafting was 41% debridement with secondary suturing was 21%
- Amputation was done in 22% cases.
- Mortality was 11% and Morbidity was 50%

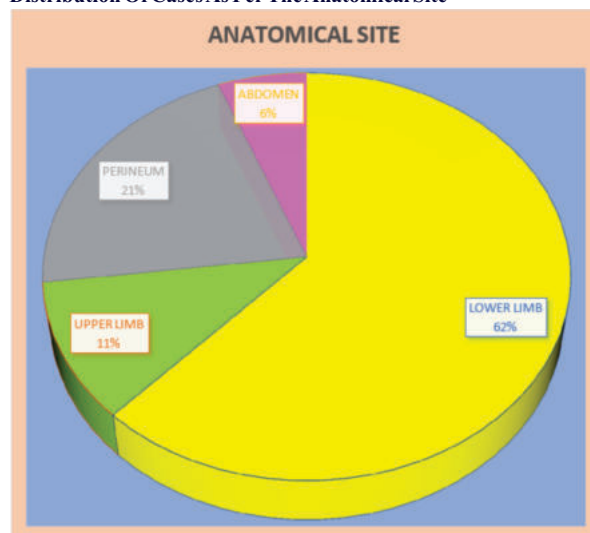
Distribution Of Cases As Per The Age Group



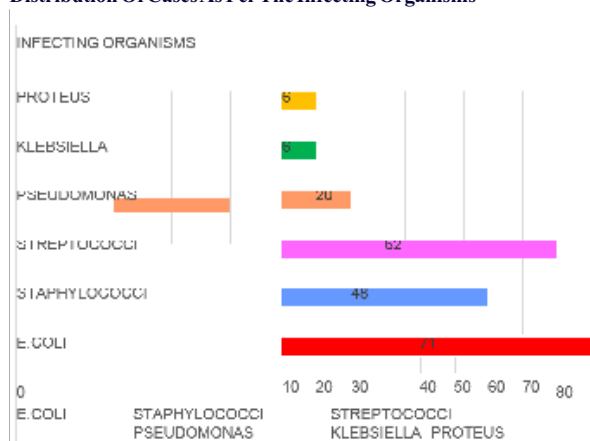
Distribution Of Cases As Per The Sex



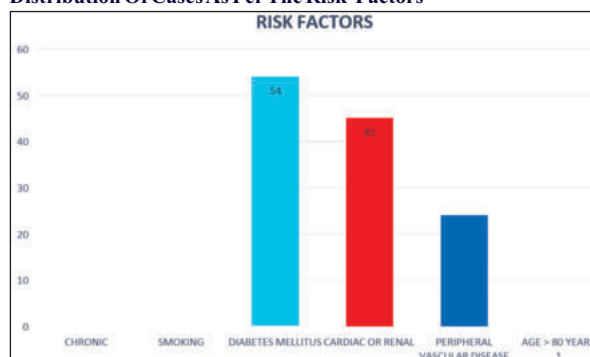
Distribution Of Cases As Per The Anatomical Site



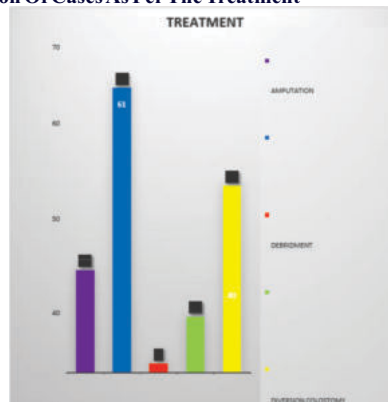
Distribution Of Cases As Per The Infecting Organisms



Distribution Of Cases As Per The Risk Factors



Distribution Of Cases As Per The Treatment



Bacteriology:

S. No	GRAM POSITIVE COCCI	
1	<i>Staphylococci</i>	48
2	<i>Streptococci</i>	62
S. No	GRAM NEGATIVE BACILLI	
1	<i>E.coli</i>	71
2	<i>Proteus</i>	6
3	<i>Pseudomonas</i>	20
4	<i>Klebshiella</i>	6
S. No		
1	Polymicrobial	89
2	Monomicrobial	11

Necrotising fascitis affecting lower limb**Necrotising Fascitis Affecting upper Limb****Necrotising Fascitis Affecting Perineum And Scrotum****DISCUSSION**

- A total of 100 cases of necrotizing fasciitis were studied from June 2017 to November 2019 in Government General hospital, Guntur. The incidence of necrotizing fasciitis has been rising.
- 90 cases were reported in the middle-age group 40 – 79 years with incidence of (90%) with vast majority being males, and is comparable to Shaikh et al¹
- The most common predisposing factors noted in the study included advanced age and diabetes mellitus. Francis and co workers also reported a similar profile of predisposing risk factors². Both these conditions are associated with a progressive decrease in immunity, which may be responsible for the infections in the tissue planes. Diabetic microangiopathy is well known to reduce the vascularity to the extremities, thereby reducing the immunity and allowing the spread of disease. Diabetic neuropathy further increases the risk of injuries, which are very often the triggering factors in cases of necrotizing fasciitis.
- Pre-existing chronic liver dysfunction, chronic renal failure, thrombocytopenia, hypoalbuminemia, and postoperative dependence on mechanical ventilation represent poor prognostic factors in monomicrobial necrotizing fasciitis. It is comparable with Lee CY, Kuo LT et al studies.³
- The most common site involved was lower extremity reported the same in Espandar and his co workers.⁴ The higher chance of injury, combined with the higher affection of vascularity of this region due to diabetes mellitus, is the likely reason for the same. The other areas affected were the upper extremity and the perineum.
- The microbiological profile of the patients revealed polymicrobial infections in the majority of patients which is comparable to Bosshardt and co workers.⁵
- The most common organisms included *E.coli*, *Streptococcus*, and *Staphylococcus*, *Proteus*, *Pseudomonas* have been comparable to that documented in other studies.⁶
- Community-associated methicillin-resistant *Staphylococcus aureus* has emerged as a prominent causative pathogen in community-acquired necrotizing fasciitis^{7,8}.
- The laboratory risk indicator for necrotizing fasciitis scores can be used for predicting a necrotizing component to a soft-tissue infection.⁹

Value	Score
C-reactive protein, mg/dL	
<150	0
>150	4
WBC count, cells/mm ³	
<15 k	0
15–25 k	1
>25 k	2
Hemoglobin level, g/dL	
>13.5	0
11–13.5	1
<11	2
Sodium level, mmol/L	
>135	0
<135	2
Creatinine level, mg/dL	
<1.6	0
>11.6	2
Glucose level, mg/dL	
<180	0
>180	1
Risk category: low <5 (<50% chance of NF), intermediate 6–7 (50–75% chance of NF), and high 8 (>75% chance of NF).	

Though specific, subcutaneous gas on radiographs is not very sensitive; in one series, it was found in only 17 % of patients, and it is often a late finding.

In patients with a low index of suspicion, ultrasound, computed tomography (CT) scan, and magnetic resonance imaging (MRI) have the advantage of providing additional anatomic information and possibly identifying other sources of infection.¹⁰

Frozen-section biopsy was not performed. However, necrosis was confirmed histopathologically in all cases.

Aggressiveness remains the key to successful outcome in necrotizing fasciitis. Aggressive debridement, often in multiple sittings, was the primary operative procedure used as curative procedures in all the cases in this study. Aggressive debridement is the first-choice treatment in necrotizing fasciitis and is recommended in almost all previous studies.

In the present study, twenty two amputations are done. The percentage of amputations in patients of necrotizing fasciitis as quoted in certain studies is as high as 33 %.

Skin grafting was the reconstructive procedure used in 40 % of patients in our study, whereas the other cases were healed by secondary suturing or by secondary intention. The average number of procedures per patient was 2.47, which was due to the repeated aggressive debridements.

Apart from the aggressive surgical management, adequate antibiotic coverage, regular dressings, and adequate nutritional support were provided to all patients.

These patients would need constant monitoring and possible respiratory and nutritional support.

Septicemia was the most common complication recorded in the study. The mortality rate in the present study is 11 %, which is considerably lower than that of the earlier studies.¹¹

Early presentation of the cases with prompt and aggressive management strategies may be the factors responsible for the reduced mortality recorded in our study. The major determinants of mortality included delayed presentation, diabetes mellitus, and systemic toxicity on admission.

MANAGEMENT :-

- 1) All patients managed in ICUs.
- 2) Aggressive fluid resuscitation

- 3) Early and prompt debridement in all patients
- 4) IV antibiotics (4th generation cephalosporins, aminoglycosides, metronidazole)
- 5) Multiple debridement
- 6) Twice daily dressings
- 7) General condition improvement of anaemia, hypoalbuminemia and other nutritional support
- 8) Skin grafting
- 9) Amputations
- 10) Proper management of Multiorgan failures, ARDS, septicemia in ICUs.
- 11) Epidural catheter placement, which helped for repeated debridement and dressings and adequate analgesia.

Morbidity and Mortality

The mortality rate is 11%

Deaths were due to,

- Sepsis
- Acute respiratory distress syndrome
- Multiple Organ Dysfunction Syndrome
- Infective and metabolic encephalopathy

Morbidity was 50%

- Amputations
- Disarticulations
- Diversion colostomy
- Placement of both testes in anteromedial sides of the thigh SSG was leading to contractions.

CONCLUSION

- Necrotizing fasciitis is a lethal soft tissue infection mostly affecting males in middle age group (40 to 70 years).
- Major predisposing factors include poor personal hygiene, age more than 50 years and diabetes mellitus.
- Lower extremity is the most common site affected. Most infections are polymicrobial.
- Early and aggressive debridement's often at repeated sittings are the mainstay in the treatment of necrotizing fasciitis, supplemented by adequate antibiotics and nutritional support.
- Low **SERUM SODIUM** and **HISTOPATHOLOGICAL EVIDENCE** are the hard signs to clinch the diagnosis.
- Any two of the following factors at presentation indicate a grave prognosis.
- Shock at presentation
- Delay of 24 hrs before hospitalization
- Anaemia, hypo-proteinemia
- Increased blood sugar levels

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