Prevalence and Mortality Rate of Necrotizing Fasciitis, 5 Years' Experience in a Single Center

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Background: Necrotizing fasciitis (NF) is a life-threatening and rapidly progressing soft-tissue infection. It is characterized by fulminant tissue destruction, systemic signs of toxicity and high mortality. NF is a diagnostic dilemma, with a majority of the cases initially misdiagnosed. Hence, these patients can rapidly deteriorate with the delay in timely interventions and surgical debridement. It was noticed that number of NF cases has been increasing in the kingdom of Bahrain, particularly in Salmaniya Medical Complex (SMC), despite that NF is a rare disease. Our aim in this case series is to describe the prevalence and determine the mortality rate of NF in our center SMC, in Bahrain.

Methods: A retrospective review of electronic medical records and medical files of patients with the main diagnosis of NF presented to Salmaniya Medical Complex, from 2015 to 2019 was performed. Data was collected in standardized forms and used for analysis. Patients' demographics, length of in hospital stay, and clinical course and outcome were reviewed.

Results: A total of 90 cases with the main diagnosis of NF were reviewed. The median age was 51 (range 25 - 78) years old; 80% male and 20% female. Patient nationalities showed 57.7% of patients were Bahrainis and 42.2% of Other nationalities. Majority of the patients were admitted in the Surgical department, a total of 84 patients. Sixty-three (70%) patients had pre-existing comorbidities, with 33 (52.3%) of them having more than one existing comorbidity. 53 patients (84.1%) had diabetes mellitus. Polymicrobial infection was more common in 39 (43.3%) patients, with either Staphylococcus spp or Streptococcus spp (Groups A, B, C) being the main causative organisms. Six (6.6%) patients had sterile intraoperative tissue, pus and wound cultures; while fifteen (16.6%) patients had missing culture results. The median length of in hospital stay for this study population was 21 days (range 2-89 days). Seventy-five (83.3%) patients were admitted to the general ward, and fifteen (16.6%) patients were admitted or shifted to the high-dependency unit and intensive care unit. The case fatality rate in this case series was 12.2%, and their median age is 56 (range 29-75).

Conclusion: This case series has showed that NF incidence has increased, especially in 2019, but its mortality has reached zero comparing to the previous 4 years (12.2%). The above results indicates that SMC standards in diagnosis and treatment are on good standards.

INTRODUCTION

Necrotizing fasciitis (NF) is a life-threatening and rapidly progressing soft-tissue infection.[1] It usually involves fascia and subcutaneous tissue leading to necrosis. NF is characterized by fulminant tissue destruction, systemic signs of toxicity and high mortality[2]. It can be monobacterial, polymicrobial or fungal[3], with a reported mortality ranging from 25% to 73%[4].

There are various predisposing factors such as advanced age, diabetes mellitus, peripheral vascular disease, chronic renal failure, trauma, IV drug abuse, and immunosuppression[5], and less than 10% of patients had more than one etiological factor[6].

NF is a diagnostic dilemma, with a majority of the cases initially misdiagnosed[7].With the delay in timely interventions and surgical debridement, these patients can rapidly deteriorate, leading to increased length of stay in hospital, need for ICU admission, morbidity and mortality[8].

In the past 5 years, we have noticed that number of NF cases has been increasing in the kingdom of Bahrain, particularly in Salmaniya Medical Complex (SMC), despite that NF is a rare disease.

The present study aims to describe the prevalence and determine the mortality rate of NF in our center SMC, in Bahrain.

METHODS

Study population and design: A retrospective descriptive study was carried out. All cases were admitted in Salmaniya Medical complex, in different departments, including Department of Surgery and its subspecialties (General, Plastic, and Vascular Surgery), Department of ENT, Dermatology, Orthopedics, Nephrology, and Gastroenterology, from 2015 to 2019. The present study included all the patients with admitting diagnosis of NF, patients for which the operative notes and or histopathological findings indicate NF. Exclusion criteria included patients without confirmed diagnosis by operative findings and or histopathological findings of NF (2 patients). After identifying patients who fulfilled the criteria, their electronic (I-Seha) and medical file records were accessed for data collection and tabulated in a standardized form. Data included age, gender, nationality, comorbidities, risk factors, causative microbiological organisms by pus and tissue culture results, on-admission vital signs (temperature, blood pressure and heart rate),

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on admission laboratory parameters, length of hospital stay, intensive care unit admission, radiological imaging and in hospital mortality.

RESULTS

Characteristics of the study population: During the 5-year study period, a total of 90 records were reviewed. The population studied had the following characteristics (see Table 1): median age is 51 (range 25-78) years old; 80% male and 20% female. Patient nationalities showed 57.7% of patients were Bahrainis and 42.2% of Other nationalities.

Table 1: Characteristics of study population

Age	25-68 years (median 51)
Gender	
Male (%)	72 (80)
Female (%)	18 (20)
Nationality	
Bahraini (%)	52 (57.7)
Other Nationalities (%)	38 (42.2)
Patient Status	
Alive (%)	79 (87.7)
Dead (%)	11 (12.2)
Intensive care unit admission	
Yes (%)	15 (16.6)
No (%)	75 (83.3)
Medically free	
Yes (%)	27 (30)
No (%)	63 (70)

Majority of the patients were admitted in the Surgical department, a total of 84 patients. 70 patients were admitted under General Surgery care, 7 patients under Plastic Surgery and 7 patients under Vascular Surgery. While the rest 6 patients were admitted in other specialties and seen by the surgical team as consultations; 1 in Dermatology, 2 in ENT, 1 in Nephrology, 1 in Orthopedics, and 1 in Gastroenterology.

Pre-existing comorbidities: Sixty-three (70%) patients had pre-existing comorbidities, with 33 (52.3%) of them having more than one existing comorbidity. 53 patients (84.1%) had diabetes mellitus, which is known to be the most frequent co-morbidity in patients with NF[9] and associated with increased mortality[10]. The prevalence of other comorbidities among patients with NF is presented in (Table 2).

Table 2: Pre-existing comorbidities

Comorbidities	Number of patients (%)
Diabetes mellitus (DM)	53 (84.1%)
Hypertension (HTN)	26 (41.2%)
Hepatitis	10 (15.8%)
Dyslipidemia	9 (14.2%)
Intravenous drug abuse	7 (11.1%)
Ischemic heart disease (IHD)	4 (6.3%)
Malignancy [a]	4 (6.3%)
End stage renal disease (ESRD)	3 (4.7%)
Neurologic disorders [b]	2 (3.1%)
Hypothyroidism	2 (3.1%)
Cardiomyopathy	1 (1.5%)
Sickle cell disease	1 (1.5%)
BPH [c]	1 (1.5%)
Psoriasis	1 (1.5%)
ITP [d]	1 (1.5%)

[a] includes Colon cancer[2], Brain cancer and Chronic Lymphocytic Leukemia, [b] includes cerebral palsy and epilepsy. [c] Benign Prostatic Hyperplasia. [d] Immune Thrombocytopenic Purpura.

Microbiology: Polymicrobial infection was more common in 39 (43.3%) patients, with either Staphyloccocus spp (Aureus 20, MRSA 3, Epidermidis 3, Hominis 1) or Streptococcus spp (Groups A, B, C) being the main causative organism. Other microbes isolated from blood, pus and tissue cultures included Pseudomonas aeruginosa, Klebsiella spp, Escherichia Coli, Acinetobacter Baumini, Enterococcus spp, Enterobacter spp, Citrobacter, Proteus mirabilis, Candida, bacteroides, Salmonhella GD and others (see Table 3). Six (6.6%) patients had sterile intraoperative tissue, pus and wound cultures; while fifteen (16.6%) patients had missing culture results.

Table 3: Microorganisms involved in the study population

Positive Wound culture	24
Positive Tissue and Pus culture	63
Polymicrobial infection	39
Monomicrobial infection	28
Gram positive	27
- Staphylococcus	14
- Streptococcus	6
- Enterococcus	1
- Anaerococcus	1
- Peptostreptococcus	2
- Not specified	
Gram negative	14
- Pseudomonas aeruginosa	14
- Klebsiella pneumoniae	6
- E.Coli	4
- Acinetobacter baumannii	4
- Enterobacter	3
- Citrobacter	2
- Proteus mirabilis	1
- Bacteroides	1
- Salmonella GD	1
- Stenotrophomonas maltophilia	1
- Not specified	1
Sterile culture	6
Missing culture results	15

Clinical course: The median length of in hospital stay for this study population was 21 days (range 2-89 days), two of the patients had left the hospital against medical advice. Seventy-five (83.3%) patients were admitted to the general ward, and fifteen (16.6%) patients were admitted or shifted to the high-dependency unit and intensive care unit. Among the later, eight patients were reported dead, four of them succumbed due to overwhelming sepsis. The case fatality rate in this case series was 12.2%, and their median age is 56 (range 29-75).

The chart below (Figure. 1), shows the total number of patients and deaths each year.
which reflects the early establishment of diagnosis and delivering the necessary treatment timely.

Increased incidence: The incidence of NF cases seemed to be fluctuating in our case series during the 5 years, yet it peaked in 2019. On the other hand, there was no deaths reported in the same year (Figure 1). This could be an actual increased incidence due to chronic comorbidities, especially diabetes mellitus (84.1%) hypertension (41.2%) and hepatitis (15.8%), increasingly being present in the population. Changes in virulence and infectivity of infecting microbes, increased clinician awareness of the specific clinical condition, and over-diagnosis of less severe skin and soft tissue infections as NF, the

use of radiological investigations such as X-rays and CT scans are other contributing factors. This finding was in line with those by Kaul et al[11] and Das et al[12].

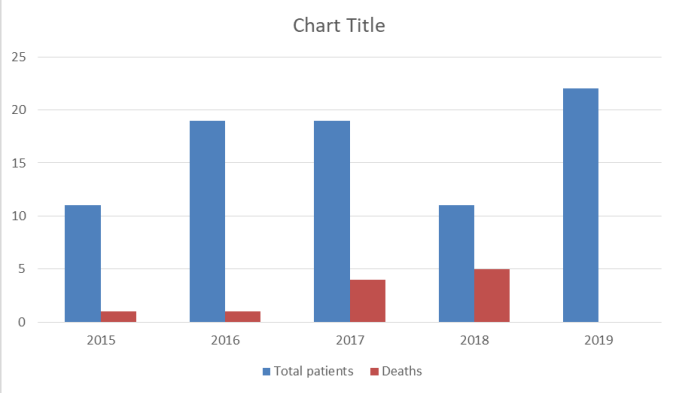

Figure 1: The number of NF cases and deaths from 2015-2019

CONCLUSION

This case series has showed that NF incidence has increased, especially in 2019, but its mortality has reached zero comparing to the previous 4 years (12.2%). The above results indicates that SMC standards in diagnosis and treatment are on good standards.

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