

Research Progress of Traditional Chinese Medicine in Alleviating Postoperative Pain of Anal Diseases

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Abstract: *Postoperative pain of anal diseases has become a core challenge in the clinical management of anorectal surgery. This is attributed to dense nerve distribution at the surgical site and high susceptibility of wounds to irritation. Its pathogenesis is closely related to inflammatory response, neural sensitization and local microcirculation disturbance. Western medicine can achieve prominent short-term analgesic effects, yet it is frequently accompanied by adverse reactions. Guided by the holistic concept of traditional Chinese medicine (TCM), TCM analgesic therapies regulate qi, blood, yin and yang of the human body so as to improve patients' postoperative quality of life. With merits of few adverse reactions and convenient operation, TCM has been widely adopted for postoperative pain and other complications of anal diseases in recent years. This paper reviews TCM interventions for postoperative pain of anal diseases, including oral medication, external therapies and acupuncture-moxibustion. Limitations of existing studies are also analyzed, so as to provide references for standardized application and further research of TCM in managing perianal postoperative pain.*

Keywords: Anal diseases, Postoperative period, Pain, Traditional Chinese medicine therapy.

1. Introduction

Anal diseases mainly include hemorrhoids, anal fistula, anal fissure and perianal abscess. Surgery is the primary treatment for advanced-stage cases [1]. Relevant studies report that the incidence of postoperative pain exceeds 95 %, among which moderate-to-severe pain accounts for over 60 %. Postoperative pain may cause patients to fear defecation and even induce constipation, which in turn aggravates pain [2]. It severely impedes postoperative rehabilitation and impairs patients' quality of life. Current Western-clinical analgesic strategies are diverse [3], covering pharmacological analgesia, continuous caudal block anesthesia, patient-controlled intravenous analgesia, balanced multimodal analgesia, preemptive analgesia and patient-controlled analgesia techniques. Although abundant analgesic agents are available clinically, various adverse risks remain. Long-term administration of opioids may lead to drug dependence, tolerance and respiratory depression [4]. Non-steroidal anti-inflammatory drugs can damage gastrointestinal mucosa and raise bleeding risk by inhibiting platelet aggregation [5]. Therefore, it is of great clinical value to explore alternative analgesic approaches. This article summarizes TCM methods and advantages for pain relief after anal disease surgery.

2. Etiology and Pathogenesis

2.1 Modern-medical Understanding of Postoperative Pain

Intraoperative injury to sphincters, nerves and perianal skin triggers release of inflammatory mediators. The anus is anatomically special, with abundant nerves and blood vessels and high neuronal sensitivity. Innervated by somatic spinal nerves below the dentate line, the region produces intense nociception after injury [6]. Surgical procedures largely determine pain severity after anorectal surgery. Anesthesia modality, surgical manipulation, as well as patient-related

factors including age, gender, physical condition, mental status and pain tolerance also exert considerable influences on postoperative pain [7].

2.2 TCM Understanding of Postoperative Pain

From the TCM perspective, postoperative pain arises from surgical trauma ("metal-blade injury") that damages skin, vessels and zang-fu organs, resulting in disharmony between nutrient-defense qi, blood stasis and meridian obstruction [8]. Most TCM practitioners hold that anal diseases are caused by invasion of wind-dampness-heat-dryness-stasis pathogens. These pathogens interact and block local qi-blood circulation. Though pathogenic toxins are removed by surgery, residual damp-heat and qi-blood stasis often persist, manifesting as local hemorrhage, edema and pain.

3. Internal TCM Therapy

Treatise on Blood Syndromes states: "All pain originates from blood stasis and stagnation." Accordingly, many clinical researchers follow the TCM principle of "treating the branch in acute conditions and the root in chronic conditions", prioritize regulating qi and activating blood circulation, and formulate individualized prescriptions based on four-diagnosis information to treat postoperative pain. Multiple studies confirm that oral Chinese herbal medicine can effectively relieve wound pain, reduce inflammatory exudate, promote granulation growth and accelerate wound healing after anorectal surgery. Qi-blood deficiency with residual toxin is a common syndrome after perianal abscess surgery [9]. Modified Tuoli Xiaodu San (composed of raw Astragali Radix, Codonopsis Radix, Angelicae Sinensis Radix, Poria Cocos, Atractylodis Macrocephalae Rhizoma, Chuanxiong Rhizoma, Lonicerae Japonicae Flos, Gleditsiae Sinensis Fructus, Cyperi Rhizoma, Persicae Semen, wine-processed Rhei Radix et Rhizoma, bran-stir-fried Aurantii Fructus and Glycyrrhizae Radix et Rhizoma

Preparata cum Melle) can markedly lower serum pro-inflammatory factors including interleukin-1 β (IL-1 β), interleukin-6 (IL-6) and tumor necrosis factor- α (TNF- α), restrain excessive local wound inflammation, up-regulate phosphorylated signal transducer and activator of transcription 3 (p-STAT3) and vascular endothelial growth factor (VEGF), activate the STAT3/VEGF signaling pathway, alleviate postoperative wound pain, decrease exudate and facilitate wound repair [10]. Yu Qiang et al. [11] reported that Anal Fistula Closure Decoction (containing Picrorhizae Rhizoma, Ampelopsis Radix, calcified Haliotidis Concha, Sophorae Flos, Angelicae Sinensis Radix and Astragali Radix) was applied for patients with damp-heat-pouring-down complex anal fistula after surgery. Following the therapeutic principles of clearing heat-dampness, regulating qi, resolving stasis and tonifying qi-blood, it accelerates wound healing, mitigates postoperative pain, reduces secretions and relieves edema. Zheng Wenbin et al. [12] treated postoperative mixed hemorrhoid patients with damp-heat pouring-down syndrome using modified Qingjie Decoction. The formula exerts effects of clearing heat-toxin, draining dampness to reduce swelling, cooling blood and relieving pain; it obviously relieves postoperative fever and pain, improves postoperative bleeding and promotes wound healing. Following Professor Shi Rong's academic viewpoints that "damp-heat is the root cause" and "qi-blood stasis is the key pathological link", Liu Xianbao [13] proposed that damp-heat serves as the fundamental factor for post-hemorrhoid-surgery pain in Fujian region, while qi-blood stasis drives disease progression. Hemostasis should also be emphasized for postoperative patients. Hence the primary therapeutic strategy is clearing heat-dampness, supplemented by hemostasis and stasis-resolving. Clinical observation on modified Sanhuang Erdi Decoction for postoperative complications of damp-heat-pouring-down mixed hemorrhoids demonstrated satisfactory pain-relieving effects and reduced rescue analgesic consumption.

4. External TCM Therapy

External TCM therapy is widely used in anorectal disorders. It shares the same therapeutic principles as internal medication but differs in drug delivery routes. Ancient TCM remarks that "external therapies are paramount for surgical diseases", highlighting its essential role in surgical conditions. Topical administration delivers herbal agents directly onto wounds, mitigating local symptoms and promoting tissue regeneration. Bypassing gastrointestinal metabolism, external herbal preparations avoid hepatic first-pass effect and gastrointestinal mucosal injury. Characterized by rapid onset, convenient application and potent local efficacy, external TCM therapies show unique advantages for anorectal postoperative complications.

4.1 Herbal fumigation and sitz bath

Herbal fumigation-sitz bath is extensively applied in anorectal diseases and postoperative rehabilitation. Huangdi Neijing records "treat pathogen-invaded lesions by soaking to induce sweating". Also named fumirontherapy or soak-compress therapy, this intervention heats herbal decoctions or liquid patent medicines to fumigate and subsequently irrigate lesions. Thermal stimulation accelerates local microcirculation, while liquid irrigation cleans wounds and herbal ingredients act

topically to reduce swelling, relieve pain, remove necrotic tissue and promote tissue regeneration.

Due to loss of stratum corneum on post-anal-fistula-surgery wounds, drugs readily penetrate viable epidermis, enhancing mucosal absorption and clinical efficacy [14]. Quyu Xiaozhong Decoction decreases serum IL-6, TNF- α and C-reactive protein (CRP), alleviates wound pain, elevates basic fibroblast growth factor and VEGF levels, shortens healing duration and improves overall therapeutic outcomes for mixed hemorrhoid surgery patients [15]. Liang Biao et al. [16]. administered modified Kushen Decoction fumigation-sitz bath to patients with damp-heat-pouring-down mixed hemorrhoids after surgery. Its analgesic effect surpassed that of 1:5000 potassium permanganate sitz bath, accompanied by significant reduction of serum inflammatory factors ($P < 0.05$). Chen Jie et al. [17] treated patients with low simple anal fistula with Kubai Liquid fumigation, achieving an effective rate of 85.42 %, versus 69.79 % in the potassium permanganate control group. Therefore, herbal fumigation effectively relieves postoperative wound pain and other complications. Common ingredients in these prescriptions include Phellodendri Chinensis Cortex, Sophorae Flavescentis Radix and Taraxaci Herba. Modern pharmacological studies reveal that Phellodendri Chinensis Cortex contains berberine, phellodendrine and ethyl caffeate, ameliorating local microcirculation and inhibiting excessive vasoconstriction to alleviate redness, swelling and pain [18] [19]. Matrine and oxymatrine from Sophorae Flavescentis Radix suppress pathogenic bacteria, mitigate local inflammation and raise pain threshold [20]. Taraxasterol in Taraxaci Herba modulates inflammatory factors via the TGF- β /Smad pathway to achieve analgesia [21].

4.2 Herbal External Application

Herbal external application, first documented in Waitai Miyao, processes medicinal herbs into ointments, powders or pastes for direct topical administration on lesions or wounds. It activates blood circulation, resolves swelling-stasis, relieves pain and promotes tissue regeneration. Circumventing gastrointestinal absorption, it lowers hepatorenal burden. Ointment lubrication reduces friction-induced irritation and relieves pain and edema. Transdermal penetration of active ingredients regulates vascular permeability, improves local circulation, modulates exudation of plasma growth factors and inflammatory mediators, attenuates inflammation and accelerates wound healing [22]. Feng Chunling et al. [23] randomized 60 postoperative anorectal patients into control group (Compound Polymyxin B Ointment) and treatment group (Zhitong Huiyang Ointment containing Corydalis Rhizoma, Chuanxiong Rhizoma, Ginseng Radix et Rhizoma, Astragali Radix, Cinnamomi Cortex, Gentianae Macrophyllae Radix, Atractylodis Rhizoma, wine-processed Phellodendri Chinensis Cortex, Angelicae Sinensis Radix, Ampelopsis Radix and Margarita Powder). The treatment group obtained lower Visual Analogue Scale (VAS) pain scores, which may be associated with inhibited prostaglandins (PGs) release; meanwhile, the formula facilitates endothelial cell proliferation and wound repair. Pan Yuqian et al. [24] enrolled 60 patients with damp-heat-pouring-down low simple anal fistula. Subjects were randomized to Zhenshi Burn Ointment treatment group and sterile petrolatum gauze

control group. On postoperative day 7, the treatment group presented significantly lower pain scores ($P < 0.05$). Lv Wenhui et al. [25] reported that transanal intersphincteric incision combined with herbal external application for high anal fistula yielded superior anal function compared with surgery alone; pain and exudation scores on postoperative day 1 and day 7 decreased, with fewer complications and lower recurrence rate.

4.3 Intra-anal Herbal Administration

Intra-anal herbal therapy delivers herbal ointments or suppositories into the anal canal. Body temperature melts suppositories, and rectal mucosa with abundant capillaries permits drug absorption into systemic circulation, generating effects of clearing heat-toxin, reducing swelling-pain, astringing and promoting granulation. Herbal suppositories feature convenience, portability, low irritation, sustained action, high stability and minimal systemic adverse effects [26] [27]. Zhang Farui [26] investigated Dahuang Xiaozhi Suppository for postoperative complex anal fistula. It relieves postoperative pain and edema, reduces wound exudate, stimulates granulation formation, decreases serum high-sensitivity C-reactive protein (hs-CRP) and IL-6, suppresses wound inflammation and shortens healing time without obvious adverse events. Melted suppositories lubricate the anorectum, facilitate defecation and lessen friction-caused wound pain [27]. For extensive-deep wounds after complex anal fistula surgery, suppositories can reach deep lesions, prevent pseudo-healing and improve wound quality [28].

4.4 Acupuncture-moxibustion Therapy

Acupuncture-moxibustion is a characteristic TCM intervention for disease treatment and health maintenance, encompassing filiform-needle acupuncture and moxibustion. Based on meridian theory, acupoints are selected following syndrome differentiation. Via meridian-acupoint conduction and specific manipulations, it balances yin-yang, strengthens healthy qi, eliminates pathogenic factors and unblocks obstructed meridians [29]. Xiao Yadan et al. [30] randomized 70 patients with post-mixed-hemorrhoid-surgery pain. The control group received intramuscular ketorolac tromethamine; the observation group added “Zhibian penetrating Shuidao” acupuncture. Deep directional penetration targeting the lesion significantly alleviated postoperative pain, improved sleep and anxiety, and reduced serum norepinephrine (NE), substance P (SP) and 5-hydroxytryptamine (5-HT). Zhang Yaping et al. [31] explored the mechanism of press-tack acupuncture for post-mixed-hemorrhoid-surgery complications. Continuous subcutaneous acupoint stimulation regulates qi-blood circulation and unblocks meridians. Its analgesic mechanism involves modulating endocrine status, promoting endogenous analgesic substances, inhibiting microglia activation and suppressing pro-inflammatory mediators. Yu Zengying [32] divided 72 patients with perianal edema after Milligan-Morgan hemorrhoidectomy into conventional moxibustion control group and thunder-fire moxibustion treatment group. Thunder-fire moxibustion achieved better efficacy for anal pain and perianal edema. Cai Shengping [33] combined moxibustion with modified Kushen Decoction fumigation for post-anal-fistula-surgery patients. The combined regimen promoted wound healing, relieved

pain, preserved anal function, regulated anorectal dynamics and inhibited systemic inflammation.

4.5 Other Therapies

A network Meta-analysis indicated that electro-acupuncture, auricular point pressing and acupoint catgut embedding effectively mitigate post-hemorrhoid-surgery pain [34]. Long Qing et al. [35] demonstrated that electro-acupuncture of different frequencies produces analgesic effects for anal postoperative pain. 2 Hz/100 Hz dense-disperse wave yields superior analgesia compared with 2 Hz/100 Hz continuous wave. Ding Meijia et al. [36] applied auricular point pressing combined with acupoint application for anorectal postoperative patients, which improved pain, constipation and accelerated recovery. He Yinxiong [37] reported 92.9 % effective rate for acupoint catgut embedding versus 86.2 % for conventional acupuncture in relieving post-low-simple-anal-fistula-surgery pain. Catgut embedding at Changqiang (GV1), Chengshan (BL57) and Shangjuxu (ST37) reduces postoperative pain and rescue analgesic consumption with favorable safety. Su Yanlin [38] adopted Chixiaodou Danggui Decoction retention enema for post-mixed-hemorrhoid-surgery patients, ameliorating anal pain, tenesmus and bleeding, and lowering the incidence of anal papillary hypertrophy. Combined TCM therapies produce synergistic effects. Xue Jun et al. [39] retrospectively analyzed 92 patients undergoing open-closed hemorrhoidectomy. The control group received potassium permanganate sitz bath and routine care; the observation group added Chengshan (BL57) acupuncture plus Sanhuang Decoction fumigation. The observation group obtained lower postoperative VAS pain scores and perianal edema scores. This combined intervention relieves wound exudate, edema and pain, suppresses inflammation, accelerates wound repair, reduces complications and improves clinical outcomes.

5. Summary

Located at the terminal digestive tract, anal surgical wounds are exposed and constantly contaminated by feces. Rich innervation below the dentate line innervated by spinal nerves generates severe nociception. Postoperative anal pain troubles numerous patients and represents a hot clinical research topic. Compared with Western pharmacological agents, TCM exerts favorable preventive and therapeutic effects on postoperative pain and related complications after anal disease surgery. Featuring few adverse reactions, simple manipulation, sustained efficacy and low cost, TCM holistically harmonizes qi-blood-yin-yang and improves postoperative quality of life. Many clinicians integrate TCM into conventional Western symptomatic treatments to elevate overall cure rates. Nevertheless, current research has limitations: diverse herbal prescriptions are mostly derived from classical formulas or individual clinical experience, hindering cross-comparison, and exact molecular mechanisms remain unclear. Many clinical studies emphasize disease identification rather than rigorous syndrome differentiation, which may bias research conclusions. Outcome measurements mainly rely on subjective patient reports and VAS scores, lacking robust objective biomarkers. Future investigations should strengthen mechanism research and incorporate targeted objective evaluation indicators.

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