FREQUENCY OF COMMON BACTERIA AND THEIR SENSITIVITY TO ANTIBIOTICS IN PATIENTS OF NECROTIZING FASCIITIS

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ABSTRACT

Objective: To determine the frequency of common bacteria and their sensitivity to antibiotics in patients of necrotizing fasciitis.

Material and Methods: The study was conducted in the whole Department of Surgery including Orthopaedic Unit, Government Lady Reading Hospital, Peshawar. Study design was descriptive case series while duration of study was 6 months, from January 2012 to December 2012. Culture reports of 145 patients were performed and analyzed using SPSS 14.0.

Results: In this study, 145 patients presenting with necrotizing fasciitis, female to male ratio was 1.46:1. Average age was 37.11 months ± 14.17SD. Distribution of common bacteria shows that Beta Hemolytic streptococci and Klebsiella was found in majority of cases which were 73(50.3%) each, followed by proteus in 60(41.4%), E Coli and pseudomonas in 55(37.9%) each while 58(40%) patients have Streptococcus Viridans and Staphylococcus Aureus were observed in 51(35.2%) of patients. Seventy-five percent of klebsiella were sensitive to commonly available, cost effective drug like ampicillin.

Conclusion: The key to overcoming the risk of this disease process is in rapid identification and prompt treatment of these lethal conditions associated with high morbity.

Key Words: Necrotizing fasciitis, Antibiotics, Bacteria, EColi, Staphylococcus Aureus.

INTRODUCTION

First described in 1871 by Joseph Jones, a Confederate Army surgeon in the American Civil War, necrotizing fasciitis is a rapidly spreading soft tissue infection characterized by progressive destruction of fascia and subcutaneous tissue1. Its histological patterns are large necrosis of the fascia, subcutaneous fat and skin with thrombosis of the microvasculature and sparing of the underlying muscles and bone2. Its worldwide incidence is estimated as 0.001%3. Other studies reported 0.4- 0.53 cases per 100,0004 and carries a mortality rate of 17-34%5. However the actual incidence of NF is not well known6 from a study conducted in Sudan as is the case in Pakistan.7

There are a number of predisposing factors to NF such as diabetes mellitus (DM)7 immunocompromised state, corticosteroid use, intravenous drug abuse, trauma, malnutrition, burns and atherosclerosis8. Early diagnosis and prompt treatment consisting of surgery and antibiotics are the key factors to improve patient outcome in NF2 and timely diagnosis can be challenging due to protein variability in this disease’s symptoms, signs and bacteriology9. The current study is designed to determine the frequency of common bacteria with their antibiotic sensitivities among the patients presenting with necrotizing fasciitis. This study will provide us with fresh local statistics showing us the local magnitude of bacteriology of patients with NF.

MATERIAL AND METHODS

The study was conducted in Surgical C Unit, Government Lady Reading Hospital, Peshawar from January 2012 to December 2012 as Case Series descriptive study. Sampling technique was consecutive sampling (non-probability) type. All patients with necrotizing fascitis of the lower limbs having age 18 years and above of either gender were included while patients with malignancy (detected by past medical records and history), history of antibiotic use in the last one week were excluded from study.

Necrotizing fasciitis is classified into three types on the basis of bacteriology. The study was conducted after approval from hospitals ethical and research committee. Informed consent was taken from patients.

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all the patients. All the culture and sensitivity procedures were done under supervision of same consultant microbiologist having minimum of five years of experience. Data collected on performa was analyzed in SSPS version 14.0. That focused on categorical evaluation of bacteria and their sensitivities. Different bacteria with sensitivities to various broad and narrow spectrum antibiotics were compared and discussed based on gender and age.

**RESULTS**

In this study, 145 patients presenting with necrotizing fasciitis, in which 86 (59.31%) were male and 59 (40.69%) were female patients. Female to male ratio was 1.46:1. Age of the patients ranged from 20 up to 71 years. Average age was 37.11 years $\pm$ 14.17SD. Distribution of common bacteria shows that Beta Hemolytic streptococci and Klebsiella was found in majority of cases which were 73 (50.3%). A significant peak of greater cases of E.coli infections were observed in patients of age group 31-50 years. This figure change to 30.5% for all other age groups.

A greater variety of bacteria other than for mentioned were observed in younger patients less than 30 years of age. The majority of males i.e. 32 (58.2%) presented with necrotizing fasciitis have esherichia coli while 23 (41.8%) Escherichia coli were found in female patients, (Table 1). The antibiotic sensitivity of common bacteria shows that Co-Amoxiclav was more sensitive while Salbactum+Cefperazone was more resistant in different micro-organism, Table 2.

**DISCUSSION**

Necrotising fasciitis (NF) is a rare soft tissue infection, primarily involving the superficial fascia and...
resulting in extensive undermining of the surrounding tissues. If untreated, it is invariably fatal, and thus a high index of suspicion for the diagnosis is required\textsuperscript{16}. Mortality remains still high in NF despite use of modern powerful antimicrobial drug regimens and advances in the care of the critically ill patients. Overall mortality ranges from 25 to 73 percent in the published literature\textsuperscript{11}. The figure reported in our study was remarkable higher that could be due to increased incidence of traumatic necrotizing fasciitis secondary to bomb blasts and fire armed injuries.

NF is traditionally classified into two distinct categories based on the causative microorganisms\textsuperscript{12}. Type 1 NF is characterized by polymicrobial, synergistic infections that are caused by non-Group-A streptococci, aerobic and anaerobic organisms\textsuperscript{13}. Type 2 NF involves Group A Streptococcus (GAS) with or without a coexisting staphylococcal infection\textsuperscript{13}. While the clinical manifestations are similar, type 1 and type 2 NF tend to affect different subgroups of patients. Higher figures of resistant bacteria included E.coli and klebsiella in our study, similar was the figures of resistant strains of E.coli as mentioned in a study conducted by Miller et al. 22 (70%).

Type 1 NF has a propensity to affect diabetic and immunocompromised individuals, whereas type 2 NF tends to occur in individuals with no underlying comorbidities. Both type 1 and type 2 NF are considered surgical emergencies; appropriate management requires comprehensive surgical debridement combined with targeted antimicrobial therapy and physiologic support\textsuperscript{14}. Group A β-hemolytic streptococcus has been the most frequently incriminated agent since Meleney’s findings. Many other bacteria may be involved. Fungi such as aspegillus, mucoraceae, and candida albicans are rare etiologic agents. <5% Pseudomonas has been implicated as an important causal agent in patients with neutropenia. In our series, pseudomonas was the main causal agent, always in association with other bacteria. The results of gram stain should not be used as a guide to therapy because of the poly microbial nature of necrotizing fasciitis\textsuperscript{15}. Instead culture was used that varies between laboratories. Thus only one microbiologist was selected to avoid bias.

Type 2 NF is rarer, making up only 10% of NF patients. The media has nicknamed Type 2 NF as the “flesh-eating bacterial infection.” It is a more dangerous infection, usually affecting the upper or lower extremities. It involves Group A β-hemolytic streptococcus, with or without Staphylococcus aureus. This is the same streptococcus that is responsible for streptococcal pharyngitis, impetigo, cellulitis, and toxic shock syndrome. Type 2 NF may affect healthy individuals at any age\textsuperscript{16}. These findings were consistent in our study although higher numbers of Type-II were reported.

Because of the importance of targeted antibiotic therapy in the treatment of NF, awareness of the spectrum of microbes that might be associated with NF is imperative. This way its management is cost effective. Microbes commonly associated with NF include: Group A Streptococcus, Clostridium perfringens, methicillin-sensitive Staphylococcus aureus, Enterobacteriaceae, E. coli, Pseudomonas spp., Klebsiella spp., V. vulnificus, A. hydrophila, and anaerobic Streptococcus spp.\textsuperscript{14}. While these microbes comprise most of all cases, other pathogens such as MRSA and Group B Streptococcus (GBS) have also been associated with NF on rare occasions. S. aureus is thought to be an uncommon agent for this disease. However, rare cases of rapidly progressing, necrotizing fasciitis have been described in diabetic patients\textsuperscript{17,18} and patients with chronic use of steroid-containing medications\textsuperscript{19}. Miller et al recently described 14 cases of necrotizing fasciitis disease due to Panton-Valentine leukocidin (PVL)-producing community associated methicillin-resistant S. aureus (CA-MRSA) in a retrospective study of 843 MRSA cases from 2003 to 2004 in Los Angeles\textsuperscript{19}.

Staphylococcus with a pathogenicity and virulence is more similar to Staphylococcus Aureus than to other coagulase-negative Staphylococcus spp. In fact, these organisms are frequently misidentified as S. aureus because of their morphologic appearance with yellow pigmentation and complete hemolysis when cultured on blood agar. Even so, appropriate identification of S. lugdunensis is imperative as misidentification may result in inadequately treated, prolonged, and persistent infection\textsuperscript{20}.

Moreover, because only about 20% of isolates are beta-lactamase positive, it is often possible to use penicillin for treatment of infections caused by these organisms. In addition, S. lugdunensis is also usually susceptible to gentamicin, rifampicin, vancomycin, oxacillin, and cefoxitin, and <10% of isolates are found to be resistant to clindamycin or fusidic acid\textsuperscript{21}. Today, the recommended initial antibiotic regimen has changed because of the emergence of resistant microbes and relative decrease in the incidence of clostridial infection. Vancomycin, linezolid, daptomycin, or quinupristin/dalfopristin are recommended for empiric coverage of gram-positive organisms because of concern for MRSA infection, especially in IV drug users\textsuperscript{22,23,24}. The figure of MRSA infections was less than 1/3 of the total staph-aureus infections in our study. Where as study conducted by Maltezor et al.\textsuperscript{24} has been reported at 26.2% much higher than our study. In their study Type-II necrotizing fasciitis was also reported higher than other western studies (33.8).

CONCLUSION

Necrotizing fasciitis is a lethal condition, its prompt diagnosis and treatment that the healthcare professional can reduce the morbidity and mortality of this infection.
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