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RESEARCH ARTICLE

MANAGEMENT OF CASES OF NECROTISING FASCIITIS- AN INDIAN PERSPECTIVE

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Abstract

Necrotising fasciitis (NF) is a severe potentially life-threatening condition which begins with an innocuous trauma or an insect bite which rapidly progresses to involve a large portion of the limb and if not managed with urgency, then it can result in sepsis and shock. Although NF can occur in any region of the body extremities especially lower limb is the most common site of infection -more prone to injury. Prognosis is poorer in the presence of co-morbidities, such as diabetes mellitus, immunosuppression, chronic alcohol disease, chronic renal failure, and liver cirrhosis.NF is classified into four types, depending infective agent. Most cases are polymicrobial, classed as type I.The clinical status of the patient varies from erythema, swelling, and tenderness in the early stage to skin ischemia with blisters and bullae in the advanced stage of infection. Because the infection is under the subcutaneous tissue and spreads fast the overlying skin may look nearly normal in early stages and the diagnosis may be missed. Hence the condition must be diagnosed clinically.However, in equivocal cases, the diagnosis and severity of the infection can be made with laboratory-based scoring systems. Computed tomography or ultrasonography can be helpful, but definitive diagnosis is attained by exploratory surgery at the infected sites. Management of the infection begins with broad-spectrum antibiotics, but early and aggressive drainage and meticulous surgical and chemical debridement constitute the mainstay of treatment. Negative Pressure Wound Management is helpful combined with continuous cleansing of the wound leads to the formation of granulation tissue with SSG for completion of healing.

Introduction:-

This condition is known by several names such as soft tissue necrosis, necrotising fasciitis or necrotising soft tissue infection.Necrotising soft tissue infection (NSTI) is an umbrella term which is used to encompass all cases where necrosis lies above the fasci and those which extends beyond the fascia to involve the muscle, skin and surrounding

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tissue eg. Necrotizing Myositis (muscle), and severe Necrotizing Cellulitis (skin/fat)[1]. While Necrotizing Fasciitis (NF) is a specific type of NSTI which is characterized by aggressive bacterial infection and necrosis of the fascia[2].
NF is an alarming condition which begins with an innocuous trauma or an insect bite which rapidly progresses to involve a large portion of the limb. It requires urgent and dedicated management to prevent fatality.Although NF can occur in any region of the body extremities especially lower limb is the most common site of infection -more prone to injury. This is followed by perineum- close to gut and urinary tract bacteria (Fournier's) and abdominal wall – gut perforation (Meleney's)[3]It is generally seen in adult males and more common during and just after the monsoons probably due to combination of stagnant dirty water and injury to lower limb. Certain conditions such as uncontrolled diabetes mellitus, perirectal abscess, trauma resulting in skin cuts or any other weakness in the immune system such as cancer, smoking, autoimmune diseases, and obesity make the person prone to this[4].

Etiopathogenesis:-
A minor trauma which perforates the skin introduces bacteria in the plane between the sub-cutaneous and the fascia. Bacterial proliferation in this region causes thrombosis of subcutaneous vessels leading to local ischemia and necrosis of overlying skin. If the host immunity is compromised then this infection spreads rapidly involving a large area of the limb and finally leading to gangrene. This infection is a synergistic infection between β haemolytic micro-aerophilic streptococci and an anaerobe such as Bacteroides, Clostridium, and Peptostreptococcus species. The Streptococci which can thrive in very low oxygen environment helps bacteria to spread while using up the oxygen and anaerobes which can proliferate in an oxygen depleted environment then grow rapidly producing hydrogen, nitrogen, hydrogen sulphide and methanewhich cause severe tissue damage[5-6].
NSTI are classified into 4 types according to microbiology of the infection[7]

Type of NF	ETIOLOGY	ORGANISN(S)	CLINICAL PROGRESS	MORTALITY
Type I(70-80%)	Polymicrobial/ synergistic	Often bowel flora Mixed aerobes + anerobes	More indolent, better prognosis, easier to recognize	Variable, depends on underlying comorbidities
Type II (20–30% of cases	Often monomicrobial, skin or respiratory-derived	Usually A β-hemolytic streptococcus (GAS), occasionally S. aureus	Aggressive, presentation easily missed	>30%, depends on associated myositis
Type III (More common in Asia)	Gram-negative, often marine-related organisms	Vibrio spp.	Seafood ingestion or water contamination in wounds	30%–40%
Type IV (Fungal)	Trauma associated	Candida spp., immunocompromised patients. Zygomycetes in immunocompetent patients	Aggressive with rapid extension, especially if immunocompromised	>50%, higher if immunocompromised

Clinical Features:-
The majority of cases exhibit swelling and erythema, but the most consistent finding is pain that is out of proportion to exam findings[8].Sometimes the infected area might look normal and may not be too tender but the patient has severe pain. The area directly over the affected tissues can look red or greyish or swollen or can have blisters; however, because the actual infection is located deeper in the soft tissues, the top part of the skin may look normal[9].
Sometimes, bacteria produce gas, which can cause a crunchy feeling when the skin is pressed. Unlike a focal infection of the skin, an NF is a systemic disease, which means that it may cause fever, changes in heart rate and blood pressure, and changes in level of alertness.

Investigations and Scoring systems:-
Although this condition is diagnosed clinically but some investigations do aid to firm up the diagnosis especially for surgeons unfamiliar with such cases.The combination of a high WBC count and low serum sodium level has a high negative predictive value (around 98-99%), meaning that if a patient's values do not meet these criteria, it is highly

unlikely they have an NSTI[10]. This also helps differentiate between necrotising and non-necrotising soft tissue infections.An admission lactate >6 mmol/L and a serum sodium <135 mEq/L have been shown to be independent predictors of in-hospital mortality in those presenting with NSTI In 2004, Wong et al developed the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score. This score uses white blood cell (WBC) count, hemoglobin, sodium, glucose, serum creatinine and serum c-reactive protein to develop a scoring system for the likelihood of necrotizing fasciitis[11]. In the original publication, a score of ≥6 yielded a positive predictive value of 92% and negative predictive value of 96%, displaying promise for predicting severity of skin and soft tissue infection among patients presenting to emergency care X-Rays, USG Doppler, Ct scan and MRI all have a role to add information and to rule out other pathologies. But clinical suspicion still remains of prime importance.

Diagnosis:-

The definitive diagnosis of NSTI is made surgically. The fascia is exposed and examined for signs of necrosis, "dishwater" brown fluid or "positive finger sign" in which a finger inserted along the fascial planes easily dissects the overlying tissue without resistance[12]. Fluid and tissue cultures together with blood cultures are sent to classify the condition and guide antibiotic coverage.

Treatment:-

Thorough repeated surgical and daily chemical (washing with soap and warm water followed by EUSOL dressing) debridement is the critical step in management of this condition. Negative Pressure Wound Management (NPWM) if available is helpful, else use of crepe bandage and limb elevation to decrease edema is recommended[13]. Chemical debridement using soap water irrigation with EUSOL dressings goes a long way in protecting functionally critical structures such as tendons, ligaments, nerves and muscles[14].

Antibiotic therapy:-

Early and aggressive use of antibiotic therapy is essential and should be performed concomitant to the patient undergoing surgical evaluation and treatment. Initial empiric therapy should encompass broad-spectrum coverage of polymicrobial infections, as about half of these infections will be polymicrobial in nature[15]. Intra-venous broad-spectrum agents against gram-negative pathogens such as piperacillin–tazobactam, ampicillin–sulbactam, or carbapenems. Metronidazole too is added to cover anerobes. Tab Clindamycin 600mg tds improves outcome and is often considered the drug of choice in this condition and must be added in all cases[16]. Empiric antifungal therapy is not essential, but an appropriate antifungal agent may be added upon visual evidence on stains or growth in blood or operative cultures of fungal elements such as Candida or Mucorales spp. Later antibiotics can be tailored according to culture reports.Amputations may be necessary in the case of diabetic foot infections or larger scale debridement of entire muscle compartments, resulting in a nonfunctioning limb. Split skin grafts are used when the wound has healed with a healthy granulation tissue.

Summary/Discussion:-

Necrotising Fasciitis (NF) which is component of Necrotising Soft Tissue Infection (NSTI) is a disease with high morbidity and mortality. This is because diagnosis can be missed or mistaken with DVT, Insect bite allergic reaction, Diabetic foot, Peripheral Vascular disease. Diagnosis is made clinically where the leg may or may not features of underlying infection but the pain is out of proportion to signs. Investigation such as High TLC with Low serum Sodium is a strong indicator of NF. Early and aggressive management with stabilization of the patient, IV antibiotics including use of Tab Clindamycin is recommended. Urgent debridement both surgical and chemical using soap water washes and EUSOL together with Negative Pressure Wound management (NPWM) with limb elevation is the key to early recovery. Finally, use of Split Skin grafts over healthy granulation tissue completes the process of healing. All this must go hand in hand with management of co-morbidities such as diabetes mellitus along with maintenance of normal physiological parameters such as Haemoglobin and Total Serum Proteins aids in healing.

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