

## Surveying necrotizing fasciitis in a teaching hospital in Tehran, 1999-2003

Mahboobe Hagiabdolbaghi<sup>1</sup>, Hossein Faezipour<sup>2</sup>, Hamideh Bagherian<sup>1</sup>, Reza Aghamohammadi<sup>1</sup>

<sup>1</sup> Department of Infectious Diseases and Tropical Medicine, Tehran University of Medical Sciences, Iran

<sup>2</sup> Department of Orthopedic Surgery, Tehran University of Medical Sciences, Iran

### ABSTRACT

**Background:** Necrotizing fasciitis is an uncommon severe infection involving the subcutaneous soft tissue, particularly the superficial and often the deep fascia. Early diagnosis is of utmost importance since the disease progress rapidly. The present study was conducted to determine clinical, laboratory and therapeutic aspects of necrotizing fasciitis in a group of Iranian patients referred to a referral center in Tehran between 1999 and 2003.

**Materials and methods:** For this descriptive study, all patients with the diagnosis of necrotizing fasciitis referred to Imam Khomeini hospital during a 4-year period (1999-2003) were enrolled. The diagnosis of necrotizing fasciitis was verified according to the clinical, radiologic, and direct inspection of a surgeon.

**Results:** Totally, 34 patients referred during the studied period with the mean age of 43.7±28.3 years and male to female ratio of 19:15. Tachycardia (41.2%) and tachypnea (44.1%) were the most common presenting signs. Lower limb was the most frequent site of involvement (70.5%). Totally, 64 operations were performed (2.14 operation/ patient).

**Conclusion:** Necrotizing fasciitis should be ruled out in any patient presented with pain, flu-like symptoms, swelling, blisters, and necrotizing appearance skin, especially if it is associated with diabetes mellitus, injecting drug abuse or recent trauma. Prompt diagnosis, suitable antibiotic use, and extensive operation could significantly reduce mortality.

**Keywords:** *Necrotizing fasciitis, Clinical manifestations.*

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### INTRODUCTION

Necrotizing fasciitis is an uncommon severe infection involving the subcutaneous soft tissue, particularly the superficial and often the deep fascia. Despite its low prevalence (3-7/1000000), the mortality is more than 30%, and even more than 70% when associated with toxic shock syndrome (1,2).

Different pathogens have been described as the causative agents including streptococci, anaerobes, bacteroides, staphylococcal aureus, and clostridium. Meanwhile, the following factors have been proposed to increase the risk of necrotizing fasciitis: recent urogenital operation, injecting drug abuse, diabetes mellitus, cirrhosis, corticosteroid use, and peripheral vascular diseases such as arteriosclerosis, and chronic ulcers (3-7).

In injecting drug abusers, necrotizing fasciitis is associated with direct inoculation of causative pathogens such as staphylococcal aureus and

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**Reprint or Correspondence:** Mahboobe Hagiabdolbaghi, Department of Infectious Diseases and Tropical Medicine, Tehran University of Medical Sciences.

**E-mail:** hajiabdo@sina.tums.ac.ir

anaerobes or toxic effects of the injected materials (5).

The early diagnosis of necrotizing fasciitis is verified clinically according to the following signs and symptoms: pain, swelling, appearance, exudate formation, criptation, odor, muscle involvement as well as other systemic manifestations. Early and accurate diagnosis is of utmost importance since the disease progress rapidly (5). Prognosis is quite poor if remained untreated, however, injecting drug abusers have a better prognosis partly because of their younger age, limb involvement instead of trunk and perineum involvement, and the absence of underlying disease such as diabetes mellitus, renal failure, bed sore, etc (4,5).

The present study was conducted to determine clinical, laboratory and therapeutic aspects of necrotizing fasciitis in a group of Iranian patients referred to a referral center in Tehran between 1999 and 2003.

## PATIENTS and METHODS

For this descriptive study, all patients with the diagnosis of necrotizing fasciitis referred to Imam Khomeini hospital during a 4-year period (1999-2003) were enrolled. The diagnosis of necrotizing fasciitis was verified according to the clinical, radiologic, and direct inspection of a surgeon.

The following initial data were surveyed and inserted in a previously prepared data bank: sex, age, underlying disease, vital signs, clinical manifestations, laboratory and radiologic findings, the prescribed antibiotic, operations, duration between the onset of clinical symptoms and operation, admission, and probable death, and finally the outcome of the patient.

Descriptive statistical methods were used for data analysis using SPSS software (version 11.0, SPSS Inc., USA).

## RESULTS

Totally, 34 patients referred during the studied period of whom 31 had necrotizing fasciitis and 3 had Fournier gangrene. The mean age of the patients was  $43.7 \pm 28.3$  years with male to female ratio of 1.3:1. The mean age of patients with necrotizing fasciitis was  $44.6 \pm 29.4$  years. Tachycardia (41.2%) and tachypnea (44.1%) were the most common presenting signs. Nine patients (26.4%) had fever, while only one patient revealed to be hypotensive. Other signs were criptation (26.5%), shock (2.9%) and dehydration (2.9%). All patients complained of pain (100%), while 32 (94.1%) had swelling. Diabetes mellitus (32.4%) and injecting drug abuse (32.4%) were the most common underlying disorders. Other underlying disorders were: trauma (23.5%), new ulcers (23.5%), immunocompromised condition (20.6%), HIV (14.7%), fracture (11.8%), recent operation (8.8%), perianal infection (5.9%), and bed sore (2.9%).

Twenty-five patients ordered radiologic studies, among whom 17(68%) demonstrated gas in the soft tissue.

Site of involvement were as follow: lower limb (70.5%), perineum (26.4%) and chest, head and neck, trunk and upper limb (8.8%).

Of 34 patients, 28(82.4%) had leukocytosis ( $WBC > 11000/mm^3$ ), 20(58.8%) had hemoglobin of  $< 12g/dl$ , and 19(55.9%) were hyperglycemic (blood sugar  $> 124mg/dl$ ). Positive ESR and CRP were detected in 19(55.9%) and 16(47.1%) patients, respectively. Seven (20.6%) patients were hypocalcemic, 4(11.8%) had  $LDH > 500U/l$ , and one had  $CPK > 195$ .

Four patients disagreed with surgery. Totally, 64 operations were performed (2.14 operation/patient).

Cephazolin was the most frequently administered antibiotic (88.9%) followed by clindamycin (73.5%).

The mean duration between the onset of symptoms and admission, operation, and death were  $168\pm144$ ,  $240\pm48$ , and  $312\pm94$  hours, respectively. Patients underwent surgery averagely  $52.5\pm32.5$  hours after their admission.

Totally, 11 (32.4%) patients died, all of whom belonged to necrotizing fasciitis group. However, fracture, trauma, and immunocompromised conditions were the most common underlying conditions among these patients.

## DISCUSSION

Necrotizing fasciitis is a disease of the third and fourth decades of life that most commonly affected males (8). The mean age of our patients was  $43.7\pm28.3$  years with male to female ratio of 1.3:1.

Prior investigators have demonstrated diabetes mellitus and perianal infections as the most frequent underlying conditions (4,9-11). This is in agreement with ours. We have found diabetes mellitus and injecting drug abuse as the most common risk factors.

Majaski et al have reported their experience with 12 necrotizing fasciitis patients. Their mean age was 61 years, while diabetes mellitus (60%), aging (65%), obesity (44%), atherosclerosis (60%), and malnutrition (33%) were the most prevalent underlying disorders (12). Aitkan et al described streptococcal A-associated necrotizing fasciitis and gangrene to be accompanied by minor trauma, penetrating wounds and operation; however, diabetes mellitus, peripheral vascular diseases, cirrhosis and corticosteroid use were frequent predisposing factors (3). Gilad et al stated lower limb as the most common site of involvement. Their findings demonstrated that penetrating trauma, laparotomy (in case of peritonitis due to visceral injuries), operations (vasectomy, hemorrhoidectomy), perianal abscess, and intestinal perforation increased the risk of

necrotizing fasciitis (10). Ballach surveyed 359 patients suspected to have necrotizing fasciitis among whom 64% were male, 31 presented with critical symptoms including blood pressure of  $<90$ mmHg, blisters, skin necrosis, and soft tissue gas in X-ray (8).

National Necrotizing Fasciitis Foundation (NNFF) assigned clinical manifestations in 3 groups of: early (pain, flu-like symptoms, diarrhea, nausea, fever, malaise, weakness, and dehydration), advanced (swelling, skin rash, blisters filled with blackish fluid, necrotizing appearance) and critical (hypotension, toxic shock, and unconsciousness). Because the beginning symptoms look like so many other minor afflictions, none of the symptoms are exclusive to this, and until the patient is so ill that they are critical, many health care workers don't consider necrotizing fasciitis. Therefore, the only means of controlling mortality is prompt diagnosis (13).

In our study, pain, swelling, wound and necrosis were the most frequent clinical manifestations, while tachycardia and tachypnea were the most prevalent vital sign abnormality. Fever was less frequent than prior reports. This could be in part explained by further immunocompromised patients.

Totally, 11 (32.4%) patients died; however, this figure was higher among patients underwent surgery during the last 10 days (42.8%). Fracture was by far the most common accompanying condition, however, perianal infections and recent operation were less commonly observed. Stamenkovic et al demonstrated a mortality rate of 20-40% in necrotizing fasciitis and 13-22% in Fournier gangrene (15). They reported a 12% reduction in mortality in case of prompt diagnosis during the first 4 days (15).

In Majaski et al study, the mean duration between admission and the first operation was 4 hours, while patients ordered daily debridement. Despite these interventions, 38% patients died (12).

Chelson et al reported a 24-hour interval between admission and operation (14).

Prior investigators have stated that prompt diagnosis, wide-spectrum antibiotics, extensive debridement and surgery, as well as adequate nutrition could improve necrotizing fasciitis patients' condition and reduce mortality(12,13,15).

In conclusion, necrotizing fasciitis should be ruled out in any patient presented with pain, flu-like symptoms, swelling, blisters, and necrotizing appearance skin, especially if it is associated with diabetes mellitus, injecting drug abuse or recent trauma. Prompt diagnosis, suitable antibiotic use, and extensive operation could significantly reduce mortality.

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