

Clinical Study on Modified Sihü Powder for Fumigation and Washing in Promoting Wound Healing after Perianal Abscess Surgery

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Abstract [Objectives] To investigate the use of the classical Chinese medicine formula Sihü Powder modified decoction for postoperative fumigation and sitz bath in patients with perianal abscess, aiming to promote wound healing and reduce medical burden. [Methods] An observational cohort study was conducted, selecting 200 patients with perianal abscess who underwent surgery in Shenzhen Guangming District People's Hospital. They were randomly divided into a treatment group and an observation group, with 100 cases in each group. Both groups followed the same surgical and antibiotic treatment principles. Starting from the first postoperative day, the treatment group received fumigation and sitz bath with modified Sihü Powder for decoction twice daily; the observation group used Compound Huangbai Liquid for fumigation and sitz bath twice daily. Indicators including pain score, wound secretion score, wound granulation tissue growth score, multidrug-resistant bacterial infection clearance rate, antibiotic usage days, and wound healing rate were observed in both groups 7, 14 and 21 d after operation. [Results] On postoperative day 7, the differences in postoperative pain score, wound secretions, and multidrug-resistant bacterial clearance rate between the treatment group and the observation group were statistically significant. On postoperative day 14, the differences between the two groups were significant in indicators including pain score, wound secretions, wound granulation tissue growth, multidrug-resistant bacterial clearance rate, and wound healing rate. On postoperative day 21, the difference in wound healing rate between the two groups was significant; furthermore, the antibiotic usage days in the treatment group were significantly fewer than those in the observation group. [Conclusions] Modified Sihü Powder for fumigation and washing can effectively alleviate postoperative pain in perianal abscess patients, inhibit the colonization and infection of multidrug-resistant bacteria at the wound site, accelerate wound healing, reduce antibiotic usage intensity and medical burden. It possesses advantages such as being economical, effective, safe, and easy to operate, making it worthy of clinical promotion.

Key words Sihü Powder, Fumigation and washing, Perianal abscess, Wound healing

1 Introduction

Perianal abscess is a common infectious disease in anorectal surgery^[1], and its pathogenesis mostly originates from infection of the anal glands, subsequently spreading to the perianal spaces^[2–3]. Currently, incision and drainage is the primary clinical method for treating perianal abscess. This approach can effectively clear the pus cavity and rapidly alleviate the acute inflammatory state^[4–5]. However, this treatment method has certain limitations. The postoperative wound healing cycle typically lasts 4–6 weeks, during which issues such as wound infection, delayed granulation tissue proliferation, and recurrent pain are prone to occur. These significantly impact the quality of postoperative recovery for patients. Relevant studies indicate that delayed postoperative wound healing is closely related to persistent local inflammatory response, impaired blood circulation, and insufficient tissue repair capacity^[6–7]. Although traditional Western dressing changes can control infection to a certain extent, their role in promoting tissue regeneration and regulating the microenvironment is relatively limited^[8–9].

In recent years, the application of traditional Chinese medicine (TCM) in the field of postoperative wound repair has received increasing attention. According to TCM theory, postoperative wounds in perianal abscess fall into the category of "lingering toxins not cleared, qi and blood stagnation". The treatment prin-

ciple should focus on clearing heat and detoxifying, and activating blood to promote tissue regeneration^[10]. TCM fumigation and washing therapy, through the synergistic effect of the physical warmth of the medicinal vapor and the active ingredients of the herbs, can reach the lesion directly, exerting multiple effects such as anti-inflammation, bacteriostasis, improving local microcirculation, and promoting granulation tissue growth. Multiple clinical studies have confirmed that TCM fumigation can significantly shorten wound healing time and concurrently reduce the incidence of postoperative complications^[11–12]. Sihü Powder originates from the medical works in Ming Dynasty—*Orthodox Manual of Surgery* (*Wai Ke Zheng Zong*) authored by Chen Shigong. The book clearly records that Sihü Powder is indicated for carbuncles and abscesses that are swollen, hard, thick like ox hide, and painful on pressure. Its action is described as "to unblock qi and blood, making the patient naturally comfortable, also to remove blood stasis, resolve toxic qi, slough off necrotic tissue, and reduce pain"^[13]. This study, based on the TCM theory of "removing putridity and promoting regeneration", employed a compound decoction composed of herbs like *Aconitum kusnezoffii* and *Arisaema cum* bile for postoperative fumigation intervention. It aims to thoroughly investigate its clinical efficacy and mechanism of action in repairing postoperative wounds in perianal abscess, thereby providing robust evidence-based support for optimizing postoperative management protocols.

2 Research subjects

200 patients with perianal abscess who were hospitalized in the

Received: May 13, 2025 Accepted: September 11, 2025

Supported by Shenzhen Guangming District Health System Scientific Research Project (2020R01120).

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Anorectal Surgery Department of Shenzhen Guangming District People's Hospital and received surgical treatment between January 2022 and June 2024 were selected.

Inclusion criteria: Age ≥ 18 years; clinical manifestations, auxiliary examinations, and intraoperative findings met the diagnostic criteria for perianorectal abscess according to the 2012 edition of the *Diagnosis and Treatment Guidelines for Common Diseases in TCM Anorectal Surgery*, including typical local symptoms such as pain, swelling, redness, and heat; imaging examinations like ultrasound or MRI clearly showing the presence of an abscess cavity; observation of purulent secretions at the corresponding site during surgery. TCM syndrome differentiation conformed to the characteristics of yin syndrome anal abscess; local skin color deep and dark, loose base of swelling, thin pus, clear and thin postoperative wound secretions, pale or dull ulcer opening, pale or dark tongue, white greasy coating, deep, wiry, thin, and tight pulse; voluntary participation in this study.

Exclusion criteria: Pregnant women; patients with severe comorbidities of the heart, lungs, liver, kidneys, or other organs; patients with a history of severe allergy to the drugs or materials used in this study; patients with mental disorders or cognitive impairment unable to understand and cooperate with the research procedures. The 200 patients were numbered 1–200 according to admission order and divided into a treatment group and an observation group using a random number table, with 100 patients in each group.

3 Research methods

3.1 Research data Data including patient group assignment, demographics (gender, age), abscess location (low, high), comorbidities (hypertension, diabetes), operation time, antibiotic usage days, bacterial resistance status, hospital stay days, and medical costs were collected. Data during hospitalization were obtained from electronic medical records; after discharge, data were collected through outpatient follow-up visits or telephone follow-up. Liver and kidney function were re-examined 7 and 14 d after operation and compared with the results at admission. Patients with abnormal results exited the study and received treatment.

Surgical principles: Low abscesses underwent incision and drainage with primary lesion debridement; high abscesses underwent incision and drainage. Antibiotics were selected based on susceptibility testing, choosing sensitive and economical drugs. The treatment course depended on wound infection status and was generally ≤ 7 d. The pain score on postoperative day 7 was taken as the median of the continuous 6-day scores from day 2 to 7; the pain score on postoperative day 14 was taken as the median of the continuous 7-day scores from day 8 to 14. This study complied with the ethical standards of the National Committee for Human Trials and the Declaration of Helsinki. It was approved by the Ethics Committee of Shenzhen Guangming District People's Hospi-

tal (Approval No. LLKT-2025015).

3.2 Collection of pus or wound secretion specimens On the day of admission and before antibiotic use, pus specimens were collected by the attending physician; postoperative wound secretions were collected by trained nurses.

The operating procedures followed the following principles:

(i) For unruptured abscesses, after strict disinfection, pus and secretions were aspirated using a sterile syringe; alternatively, incision and drainage could be performed and specimens collected using a sterile cotton swab, but care must be taken not to leave disinfectants such as iodine or ethanol behind.

(ii) For ruptured abscesses, pus and secretions from the deep part of the lesion were collected using a sterile cotton swab, placed into a sterile tube, and sent for examination.

(iii) For wound secretion specimen collection, the wound was first rinsed with normal saline, and secretions were collected from the deep part at the junction of pus and tissue using a sterile swab.

All specimens needed to be delivered to the microbiology laboratory within 30 min after collection for subsequent testing.

3.3 Bacterial culture, identification, and drug susceptibility testing Specimens were cultured in broth using selective media. Extended-spectrum β -lactamase (ESBL) screening tests were performed using ceftazidime and cefotaxime; Carbapenemase screening was performed using imipenem, ertapenem, or meropenem; Methicillin-resistant *Staphylococcus aureus* (MRSA) was detected using the cefoxitin disk diffusion method; The susceptibility of *Enterococci* to vancomycin was detected by the disk diffusion method. Based on EUCAST^[14] standards, routine drug susceptibility testing was performed on the isolated multidrug-resistant organisms (MDROs).

3.4 Composition of modified Sihü Powder formula and fumigation-sitz bath method Modified Sihü Powder formula: *A. cum bile* 10g, prepared kusnezoff monkshood root 10 g, prepared common monkshood daughter root 10 g, Rhizoma Pinelliae Praeparatum 10 g, Radix et Rhizoma Asari 5 g, Radix Angelicae Dahuricae 10 g, Spina Gleditsiae 10 g. Treatment group: The modified Sihü Powder was decocted twice in water to obtain 400 mL of decoction, which was divided into two doses for use. Each time, 200 mL of the decoction was added to 2 000 mL of water. Fumigation was performed while the solution was hot. When the water temperature reached 38–41 °C, sitz bath was performed. This was done twice daily, each time for 15–20 min. Observation group: 50 mL of Compound Huangbai Liquid Liniment was taken, diluted to 2 000 mL with warm water at 38–41 °C for sitz bath, with the same frequency and duration as the treatment group. The fumigation-sitz bath method was made into brochures and videos for admission education in the department.

3.5 Treatment evaluation criteria

3.5.1 Wound healing time. The duration from the start of wound medication to complete epithelialization. After discharge, follow-

up examinations were scheduled via the follow-up system.

3.5.2 Pain degree. It was measured using the linear Visual Analog Scale (VAS), where 0 point indicated no pain, 1–3 points indicated mild pain, 4–6 points indicated moderate pain, 7–9 points indicated severe pain, and 10 points indicated excruciating pain.

3.5.3 Wound secretions. A dry and clean wound scored 0 point; scant secretions (moistening <1/3 of the dressing) scored 1 point; moderate secretions (moistening 1/3–2/3 of the dressing) scored 2 points; copious secretions (moistening >2/3 of the dressing) scored 3 points.

3.5.4 Granulation tissue growth. A wound that was basically healed with good granulation growth scored 0 point; bright red new tissue with vigorous growth scored 1 point; light red new tissue with vigorous growth scored 2 points; no new tissue growth or slow growth presenting as pale dull gray scored 3 points.

3.6 Statistical methods SPSS 25.0 statistical software was used to analyze the research data of the two groups. Categorical data were expressed as percentages and analyzed using the χ^2 test or rank-sum test; measurement data conforming to a normal distribution were expressed as ($\bar{x} \pm s$) and analyzed using the t -test; data with a skewed distribution were expressed as M (P25, P75) and analyzed using the rank-sum test; differences within groups before and after treatment were compared using one-way analysis

of variance (ANOVA) or the χ^2 test; differences between groups were compared using the independent samples t -test. A P -value < 0.05 was considered statistically significant.

4 Results and analysis

In the treatment group, 3 cases dropped out on postoperative day 7, 8 cases at day 14, and 16 cases at day 21. In the observation group, 5 cases dropped out on postoperative day 7, 9 cases at day 14, and 14 cases at day 21. Reasons for dropout: Routine discharge or leaving the hospital without meeting the clinical cure standard, population mobility (leaving the local area due to work or life reasons). There were no dropouts due to severe complications or death. The loss to follow-up rates between the two groups on postoperative day 7, 14, and 21 showed no statistically significant difference ($P > 0.05$), and the distribution of dropout reasons was balanced.

4.1 General data The comparison between the treatment group and the observation group regarding gender, age, classification of perianal abscess, comorbidities, number of multidrug-resistant bacterial infections, and number of incisions showed no statistically significant differences ($P > 0.05$). Case data for both groups of patients were complete, with no dropouts in the baseline data; the general data are shown in Table 1.

Table 1 General data of patients in the two groups ($n = 100$)

Factor	Total	Treatment group	Observation group	$t/z/\chi^2$	P
Gender				0.818	0.366
Male	178 (89.00%)	91 (91.00%)	87 (87.00%)		
Female	22 (11.00%)	9 (9.00%)	13 (13.00%)		
Age (years, $\bar{x} \pm s$)		35.31 $\pm$ 9.99	34.19 $\pm$ 8.12	0.870	0.386
Classification of perianal abscess				0.149	0.701
Low	168 (84%)	83 (83.00%)	85 (85.00%)		
High	32 (16.00%)	17 (17.00%)	15 (15.00%)		
Comorbidity					
Diabetes Mellitus	10 (5.00%)	6 (6.00%)	4 (4.00%)	0.421	0.516
MDRO (+)	41 (20.50%)	23 (23.00%)	18 (18.00%)	0.768	0.381
Operation time (h)					
M (P25,P75)		0.33 (0.25,0.41)	0.35 (0.25,0.42)	1.771	0.077
Number of incisions		2 (1,2)	1 (1,2)	1.380	0.890

NOTE MDRO = Multiple Drug-resistant Organism.

4.2 Comparison of observation indicators during the healing process between the two groups Postoperative day 1: There was no statistically significant difference in postoperative pain scores and wound secretion scores between the two groups ($P > 0.05$).

Postoperative day 7: Differences between the two groups in postoperative pain scores, wound secretions, and multidrug-resistant bacterial clearance rate were statistically significant ($P < 0.05$); whereas in terms of wound granulation tissue growth, the difference was not statistically significant ($P > 0.05$).

Postoperative day 14: The two groups showed significant differences in postoperative pain scores, wound secretions, wound granulation tissue growth, multidrug-resistant bacterial clearance rate, and wound healing rate ($P < 0.001$).

Postoperative day 21: There was no statistically significant difference between the two groups in pain scores ($P > 0.05$), but a significant difference existed in wound healing rate ($P < 0.001$).

The treatment group exhibited significantly shorter duration of antibiotic use (4.52 ± 2.41 d) compared to the control group (5.61 ± 3.24 d) ($P < 0.001$) (Table 2).

Table 2 Comparison of observation indicators during the healing process between the two groups

Group	Observation time (postoperative day)	Pain score points	Wound secretion score//points	Wound granulation growth score//points	MDRO clearance rate//%	Wound healing rate//%	Antibiotic usage intensity//d
Treatment	1 (n = 100)	5.07 ± 2.12	2.26 ± 0.45				
	7 (n = 97)	3.19 ± 0.26*	1.87 ± 0.41*	2.07 ± 0.71	33.33*	—	5.00 (4.00, 7.00)*
	14 (n = 92)	2.00 ± 0.16 [#] *	0.76 ± 0.25 [#]	1.23 ± 0.65 [#]	69.57 [#]	14.00*	
	21 (n = 84)	1.18 ± 0.67	—	—	—	66.67 [#]	
Observation	1 (n = 100)	5.13 ± 2.13	2.33 ± 0.32				
	7 (n = 95)	4.13 ± 0.24	2.15 ± 0.35	2.21 ± 0.63	18.18	—	5.00 (5.00, 8.75)
	14 (n = 91)	2.99 ± 0.28 [#]	1.73 ± 0.21 [#]	1.85 ± 0.86 [#]	54.54 [#]	6.00	
	21 (n = 86)	0.93 ± 0.53	—	—	—	48.00 [#]	

NOTE * $P < 0.05$ vs observation group; [#] $P < 0.05$ compared with pre-treatment within the same group.

4.3 Comparison of medical costs The average length of hospital stay and medical costs in the treatment group were significantly lower than those in the observation group ($P < 0.001$) (Table 3).

Table 3 Comparison of medical costs between the two groups

Medical cost	Treatment group	Observation group	<i>t</i>	<i>P</i>
Average hospital stay//d	7.28 ± 1.46	8.81 ± 3.84	3.442	<0.001
Medical cost//10 000 rmb	0.85 ± 0.14	0.94 ± 0.22	3.721	<0.001

4.4 Drug safety monitoring In this study, patient compliance was good. Regarding safety: In the treatment group, 97 patients underwent re-examination of liver and kidney function on postoperative day 7.63 patients underwent re-examination of liver and kidney function on postoperative day 14. Compared with the data at admission, no significant differences were found in any of the indicators.

5 Discussion

Wound healing after perianal abscess surgery is affected by the special anatomical location, making it susceptible to fecal contamination which can cause inflammation and edema; patients with concurrent diabetes are more prone to developing chronic non-healing wounds^[15–16]. Clinical observations indicate that the healing process is divided into an exudative phase (5–10 d) and a granulation phase. The former is characterized mainly by copious purulent exudate, while the latter is manifested as granulation tissue proliferation and epithelial migration. Healthy granulation tissue appears bright red and granular, whereas abnormal granulation tissue is often dark gray and covered with a moss-like membrane, indicating the presence of infection. Notably, our team’s retrospective study showed that the multidrug-resistant organism (MDRO) infection rate in 85 cases of non-healing wounds reached 75.3%^[7], which is close to the 83.6% reported in the literature^[17]. Despite current guidelines classifying anorectal surgery as clean-contaminated incisions, there is still widespread overuse of prophylactic antibiotics in clinical practice^[18–20]. The "double-edged sword" effect of antibiotics has led to a continuous rise in the detection rate of drug-resistant bacteria, creating a vicious cycle of "increased treatment demand—intensified drug resistance". Therefore, exploring local alternative therapies holds significant clinical importance.

Based on the theory of external treatment in TCM, our team modified the classic formula Sihü Powder (containing raw *Pinellia*

ternata, *Arisaema erubescens*, *Aconitum kusnezoffii*, and *Stellera chamaejasme*), adding auxiliary herbs such as *Angelica dahurica* and *Gleditsia sinensis* thorns to prepare a fumigation and washing agent. Modern pharmacology confirms that raw *P. ternata* contains alkaloids with anti-inflammatory effects; *A. erubescens* contains flavonoid components with antibacterial activity; *A. kusnezoffii* alkaloids have analgesic and anti-inflammatory properties; *S. chamaejasme* contains coumarin components with immunomodulatory functions^[21–24]. Our research results show that modified Sihü Powder for fumigation and sitz bath effectively reduced the degree of postoperative pain in patients, decreased the amount of wound exudate, promoted granulation tissue growth and wound healing, demonstrated strong inhibitory effects against multidrug-resistant bacteria in abscess wounds, and significantly reduced antibiotic usage. We speculate that Sihü Powder for fumigation and washing can significantly shorten the exudative phase of perianal abscess wounds and promote the formation of healthy granulation tissue. Its mechanism may be related to three aspects: (i) Local antibacterial action improves the wound microenvironment; (ii) The warming effect of the medicinal solution promotes angiogenesis; (iii) Its effect of promoting blood circulation and resolving stasis accelerates the epithelialization process.

Safety evaluation showed that fumigation and sitz bath, by local administration, reduced systemic toxicity, and dynamic monitoring of liver and kidney function revealed no abnormalities. However, attention must be paid to the toxicity of the raw herbs in the original formula (such as *S. chamaejasme*, *P. ternata*, etc.). It is recommended that clinical use strictly adheres to the modified formula and preparation standards.

Currently, we have accumulated 3 years of application experience in this therapeutic regimen, but the following limitations still exist: (i) The sample size is relatively small, necessitating expansion of the research scale; (ii) The mechanism of action has not been fully elucidated, requiring molecular biology research; (iii) Long-term safety needs to be verified through animal experiments.

The clinical implication of this study is that, considering the characteristics of post-anorectal surgery wounds, TCM fumigation and washing can serve as a beneficial supplement to antibiotic alternative therapies.

6 Conclusion

The modified Sihü Powder for fumigation and washing therapy can effectively alleviate postoperative pain in patients with perianal ab-

scences, inhibit bacterial growth on the wound, shorten the course of the disease, and reduce the medical burden. It possesses advantages such as being economical, effective, safe, and easy to operate. It is recommended that future research focus on establishing standardized therapeutic regimen, validating efficacy through multicenter randomized controlled trials (RCTs), and simultaneously strengthening toxicological studies to ensure medication safety. Through an integrated Chinese and Western medicine strategy, it may be possible to effectively resolve the current predicament of antibiotic abuse and the increasing prevalence of drug-resistant bacteria.

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