

Analysis of the Causes and Risk Factors of Slow Wound Healing in Patients with Anal Fistula after Surgery

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Abstract: *This paper reviews the causes and risk factors of postoperative wound healing in patients with anal fistula, in order to provide a reference for exploring the causes of slow postoperative wound healing, avoiding controllable risk factors, alleviating the pain of postoperative recovery and promoting good wound healing of patients with anal fistula, so as to further reduce the pain of postoperative recovery and improve the quality of life of patients in clinical practice.*

Keywords: Postoperative anal fistula, Wound healing, Risk factors, Review.

1. Introduction

Anal fistula is mostly caused by sequelae caused by perianal abscess, and the symptoms mainly include local itching, painful pus, etc. [1], and most of them are pathological abnormal channels formed by the rectum or anal canal connected with the perianal skin after the abscess is ulcerated. The process of anal fistula lesions includes primary internal orifice, fistula and secondary external orifice, as stated in the Song Dynasty medical book "Taiping Shenghui Fang", "a man who has hemorrhoids and leakage, and the hemorrhoids and poisonous gases accumulate on the anal side, and after piercing, the wound is not combined." Anal fistula is one of the common diseases in proctology, with a prevalence of 12.3 cases per 100,000 cases in men and 5.6 cases per 100,000 cases in women [2]. At present, the treatment of anal fistula at home and abroad is mainly based on surgery, due to the severe pain caused by the formation of pathological channels caused by local abscess ulceration and many complications, the wound healing after anal fistula surgery is also greatly affected, so the causes and risk factors of slow wound healing after anal fistula can be actively summarized and analyzed, which can formulate effective interventions for patients with anal fistula, reduce the pain of patients after surgery, promote wound healing, and improve the quality of life of patients with anal fistula. For patients who have undergone anal fistula surgery, the healing of the wound is an important basis for evaluating the effectiveness of surgery. The progress and quality of wound healing are directly related to whether patients can successfully return to normal life. Therefore, the wound healing after anal fistula surgery is not only related to the patient's physical health, but also an effective indicator to measure the effectiveness of the operation [3]. However, the current research on anal fistula focuses more on treatment, and there are few systematic summaries of the causes and risk factors of postoperative wound healing. From the perspective of wound healing after anal fistula, this study will review its causes and influencing factors, in order to provide reference for postoperative wound healing nursing in patients with anal fistula.

2. Causes Affecting Wound Healing after Anal Fistula Surgery

2.1 Poor Bowel Habits

Poor bowel habits are an important reason for bowel habits after anal fistula surgery, and it is also an important reason for the recurrence of anal fistula. In terms of the occurrence of anal fistula, anal fistula is usually secondary to anorectal abscess, which is caused by anal gland blockage, infection, anal cryptitis, or due to anal fissure, thrombotic external hemorrhoidal infection, internal hemorrhoids or intestinal prolapse after injection treatment, improper nursing operation is one of the important causes of perirectal abscess. Usually the infection is located near the sphincter complex, so the fistula can pass through the sphincter. One-third of patients who undergo incision and drainage of an anorectal abscess later develop a fistula [4]. The occurrence of anal cryptitis is closely related to poor bowel habits, such as repeated watery stools or persistent diarrhea, which can cause feces to rub on the crypt continuously and cause trauma or form deposits in the crypt, which can cause infection in the long run. In addition, hard stools may also lead to inflammation of the anal crypt or adjacent structures, such as proctitis, and the presence of some external sources of infection (foreign body or parasitic infection) may also lead to cryptitis [5]. If the patient still has poor bowel habits after anal fistula surgery, the recovery of the wound will be affected, causing infection and slow recovery.

2.2 Wound Infection after Anal Fistula Surgery

Wound infection or infection after anal fistula surgery is not effectively controlled will hinder the growth of new tissues and prolong the healing time. Patients with anal fistula have open wounds after surgery and are exposed to the outside world. Therefore, they are susceptible to infection after surgery. The signs of infection are usually pain, fever, and general fatigue. It may cause complications such as increased wound secretions and bleeding, which can affect the healing

speed of the wound and increase the pain time. Second, rush for surgery when the sinus tract has not yet formed. This will spread inflammation and form new sinuses and pus cavities. The wound will not heal for a long time and the condition will be repeated, causing great harm to the patient's life and psychology.

2.3 Improper Diet During the Postoperative Recovery Period

Dietary regulation during the postoperative recovery period is also very important. Intake of spicy, greasy or irritating foods may irritate wounds and delay healing. Patients with diarrhea or thin stools take more fiber-rich foods. Fiber works by absorbing and retaining fluid, thereby softening hard stools and thickening thin stools, which have a two-way regulatory effect. Adequate increase in fiber feces can make defecation more thorough, less sputtering during defecation, less force during defecation, and more regular defecation.

2.4 Anal Fistula Surgery

Depending on the location of the fistula, different surgical options or problems in the treatment of the problem during the operation will affect the recovery of the wound after the operation. The first is the classification of anal fistula: According to research, the recurrence rate of low-level trans-sphincter fistula is 10.7%, the recurrence rate of high-level trans-sphincter fistula is 37.8%, and the AFR rate of the horseshoe-shaped extension bundle is 44.4% [6]. The incidence of AFR in the superior sphincter bundle is the highest [6-8], and undetected internal openings can increase AFR to 43%-53% [9-12]. The second is the problem of surgical operation: the inner opening cannot be found during the operation or the inner opening is not handled correctly, resulting in the formation of the inner opening; the necrotic tissue in the fistula is not scratched cleanly, and the source of infection remains; there are gaps or dead cavities left during the suture of the wound, which leads to infection and difficulty in healing; therefore, it is possible to know whether the operation is accurately finding and dealing with the inner mouth and completely removing the source of infection (such as the primary foci of the anal sinus, anal glands and internal sphincter) are important influencing factors for wound healing after surgery.

2.5 Patient-specific Physical Differences

Individual differences may lead to slower healing, which can affect the speed at which wounds can heal in patients with anal fistula that is specific to themselves. Wound healing includes the patient's own underlying diseases, immune system response, TCM constitution theory, etc. Patients with underlying medical conditions such as diabetes mellitus may develop a variety of complications, including chronic wounds, such as non-healing DFU, which are caused by perturbations at each stage of wound healing [13]. Chronic diseases such as tuberculosis, leukemia, and anemia can affect the speed at which wounds heal. Systemic diseases such as inflammatory bowel disease, uremia, malignancy, and jaundice can also adversely affect wound healing.

Theory of constitution in traditional Chinese medicine:

Studies have shown that the proportion of damp-heat and phlegm-damp matter in patients with perianal abscess is greater than that of the general population, and the proportion of peaceful quality, qi deficiency quality, blood stasis quality, qi stagnation quality and special quality is smaller than that of the general population. The proportion of damp-heat, phlegm-dampness, and yang deficiency in patients with anal fistula was greater than that of the general population, and the proportions of qi deficiency, peace, blood stasis, yin deficiency, special endowment, and qi stagnation were smaller than those in the general population, and the above differences were statistically significant [14]. It can be seen that phlegm-damp constitution, damp-heat body, and yang deficiency are more likely to suffer from perianal abscess and then cause anal fistula.

2.6 Circulatory Disorders

Poor circulation can affect the supply of nutrients and the excretion of waste from wounds, which in turn can affect healing. According to data, when the mean arterial pressure is less than 80 mmHg, it can lead to slow wound healing, stagnation, or worsening of the wound healing process. With any local treatment or nursing intervention, a significant correlation between the level of sluggish or stagnant local wound healing and mean arterial pressure values can be observed. Thus, the data also suggest that a reparative state of hypoperfusion should be prioritized before making a decision on treatment [15]. In addition, poor lifestyle habits such as sedentary lifestyles lead to reduced blood flow around the anus, resulting in slow wound healing after surgery. Therefore, under the condition of normal blood circulation, proper activity during the recovery period of anal fistula patients can help the wound heal.

2.7 Wound Foreign Body Irritation

After anal fistula, if the anus cannot be rested, the anal sphincter is often in a spasmodic state due to sphincter contraction or inflammatory stimulation, which is not conducive to fistula bonding and wound recovery. There are foreign bodies left in the wound, such as threads, cotton wool, etc., which affect the normal growth and healing of the wound. Foreign bodies such as stitches and drains after surgery may irritate the wound and delay healing. In addition, excessive activity too early after surgery can lead to irritation of the wound and affect healing.

2.8 Local Neurological Abnormalities

Nerve damage or dysfunction may affect the healing process of the wound. The dermis of the skin is rich in sensory innervation. Alapure [16] found that surgical removal of the auricular cutaneous nerve in small animals hindered skin wound healing. Further studies have found that the cutaneous sensory nerve fiber terminals can produce a variety of neuropeptides, such as substance P, calcitonin gene-related peptide (CGRP), neurokinin A, and vasoactive intestinal peptide (VIP) [17]. In the process of wound healing, these neuropeptides have the effect of dilating blood vessels and promoting vascular regeneration [17], and these studies suggest that sensory nerves play an important role in vascular regulation in wound healing. Neurological injury or

dysfunction has a negative effect on wound recovery.

3. Risk Factors

3.1 Age

Older people may have a weaker ability to heal wounds than younger people due to reduced physical function. Old age and frailty, long-term illness and weakness, long-term lack of exercise, etc., affect the ability of tissue regeneration. There are numerous studies that show that as people age, the defense function of the epidermis and dermis gradually weakens, and the skin's ability to resist damage and injury decreases. In particular, the dermal-epidermal junction becomes flattened, which makes the tissue more susceptible to external friction [18].

3.2 Chronic Diseases

Such as diabetes, cardiovascular disease, etc., which may affect the wound healing process. Cardiovascular diseases such as myocardial infarction: The similarity of wound healing conditions between the skin and the heart allows us to inform patients about how to cope with myocardial infarction based on the degree of recovery from skin damage. Those who heal faster in skin wounds heal better and are more likely to survive and recover relatively well after a myocardial infarction. Changes in skin condition after injury can be used as an indicator of the heart's response to injury. In addition, diabetes mellitus is a predictor of the degree of heart failure and its worsening or improvement after myocardial infarction in humans. A recently published study showed that mice whose skin wounds healed faster also performed better to survive and recover from myocardial infarction. (Becirovic-Agic et al., 2022) [19].

3.3 Smoking

Smoking reduces the amount of oxygen in the blood and affects wound healing. Smoking produces tissue hypoxia, leading to vasoconstriction, cellular dysfunction, and thrombosis-mediated delayed or impaired wound healing [19]. Smoking is often associated with a sedentary lifestyle, resulting in increased pressure in the anorectal area and reduced blood flow to the surgical site. Studies have shown a 15 percent decrease in blood flow shortly after laser Doppler flow assays detect smoking in the anorectal mucosa [20]. Studies have shown that gutin can reduce the proliferation of red blood cells, fibroblasts, and macrophages. Carbon monoxide reduces oxygen transport and metabolism, while hydrogen cyanide inhibits oxidative metabolism at the cellular level and the enzyme system necessary for oxygen transport. Clinically, slower healing has been observed in smokers with wounds caused by trauma, illness, or surgery [20].

3.4 Malnutrition

The nutritional requirements of the wound healing process are complex. Proteins, carbohydrates, arginine, glutamine, polyunsaturated fatty acids, vitamin A, vitamin C, vitamin E, magnesium, copper, zinc, and iron play an important role in wound healing, and any deficiency of any component can affect wound healing [21]. Studies have shown that nutritional

deficiencies are more prevalent in patients with chronic wounds. Malnutrition may alter the inflammatory response, collagen synthesis, and wound tensile strength, all of which are essential for wound healing. Although the specific role of nutrition and supplements in wound care remains uncertain, it is necessary to identify and correct nutritional imbalances to avoid any potential deterioration of the healing process.

3.5 Psychological Stress

Studies have shown that psychological stress and depression may reduce the inflammatory response required for bacterial clearance, thereby delaying wound healing [22]. According to a study of traumatic facial burns, long-term anxiety and psychological stress can affect the body's immune function and healing process. If the psychological stress is too high, it may worsen the condition, which in turn affects the speed of wound healing. Based on prospective studies, emotion regulation intervention programs can significantly reduce the healing time and hospital stay in patients with facial burns. Psychological factors can affect immune function and inflammatory responses, further influencing the wound healing process. A positive mindset can enhance immune function and anti-inflammatory abilities, and promote facial healing; Negative psychological states can suppress immune function and increase inflammation, delaying facial healing [23].

4. Countermeasures

Anal fistula is a common anorectal condition, and nowadays, surgery is the main treatment for anal fistula. However, postoperative wound healing is a relatively slow process, and here is a summary of some methods that can help speed up wound healing after anal fistula surgery.

4.1 Strengthen Nutritional Support and Promote Tissue Recovery

After surgery, nutritional intake should be strengthened and foods rich in protein, vitamins and minerals should be eaten to promote tissue repair.

4.2 Prevent and Control Infection and Reduce Postoperative Recurrence

Antibiotics should be used strictly according to the doctor's instructions after surgery to avoid wound infection. For large and deep wounds, hydrogen peroxide can be used for cleaning, and wet compresses such as metronidazole and gentamicin can be used.

4.3 Keep the Wound Clean and Reduce Wound Irritation

Change the dressing regularly to keep the wound clean and dry to avoid irritation of the wound by feces and intestinal fluid.

4.4 Encourage Patients to Exercise Appropriately to Promote Wound Healing

Proper exercise can promote blood circulation and further aid wound healing, but recurrence caused by strenuous exercise

should be avoided.

4.5 Traditional Chinese Medicine Adjuvant Treatment

You can take the traditional Chinese medicine decoction that nourishes qi and blood, invigorates blood and dissipates blood stasis, or uses purulent and decaying drugs such as Jiuyi Dan and Baerdan to change the dressing. Topical drugs such as Jiawei Shengjiyu Red Paste can reduce inflammation and promote the growth of vascular endothelial cells by inhibiting the expression of NF- κ B p65 and IL-1 β proteins, up-regulating the expression of VEGF protein, reducing inflammatory responses, and promoting the growth of vascular endothelial cells, thereby shortening the healing time of wounds after anal fistula surgery [24].

4.6 Supplementation of Trace Elements

Such as supplementation of zinc-containing preparations (such as zinc gluconate), zinc is an important trace element to promote wound healing.

4.7 Avoid Irritating Foods

The postoperative diet should be mainly light, and spicy, greasy and other irritating foods should be avoided.

4.8 Regular Review

Regular review after surgery to detect and deal with problems that may affect healing in a timely manner, such as edema granulosa hyperplasia, false healing or bridge healing.

4.9 Psychological Adjustment

Maintain a good state of mind, reduce psychological stress, and help the body recover.

4.10 Follow Professional Guidance

Perform postoperative recovery under the guidance of a professional doctor, follow the doctor's instructions, and change dressings correctly. Each patient's situation is different, and the above methods should be carried out under the guidance of a doctor. If there are any problems during the postoperative wound healing process, you should consult your doctor promptly.

In summary, the factors affecting wound healing after anal fistula are diverse and complex, and this review summarizes and analyzes the causes and risk factors of slow wound healing in patients with anal fistula, including poor bowel habits, postoperative wound infection, improper diet during postoperative recovery, anal fistula surgical process, patient-specific physical differences, blood circulation disorders, postoperative wound stimulation, and local neurological abnormalities. Risk factors include: age, chronic diseases, malnutrition, smoking, psychological stress and some countermeasures, postoperative wound healing is often affected by multiple factors, and studying the influencing factors and avoiding related risks is the key to our future clinical research, improve efficacy, and improve the prognosis of patients after surgery. However, the impact on

postoperative wound healing does not stop there, and the description in this article is not necessarily very comprehensive and detailed, and further research will be carried out in follow-up learning and clinical practice to have a more comprehensive understanding of its causes and influencing factors.

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