Necrotizing Fasciitis
A prospective study of 18 cases at Al Yarmouk Teaching Hospital

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Summary:

Background: Necrotizing Fasciitis is a progressive, rapidly spreading, inflammatory infection located in the deep fascia, with secondary necrosis of the subcutaneous tissues Polymicrobial infection is the most common finding in necrotizing fasciitis rather than a single causative organism. Although diabetes mellitus is the most common predisposing risk factor, other conditions may predispose to such immune-compromisation such as cancer, alcoholism, vascular diseases, organ transplantation, HIV...etc.

Patients and Methods: Eighteen cases of Necrotizing Fasciitis were followed prospectively as inpatients in the surgical dept. in Al Yarmouk teaching hospital, and followed later on at the outpatient clinic or in the plastic surgery clinic and department. Most of them were treated with successive wound excisions. All were covered with one or more parenteral antibiotic and antimicrobial therapy. Intensive care unit services were needed on several occasions and sometimes more than once for the same patient. Mortality was the end result in three of the cases. Most of patients needed plastic surgical procedures to cover the defects yielded after wound excision. All the data estimated out of these cases were tabulated and certain incidences were estimated. The results were compared with some of the published literatures to come into conclusions or guidelines for the management of such condition.

Results: Eighteen cases of necrotizing Fasciitis were admitted to the surgical dept. of our hospital; fifteen (83.3%) males and three (16.7%) females. Age ranges 19-65 years, with mean age 45.2 years. Of these 77.8% were 30-60 years ages. In male patients 7 (38.8%) were scroto-penile region, 6 (33.3%) perianal region, 2 (11.1%) gluteal region. While in female patients 1(5.56%) for labial, perianal & gluteal regions.

Conclusion: Necrotizing Fasciitis is an uncommon condition, characterized by deep aggressive, gangrenous and necrotizing soft tissue infection. Unless it is rapidly and aggressively managed with in a well equipped surgical unit supported by an intensive care unit, it may end lethally by progressive multi-organ failure.

Keywords: Necrotizing Fasciitis, pathology, management,wound excision, plastic surgical procedures.

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Introduction:

The spectrum of Bacterial diseases of the soft tissues ranges from superficial, localized, easily recognized and easily treatable skin eruptions, to deep, aggressive, gangrenous and necrotizing infections that might be innocuous at first but quickly become life-threatening (1). Bacterial Soft Tissue Infections are classified into: Simple superficial infection e.g. folliculitis and impetigo. Fascial Level Infections e.g. Necrotizing Fasciitis. Bacterial Myonecrosis e.g. Clostridial myonecrosis (Gas Gangrene), and Non Clostridial Myonecrosis like β-heamolytic Streptococcal gangrene (2, 3, 4). So Necrotizing Fasciitis represents progressive rapidly spreading, extensive infection of the fascia deep to the necrosed subcutaneous adipose tissue (3). The incidence of soft tissues infections had been rising because of the increase in the number of immune-compromised patients. Predisposing risk factors for such immune compromisation include Diabetes Mellitus, cancer, alcoholism, vascular diseases, old age, organ transplantation, HIV and neutropenia (2, 3, and 4). Necrotizing Fasciitis may follow perineal soft tissue infections, traumatic rectal perforation, perirectal abscess, pilonidal sinuses and abscesses, periurethritis and Bartholin's cysts in females [4]. It may also follow surgical wounds, trauma, or can be totally idiopathic (2, 3, 4). Fournier's gangrene of the scrotum, Meleney's gangrene and ulcer, hospital gangrene, suprapubic fasciitis and erythema gangrenosum are among the different terms used to describe Necrotizing Fasciitis of specific location or predisposing factor (5, 6, and 7). Bacterial growths from such extensive infections can be aerobic, anaerobic or mixed. Polymicrobial synergistic infections tend to be much more common than those caused by a single organism. The synergy is usually composed of facultative aerobic, anaerobic, and microaerophilic bacteria(8, 9). Understanding the patho-physiology of Necrotizing Fasciitis as severe infection leading to thrombosis of subcutaneous arterioles with the resultant ischemia contributes to the rapid extension of infection and gangrene. This concept directs the surgeon to the major headlines of treatment consisting of parenteral antibiotic therapy, serial extensive soft tissue debridement and supportive therapy (including sometimes massive blood transfusion), followed later on by reconstructive surgery in the form of plastic surgical procedures and physiotherapy if needed (9, 10).

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Patients and Methods:

A prospective study over 6 years between July 2003 and July 2009, eighteen cases of severe necrotizing soft tissue infection were admitted and treated by the authors in the surgical dept. at Al Yarmouk teaching hospital. These patients were followed prospectively regarding their age, sex, clinical presentation, the duration of such presentation prior to admission, the steps followed for diagnosis, types of micro-organisms detected, antimicrobial therapy used, type and number of surgical procedures performed, the duration of hospitalization (whether single or multiple admissions), and the outcome of such treatment regimens. Each patient was approached first by taking detailed history, regarding the initial provoking condition (like a scrotal ulcer or a peri-anal abscess), and the new following signs and symptoms suggesting the development of Necrotizing Fasciitis like increased pain and extension of skin redness and oedema +/– sign and symptoms of toxicity (generalized ill-health, fever, loss of appetite, tachycardia, ...etc.). Past medical history was specifically enquired about to identify any predisposing factor like diabetes mellitus, or any other factor causing immune compromisation. Samples of any drained material, or debrided tissue were sent for histo-pathology and for microbial culture and sensitivity. Initial antimicrobial management was manipulated accordingly, the surgical procedures for these patients multiple sessions of wound excision under general anesthesia (or even sometimes performed in the ward when dead patches of skin and subcutaneous tissue had lost pain sensation, and could be debrided safely in the ward under aseptic conditions). 3-7 wound excisions were performed for these patients depending on; the severity of the condition, how deep it was, and the surface area involved. These sessions were followed by 1-3 skin grafting sessions (of the split-thickness type mostly, although some rotation flaps were needed) when the patient condition was optimal for such procedures. One single patient showed initial improvement on a combination of 2 antimicrobial drugs, but relapses at the end of the 4th week to present with multiple abscesses high up in the abdominal wall (initial presentation was a huge ill managed peri-anal abscess), when he was treated with 2 sessions of drainage of his abscesses and minor wound excision. Large amount of foul smelling pus and slough material were cleaned. He was discharged without the need for skin grafting. Antibiotics and antimicrobials used varied within a wide range. Among those used to start with was Penicillin G (8.1 mega unit 6 hourly), Clindamycin (600mg 6 hourly), Garamycin (8mg / kg 8 hourly), chloromphenicol (50-100mg / kg 6 hourly) and cefotaxim 2g 8 hourly). Metronidazole was added to one of the previous list of antibiotics in a dose of 500mg 8 hourly to cover anaerobic micro organisms. The patient mentioned above was treated initially with meropinem 500mg twice daily for one week with metronidazole, and he showed sound improvement but relapsed again as mentioned above. Following sound improvement, these patients were followed till definite signs of clean granulation tissue formation were noticed; this was the indication for the next step of their management in the form of plastic surgery procedures to cover defects left behind. These steps were manipulated to suit each condition according to the specific circumstances related to each patient.

Results:

Eighteen patients were diagnosed as having Necrotizing Fasciitis and were admitted by the authors to the surgical dept. at Al Yarmouk teaching hospital. They were 15 males and 3 females.

Table No. 1 Sex incidence

Sex	Number	percentage
Males	15	83.33%
Females	3	16.67%
Total	18	100%

Age of the patients ranges from 19-65 years, with a mean of 45.22 years. 14 of the cases (77.78%) were between 30 and 60 years of age.

Table No. 2 Age incidence

Age (years)	11-20	21-30	31-40	41-50	51-60	60>	total
No.	1	1	4	6	4	2	18
%	5.56%	5.56%	22.22%	33.33%	22.22%	11.11%	100%

The original lesion prior to the development of extensive Necrotizing Fasciitis was usually a perianal abscess or scrotal ulcer that was improperly managed, especially when resorting on injectable antibiotics versus surgical drainage or debridement, or less commonly when these lesions fail to respond to the standard methods of management. According to its location; it was scrotal/penile (or labial in females) in 8 of the patients, and peri anal/ perineal in 7 of the cases, while gluteal abscess was the primary lesion in 3 patients.

Table No. 3 The primary lesion

Sex	Scrotal /penile♂ (labial ♀)	Peri-anal/ perineal	Gluteal	Total
Males	7 (38.89%)	6 (33.33%)	2 (11.11%)	15 (83.33%)
Females	1 (5.56%)	1 (5.56%)	1 (5.55%)	3 (16.67%)
Total	8 (44.44%)	7 (38.89%)	3 (16.67%)	18 (100%)

Regarding risk factors 10 of the 18 patients were diabetic (55.56%), 4 male patients (22.22%) were drinkers of alcoholic beverages (but the amount was difficult to be accurately estimated). Only two patients (11.11%) were older than 60. Neutropenia was discovered during the long period of management of each of these patients in several occasions; yet it was not obvious whether it was a predisposing risk factor or a result of such severe overwhelming infection. Infection with HIV was also difficult to be estimated in the first ten patients included in this study due to non availability of the test. The last 8 patients were checked regarding such infection and it was negative. The reports of the HIV tests for the rest 2 patients could not be obtained although samples were collected and sent to the directorate of the central teaching laboratories in Baghdad. Body weight for nearly 2/3 of the patients (12 patients; 66.67%), was on the obese side, as their BMI was 30 or more.

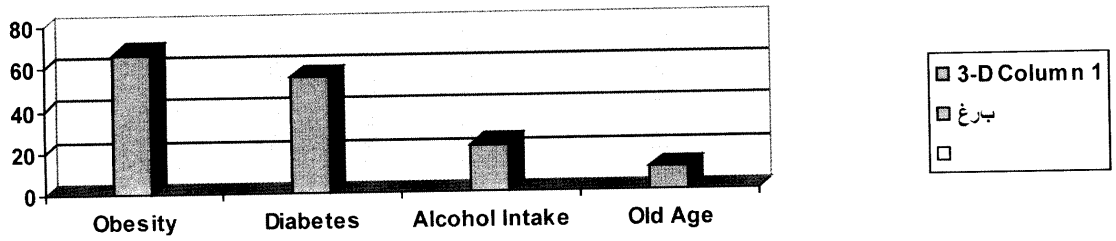

Chart No. 1 comparing predisposing risk factors

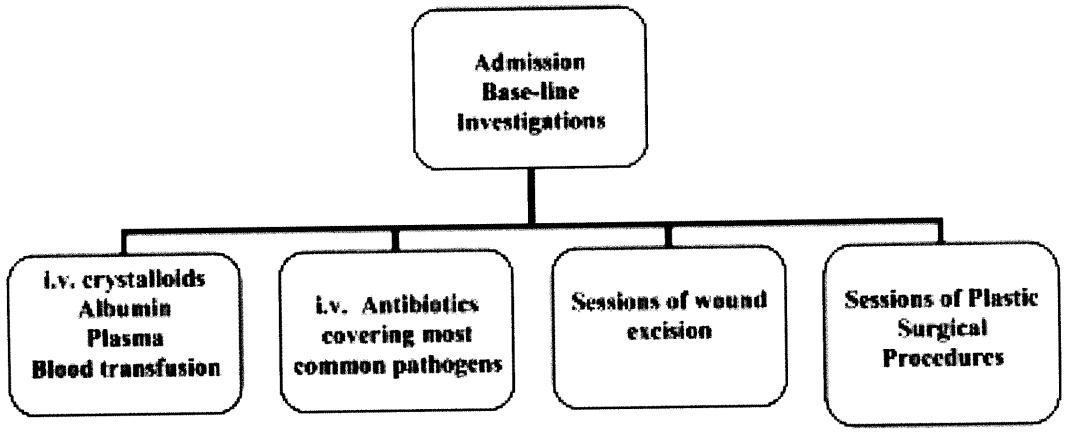

Figure No. 1 Cornerstones for management.

Period of hospitalization ranges between 28 days and 71 days (for 4 of the patients it was the sum of the periods of 2 admissions), with a mean of 51.64 days of hospitalization.

Table no. 4 Period of hospitalization:

Days of hospitalization	<30 days	31-45 days	46-60 days	61-75 days
NO. of patients	2	3	10	3

Although we had some difficulties in having early results of culture and sensitivity (as will explained in the «Discussion» sector), samples of debrided material or drained pus were sent for culture and sensitivity as soon as they were obtained and the lab was ready to receive them. The results were mostly of a mixed bacterial growth. Aerobic gram positive organisms such as hemolytic streptococci or Staphylococcus aureus were found alone or in synergism. However, other aerobic and anerobic pathogens had been grown from these sanples, including Bacteroides, Enterobacteria, Coliforms, Proteus and Pseudomonas. Bacteroides was noticed as part of a mixed flora in combination with Escherichia coli in 4 of our samples but their role in initiating Necrotizing Fasciitis was uncertain.

Table No. 5 the combination antimicrobial therapy used.

A combination of one of the following	Crystalline Penicillin	with	Metronidazole
	Ampiclox		
	Clindamycin		
	Garamycin		
	Chloromphenicol		
	Cefotaxim		
	Meropinem		

Three of the patients died during their hospitalization. Two of these patients were referred to our hospital from district

hospitals in a state of septicemia. The third patient showed initial improvement after two sessions of wound excision but relapses at the end of 2nd week of his admission. Also we have lost contact with 7 of our patients as they had discharged themselves without informing their doctors. Although an initial sample of pus (or tissue) was obtained early during the management of these patients and sent for microbial study, the results were not as helpful as they were expected to be. Most of these patients were receiving antibiotics at the time of presentation, and samples obtained late during the day or at night were either kept till next morning or were discarded and lost.

Discussion:

Regarding the small number of the patients, it was obvious to the authors that the incidence of Necrotizing Fasciitis is so small that collecting such number (18 patients only) is still valid to study such a rare condition in our community and fix some facts regarding their incidence, presentation, predisposing factors and the best tools for management and treatment.The preponderance of male gender (as 15 out of the 18 patients were males), cannot be easily explained although the difference is so significant. So can we fix male sex as being a risk factor? This question is not easy to be answered as we think that some of the female patients had escaped detection by the male authors, since most of the cases started in the genital or peri-anal area, and these two areas are embarrassing for female patients in our society and our country. Since the majority of the patients (77.78%) were between 30 and 60 years of age, so being an elderly is not an obvious risk factor, as only two patient out of the 18 were older than 60.

A focus of purulent infection was always the first event. It started in the penile/scrotal skin (or labial skin) in eight of the cases, and peri-anal or perineal in seven of them. The history mostly suggested mismanagement in the form of delayed active intervention and relying on giving injectable antibiotics as the only form for management (a third generation cephalosporin-Cefotaxime was prescribed in most of the cases).

Even when the picture suggestive of Fournier's gangrene was clear, only local antiseptics or creams were added by the GP or the local health officer(perminant doctor senior house officer) initially managing these patients, prior to their frank presentation as Necrotizing Fasciitis. This whole situation was copied when the initial event was a peri-anal or a gluteal cellulitis or abscess, but the number for each situation was less, possibly because the decision for surgical interventions was taken earlier. In a series of 39 pediatric cases the most common initiating factor in 13 of them was Varicella 11. Immune compromization was a definite factor in letting the "fire" burn the whole "bush" as we have noticed that "Diabetes" was there in 10 patients (55.56%) of them, (compared with 20-40% in one of the studies 1) with all its pathological criteria that interfere with normal tissue healing and assist infections to flourish and cause more tissue damage. Alcohol intake was also taken in account, and was noticed in only 4 male i.e. in 22.22%, (in contrast with 35% in the same study mentioned above1). They declared to us that they drank alcoholic beverages regularly. HIV infection was not well estimated, as its test was not available and even the results for some of the patients could not be obtained during the period covered by the study. The period of hospitalization was relatively long (ranging between 28-71 days), as this condition was managed step-wise i.e. the patient after each wound excision was followed closely for signs of improvement, but if any need for further wound excision re-appeared, it was done immediately and that's why the need for multiple surgical interventions and longer hospital stay. The relatively large number of wound excision procedures done (4-7 times) in 5 of the patients was because any minor procedure done in the ward to clean and debride dead tissues, even those done under local (or even without) anesthesia was counted as wound excision, although major wound excisions were only up to 3 in most of the cases. , so the result were either undependable or even lost. Samples obtained during the day in patients kept without antimicrobials for 48 hours, yielded a mixture of Gram positive and Gram negative micro-organisms with some anaerobes (and the test to detect them was not always available), and according to these results antimicrobial drug treatment was manipulated and changed towards most effective regimens.

Injectable Metronidazole was nearly always there to combat anaerobes. And high doses of penicillin-G, Ampiclox, or Chloromphincol were among the drugs used to combat Gram positive micro-organisms. A 3rd generation Cephalosporin or Garamycin were the drugs used to combat Gram negative bacteria, and Meropenim was used once and we claim good response in an obvious case of spreading fasciitis, as this patient was saved extensive wound excision as limited excision was done for him plus drainage of abdominal wall abscesses. Although we have lost three of our patients, we still claim good results in comparison with other published mortality rates associated with necrotizing fasciitis. Two of these patients were received in a late septicemic phase, and all efforts to resuscitate them by wound excision and intensive care were unsuccessful. The third patient, after initial improvement, showed rapid deterioration at the end of the 2nd week, with signs of DIC, renal and respiratory failure. All the three cases ended with Multi Organ Failure Syndrome- MOFS. This relatively low mortality rate; 3 out of 18 patients i.e. 16.67%, is biased by losing contact with 5 of our patients. Most of them had discharged themselves! Without informing their doctors. Mortality rate reported in one of the studies was 25%, and if the condition of the patient was complicated with severe sepsis and renal failure, the mortality rate will be as high as 70% (12). Hyperbaric Oxygen therapy claimed to be successfully used in treating necrotizing fasciitis (13), is not available in our hospital, and as far as we know, it is not available in the whole country.

References:

1. Necrotizing Fasciitis, a lecture given by Michael Maynor, MG, Clinical Assistant Professor, Department of Hyperbaric/Emergency Medicine, Louisiana State University School of Medicine. Published on the net.

2. Leaper D.J. Wound Infection. In: Russell RCG, Williams NS, and Bulstrode CJK. Bailey & Love's Short Practice of Surgery. 24th ed. London: Hodder Headline Group; 2004. p. 124.

3. Hanson SL, Mathes SJ, and Young DM. Skin and Subcutaneous Tissue. In: Brunicardi FC, editors. Schwartz's Principles of Surgery. 8th ed. Singapore: The McGraw-Hill Inc; 2005. p. 434.

4. Mirdha BK, Gupta E, and Chumber S. Microbiology for the Surgeon. In: Chumber S. Essentials of Surgery. 1st ed. New Delhi: Japee Brothers Medical Publishers; 2005. p. 373-376.

5. Fournier A: Gangrène foudroyante de la verge. Semaine Med 3:345, 1883.

6. Meleney FL: Hemolytic streptococcus gangrene. Arch Surg 9:317, 1924.

7. Meleney FL: Bacterial synergism in disease processes with confirmation of the synergistic bacterial etiology of a certain type of progressive gangrene of the abdominal wall. Ann Surg 94:961, 1931.

8. Davis, JM and Simmons, RL. Surgical Infectious Disease. 2nd ed. Norwalk, CT: Appleton and Lange; 1988.

9. Elliot D, Kufera JA, Myers RAM: The microbiology of necrotizing soft tissue infections. Am J Surg 179:361, 2000.

10. Elliot DC, Kufera JA, and Myers RAM: Necrotizing soft tissue infections. Risk factors for mortality and strategies for management. Ann Surg 224:672, 1996.

11. Ford LM, Waksman J. Necrotizing fasciitis during primary varicella. Pediatrics. Jun 2000;105(6):1372-3; author reply 1373-5.

12. Robert A Schwartz, Necrotizing Fasciitis, eMedicine specialist dermatology newspaper, UMDNJ-New Jersey Medical School, March 2010.

13. Riseman JA, Zamboni WA, Curtis A, et al: Hyperbaric oxygen therapy for necrotizing fasciitis reduces mortality and the need for débridements. Surg 108:847, 1990.