

## PREVALENCE OF NECROTIZING FASCIITIS DURING RAMADAN AND HAJJ 1427-H

Abdul Rashid Surahio, Ashar Ahmad Khan, Main Usman Farooq, Iffat Fatima\*,  
Muhammad Zeeshan Azhar

Department of General Surgery, \*Department of Obstetrics and Gynaecology, Al-Noor Specialist Hospital, Makkah, Kingdom of Saudi Arabia

**Background:** Necrotizing Fasciitis is a rare progressive disease which results in significant rate of mortality and morbidity if there is any delay in diagnosis and treatment. Objectives of this Prospective observational study were to share our experience of dealing necrotizing fasciitis in terms of different presentations, diagnosis, treatment and outcome during Ramadan and Hajj. It was conducted in the Department of General Surgery, Al-Noor Specialist Hospital, Holly Makkah, KSA during Ramadan and Hajj period from 1-8-1427 to 30-1-1428. **Methods:** Total 35 patients >12 years of age, irrespective of the gender belonging to different nationalities admitted to Al-Noor specialist hospital, Makkah, KSA were included in this study to evaluate the different causative factors, presentations, response to medical/ surgical treatment and outcome. **Results:** Total 35 patients with male to female ratio of 6:1 were admitted during Ramadan and hajj period from 1-8-1427 to 30-1-1428 (six months) with the features of necrotizing Fasciitis. Out of these 35 patients, 23 (65.7%) were hajji and 12 (34.28%) were residents (Both Saudi and non Saudi) with a ratio of 2:1. Major co-morbid factors were old age, diabetes mellitus, hypertension and renal failure. Among systemic manifestations, 4 (11.42%) developed septic shock and admitted to ICU, 4 (11.42%) needed ventilator support for respiratory failure, and 5 (14.28%) patients developed Myocardial infarction. After resuscitation, 33 patients under went aggressive surgical debridement and two patients died before surgery. Microbiology revealed, 15 (42.85%) Streptococcus Group-A infection, 13 (8.51%) Polymicrobial and 4 (11.42%) MRSA. Diagnosis was conformed by histopathology. Mortality rate was 11.5%. **Conclusion:** Better outcome in necrotizing fasciitis depends upon early presentation, prompt diagnosis and aggressive surgical debridement. There was strong correlation between severity of necrotizing fasciitis and co morbid factors, general condition at presentation, systemic toxicity and raised WBC count.

**Keywords:** Necrotizing fasciitis, Septic shock, Bullae, Blister

### INTRODUCTION

Necrotizing Fasciitis is a rare, rapidly progressing infection affecting the superficial fascia and subcutaneous tissue, accompanied by severe systemic toxicity and multiorgan failure.<sup>1,2</sup> In the management of necrotizing fasciitis, early diagnosis is always a challenge for surgeons because of vague presentation, lack of clear boundaries and palpable limits between viable, nonviable and infected tissue. There is layer of necrotic tissue which is not walled off by an inflammatory reaction. Overlying skin has a relatively normal appearance in early stages of infection and visible degree of involvement is substantially less than actual pathology.<sup>3</sup> Despite the much clinical experience, management of this disease remains suboptimal with mortality rates of approximately 30%.<sup>4,5</sup>

Most common organism involved is Group-A beta haemolytic streptococcus.<sup>1</sup> Polymicrobial infection tends to be more common findings in necrotizing infection than single organism. Other organisms include Enterococci, Staphylococci, Staphaureus, Clostridium species, Escherichia coli, Enterobacteria and Pseudomonas. Recently bacteriology reports indicate an increasing incidence of infection caused by Methicillin resistant Staphaureus (MRSA).<sup>6</sup>

The predisposing factors for necrotizing fasciitis include Diabetes mellitus, malnutrition, obesity, chronic alcoholism, peripheral vascular disease, chronic lymphocytic leukaemia, steroid use, chronic renal failure, cirrhosis and autoimmune deficiency syndrome.

Different classifications for necrotizing soft tissue infection have been reported. These are based on anatomical sites, causative pathogens and tissue planes affected and extent of invasions. According to the site, different names given such as a Fournier's gangrene<sup>7</sup> when involving the perineum and genitalia, described by Fournier in 1883 and Meleney's gangrene when involving the abdominal wall described by Meleney<sup>8</sup> in 1924. Classification according to the causative pathogens, necrotizing fasciitis can be due to single organism or multiple organisms (Synergistic gangrene). According to the tissue planes, if only skin and subcutaneous tissue involved, called necrotizing fasciitis but if muscles also involved then called necrotizing myositis.

Common presentations of necrotizing fasciitis include cellulitis with ecchymosis, bullae, palpable Crepitation, failure to response to conservative non-operative treatment and septic shock. There is no definite diagnostic test but it can be dealt with high

index of suspicion, extensive debridement, broad spectrum antibiotics and intensive monitoring.<sup>8,9,10</sup> In recent years, the use of adjunctive treatment such as intravenous human immunoglobulin<sup>11</sup> and hyperbaric oxygen<sup>12</sup> has also been investigated.

This is a prospective observational study done during the Ramadan and Hajj period in patients with different nationalities to evaluate the different causative factors, presentations, response to medical/surgical treatment and outcome.

## MATERIAL AND METHODS

This is a prospective observational case series study done at general surgery department in Al-Noor specialist hospital, Holly Makkah, KSA during the Ramadan and Hajj period from 1-8-1427 H to 30-1-1428 H. AL-Noor specialist hospital is a tertiary care centre and only referral hospital in Makkah region. Al-Noor hospital is unique for dealing a variety of patients belonging to different nationalities, races and socioeconomic status.

Total 35 patients above the age of 12 years irrespective of the gender were included. Patients with the signs and symptoms of inflammation, discharge, trauma, bullae or palpable Crepitation over the skin and soft tissue with or without septic shock were admitted through emergency department. After the admission, investigations like complete blood count, chemistry, coagulation profile, arterial blood gases, chest X-ray and soft tissue X-Ray were done. In few cases, Doppler ultrasound or computed tomography done to confirm the diagnosis. Empirically broad spectrum antibiotics started and most of the patients underwent surgery. During surgery, wound swabs were sent for culture and sensitivity and tissue specimen for histopathology. Diagnosis was confirmed by histopathology. After surgery, daily dressing was done and antibiotics changed according to culture and sensitivity report. In some patients, multiple debridements were done and later on skin grafting was done by the plastic surgeon to cover the raw area. All the information was collected on a preformed Performa.

## RESULTS

Total 35 patients were admitted during Ramadan and hajj period from 1-8-1427 H to 30-1-1428 H (six months) with the features of necrotizing Fasciitis. Out of these 35 patients, 30 (85.5%) were male and 5 (14.3%) female with a ratio of 6:1. Out of these 35 patients, 23 (65.7%) were hajji and 12 (34.28%) were residents (Both Saudi and non-Saudi) with a ratio of 2:1. In our study, patients from different nationalities were included. Maximum number of patients (17.14%) belonged to India, followed by 11.4% from Indonesia and 8.6% each from Burma, Pakistan, Egypt and Nigeria. Patients with other nationalities

include 5.7% from Sudan, Filipino, Yemen, Bangladesh and Saudi Arabia each while 2.85% belonged to Malaysia and Kyrgyzstan.

**Table-1: Major findings in Study (n=35)**

	Number	Percentage
<b>A)-Pre-existing Co-morbid Factors</b>		
Diabetes mellitus	28	80.0
Hypertension	16	46.0
Ischemic heart disease	9	26.0
Renal failure	14	40.0
Failure of treatment	11	31.0
<b>B)- Site of Infection</b>		
Upper limb	5	14.28
Lower limb	24	68.57
Abdominal wall	2	5.7
Perineum	3	8.5
<b>C)- Symptoms</b>		
Redness	31	89.0
Discharge	12	34.0
Swelling	27	77.0
Fever	16	46.0
H/O Trauma	17	49.0
Previous surgery	4	11.0
Limb Ischemia	2	6.0
<b>D)-Body Temperature</b>		
<5 °C	2	5.75
36 °C	5	14.28
37 °C	7	20.0
38 °C	17	48.57
<39 °C	4	11.42
<b>E)-Systemic Examination</b>		
Conscious	8	22.85
Confused	4	11.42
Unconscious	4	11.42
Septic shock	7	20.0
Palpable regional lymph node	3	8.57
Impaired CVS	5	14.28
Impaired Respiratory Function	4	11.42
<b>F) Local Signs</b>		
Change of Skin colour	33	94.0
Discharge	13	37.0
Swollen local region	35	100
Bullae	30	86.0
Raised local temperature	32	91.0
Tenderness	26	75
Loss of sensation	11	31.0
Palpable Crepitation	2	6.0
Chronic ischemia	2	6.0
<b>G)-Lab Investigations</b>		
<b>Haemoglobin:</b>		
>12 gm%	21	60.0
8-12 gm%	12	34.28
<8 gm%	2	5.7
<b>WBC:</b>		
>30	9	25.71
25-30	8	22.85
20-24	10	28.5
15-19	6	17.14
<15	2	5.7
<b>Blood Urea:</b>		
<50	12	34.2
50-100	9	25.71
100-150	8	22.82
>150	6	17.1
<b>Creatinine:</b>		
<1	13	37.14
1-2	8	22.82
2-3	8	22.82
>3	6	17.1
<b>Bilirubin:</b>		
<1	18	51.42
1-2	6	17.14
2-3	7	20.0
>3	4	11.42

On presentation, 11 (31.42%) patients had pulse rate below 100/m, 17 (48.57%) between 100–120/m and 7 (20%) above 120/m. Regarding systolic blood pressure, 16 (45.71%) patients had above 140 mm Hg, 7 (20%) between 120–140 mm of Hg, 5 (14.28%) between 100–120 mm of Hg and 7 (20%) below 100 mm of Hg. On presentation, 65% patients showed abnormal temperature, 5.7% hypothermia and 60% hyperthermia. Major findings of the study shown in Table-1.

After admission, resuscitation was started with intravenous fluid and antibiotics. All patients under went early surgical debridement. Some patients presented late (3–5 days). Average time between admission and debridement was 14:40 hours. Two patients died before surgical debridement. In 5 patients (14.28%) who had ischemic heart disease surgery was delayed for 24 hours while 4 patients (11.42%) came with septic shock admitted to ICU and provided with inotropic support. During hospital stay, 5 (14.28%) patients developed respiratory failure and required ventilator support.

Most common antibiotic used was Injection Piparcillin + Tazobactam. While other less commonly used antibiotics were Meropenam, cephalosporin and Metronidazole. Commonest organism (42.85%) was Streptococcus Group-A (Table-2).

Two patients (6%) under went below knee amputation and in 19 patients (54.28%), split skin grafting was done to cover the wound while in other wounds were healed by secondary intention.

**Table-2: Microbiology results (n=35)**

Micro organisms	Number	Percentage
Streptococcus group A	15	42.85
MRSA	4	11.42
E coli	5	14.21
Pseudomonas aeruginosa	3	8.51
staph; Aurous	3	8.51
Acinitobactor	2	5.7
Multiple organisms	3	8.51

## DISCUSSION

Necrotizing soft tissue infections continue to be a challenge for practicing surgeons. Necrotizing fasciitis has been under diagnosed in the past but is now gradually gaining recognition.<sup>13</sup> In our study male to female ratio was 6:1 while it was 2:1 reported by Peer *et al* from India.<sup>14</sup> Mean age group mentioned by Peer *et al* from India was 52.7 years, 46 years by Hefny AF from UAE<sup>15</sup> and was 61 years in our study. In our study 11 patients were above the age of 70 years. All previous studies were done on people of certain geographical area but in our study patients were included from all over the world with different racial back grounds that came to Makkah to perform *Umrah or Hajj*.

Infection was most common (68.75%) in lower limbs followed by upper limbs (14.2%). Same trend was seen in other studies like 68% in lower limbs and 18.4% in perineum reported by Peer<sup>14</sup> and 69.7% in lower limbs and 10% in upper limbs reported by Wong *et al*<sup>16</sup> In Brook and Frazier study, lower limbs involvement was 16.9%.<sup>17</sup> Usually most of the patients present with infection of only one part of the body but in our study 3 patients present with involvement of more than one body part. It was comparable with two patients reported by Yi-Jia Lim<sup>18</sup> who have the necrotizing fasciitis involving contra lateral upper and lower limbs.

Among the pre existing co morbid factors in our study, old age (100%) and diabetes mellitus (80%) were on the top and in 46% patients, more than one co morbid factors were present. Extreme obesity and diabetes mellitus were the most common co morbid factors reported by Huljev D<sup>10</sup>, diabetes mellitus ( 64%) reported by Hefny AF<sup>15</sup> and diabetes mellitus (47.3%) and hypertension (21%) reported by Peer *et al*.<sup>14</sup>

Most common presentations in our study were redness (89%) and swelling (77%) of some part of the body followed by fever (46%) and discharging wound ((34%). History of minor trauma was given by 49% patients. Among the rare causes of abdominal wall necrotizing fasciitis, Conor D Marron reported carcinoma caecum<sup>19</sup> and Khan *et al*<sup>20</sup> reoprted empyema gall bladder leading to entero-cutaneous fistula. Shirley Yuk<sup>21</sup> reported rectal carcinoma as a cause of multi limb necrotizing fasciitis. Mode of presentation reported by Peer *et al* was pain and swelling in 68.4%, discharging wound in 23.6% and fever in 8% patients. According to Wong CH<sup>16</sup> necrotizing fasciitis can occur in about 50% cases with out known preceding event.

In our study, 11.2% patients were either confused or unconscious, 42.82% patients presented with pulse rate more than 110/m and 20% with systolic blood pressure less than 100 mm of Hg. Sixty five percent patients presented with abnormal body temperature, 11.2% above 39 °C, 48.57% between 38 °C and 39 °C and 5.7% less than 35 °C. In 20% patients, there was septic shock. On local examination, more than 90% patient revealed redness raised local temperature and swollen local region. In 86% patients there were local bullae and palpable crepitation in only 6% patients. Peer *et al* in his study reported tachycardia in 34.2%, hypotension in 15.7%, shock in 5.2%, local bullae and blister in 47.3% and palpable crepitation in 18.4%<sup>14</sup>.

In our study, investigations revealed 20% patients with haemoglobin less than 8 gm/dl. About 50% patients had white cell count more than 24% and 25.71% had more than 30%. Forty percent patients had urea >100 mg%, creatinine >2 mg% and bilirubin

>2 mg%. There was a strong correlation between severity of necrotizing fasciitis and raised white cell count and impaired renal parameters and liver function test.

After admission, 33 out of 35 patients under went aggressive surgical debridement while two patients died before debridement. Average time between admission and debridement was 14 hours (2–48 hours). In 5 (14.28%) patients, who presented with ischemic heart disease surgery was post pond for more than 24 hours. Peer *et al*<sup>14</sup> reported in his study, average time between admission and surgery 46.75 hours (1.5 hour–8 days) and one patient expired before surgery. In our study 4 (11.42%) patients admitted to ICU on presentation due to septic shock for inotropic support and another 5 (14.28%) patients shifted to ICU during hospital stay due to respiratory failure for ventilator support. According to Peer *et al*, 4 (10.5%) patients required inotropic support, 3 (7.8%) required both inotropic and Ventilatory support and 1 (2.6%) required inotropic support, artificial ventilation and hem dialysis. Out of 33 patients who under went surgery, 2 (6%) under went below knee amputation, 11 (33%) required two debridement and 4 (12.12%) required more than two debridement and in 19 (57.5%) patients wound cover was done by split skin graft. In a study of Peer *et al*<sup>14</sup>, 2 (6.6%) patients under went below knee amputation and 1 (3.3%) above knee amputation, 19 (63.4%) patients under went split skin graft and 2 (6.6%) patients were treated by secondary suturing. Mortality rate in our study was 11.4% which was 21% reported by Peer *et al*<sup>14</sup>, 18% reported by Hefny *et al*<sup>15</sup>.

Necrotizing fasciitis may be caused by caused by monomicrobial or polymicrobial infection. In our study monomicrobial infection was more common (91%) as compared to the polymicrobial which is opposite to other international studies.<sup>20</sup> Streptococcus was the most common (42.85%) organism found in our study which was similar as mentioned by Peer<sup>14</sup> and Hefny<sup>15</sup>. Increasing infection rate by MRSA (11.42%) was found in our study. Many other organisms were found to be responsible for necrotizing fasciitis and among the rare causes Chryseobacterium meningosepticum repoted by Ching-Chi<sup>22</sup> and Shewanella putrefaction by Tsung-Hung<sup>23</sup>.

Necrotizing fasciitis is well known to be difficult to diagnose, as the early signs of more than 90% patients in our study were redness, hotness and swollen local region can easily be mistaken as cellulitis.<sup>24</sup> According to Wong *et al*<sup>16</sup>, only 14.89% of 89 cases had initial diagnosis of necrotizing fasciitis. Common early diagnoses were cellulitis (58.4%) and abscess (18%). Rate of misdiagnosis in

early stage was 64% reported by Henfy<sup>15</sup> and 60% reported by Kihiczak<sup>25</sup>.

In our study strong correlation was found between severity of necrotizing fasciitis (with outcome) and presentation of the patient (Age, nutritional status, Diabetic control, other co morbid factors and delay in presentation), presence of abnormal body temperature, altered sensorial, septic shock, body surface area involved in necrotizing fasciitis, white cell count >25 mg% and evidence of disturb organs functions (Renal, liver, cardiovascular or respiratory functions). On these grounds, we suggest that necrotizing fasciitis can only be diagnosed on high degree of suspicion in patients with minimal local signs but if the patients have multiple co morbid factors, systemic toxicity and very high WBC (>25 mg%) which can not be explained by other ways.

We are looking forward to conduct another study of larger duration and larger number of patients with necrotizing fasciitis on pilgrims coming to Makkah and then we will be able to suggest a diagnostic criterion for necrotizing fasciitis.

## CONCLUSION

Successful treatment of necrotizing fasciitis depends upon early diagnosis and aggressive surgical debridement. Misdiagnosis is very common and high degree of clinical suspicion is required for early diagnosis. There is no specific diagnostic test. Many times diagnosis made on preoperative findings and confirmed by histopathology and by this time it is already very late. It should be suspected in cases where local examination showed swollen area, bullae, crepitation and foul smelly discharge or in cases with suboptimal local findings but presence of co morbid factors, systemic toxicity and very high white cell count (>25 mg%) not explaining the simple cellulites.

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**Address for Correspondence:**

**Dr. Abdul Rashid Surahio**, R-39, Evacuee Society, B-10A, Gulshan-E-Iqbal, Karachi. Cell: +92-302-2631889.

**Email:** a\_surahio@yahoo.com