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General Surgery

NECROTISING SOFT TISSUE INFECTIONS: AN INSTITUTIONAL EXPERIENCE

Abdul Haque Assistant Professor, Dept of General Surgery, IIMSR, Integral University, Lucknow

Ankur Sharma Associate Professor, Dept of General Surgery, IIMSR, Integral University, Lucknow Corresponding Author

ABSTRACT Necrotising Soft Tissue Infection (NSTI) or Necrotising Fasciitis (NF) is a disease of infective origin. It has a portal of entry of infecting organisms even though it may be so trivial as to go unnoticed. The infecting organisms may be aerobic or anaerobic. A high index of suspicion is important in view of paucity of specific cutaneous findings early in the course of the disease.

The cornerstone in the management is early diagnosis followed by aggressive resuscitation, broad spectrum antibiotics, prompt and repeated surgical intervention. Adjuvant hyperbaric oxygen (HBO) therapy and Intravenous immunoglobulins may give a higher survival rate.

The present study describes the clinical presentation, laboratory markers including microbiology, imaging and fine needle aspiration cytology (FNAC) for early and definitive diagnosis. Multidisciplinary approach in the management based on severity of the disease is discussed.

Background: In 1843-44 Alfred Fournier described cases of scrotal gangrene in France. (1) He called the condition idiopathic scrotal gangrene since he could not determine the aetiology. Fournier's gangrene is probably the same disease as necrotising fasciitis occurring in other parts of the body but modified by peculiar anatomy of genitoperineum.(2) in 1875, a confederate army surgeon named Josef Jones first described the NF during American civil war.(3) in 1920, Meleney in China identified 20 patients in whom haemolytic streptococcus was the causative microorganism.(4) Wilson coined the term NF in 1952 and found no specific pathogenic bacteria related to the disease.(5) Daniel et al in 2007 further emphasised the use of term NSTI instead of NF.(6)

KEYWORDS : .Necrotising Fasciitis, Debridement, Necrotising soft tissue infections

Introduction:

NSTI is a severe soft tissue infection of deeper layer of skin and subcutaneous tissues confined upto fascial planes. It is perhaps the most aggressive form of soft tissue infection and can spread rapidly to evolve the whole limb within hours. A number of bacteria in isolation or as a polymicrobial infection can cause NSTI. The organisms commonly linked are group A Streptococcus but the majority of cases are caused by other bacteria or different streptococcus serotypes.

Taking this into account, NSTI is classified as
Type I- polymicrobial
Type II- Streptococcus

Clinically, on the basis of severity NF is described as subacute, acute or fluminant.(7)

Most of the times, the preceding trauma is trivial enough to go unnoticed. It may follow pricks, bruises, contusions, abrasions, lacerations or following surgical procedures.

This uncommon condition is initially difficult to diagnose as most of the signs and symptoms are influenza like and hence need a high index of suspicion. A delay in the diagnosis is associated with high morbidity and mortality.

Pathology:

Microbial invasion of the subcutaneous tissues occur either through external trauma or direct spread from a perforated viscus, particularly colon, rectum and anal canal. Bacteria then track into subcutaneous tissues producing endo and exotoxins. (8) These toxins cause microvascular thrombosis, tissue ischemia, liquefective necrosis and later, systemic illness. (9) Tissue ischemia impedes oxidative destruction of bacteria by neutrophils and prevents adequate delivery of oxygen and antibiotics. Hence, surgical debridement is the mainstay in therapy for NSTI and antibiotic therapy alone is of little value and only masks the severity of symptoms.

NF can involve any part of the body but commonest are extremities, followed by genitals and abdominal wall. Scrotal gangrene has been labelled as Idiopathic, or Fournier's gangrene. Initially, NF may be indistinguishable from typical cellulitis which may delay in diagnosis and definitive treatment leading to poor outcome in the form of bacteremia, septicaemia and MODS. Incidence of NF in adults has been reported to be 0.4 cases per lakh population with an incidence of 0.08 cases per lakh population in children worldwide. The diagnosis of the disease is complex and often being missed and the death rate of patients affected has been reported to be as high as 73% in Europe. This life threatening condition needs a early diagnosis which is key successful outcome and remains a challenge.

Clinical Manifestations:

Lack of cutaneous findings early in the disease make the diagnosis challenging and high index of suspicion is essential. The most common early signs are erythema, local warmth, skin induration and oedema. These signs make the early diagnosis difficult and the condition is often confused with cellulitis, abscess or septic arthritis and NF is only suspected when patient fails to respond to broad spectrum intravenous antibiotics. Pain out of proportions to be apparent severity of the lesion should alert the physician to the possible diagnosis of NF. Patches of skin necrosis, tissue crepitus, haemorrhagic bullae and systemic evidence of sepsis such as tachycardia and hypotension are late features.

Materials and Methods:

The study includes 74 consecutive cases of NF admitted to surgical ward and Surgery ICU at IIMSR, Integral University, Lucknow from May 2013 to April 2017. The patients' age, sex, site and extent of tissue involved were documented. Patients' social class, nutritional status, associated illnesses were also recorded. As a routine, blood was taken for fasting blood sugar, complete hemogram, C Reactive protein, renal function tests, and serum electrolytes. Serology for hepatitis markers and for HIV was done in all cases too. Pus swab for culture and sensitivity was also done routinely. Imaging, FNAC, and tissue biopsy was a diagnostic procedure in selected and difficult cases. In seriously ill patients presenting with septicaemia, Arterial blood gas (ABG) study was an adjuvant investigation for diagnosis and management.

Observations:

A total of 74 cases were studied. Patients' age ranged from 14 years to 78 years. Male to female ratio was 8:1. Majority of the patients were old, malnourished from low socioeconomic status. 17 patients were found to be diabetic with 5 having coronary artery disease. 30 patients had COPD. & patients had chronic renal failure. Two patients were found to be reactive for HIV, while9 and 11 patients were reactive for hepatitis B and C respectively. Majority of them were anaemic, with haemoglobin ranging from 5 gm% to 10 gm%. White cell count ranged from 3000/cu mm to 32,000/cu mm.

20 patients had major constitutional disturbances with features of severe sepsis, Shock and impending MODS.

Mortality rate in our series was 16%. Different parts of the body were

involved, commonest being lower limb, in 32 patients, 43%; Urogenital area in 24 patients, 33%; Upper extremity was involved in 12 patients, 16% and abdominal wall in 6 patients, 8%.

During this study, a wide spectrum of organisms was cultured. In 12 cases, Group A Streptococcus was cultured, whereas in 22 patients the culture was reported to be sterile. Remaining cases showed a mixed infection from a combination of gram positive, gram negative and anaerobic bacteria.

Management:

History has shown that when treatment is only based on antimicrobial and supportive therapy, mortality approaches close to 100%. It is clear that early and complete debridement is essential for the treatment of NSTI. Concomitantly, appropriate broad spectrum antibiotic coverage combined with adequate organ support and monitoring helps patients during acute phase of the disease. SO the mainstay of the treatment is early and adequate debridement combined with antibiotics, critical care and physiological support. Novel therapeutic strategies including HBO and intravenous immunoglobulins have been described but their efficacy is controversial. (6)

Treatment of NSTI involves the principle of treatment for any kind of surgical infection- source control, antimicrobial therapy, physiological support and monitoring. Cases of NSTI are excellent examples of the importance of the source control. (10)

A. During the operation, a generous incision is performed and macroscopic findings of the disease are used to help guide the extent of the debridement. Incision may be extended to allow for complete debridement of infected or necrotic tissue. Healthy viable bleeding tissue should be present at the edges of the debridement site and aggressive resuscitation should accompany the perioperative period. Once the initial debridement has been done, management in the setting of ICU is recommended. Scheduled debridements on daily basis or as often is required should be done until no further necrosis is seen.

B. Antimicrobial therapy is an adjunct to source control for the treatment of NSTI. Broad spectrum antibiotics should be started early in the course to include coverage of Gram positive, Gram negative and anaerobes. Special consideration for Group A Streptococcus and Clostridium species should be taken. Acceptable regimes include:

Monotherapy with imipenem, Meropenem, Ertapenem.

Or a multi drug regimen with high dose penicillin, clindamycin and a flouroquinolone or an aminoglycoside.

Antimicrobial administration should be continued until no further debridements are needed and the patient's physiological status has improved. Some researchers also advocate surgery as a means for diagnosis in patients in whom clinical and laboratory findgins are still not conclusive. (11,12)

C. Finally, physiological support, combined with close monitoring in an ICU setting is encouraged. It is not uncommon to see patients with NF develop MODS such as acute renal failure which requires renal replacement therapy. Aggressive fluid resuscitation and blood component therapy is often required during perioperative periods. Appropriate early nutritional support helps in control of catabolic response of the patients.

D. Judicious control of blood glucose levels as well as novel therapeutic approaches like HBO and immunoglobulins for severe sepsis should be considered to optimise the host response to infection. HBO has been advocated by different groups that argue for a decreased number of debridements and decreased mortality. (13,14)

Intravenous immunoglobulins have also been used in treatment of NF. According to Canadian experience, it seems reasonable to use intravenous immunoglobulins in patients with Group A Streptococcal infection who have developed streptococcal toxic shock syndrome and in those with a high mortality risk.(15)

Imaging:

Diagnostic adjuncts like ultrasound, CT scan and MRI are helpful in suspicious cases. Rahmouni et all in 36 cases were able to differentiate between non necrotising cellulitis that would respond to medical treatment and severe necrotising infections that required rapid life saving surgery. (16)

Examination of frozen section specimens from compromised sites has been suggested as well as a means to achieve early diagnosis of NF. (17)

Conclusion:

NF and NSTI are a potentially life threatening conditions which require a multidisciplinary approach for successful outcome. Early aggressive surgical intervention along with judicious use of antibiotics and supportive care can help in reducing mortality associated with this condition. Appropriate attention should be given to source control of infection and one should not hesitate from repeated debridements as and when need arises.

References:

1. Fournier JA. Gangrene foudroyante de loa vergo. Med Pract Paris 1883;4:589-97.
2. SEE Efem. Features and aetiology of Fourniers gangrene. Post grad Med J 1994;70:568-71.
3. Jones J : Investigation upon the nature, causes and treatment of hospital gangrene as it prevailed in the confederate armies 1861-65. In surgical memories of the war of rebellion New York: United States Sanitray Commision 1871.
4. Meleney F. Hemolytic streptococcal gangrene. Arch Surg 1924;9:317-64.
5. Wilson B. Necrotising fasciitis. Am Surg 1952;18:416—31.
6. Daniel A, Anaya E, Pachen D. Necrotising soft tissue infection: Diagnosis and management. Clinic infec Dis 2007;44:705-10.
7. Wong CH, Chang HC, Pasupathy S. Necrotising fasciitis: Clinical presentation, microbiology and determinants of mortality. J Bone Joint Surg Am 2003;85:1454-60.
8. Hackett SP, Stevens DL. Streptococcal septic shock syndrome: Synthesis of Tumour Necrosis Factor and Interleukins by monocytes stimulated with pyogenic exotoxin and streptolysin O. Journal Infec Dis 1992;165:879-885.
9. Cainzos M, Gonzalez-Rodriguez FJ. Necrotising Soft Tissue Infections. Curr Opin Crit Care 2007;13:433-9.
10. Marshal JC, Maier RV, Jimenez M, Dellinger AP. Source control in the management of severe sepsis and septic shock: An evidence based review. Cit Care Med 2004; 32(supp 11):5513-26.
11. Biltan BD, Zibari GB, McMillan RW, Aultman DF, Dunn G, McDonald JC. Aggresive surgical management of NF serves to decrease mortality: A retrospective study. Am Surg 1998;64:397-400.
12. Lille ST, Sato TT, Engrav LH, Foy H, Jurkovich GJ. Necrotising Soft Tissue Infections: Obstacles in diagnosis. J Am Coll Surg 1996;182:7-11.
13. Riseman JA, Zamboni WA, Curtis A, Graham DR, Konrad HR, Ross DS. Hyperbaric oxygen therapy for NF reduces the mortality and need for debridement. Surgery 1990;108:847-50.
14. Jallali N, Withey S, Butler PE. Hyperbaric oxygen as adjuvant therapy in the management of NF. Am J Surg 2005;189:462-6.
15. Kaul R, Mc Geer A, Low DE, Green K, Schwartz B. Population based surveillance for Group A Streptococcal Necrotising Fasciitis: Clinical features, prognostic indicators and microbiologic analysis of 77 cases. Am J Med 1997;103:18-24.
16. Rahmouni A, Chosidow O, Mathiew D. MRI imaging in acute infections cellulitis. Radiology 1994;192:493.
17. Majeski J, Majeski E. Necrotising fasciitis: improved survival with early recognition by tissue biopsy and aggressive surgical treatment. South Med J 1997;90:1065-8.