IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 1 Ser.17 (January. 2020), PP 39-43
www.iosrjournals.org

A Clinico Pathological Study and Management of Necrotizing Fasciitis

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Abstract
BACKGROUND: *Necrotizing fasciitis is a progressive infection occurring in the deep fascial layers. The diagnosis of necrotizing fasciitis is usually clinical and is important to find it in early stage to avoid significant mortality by proper management.*
MATERIALS AND METHODS: *Sixty consecutive patients admitted with the features of necrotizing fasciitis in general surgery ward of Coimbatore medical college hospital during January 2019-December 2019 were included in the study. Pregnant women and those below the age of 13 were excluded from the study. Surgical management was carried out after detailed history, through physical examination and routine investigations. Bacteriological culture and sensitivity tests were carried out for both aerobic and anaerobic organisms. The cultured organisms were tested for resistance pattern by disc diffusion method. We used descriptive statistical analysis.*
RESULTS: *Necrotizing fasciitis is most commonly seen in the elderly males. Diabetes mellitus is the most common comorbid factor. The disease was poly microbial in about 62% of cases. The most common isolated organism was E.coli in about 46.6%.*
CONCLUSION: *Necrotizing fasciitis is the disease of elderly males and often polymicrobial. The source is identifiable in most of them and diabetes is the most common comorbid factor. Early recognition of the condition followed by aggressive surgical management along with broad spectrum antibiotics may reduce mortality and morbidity. Multidisciplinary team approach is required for better outcome in necrotizing fasciitis.*
Keywords: *Necrotising fasciitis, Aerobic and anaerobic infections, management*

Date of Submission: 14-01-2020 Date of Acceptance: 30-01-2020

I. Introduction

Necrotizing fasciitis is an infection occurring in the deep fascial layers causing necrosis of skin and subcutaneous layer. In the year 1871 US army surgeon Joseph Jones during United States civil war first described this disease. In 1952 Wilson named this condition as necrotizing fasciitis.[1,2.] It is also known as progressive synergistic gangrene, suppurative fasciitis, and acute dermal gangrene. In some cases there will be necrosis of underlying muscles causing necrotizing myositis. Diabetes mellitus is the most common co-morbid condition associated with necrotizing fasciitis[3]. It is a life threatening surgical emergency characterized by rapidly spreading necrosis of the subcutaneous fat and fascia with thrombosis of cutaneous micro-circulation[4,5]. 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.[6] It may present as a low-grade cellulitis that progress to a limb or life-threatening infection.[7] It must be treated as an emergency with repeated surgical interventions and high doses of broad-spectrum antibiotics through parenteral route.[8]. Though it spreads contiguously systemic spread via blood stream and lymphatics results in sepsis and shock in severe cases

II. Materials and methods

This prospective comparative study was carried out on patients of Department of general surgery, Coimbatore Medical College and hospital from January 2018 to January 2019. A total 60 adult subject (both male and females) of aged ≥ 18, years were for in this study

Study Design: Prospective open label observational study
Study Location: This was a tertiary care teaching hospital based study done in Department of General surgery, Coimbatore Medical College and Hospital
Study Duration: January 2019 to December 2019
Sample size: 60 patients.

Inclusion criteria:
1. Either sex
2. Age > 18
3. Patients presenting with the features of necrotizing fasciitis in general surgery ward of Coimbatore medical college hospital during January 2018-December 2019

Exclusion criteria
1. Pregnant women
2. Patients not willing to take part in the study

Procedure methodology

After written informed consent was obtained, Detailed history was taken followed by complete physical examination of the patient was done to identify etiology, risk factors and co-morbidities. Following this routine hematological, RFT, LFT and necessary blood investigations were done. Appropriate radiological investigations were done in selected cases. Bacteriological culture and sensitivity tests were carried out for both aerobic and anaerobic organisms. The samples were transported promptly using proper transportation technique to laboratory. They were then cultured in blood agar and McConkey agar for aerobic bacteria and in Robertson's cooked meat media for anaerobic bacteria. The cultured organisms were tested for resistance pattern by disc diffusion method. Treatment was started once the diagnosis is suspected which includes resuscitation with intravenous fluids, antibiotics and wound debridement. Following initial debridement the wound was inspected regularly and subsequent debridement were done periodically whenever necessary. Once the wound seems to be fit split skin graft was done to cover the raw area.

Statistical analysis

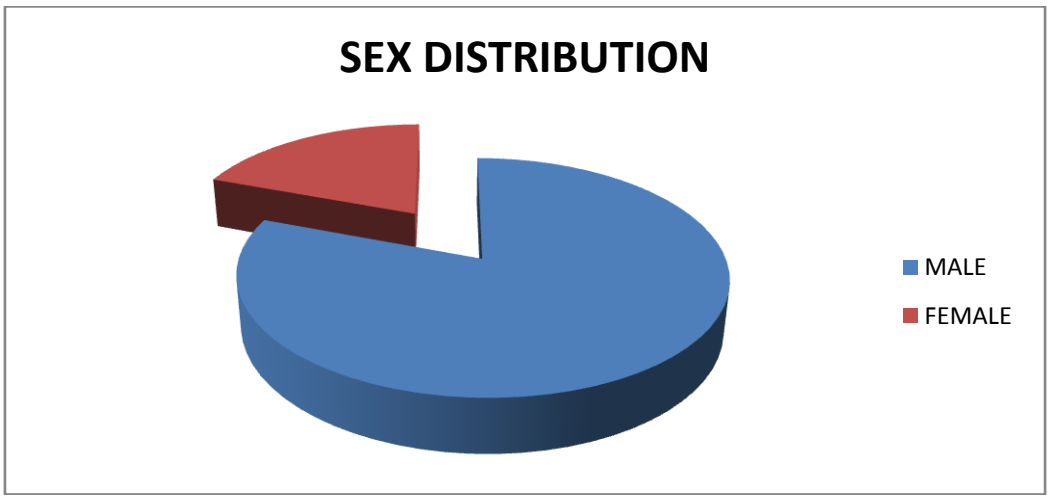
In our study we used descriptive statistical analysis. Continuous measurements were represented on mean with or without standard deviation. Categorical measurements were represented in number (%). Confidence interval of 95% is used to find significance of value. Confidence limit >50% is associated with statistical significance. Tables and charts were completed using Microsoft word and excel software

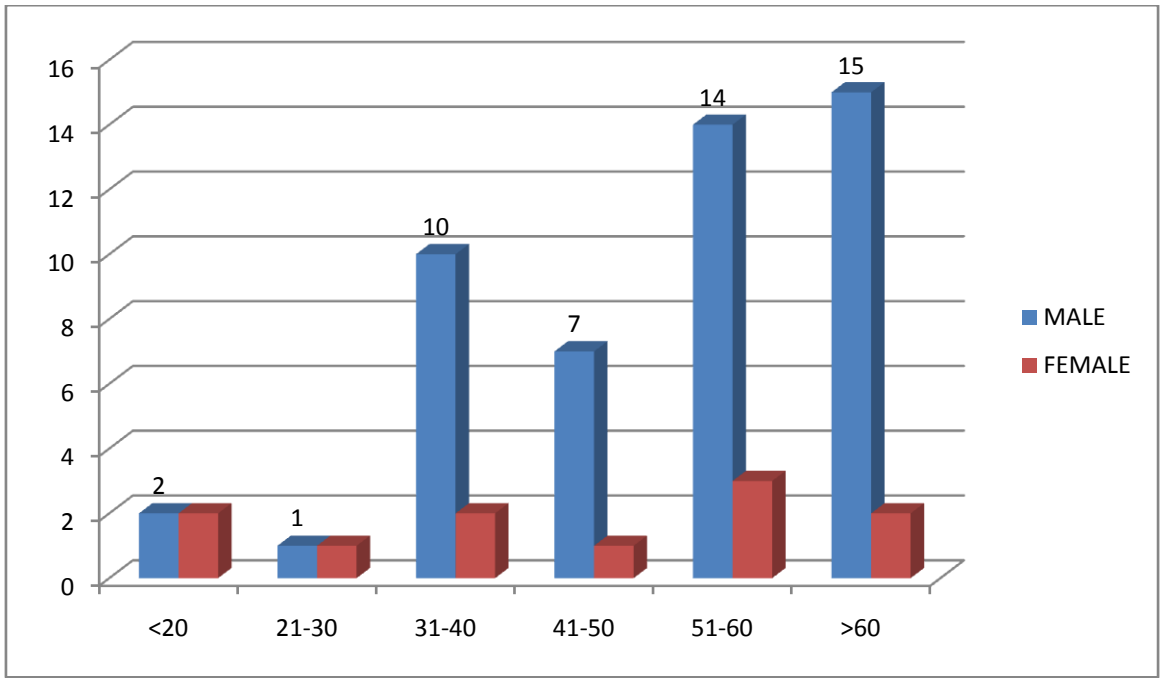
III. Result.

About 60 patients were included in our study. The clinical features, predisposing factors, age, microbiological pattern and antibiotic sensitivity pattern were analyzed.

In this study the age of the patients ranges from 14-81yrs. Mean age was 50.42 ±17.31yrs. Most of these patients were in the age group of above 50 yrs.

In our study most of the patients were male (49) when compared to female (11) with the ratio of 4.45:1.





Agricultural work is the most common occupation among these patients (28.3%). The most common affected part was lower limb (53.3%) followed by perineal region (30%) and the trunk (8.3%).

Table 1: Area affected

SITE	NUMBER OF PATIENTS	PERCENTAGE
LOWER LIMB	32	53.3
PERINEUM	18	30
TRUNK	5	8.3
UPPER LIMB	4	6.7
ANTERIOR ABDOMINAL WALL	1	1.7
TOTAL	60	100

Regarding the clinical presentation the commonest symptom being pain and was present in about 95% cases. Fever and discharge was seen in 61.7% and 58.3% respectively. Presence of swelling was found in about 45%. Blisters were seen in about 18.3%. Edema and ulcer were the most common clinical signs and were seen in about 85% and 76.7% cases respectively.

In this study we noticed there was delay in presentation of patients to healthcare setup in most cases. Only 55% of patients presented to us within 1 week of clinical symptoms. 31.7% in 2nd week and 8% in >2 weeks group. The mean duration of presentation was 10.08±10.09 days.

We noticed in our study that the commonest cause for developing necrotizing fasciitis is trauma which is found in 30% cases. In about 6.7% of cases there was no defined etiological factor for development of necrotizing fasciitis. Diabetes mellitus (38.3%) was the most common co-morbid condition among these patients followed by hypertension (30%).

On analyzing laboratory parameters we found that 30% were anemic, 23.3% had elevated blood sugar levels, 23.3% had elevated serum creatinine value and 15% had hyponatremia(<128meq/l).

The culture study was polymicrobial in 79.9% and mono microbial in 13.3%. Negative culture was found in about 6.6% of patients. Aerobic organisms constituted 86.7 % and anaerobic organisms 13.3% of culture positive study. The most common organism cultured in our study was Escherichia coli in about 46.6%. Streptococcus is the next common species being found in 41.6% followed by klebsiella (36.6%).

TABLE 1: ISOLATED ORGANISMS

ORGANISMS	NUMBER	PERCENTAGE
E coli	28	46.6
Streptococcus	25	41.6
Klebsiella	22	36.6
Pseudomonas	16	26.6
Staphylococcus	10	16.6
Enterococcus	8	11.6
Proteus	8	11.6

Bacteroides	4	6.6
Acinetobacter	3	5

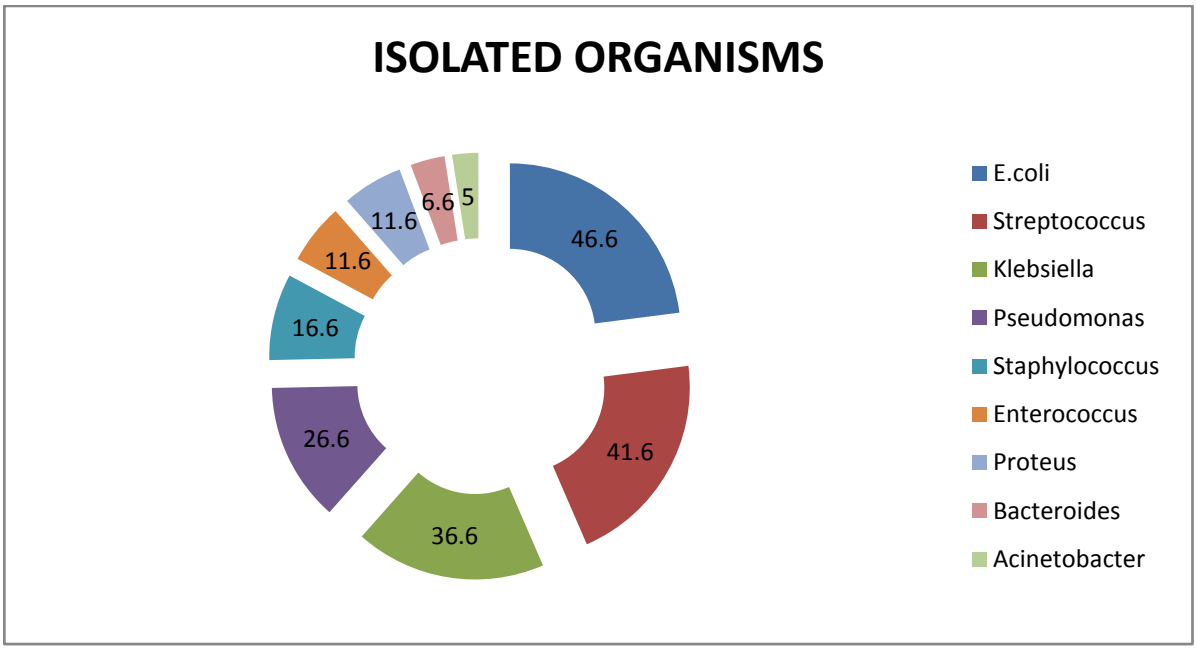


TABLE 4 NUMBERS OF MICROBES ISOLATED

Number of microbes isolated	Number of cases	Percentage of cases
Nil	4	6.6
One	8	13.3
Two	35	58.3
Three	8	13.3
Four	5	8.3

All the patients initially received broad spectrum antibiotic of third generation cephalosporin with aminoglycoside and metronidazole. In about 95% patients we performed wound debridement further 5% had undergone fasciotomy. Secondary suturing was done in about 28.3% of patients. Average duration of hospital stay was about 25 days. The mortality in our study was 21.7%.

IV. Discussion

Necrotizing fasciitis was common among males and its incidence increases in elderly age with the peak noted in the age group above 60 yrs. On the contrary in women its incidence was evenly distributed. 80% of the cases occurred in males. Muqim R et al, in his observational descriptive study also observed male predominance similar to present study.[9] Khamnuan et al, in their study in 2015 also observed a slight male predominance with male female ratio of 1.29:1[10]. According to Wipf et al [11], the single most important determinant of survival is the amount of time elapsed between initial presentation and surgical debridement. In this study we noticed there was delay in presentation of patients to healthcare setup in most cases. According to Paty R et al [12] in case of fournier's gangrene, a 24 hour delay in radical debridement increases the mortality rate by 11.5%; a 6 day delay is associated with a mortality rate of 76% The higher incidence in elderly might be due to higher occurrence of the risk factors in the older age group. Proneness to trauma, nature of the work and alcoholism among male population predisposes them to develop necrotizing fasciitis. Minor injuries are common in workplaces that require physical labor. Lack of proper safety precautions and bad hygiene in the work place also forms a perfect combination for the origin of infection. The incidence was highest among agricultural laborers. By improving the hygiene and safety at working environment through proper training the incidence of necrotizing fasciitis can be brought down.

Majority of the cases of necrotizing fasciitis follow minor injury and poor wound care following that. The incidence was highest following the trauma. The foreign body that might get lodged or the deep inoculation that occurs with trauma, thorn prick and other cause forms a perfect incubator for the organisms to flourish. This was complemented by lowered host defense due to alcoholism and diabetes leads to fulminant local infection leading to necrotizing fasciitis.

Lower limb is the most common site for necrotizing fasciitis followed by perineum and upper limb. The least common site for necrotizing fasciitis is the anterior abdominal wall. Similar studies conducted in other parts of the world show the perineum is the most common site of necrotizing fasciitis. This difference might due to difference in work pattern, higher safety precautions in the west and difference in the hygiene among the population. Most of the patients presented with pain, swelling and discharge of the affected area associated with high grade fever. Edema is the most common sign followed by ulcer. Agricultural laborers has highest incidence of necrotizing fasciitis probably due to repeated minor trauma during their work which often goes unnoticed and later presented with rapid spread of infection. We observed trauma is the most common etiology in this study. Poor host defense due to severe systemic illness like diabetes could be the reason in 20 to 40 percent of cases.

Infection with polymicrobial organisms was found in 62% of cases among these E.coli (35%) was most commonly isolated. Most common antibiotic sensitive to organisms was Ceftriaxone followed by Aminoglycosides. Surgical debridement was done in 95% of patients. Primary suturing, secondary suturing and SSG were carried out in the reminder.

V. Conclusion

Necrotizing fasciitis is the disease of elderly males and often polymicrobial. The source is identifiable in most of them and diabetes is the most common comorbid factor. Early recognition of the condition followed by aggressive surgical management along with broad spectrum antibiotics may reduce mortality and morbidity. New modalities of treatment like HBOT and VAC may be considered in appropriate cases. Though the diagnosis of necrotizing fasciitis is mainly on clinical features diagnostic adjuvant such as LRINEC[13] scoring system and FGSI can be used for early diagnosis and predicting the severity. Multidisciplinary team approach is required for better outcome in necrotizing fasciitis

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Dr B Jayalakshmi Ms, et.al. "A Clinico Pathological Study and Management of Necrotizing Fasciitis." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(1), 2020, pp. 39-43.