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Research Progress in Perianal Necrotizing Fasciitis

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Abstract: Perianal necrotizing fasciitis is an infectious disease with serious clinical manifestations and high mortality rate. When the diagnosis of the infection is unclear at the early stage, according to the summary analysis of the diagnosis, clinical manifestations, treatment and postoperative treatment of perianal necrotizing fasciitis, timely opening of debridement treatment has extremely high reference value for patient prognosis, which can reduce the risk of disease and mortality, and timely and effective comprehensive treatment can avoid the deterioration of the disease and improve the quality of life of patients.

1. Introduction

Perianal Necrotizing Fasciitis (PNF) is a serious infectious disease characterized by extensive and rapid necrosis of the perianal and perineal skin and subcutaneous fascial tissue without invasion of muscle tissue. There is no clear Chinese medical name for PNF, but according to its clinical manifestations and pathological characteristics, it is similar to the categories of "sores", "gangrene" and "boils" in Chinese medicine. The "Treatise on the Origin of Diseases - The Various Symptoms of Furunculosis" says: "There are also flesh protruding like the shape of a fish eye, red and black and miserable pain through the bones ..... one or two days the sores will become scorched black, swollen and light up, the roots are hard and strong, and all cannot be approached ..... poison into the abdomen, then boredom, trance Not good, or as drunk, those suffering from this, three or two days will die." This disease is due to the deficiency of the patient's positive qi, while the evil toxin is real and takes advantage of the deficiency to invade internally, or because the flesh and skin are damaged and feel the evil toxin, so that the evil toxin is embedded in the skin, which turns into heat, the toxin coalesces, and the flow of qi and blood is obstructed. The clinical presentation of PNF coincides with it. The incidence of this disease is low, 1.6~3.3/100000, but early diagnosis is difficult, clinical progression is rapid, and the mortality rate is high, 9%~25% or even higher according to the latest literature[1].Because of the loose anorectal tissue and more natural cavities, it is a common site for PNF[2].

PNF is caused by a perianal bacterial infection, which progresses rapidly and is very difficult to diagnose early. The disease is mainly a combination of multiple bacteria, including aerobic and anaerobic bacteria. Of these, Escherichia coli accounts for 58% and Staphylococcus aureus for 36%, the two most common infecting bacteria[3]. Zhang Weihua [4] et al. found a large difference in clinical outcomes for PNF within different hand treatment times, with a mortality rate of 0 and a complication rate of 16.67% for timely surgical debridement and a mortality rate of 6% and a complication rate of

42.18% due to delayed debridement. A Japanese study of 379 patients with clinical medical interventions at different times showed that early intervention (within 2 days of hospitalization) reduced mortality by half compared to late intervention[5].

2. Clinical Manifestations

Symptom: The early clinical manifestations of PNF are not specific, with pain around the perineum or rectum as the main symptom, with severe pain at the lesion site, disproportionate to the extent of the skin lesion, accompanied by skin erythema, swelling or even skin cracking. When the disease develops further, the skin of the lesion area becomes dark red and sclerotic, and bloody blisters appear. As the blood vessels of the dermal papillae are destroyed and thrombus is formed, the nerve endings of the lesion area are destroyed, so the pain is reduced. When the disease develops to the later stage and the infection is aggravated, it is accompanied by high fever and even confusion, irritability, blurred consciousness and other serious illnesses, which can be complicated by sepsis, infectious shock and multi-organ failure in serious cases.

Diagnosis: PNF is highly susceptible to misdiagnosis and is easily diagnosed clinically as perianal abscess, cellulitis, and dermatitis. Therefore, a reasonable identification tool can help clinicians reduce the rate of misdiagnosis and allow patients to receive effective clinical treatment in the first place. Laboratory tests in patients with PNF suggest significantly elevated white blood cell counts and varying degrees of hypoproteinemia, electrolytes, and acid-base imbalance[6]. Imaging can also be a useful adjunct to the diagnosis. Localized subcutaneous emphysema is a characteristic radiographic manifestation. This is an important radiological manifestation. Early ultrasonography can reveal characteristic localized vesicular changes, presenting a different imaging presentation from perianal tissue, suggesting a large perianal abscess, but not completely distinguishable from perianal abscess. In men with scrotal invasion, ultrasound can provide strong evidence for subsequent debridement and imaging evidence for preservation of the testis and epididymis. CT and MRI have a certain sensitivity for the diagnosis of PNF, which can show the accumulation of gas, fluid and even pus in the necrotic soft tissues and help to determine the source of infection in the lesion and the best biopsy site, but the specificity is not obvious and the diagnosis is easily missed when the disease is mild, which may even delay the treatment and cause serious consequences, so we should not rely too much on the imaging findings such as CT or MRI.

CT and MRI are not the primary means taken to diagnose PNF. The finger test is the best way to diagnose necrotizing fasciitis[7]. The patient is diagnosed with NF when the skin and fascia can be easily separated under local anesthetic conditions with finger probing after incision, but the muscles are not involved and the odor is unpleasant. The sensation of snow grip and twisting of the fingers is also a strong evidence to assist in the diagnosis, and the affected area has elevated skin temperature, strong positive tenderness, and the degree of pain is disproportionate to the extent of the skin lesion. As the disease progresses further, the skin of the lesion area becomes dark red and hardened, bloody blisters appear, and the nerve endings of the lesion area are destroyed, resulting in less pain than before. When the disease progresses to the later stage and the infection is aggravated, it is accompanied by high fever and even confusion, irritability, blurred consciousness, and other serious illnesses, which can be complicated by sepsis, infectious shock, and multi-organ failure in severe cases.

Currently, the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) is often used for PNF[8], quantitative scoring based on serological indicators. The scores were divided into three groups according to the scores, with a minimum total score of 0 and a maximum score of 13. The low-risk group refers to LRINEC score ≤5 and the incidence of necrotizing fasciitis <50%, which is low risk; the intermediate-risk group refers to LRINEC score 6-7 and the incidence of 50%-75%, which is

moderate risk; the high-risk group refers to LRINEC score ≥8 and the incidence of >75%, which is high risk. The positive and negative predictive values were 92% and 96%, respectively, when the LRINEC score of 6 was used as the diagnostic threshold[9]. However, this scoring system does not exclude other influencing factors and therefore cannot be used as the only evidence for diagnosis.

3. Treatment

3.1. Surgical Treatment

Surgical treatment is the most effective treatment for PNF, and different timing of debridement has a great impact on the prognosis of patients. Zhang Weihua [4] pointed out that surgery within 24h of onset, the mortality rate is almost zero, while surgery after 6 days due to toxic shock and multiple organ failure in patients can be as high as 30% to 60% or more. Cut the skin around the infection, fully expose the wound, expand the pus cavity until the normal healthy tissue, because the necrosis of the fascia may not be completely cleaned to continue the infection, or the formation of cavity after the accumulation of necrotic material, there is the possibility of secondary or even multiple clearing, so it is necessary to hang rubber strips or multiple thick lines between different incisions to play the role of drainage, is in which the necrotic material completely drainage, try to avoid secondary infection resulting in changes in the condition. Key points of surgery [10]: (1) open the local infected skin, remove local necrotic fascia, so that the lesion site can be fully drained; (2) select the size and number of incisions to be opened and the distance according to the extent of the lesion, make sure to open at the most edge of the infected tissue, make incisions along the skin line as far as possible, ensure that the incisions between the lesion sites can communicate with each other and maintain a certain distance, leaving a skin bridge to avoid local skin tissue ischemia and necrosis; (3) when removing necrotic tissue from the lesion site, we should gradually try our best to explore and tonically separate the subcutaneous tissue until the blood flow is relatively normal, try to protect the subcutaneous nerves and blood vessels, and do not injure the muscles; (4) different treatment plans are specified for different patients, and under the general framework of disease treatment, we should develop treatment plans suitable for the patients themselves according to their own conditions, and reasonably use postoperative dressing changes to flush the infected site, and open the trauma and repeatedly flush the pus cavity after surgery.

3.2. Antibiotic Anti-Infection Therapy

First of all, choose broad-spectrum antibiotics, give sufficient and adequate antibiotics and do a good bacterial culture. The antibacterial spectrum should be chosen to cover almost all pathogenic bacteria, and the combination of anti-anaerobic drugs can give better results [2]. When the results of bacterial culture are available, change the corresponding antibiotics according to their results. Also change the medication after surgery, make sure to rinse the wound with hydrogen peroxide and then wash it with saline to remove the wound secretions and necrotic tissue.

3.3. Chinese Medicine Treatment

Although PNF is caused by external toxicity, it is due to internal deficiency of positive energy. The pathogenesis is mainly due to the deficiency of positive qi, heat and toxicity, which is not able to overcome the evil and is trapped in the inside. In the process of treatment, it is necessary to identify the symptoms, the deficiency, the priority, and the correct identification of the strength and weakness of the positive and the evil, or to eliminate the evil and to supplement the deficiency, or to attack and supplement both, or to supplement the deficiency and to eliminate the evil at the later stage of the

disease[11]. The early manifestation of the disease is a school of hot and poisonous incandescence evidence, with evil being the main focus, treatment should focus on eliminating evil, clearing heat, detoxifying and cooling the blood; the formula is Huang Lian Detoxification Tang combined with Cool Blood Di Huang Tang plus reduction to nourish Yin and clear heat, detoxify and cool the blood to support the righteousness and eliminate evil. After early and timely treatment, the poisonous evil has gone out and has not entered the interior, but the remaining poison has not been cleared and the patient's righteousness has been deficient, at this time the treatment should focus on both helping the righteousness and dispelling the evil to achieve the effect of holding the poison out, the formula uses Bazhen Tang and Si Miao Yong An Tang, At this time, the patient has already passed the early drainage of pus, so the treatment is to support the righteousness and dispel the evil together, and to use "TUO" as the method to penetrate the evil out and supplement the righteousness at the same time, which is conducive to the release of the poisonous evil, promote the continuous growth of the wound, and promote the recovery of the patient's righteousness. Gufeng's [12] application of pus-transferring toxin drink combined with surgery for PNF can significantly inhibit leukocyte infiltration, reduce inflammatory response, increase hemoglobin content, improve systemic symptoms, and enhance overall clinical efficacy. In the phased treatment of PNF by Chinese and Western medicine, Song Jinzhong et al[13]. found that the rational use of prescription drugs could improve the local blood circulation of the traumatic surface, while improving the hematopoietic function of the patient's organism and correcting the systemic symptoms such as hypoproteinemia of the patient, and at the same time, the local can generate muscle and remove decay, enhance the positive energy and strengthen immunity.

3.4. Other Treatments

Hyperbaric oxygen therapy: after early debridement, hyperbaric oxygen therapy has a direct counteracting effect on anaerobic bacteria; hyperbaric oxygen therapy can increase the activity of neutrophils, improve the oxygen content of local tissues, improve the symptoms of tissue hypoxia, enhance the phagocytosis of leukocytes, stimulate fibroblast proliferation and collagen formation, and promote the growth of fibroblasts and blood vessel formation, thus promoting the healing of the wound[14]. Wilkinson and Doolette et al. concluded that the morbidity and mortality rate for ANF patients who did not receive hyperbaric oxygen therapy was 36% and for those who received it was 6%[15].

Vacuum Sealing Drainage(VSD) technology treatment: consists of a porous sponge containing a drainage tube and a sealing film, using this technology can form a closed space for the lesion, and at the same time can achieve adequate drainage, and will not affect the blood supply to the area, and at the same time through the stable negative pressure to reduce the absorption of toxic substances in the area; this technology can also promote local blood circulation and capillary regeneration and wound granulation tissue growth, to provide a good environment for subsequent wound recovery. This technique can also promote local blood circulation, capillary regeneration and granulation tissue growth, providing a good growth environment for subsequent wound recovery. When using VSD technology, the infected area should be thoroughly cleared, leaving no dead space and maintaining a good closed and continuous negative pressure environment[16].

4. Complications

Improperly treated patients with PNF may develop serious complications such as hypoproteinemia, sepsis, and shock, which seriously threaten the health of patients. PNF can spread rapidly along the perianal and perineal triangle fascia, causing progressive and extensive necrosis of the skin, subcutaneous tissues and fascia of the affected area, which can lead to serious complications such as

sepsis, infectious shock and even multi-organ failure, and even death[17].

5. Conclusions

PNF is an infectious critical emergency characterized by extensive necrosis of the skin, subcutaneous tissue and fascia in the perianal and perineal triangle without muscle involvement, and is likely to occur in immunocompromised populations, such as those with diabetes mellitus and malignant tumors. Because the etiology and pathogenesis of PNF are still unclear, early diagnosis and treatment of the disease is important, but there are its early clinical manifestations are not obvious and atypical, making diagnosis difficult, and it is easy to be confused with perianal abscess or other perianal soft tissue infectious diseases, which is difficult to identify, delaying the best treatment window for patients and bringing serious consequences such as disability or death to patients. Therefore, in clinical work, clinical workers should be highly alert to necrotizing fasciitis, quickly diagnose and assess the condition through the patient's clinical manifestations, combined with auxiliary examinations, and quickly perform surgical treatment while treating the condition, which must be incised and drained as early as possible, which can greatly improve the patient's survival rate as well as prognosis. At the same time, we actively strengthen systemic supportive treatment after surgery, apply sufficient amount of broad-spectrum antibiotics, and adjust the type and dose of antibiotics after the results of bacterial culture are available to provide disease treatment.

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