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Research Progress of Traditional Chinese Medicine Intervention in Postoperative Pain after Mixed Hemorrhoid Surgery

Xingyu Guo[1], Jin Zeng[2,*]

[1]Shaanxi University of Chinese Medicine, Xianyang 712046, Shaanxi, China
[2]Xi'an Hospital of Traditional Chinese Medicine, Xi'an 710021, Shaanxi, China
**Correspondence Author*

Abstract: ***Mixed hemorrhoids are common and frequently encountered diseases in anorectal surgery. Although surgery can effectively remove the lesions, postoperative pain remains an important issue affecting patients' recovery experience and the quality of wound healing. Its occurrence is closely associated with the rich innervation and vascularity of the perianal region, surgical trauma, release of inflammatory mediators, sphincter spasm, defecation-related stimulation, and psychological stress. From the perspective of traditional Chinese medicine, this condition is mainly attributed to incised-wound injury, damage to the meridians and collaterals, impaired circulation of qi and blood, and obstruction caused by damp-heat and blood stasis. It may also be accompanied by postoperative depletion of qi and blood and local malnourishment, manifesting as "pain due to obstruction" and "pain due to malnourishment." In recent years, traditional Chinese medicine interventions have gradually developed into an integrated therapeutic model involving oral Chinese herbal medicine, herbal fumigation and sitz bath, external ointment application, rectal administration of suppositories, and acupuncture. Related studies have shown that traditional Chinese medicine can exert analgesic, anti-edematous, and wound-healing effects by regulating inflammatory factors and pain-related mediators, improving local microcirculation, alleviating edema, and promoting wound repair. This article reviews the research progress of traditional Chinese medicine interventions for postoperative pain after mixed hemorrhoid surgery, aiming to provide a reference for their standardized clinical application.***

Keywords: Mixed hemorrhoids, Postoperative pain, Traditional Chinese medicine, Inflammatory factors, Research progress.

1. Introduction

Mixed hemorrhoids are formed by the confluence of pathological changes in the internal and external hemorrhoidal venous plexuses and represent one of the most common diseases in anorectal surgery. For patients with grade III or IV mixed hemorrhoids, recurrent bleeding or obvious prolapse, poor response to conservative treatment, or concomitant anal fissure or anal fistula, surgery remains the main treatment modality [1]. With the development of techniques such as stapling devices, energy-based instruments, and selective hemorrhoidal mucosal resection, the safety and precision of mixed hemorrhoid surgery have been continuously improved. However, because the anal region is densely distributed with nerve endings, has abundant vascular and lymphatic circulation, and is characterized by an open wound surface that is continuously stimulated by feces and defecation, postoperative pain is prone to occur, and wound healing may be delayed [2,3]. Pain may cause patients to avoid defecation, reduce food intake, suffer from impaired sleep, and experience emotional tension, thereby inducing constipation, urinary retention, anal margin edema, and increased wound exudation, eventually forming a vicious cycle of "pain–spasm–edema–recurrent pain." Therefore, postoperative pain after mixed hemorrhoid surgery is not merely an isolated symptom, but also an important factor affecting the quality of perioperative recovery, length of hospital stay, patient satisfaction, and long-term anal function.

Current Western medical analgesic measures include nonsteroidal anti-inflammatory drugs, opioids, local anesthetics, caudal block, analgesic pumps, balanced analgesia, and preemptive analgesia [4]. These approaches have definite short-term analgesic effects, but they still have limitations, including gastrointestinal discomfort, risk of bleeding, nausea and vomiting, urinary retention, drowsiness, drug dependence, and considerable individual variation [5,6]. Especially after anorectal surgery, patients often require repeated dressing changes and defecation, and reliance on analgesic drugs alone is often insufficient to achieve multiple therapeutic goals, such as pain relief, edema reduction, anti-inflammation, and wound healing promotion. Traditional Chinese medicine treatment for postoperative pain after mixed hemorrhoid surgery emphasizes both holistic regulation and local syndrome-based treatment. Oral herbal prescriptions can regulate qi and blood, clear damp-heat, and activate blood circulation to unblock the collaterals, while fumigation and sitz baths, external application, rectal administration, and acupuncture can directly act on the perianal wound and related acupoints. These therapies have advantages such as diverse treatment modalities, clear local effects, high patient acceptance, and compatibility with conventional treatment. In recent years, relevant studies have not only focused on improvements in pain scores but have also gradually introduced the theory of inflammatory factors, providing relatively rich clinical and mechanistic evidence for traditional Chinese medicine interventions in postoperative pain after mixed hemorrhoid surgery.

2. Modern Medical Perspectives on Postoperative Pain after Mixed Hemorrhoid Surgery

The occurrence of postoperative pain after mixed hemorrhoid surgery is first associated with the special anatomical structure of the anorectal region [7]. The area below the dentate line is mainly innervated by somatic nerves and is highly sensitive to pain. Surgical incisions, ligation sites,

exposed wounds, and dressing changes can all directly stimulate nociceptors. Although traditional procedures such as external dissection and internal ligation are reliable in efficacy, they require excision of external hemorrhoidal tissue and ligation of the base of internal hemorrhoids, leaving relatively open postoperative wounds with obvious local inflammatory exudation and edema. Stapler-related procedures can reduce some open wounds; however, if there is excessive anastomotic tension, local tissue traction, or edema, they may also cause anal distension and pain. Second, postoperative defecation is an important trigger for pain aggravation [8]. Mechanical friction occurs when feces pass over the wound surface. Because patients may delay defecation due to fear of pain, fecal dryness and hardening may develop, further increasing anal canal pressure and tearing the wound, thereby markedly aggravating pain.

From the perspective of molecular mechanisms, postoperative pain after mixed hemorrhoid surgery is related to intraoperative trauma to the perianal soft tissues and nerves. The body releases various inflammatory and pain-inducing mediators, such as neuropeptides and cytokines, which induce pain symptoms after binding to their corresponding receptors [9]. Surgical manipulation disrupts the normal structure of perianal tissues and stimulates nociceptors to produce pain-related factors such as interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-α), thereby causing pain. Meanwhile, the body's endogenous analgesic pathways are activated simultaneously, leading to the secretion of neuropeptides with morphine-like activity, such as β-endorphin, to alleviate postoperative pain [10]. Existing studies have confirmed that traumatic stimulation can increase the sensitivity of nerve endings and promote the secretion of inflammatory cytokines, 5-hydroxytryptamine (5-HT), prostaglandins (PGs), and other chemical transmitters, further inducing pain. In addition, the excitability of perianal nociceptors increases after surgery and the pain threshold decreases, which significantly intensifies patients' subjective perception of pain [11,12].

3. Traditional Chinese Medicine Perspectives on the Pathogenesis of Postoperative Pain after Mixed Hemorrhoid Surgery

Traditional Chinese medicine holds that postoperative pain after mixed hemorrhoid surgery is associated with factors such as wind, dampness, heat, dryness, qi stagnation, blood stasis, and deficiency of qi and blood. Although surgery can remove hemorrhoidal masses and tangible pathogenic factors, incised-wound injury damages the skin, flesh, vessels, and collaterals, leading to local meridian impairment, unsmooth circulation of qi and blood, and stagnation of blood stasis; therefore, "pain occurs when there is obstruction" [13]. After surgery, the wound surface remains open, allowing residual damp-heat pathogens to linger in the anal region. Alternatively, fecal contamination during defecation or inadequate local cleansing may cause damp-heat toxin to descend. Dampness is characterized by stickiness and stagnation, while heat is characterized by burning and injury; when both combine with blood stasis, swelling, burning pain, and exudation may occur simultaneously. If the patient has constitutional spleen deficiency, insufficiency of qi and blood, or considerable intraoperative bleeding, the postoperative skin, flesh, vessels, and collaterals may lose nourishment, resulting in "pain due to malnourishment" [14]. In such cases, the pain is often dull and lingering, accompanied by delayed wound healing.

4. Research Progress on Internal Treatment with Chinese Herbal Medicine

Internal treatment with Chinese herbal medicine focuses on regulating the postoperative condition of the body as a whole, and its therapeutic rationale is closely related to the pathogenesis of postoperative pain after mixed hemorrhoid surgery. Xue Zheng Lun states that "all pain is caused by the coagulation and stagnation of blood stasis." Therefore, many clinical researchers have approached postoperative pain from this perspective. In accordance with the traditional Chinese medicine principle of "treating the branch in acute conditions and treating the root in chronic conditions," regulating qi and activating blood circulation are commonly adopted as the main therapeutic methods, with prescriptions formulated according to syndrome differentiation based on the four diagnostic methods. Numerous studies have shown that oral administration of Chinese herbal medicine after anorectal surgery can regulate the expression of inflammatory factors, improve local microcirculation, and relieve pain.

4.1 Correlation between Inflammatory Factors and Postoperative Pain after Mixed Hemorrhoid Surgery

Prostaglandin E2 (PGE2) is an important lipid mediator derived from arachidonic acid metabolism. It is widely involved in various physiological and pathological processes and is a key factor mediating postoperative inflammatory responses [15]. PGE2 has dual pain-promoting effects: it can directly mediate local inflammatory injury and also induce pain sensitization, lower the pain threshold, and significantly amplify pain perception. Related studies have shown that pro-inflammatory factors such as TNF-α and IL-6 can further promote the synthesis and release of PGE2, activate perianal nociceptors, and thereby induce and aggravate postoperative pain after mixed hemorrhoid surgery [16].

The interleukin (IL) family includes multiple subtypes, among which IL-1, IL-6, IL-8, and IL-10 are closely associated with the occurrence and development of postoperative pain after mixed hemorrhoid surgery. IL-6 is a highly sensitive inflammatory indicator in the body's stress response and can effectively reflect the degree of postoperative inflammation. It is one of the key reference indicators for clinically evaluating the effects of postoperative analgesic interventions [17]. IL-10 is a typical anti-inflammatory and immunosuppressive cytokine. By inhibiting the inflammatory secretory functions of immune cells such as macrophages and lymphocytes, it reduces the release of various pro-inflammatory mediators, thereby alleviating inflammatory injury after perianal surgery and reducing local inflammatory responses [18]. Existing clinical studies have confirmed that the postoperative expression levels of pro-inflammatory factors such as IL-6 and IL-8 in patients with anorectal diseases are positively correlated with the severity of postoperative pain, whereas the expression level of the anti-inflammatory factor IL-10 is negatively correlated with pain intensity. Together, these cytokines participate in regulating postoperative pain and inflammatory

responses after mixed hemorrhoid surgery [19].

Tumor necrosis factor-α (TNF-α) is mainly synthesized and secreted by activated macrophages, monocytes, and T lymphocytes. It is a homotrimeric inflammatory factor composed of 157 amino acids [20]. Related studies have shown that, after traumatic stimulation, the body releases large amounts of TNF-α to initiate immune defense mechanisms and chemotactically recruit immune cells to clear local infectious lesions. However, excessive expression of this factor can trigger an inflammatory cascade amplification effect, induce the production of more inflammatory mediators, further aggravate inflammatory injury in local perianal tissues, and intensify postoperative pain responses [21-22].

Substance P (SP) is a neuropeptide composed of 11 amino acids and is a key mediator of pain signal transmission [23]. When sensory nerve endings are stimulated by trauma, SP is released into peripheral tissues, causing local capillary dilation and increased vascular permeability, which induces a series of inflammatory pathological changes, such as plasma protein extravasation and tissue edema, thereby aggravating local inflammatory responses [24]. β-Endorphin is mainly synthesized in the hypothalamus and anterior pituitary gland and is a core substance in the body's endogenous analgesic system. By binding to opioid receptors and inhibiting the release of pain-inducing transmitters such as SP, it blocks pain signal transmission and exerts endogenous analgesic effects [25]. Related studies have confirmed that, under postoperative stress, the body activates a bidirectional regulatory mechanism: on the one hand, SP is released to accelerate pain transmission; on the other hand, β-endorphin expression is upregulated to counterbalance excessive pain responses by inhibiting SP secretion and pain signal transmission, thereby achieving self-regulation of analgesia [26-27].

4.2 Oral Administration of Chinese Herbal Decoctions

Postoperative pain after mixed hemorrhoid surgery is often caused by qi stagnation and blood stasis, deficiency of qi and blood, or a complex syndrome of deficiency complicated by excess. Therefore, the basic therapeutic principles include activating blood circulation to dissipate stasis, tonifying qi and nourishing blood, unblocking the meridians, and relieving pain, with flexible prescription modifications according to each patient's individual syndrome pattern. Yuan Weichao et al. [28] used Modified Shaoyao Gancao Decoction to improve wound pain after mixed hemorrhoid surgery. After intervention, the serum concentrations of SP and PGE2 decreased simultaneously, and the patients' pain and discomfort were substantially relieved. He Zhiguang et al. [29] found that Zhitong Rushen Decoction could increase serum IL-2 and β-endorphin levels, thereby relieving postoperative pain after mixed hemorrhoid surgery while shortening wound healing time. The study by Luo Zeqin et al. [30] also confirmed that combined internal and external application of Modified Sihuang Decoction could downregulate IL-1, C-reactive protein, and PGE2, thereby alleviating postoperative pain. Liu Xianbao [31], inheriting Professor Shi Rong's therapeutic concept that "damp-heat is the root" and "qi stagnation and blood stasis are the key," proposed that in Fujian Province, damp-heat is the fundamental factor leading to postoperative pain after hemorrhoid surgery, while qi stagnation and blood stasis are important factors in its development. In addition, considering that hemostasis should be emphasized in patients after hemorrhoid surgery, treatment should still focus on clearing heat and draining dampness, supplemented by stopping bleeding and resolving stasis. By observing the effects of Modified Sanhuang Erdi Decoction in treating postoperative complications of mixed hemorrhoids with the damp-heat downward-diffusion syndrome, the study found that it had a significant effect in relieving pain and reduced the frequency of analgesic use.

5. Research Progress on External Treatment Methods of Traditional Chinese Medicine

External treatment methods of traditional Chinese medicine include various forms such as herbal fumigation and sitz bath, external ointments, and suppository preparations. Their pharmacological effects, including clearing heat and detoxifying, activating blood circulation and dissipating stasis, reducing swelling, and relieving pain, can significantly inhibit postoperative perianal inflammation, alleviate pain symptoms, promote wound regeneration and repair, and improve patients' postoperative quality of life, with a low overall incidence of adverse drug reactions.

5.1 Herbal Fumigation and Sitz Bath

Herbal fumigation and sitz bath exert therapeutic effects through both warm stimulation and pharmacological action. Warm stimulation can dilate local blood vessels, improve blood and lymphatic return, and relieve sphincter spasm. Washing with the herbal solution can reduce wound contamination and inflammatory secretions, improve local blood circulation, promote wound healing, accelerate metabolism, and relieve pain [32]. Quyu Xiaozhong Decoction can effectively reduce serum levels of inflammatory factors such as IL-6, TNF-α, and C-reactive protein (CRP) after mixed hemorrhoid surgery, thereby reducing wound pain, increasing basic fibroblast growth factor and vascular endothelial growth factor levels, shortening healing time, and improving overall clinical efficacy [33]. Liang Biao et al. [34] treated postoperative patients with mixed hemorrhoids of the damp-heat downward-diffusion type using fumigation with Modified Kushen Decoction and found that the analgesic effect of Chinese herbal sitz bath was significantly superior to that of potassium permanganate solution fumigation, with a marked decrease in serum inflammatory factors. A related trial conducted by Feng Yuxi [35] confirmed that intervention with Zhongtong Fumigation Lotion could upregulate the expression of IL-10 and β-endorphin while downregulating the concentration of PGE2. The results of Kang Xijie [36] showed that Shenyu Lotion could reduce the serum expression levels of substance P and neuropeptide Y, relieve postoperative pain, and prolong the interval between pain episodes. Liu Yuyan et al. [37] observed that Huaiyu Decoction could improve serum levels of TNF-α, IL-6, and IL-10, inhibit neural excitation, reduce central pain sensitization, and thereby achieve analgesic effects. These findings indicate that herbal fumigation can exert favorable analgesic effects by regulating inflammatory factor levels.

5.2 Chinese Herbal Ointments

Ointments act directly on local lesions or wound surfaces, with the core effects of activating blood circulation and resolving stasis, reducing swelling and relieving pain, and promoting tissue regeneration and wound healing. Since the drugs are not absorbed through the gastrointestinal tract, damage to the liver and kidneys can be reduced. The lubricating effect of Chinese herbal ointments can decrease local frictional stimulation and relieve pain and edema. The active components of the drugs can penetrate through the skin, regulate vascular wall permeability, and increase the rate of drug absorption. They can also improve local blood circulation, promote the exudation of growth factors and inflammatory factors in plasma, reduce inflammatory responses, and facilitate wound healing [38]. A study conducted by Li Shuang et al. [39] confirmed that external application of Huanglian Ointment combined with oral administration of Zhitong Rushen Decoction could reduce serum TNF-α and IL-6 expression levels, alleviate local inflammatory stress responses, improve postoperative anal swelling and pain as well as wound edema, and promote surgical wound repair.

5.3 Suppositories

During suppository administration, the preparation is inserted directly into the anus and gradually melts under body temperature, allowing the drug to come into direct contact with the perianal lesion site. The rectal mucosa has an abundant blood supply and good permeability, enabling the melted active components to be rapidly absorbed into the bloodstream through the mucosa, thereby exerting pharmacological effects such as clearing heat and detoxifying, reducing swelling and relieving pain, astringing sores, and promoting tissue regeneration. Compared with other external dosage forms, Chinese herbal suppositories have multiple advantages: they are easy to use, store, and carry; they cause only mild local irritation; they have a prolonged duration of action and good formulation stability; and they produce fewer systemic adverse reactions after administration. Zhang Farui [40] studied Dahuang Xiaozhi Suppository and found that it could be conveniently inserted into deep lesion sites, prevent false healing of the wound to a certain extent, reduce postoperative pain and edema, decrease wound exudation, promote the growth of wound granulation tissue, effectively lower serum hs-CRP and IL-6 levels, inhibit wound inflammatory responses, promote wound growth, shorten healing time, and cause no observed adverse reactions. In addition to the effects of the medicinal ingredients, the melted suppository can lubricate the anal canal and rectum, facilitate smooth defecation, reduce friction between feces and the wound surface, and alleviate postoperative wound pain [41].

5.4 Acupuncture and Other Therapies

Acupuncture and moxibustion are distinctive therapeutic methods of traditional Chinese medicine and are widely used in the treatment of various diseases as well as in health preservation. Acupuncture and moxibustion therapy mainly includes acupuncture and moxibustion. Its pain-relieving mechanism is based on meridian theory in traditional Chinese medicine. Through syndrome differentiation and treatment, appropriate acupoints are selected, and the conductive functions of meridians and acupoints are utilized together with specific manipulation techniques to treat various systemic diseases. Acupuncture and moxibustion can balance yin and yang, strengthen healthy qi, eliminate pathogenic factors, and unblock the meridians [42]. Xiao Yadan et al. [43] randomly divided 70 patients with postoperative pain after mixed hemorrhoid surgery into two groups. The control group received intramuscular ketorolac tromethamine, while the observation group received the “Zhibian penetrating to Shuidao” needling method on the basis of the control treatment. This directional deep penetrating needling technique can reach the lesion site directly. After treatment, it significantly relieved postoperative pain in patients with mixed hemorrhoids, improved sleep and anxiety, and reduced serum levels of norepinephrine (NE), substance P (SP), and 5-hydroxytryptamine (5-HT). Zhang Yaping et al. [44] analyzed the mechanism of thumbtack needle therapy for postoperative pain and other complications after mixed hemorrhoid surgery and found that thumbtack needles can provide continuous stimulation by being fixed subcutaneously at acupoints, thereby regulating qi and blood and promoting qi movement through the collaterals. Its analgesic mechanism mainly involves regulation of endocrine function and the release of endogenous analgesic substances, as well as inhibition of microglial activation and pro-inflammatory factor production. A network meta-analysis [45] indicated that electroacupuncture, auricular point pressing, and acupoint catgut embedding are effective therapeutic methods for relieving postoperative pain after hemorrhoid surgery. Long Qing et al. [46] found that electroacupuncture at different frequencies can relieve postoperative anal pain, and different stimulation parameters can produce different effects in the body. The analgesic effects also vary by frequency, with 2 Hz/100 Hz sparse-dense wave electroacupuncture showing superior analgesic effects compared with 2 Hz/100 Hz continuous wave stimulation. Su Yanlin [47] applied Chixiaodou Danggui Powder retention enema after mixed hemorrhoid surgery and found that it significantly improved postoperative anal pain, anal distension, and bleeding, while also reducing the incidence of postoperative anal papilla hypertrophy.

6. Summary and Prospects

The mechanism of postoperative pain after mixed hemorrhoid surgery is relatively complex and is closely associated with surgical trauma, inflammatory responses, neural sensitization, sphincter spasm, wound edema, and defecation-related stimulation. From the perspective of traditional Chinese medicine, its core pathogenesis lies in impaired circulation of qi and blood, blood stasis, damp-heat obstruction, and meridian blockage after incised-wound injury, and it may also be accompanied by deficiency of qi and blood and local malnourishment. Based on syndrome differentiation and treatment, traditional Chinese medicine interventions have gradually developed into various therapeutic approaches. They can regulate inflammatory factors and pain-related mediators such as IL-6, TNF-α, PGE2, SP, and β-endorphin, improve local microcirculation, reduce edema, and promote wound repair, thereby exerting analgesic, anti-edematous, and wound-healing effects. These interventions have advantages such as fewer adverse reactions, relatively high patient

acceptance, and compatibility with conventional treatment.

However, some limitations remain in current studies. Most existing studies are single-center clinical observations with small sample sizes, and some studies are not sufficiently rigorous in randomization, control group design, and treatment-course arrangement, which affects the reliability of their findings. Meanwhile, considerable differences exist among studies in syndrome differentiation criteria, herbal prescription composition, acupoint selection, fumigation duration, sitz bath temperature, external application dosage, and treatment course, increasing the difficulty of comparing results and promoting clinical application. In addition, efficacy evaluation mostly relies on pain rating scales, while objective indicators remain insufficiently applied. Future studies should further conduct large-sample, multicenter, randomized controlled trials, standardize syndrome differentiation criteria, treatment protocols, and operational procedures, and combine pain scores with objective indicators such as inflammatory factors, so as to further clarify the clinical efficacy and mechanisms of traditional Chinese medicine interventions for postoperative pain after mixed hemorrhoid surgery.

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