

Chapter 1:

Necrotizing Fasciitis: Background & Epidemiology

Syed Muhamad Ali, Zia Aftab, Nissar Shaikh, Hassan Al Thani

Hamad Medical Corporation & Weill Cornell Medical College
in Doha-Qatar

Chapter 1. Necrotizing Fasciitis: Background & Epidemiology

Necrotizing fasciitis (NF) is a pathological descriptive term denoting a life threatening soft tissue infection. It is among the most challenging surgical infections faced by surgeons.

Although not apparent initially and difficult to diagnose it may lead to catastrophic events that may result in either amputation of the extremity or loss of life. It characteristically causes extensive necrosis of the fascia and subcutaneous tissue leading to severe systemic toxicity. Various terminologies are used in literature such as hospital gangrene, streptococcal gangrene, acute dermal gangrene, phagedena (literally eating away), Fournier's gangrene, suppurative fasciitis and synergistic necrotizing cellulitis but the most widely used term "Necrotizing Fasciitis" (NF) was coined by Wilson in 1952 and it describes the most consistent feature of the disease, the fascial necrosis [1]-[4] [15]-[17].

Mortality rates remain high despite the advancement in antimicrobials and care of critically ill patients. Overall mortality ranges from 4.2 - 75% although it is much lower in recent studies, approximately 26% [3] [4].

Necrotizing Fasciitis (NF) was seen sporadically in the previous century during war time and was monobacterial in etiology but now it is seen more commonly in civilian population and is mainly due to polymicrobial infection and methicillin resistant staphylococcus aureus (MRSA) [5].

Historical Perspective

NF has been reported from all parts of the world and has been known from the ancient times. They were described by the Hippocrates in 5th century B.C "The erysipelas would quickly spread widely in all directions.

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Flesh, sinews and bones fell away in large quantities... fever sometime present and sometimes absent... there were many deaths, the course of the disease was same to whatever part of the body it spread” [10], [15]-[17].

They were also reported by Galen, Avicenna and great renaissance surgeon Pare. Formation of pus below the skin (sopha) with danger of spreading to healthy tissue has been described in *susruthasamhita*. Joseph Jones, a surgeon in a confederate army of U.S in 1871, clearly described this condition, as it happened in 2642 soldiers during civil war with 46% mortality, he named it hospital gangrene, a rapidly progressing fascial necrosis of bacterial origin. Fournier in 1884 published a classic description of gangrenous infection of the perineum and male genitalia [16].

Meleney in 1924 described “acute hemolytic streptococcus gangrene” thought to be caused exclusively by beta hemolytic streptococcus, although the microbiologic techniques were limited at that time. Later on he also described the synergistic association of anaerobic streptococci and staphylococcus and proposed differential diagnosis between different kinds of infectious gangrene of the skin with particular reference to hemolytic streptococcal gangrene and bacterial synergistic gangrene. As mentioned earlier necrotizing fasciitis was first used by Wilson describing the fascial necrosis as constant feature of the disease [21].

Pasteur reported anaerobic bacteria in 1861, but anaerobic renaissance started in 1960s. Technical advancement led to isolation and identification of non-sporing anaerobic bacteria, attributed by Gorbach and Barlett. Later on Guiliano in 1977 determined the polymicrobial nature of necrotizing

fasciitis by variety of micro-organisms including aerobic and anaerobic gram positive cocci and gram negative bacilli [16] [17] [19] [20].

Epidemiology

Incidence of necrotizing fasciitis is variable as the confusion by recording various eponyms in literature. In U.S.A the necrotizing fasciitis occurs in 4.3 per 100,000 of population. Center for disease control reported 600 cases in U.S in 1999. In U.K about 500 new cases are recorded annually, whereas in Canada the incidence ranges from 0.15 to 0.55 cases per 100,000 in those younger than 45 to those older than 65 years [6] [7].

In a study of Das *et al.* from New Zealand, incidence and mortality rates of necrotizing fasciitis have increased significantly. Males are affected more than female 3:1, due to increased incidence of trauma and more frequently it affects the extremities.

NF is relatively rare in childhood. Goldberg and associates found 14 cases in infancy, most of which results from circumcision and fetal scalp monitoring. Other cases may result from scalp vein infusion and omphalitis. Urachal anomalies have also been reported leading to necrotizing fasciitis. Collette reported Hemophilus influenza type b and chickenpox leading to necrotizing fasciitis. Adeyokunnu reported Fournier's gangrene in six children aged between 3 - 12 weeks secondary to circumcision, diaper rash and perianal skin abscesses [6] [7] [9].

Risk Factors

Although no age is spared, increasing age is a constant risk factor as