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Clinical Study on TROPIS Procedure Combined with Thread-Dragging and Cotton-Padding Therapy for the Treatment of Perianal Abscess

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Abstract

Objective: To evaluate the efficacy of TROPIS procedure combined with thread-dragging and cotton-padding therapy in the treatment of perianal abscess. *Methods:* Sixty patients were randomly divided into an observation group (n = 30) and a control group (n = 30) using a random number table. The observation group underwent the TROPIS procedure combined with thread-dragging and cotton-padding therapy, while the control group received conventional incision and drainage with standard postoperative care. Clinical efficacy, wound healing time, wound exudation score, pain score, anal function, and fistula formation rate were compared between the two groups. *Results:* The total effective rate was significantly higher in the observation group than in the control group. Wound exudation scores were lower in the observation group at postoperative days 5, 7, and 14, and the pain score was lower on day 14. The wound healing time was significantly shorter in the observation group compared to the control group. The incidence of fistula formation was significantly lower in the observation group. No statistically significant differences were observed in anal resting pressure or anal squeeze pressure between the two groups, while the Wexner score was lower in the observation group. *Conclusion:* The combination of TROPIS procedure and thread-dragging and cotton-padding therapy for perianal abscess can shorten wound healing time, reduce the risk of fistula formation, alleviate pain, and better preserve anal function, making it worthy of clinical promotion.

Keywords

Perianal abscess

TROPIS procedure

Thread-dragging and cotton-padding therapy

Anal function assessment

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1. Introduction

Perianal abscess, defined as an acute suppurative infection occurring in the perianal and perirectal spaces, represents the most common type of anorectal abscess. With changes in dietary habits, its incidence in China has been rising consistently, particularly among males aged 20–40 years, where the prevalence reaches approximately 2% [1]. Perianal abscess is characterized by acute onset and rapid progression. Delayed or inadequate treatment may lead to aggravated infection, sinus tract formation, and negative impacts on patients' physical and psychological health [2]. The primary treatment principle involves thorough debridement of the infected focus and adequate drainage, for which surgical intervention is often required. Conventional surgical approaches, however, carry risks of anal sphincter injury and potential anal incontinence. Incomplete drainage may also contribute to fistula formation, leading to anal fistula [3]. The TROPIS procedure enables effective removal of infectious tissues while minimizing damage to anal function [4,5]. Thread-dragging and cotton-padding therapy, a characteristic technique in traditional Chinese medicine, facilitates thorough drainage and promotes adhesion between muscle layers. This study reported the outcomes of combining the TROPIS procedure with thread-dragging and cotton-padding therapy for the treatment of perianal abscess.

2. Materials and methods

2.1. Study subjects

A total of 60 patients with perianal abscess who underwent surgical treatment at the Department of Proctology, Jiangxi Provincial Hospital of Traditional Chinese Medicine between June 2024 and June 2025 were selected as the study subjects. They were randomly assigned to either an observation group or a control group, with 30 patients in each group. The observation group comprised 21 males and 9 females, with a mean age of 33.73 ± 6.59 years, disease duration of 3.3 ± 0.91 days, and BMI of 24.82 ± 1.06 kg/m². The control group included 20 males and 10 females, with a mean age of 33.06 ± 6.88 years, disease duration of 3.16 ± 1.01 days, and BMI of 24.69 ± 1.12 kg/m². No statistically significant differences were observed in baseline characteristics between the two groups ($p > 0.05$).

2.1.1. Inclusion criteria

(1) Meeting both Chinese and Western diagnostic criteria for perianal abscess
(2) Age between 18 and 65 years
(3) Tolerance to the treatment methods used in this study, with no significant abnormalities in relevant laboratory tests
(4) Willingness to participate in the clinical trial and provision of signed informed consent
(5) Agreement to undergo postoperative follow-up

2.1.2. Exclusion criteria

(1) Comorbidities such as other perianal diseases, enteritis, malignant tumors, or HIV
(2) Pregnant or lactating women
(3) Severe cardiovascular and cerebrovascular diseases, psychiatric disorders, autoimmune diseases, or malignant tumors
(4) Participation in other drug trials
(5) Other factors potentially influencing the study outcomes
(6) Unwillingness to participate in follow-up

2.2. Therapeutic methods

2.2.1. Preoperative preparation

(1) Both groups completed comprehensive preoperative examinations, including routine blood, urine, and stool tests, liver and kidney function, coagulation profile, infectious disease screening, electrocardiography, and perianal MRI, to exclude surgical contraindications.
(2) Preoperative education was provided to alleviate patient anxiety, and surgical consent forms were signed.
(3) Standard preoperative protocols were implemented: perianal skin preparation was performed one day before surgery, fasting and water restriction were initiated preoperatively, and cleansing enema was administered on the day of surgery.

2.2.2. Surgical procedures

(1) Observation group

TROPIS procedure and thread-dragging therapy

After anesthesia took effect: Incision and drainage were performed, and the purulent cavity was debrided. Based on preoperative imaging and intraoperative exploration, the infected anal gland was incised at the identified site, followed by an intersphincteric approach to incise the internal sphincter and remove necrotic tissue within the intersphincteric space. The cavity was repeatedly irrigated with 3% diluted hydrogen peroxide to achieve thorough eradication of the infectious focus. Depending on the cavity size, a No. 7 silk thread was threaded between the intersphincteric incision and the abscess drainage incision, with both ends knotted to maintain a slack state. Wound edges were trimmed to facilitate drainage, hemostasis was achieved, and a pressure dressing was applied.

(2) Control group

Incision and drainage procedure

After anesthesia took effect, a radial incision was made at the site of maximum fluctuance to drain the purulent material. The loculations within the abscess cavity were bluntly dissected using hemostatic forceps, and the extent of the cavity was explored. The cavity was thoroughly debrided, a drainage gauze strip was placed, hemostasis was achieved, and a pressure dressing with gauze was applied.

2.2.3. Postoperative management

(1) Routine Care

On the day of surgery, patients were advised to rest in bed, maintain a liquid diet, and avoid defecation. Both groups received antibiotics for infection prevention. Daily sitz baths with hospital-formulated solutions were administered postoperatively, twice daily for 5–10 minutes per session. Daily wound dressing changes were performed, including thorough irrigation with normal saline. From postoperative day 2, patients resumed a normal diet while avoiding spicy or irritative foods. Nonsteroidal anti-inflammatory drugs were routinely administered for analgesia.

(2) Observation group

In addition to routine care, during dressing changes, a herbal formulation for pus removal and tissue regeneration was applied along the silk thread. The thread was removed 10–14 days postoperatively based on the presence or absence of wound exudate. Concurrently, cotton padding was applied with pressure bandaging, secured firmly with wide adhesive tape. A sandbag was externally placed over the wound to maintain continuous pressure until healing was achieved. Patients were instructed to maintain pressure primarily in a sitting position for 3–5 days, with each sitting session lasting ≥ 4 hours. A 30-minute rest interval was required after every 30 minutes of sitting pressure.

2.3. Observation indicators

2.3.1. Overall efficacy rate

Based on the Traditional Chinese Medicine Industry Standards of the People's Republic of China. Diagnostic and Efficacy Criteria for Anorectal Diseases, the following criteria were established

(1) Cured

Wound healing rate of 100%

(2) Markedly effective

100% > Wound healing rate ≥ 75%

(3) Effective

75% > Wound healing rate ≥ 25%

(4) Ineffective

Wound healing rate < 25%

(5) Overall efficacy rate

(Cured + Markedly Effective + Effective) / Total cases × 100%.

2.3.2. Wound healing time

Defined as the time required for complete wound healing with no secretions or inflammatory exudate.

2.3.3. Wound secretion assessment

Recorded on postoperative days 1, 5, 7, and 14 during dressing changes. Scoring based on the number of gauze layers penetrated: 0 points: None;1 point: Minimal (does not penetrate one gauze layer); 2 points: Moderate (penetrates one gauze layer); 3 points: Severe (penetrates two or more gauze layers).

2.3.4. Pain assessment

Evaluated using the Visual Analog Scale (VAS) before dressing changes on postoperative days 1, 3, 7, and 14. A 10 cm scale was used with the following classifications: 0 points: No pain; 1 point: Mild pain (tolerable); 2 points: Moderate pain (affects sleep but tolerable); 3 points: Severe pain (intolerable).

2.3.5. Anal function

Measured preoperatively and 3 months postoperatively using anorectal manometry to assess anal resting pressure and anal squeeze pressure. Wexner scores were also recorded for both time points.

2.3.6. Fistula formation rate

Evaluated at 3-month follow-up through digital rectal examination and perianal MRI. Fistula formation rate = (Number of patients with anal fistula / Total patients) × 100%.

2.4. Statistical analysis

Data were analyzed using SPSS 25.0. Categorical data were compared using chi-square tests. Continuous data, presented as mean ± standard deviation ($\bar{x} \pm s$), underwent normality and homogeneity of variance tests. Normally distributed data with equal variances were analyzed with *t*-tests; otherwise, Wilcoxon rank-sum tests were applied. Ordinal data were analyzed using Mann-Whitney U tests. A p-value < 0.05 was considered statistically significant.

3. Results

3.1. Treatment outcomes

Following treatment, the observation group demonstrated 9 cured cases, 19 effective cases, and 2 ineffective cases, yielding an efficacy rate of 93.33%. In contrast, the control group showed 5 cured cases, 17 effective cases, and 8 ineffective cases, with an efficacy rate of 73.33%. The TROPIS procedure combined with thread-dragging and cotton-padding therapy exhibited significantly superior efficacy compared to the control group ($p < 0.05$), as detailed in **Table 1**.

3.2. Wound healing time

Statistical analysis revealed that the observation group exhibited significantly shorter wound healing time compared to the control group, with the difference being statistically significant ($p < 0.05$), refer **Table 2**.

3.3. Wound exudation and pain score

The observation group demonstrated significantly lower wound exudation scores at postoperative days 5, 7, and 14, as well as lower pain scores at day 14, compared to the control group, with all differences being statistically

Table 1. Comparison of clinical efficacy between the two groups (Unit: %)

Group	Cases	Cured	Effective	Ineffective	Total Effective
Observation group	30	9 (30%)	19 (63.33%)	2 (6.66%)	28 (93.33%)
Control group	30	5 (16.66%)	17 (56.66%)	8 (26.66%)	22 (73.33%)
t-value					4.32
p-value					0.03

Table 2. Comparison of wound healing time between the two groups (Unit: days)

Group	Cases	Wound healing time (days)
Observation Group	30	31.8 ± 3.14
Control Group	30	40.4 ± 2.29
t-value		12.09
p-value		< 0.05

Table 3. Wound exudation and pain scores (points)

Group	Case	Wound exudate score				Postoperative pain score			
		Post-operative day 1	Post-operative day 5	Post-operative day 7	Post-operative day 14	Post-operative day 1	Post-operative day 3	Post-operative day 7	Post-operative day 14
Observation group	30	2.4 ± 0.49	1.46 ± 0.5	1 ± 0.64	0.16 ± 0.37	2.6 ± 0.49	2.46 ± 0.57	1.5 ± 0.5	0.53 ± 0.5
Control group	30	2.56 ± 0.5	2.2 ± 0.48	1.83 ± 0.37	1.06 ± 0.36	2.53 ± 0.5	2.66 ± 0.47	1.7 ± 0.46	1.23 ± 0.43
t-value		1.28	5.72	6.11	9.36	0.51	1.46	1.58	5.76
p-value		0.2	< 0.05	< 0.05	< 0.05	0.61	0.14	0.11	< 0.05

Table 4. Comparison of anal function (mmHg/points)

Group	Cases	Anal resting pressure		Anal squeeze pressure		Wexner score	
		Pre-operative	3 months post-operatively	Pre-operative	3 months post-operatively	Pre-operative	3 months post-operatively
Observation group	30	66.3 ± 1.2	65.9 ± 1.44	143.66 ± 1.72	144.56 ± 2.55	11.3 ± 0.65	0.9 ± 0.54
Control group	30	66.33 ± 1.12	66.2 ± 1.18	143.83 ± 1.8	143.13 ± 3.04	11.33 ± 0.66	3.7 ± 0.65
t-value		0.11	0.87	0.36	1.97	0.19	18.02
p-value		0.91	0.38	0.71	0.05	0.84	< 0.05

Table 5. Comparison of fistula formation rate (%)

Group	Cases	Number of anal fistula cases	Fistula formation rate
Observation group	30	5	16.66%
Control group	30	12	40%
χ^2			4.02
p-value			0.04

significant ($p < 0.05$), refer **Table 3**.

3.4. Comparison of anal function

At the 3-month postoperative follow-up, no statistically significant differences were observed in anal resting pressure or anal squeeze pressure between the observation group and the control group ($p > 0.05$). However, the Wexner score was significantly lower in the observation group compared to the control group ($p < 0.05$), indicating better preservation of anal function in the observation group, refer **Table 4**.

3.5. Fistula formation rate

At the 6-month postoperative follow-up, the observation group exhibited a significantly lower fistula formation rate compared to the control group, with the difference being statistically significant ($p < 0.05$), refer **Table 5**.

4. Conclusion

Perianal abscess, the most common type of anorectal abscess, refers to an acute suppurative infection occurring

in the perianal and perirectal spaces [6,7]. With societal development and dietary changes, its incidence has been continuously increasing. In China, perianal abscess accounts for 8–25% of anorectal diseases, predominantly affecting males aged 20–40 years [8,9].

Studies indicate that perianal abscess primarily results from nonspecific obstruction leading to secondary infection of rectal or anal gland crypts, with common risk factors including smoking, HIV, immunosuppressive therapy, and diabetes [9–11]. Crohn's disease also represents a significant risk factor. Typical clinical manifestations include perianal pain, fluctuant masses, purulent discharge, or indurated perianal nodules, with some patients experiencing fever, constipation, or diarrhea [12]. Due to the continuity of perianal anatomical structures and rapid disease progression, delayed treatment may lead to infection extension into the ischiorectal or intersphincteric spaces, increasing patient discomfort, treatment costs, and adversely affecting prognosis. Furthermore, the perianal spaces surrounding the anus connect with gluteal fat tissue, and abscess rupture with pus dissemination can form sinus tracts and cavities, severely impacting patients' physical and psychological health.

The treatment principles for perianal abscess involve managing the internal opening, eliminating the infectious focus, and ensuring adequate drainage. Conservative antibiotic therapy alone is insufficient, making surgery the optimal treatment approach. Common surgical techniques include incision and drainage, incision with seton placement, and three-space drainage. The transsphincteric incision and drainage procedure, a variant of three-space drainage, precisely incises the internal sphincter at the infected intersphincteric space under MRI guidance, maintaining the intersphincteric space open for continuous drainage.

This approach offers several advantages

(1) Most anal gland infections locate within the intersphincteric space, and TROPIS facilitates complete debridement

(2) Opening the affected intersphincteric space ensures sufficient drainage, allowing secondary healing which promotes infected wound recovery compared to primary healing, thereby improving treatment success rates

(3) Avoiding external sphincter injury preserves anal function and reduces postoperative incontinence risk. However, TROPIS alone has limitations, including potential inadequate drainage and prolonged secondary healing, which may lead to infection recurrence.

Thread-dragging and cotton-padding therapy, a characteristic traditional Chinese medicine technique, involves threading a medicated silk suture through the fistula tract. Daily dressing changes create friction through suture movement, achieving debridement and promoting tissue regeneration. After suture removal, cotton padding provides compression, facilitating better integration between perianal skin and muscle tissue, effectively clearing wound secretions and promoting tissue closure. Research demonstrates satisfactory clinical outcomes of thread-dragging and cotton-padding therapy for complex anal fistula, effectively reducing complications, improving cure rates, lowering recurrence rates, and minimizing anal sphincter injury [13]. Combining TROPIS with thread-dragging and cotton-padding therapy achieves thorough infection control and adequate drainage. The thread-dragging component compensates for potential inadequate drainage in TROPIS, while cotton-padding promotes tissue adhesion and addresses the limitation of prolonged secondary healing, ultimately resulting in better anal function recovery.

In this study, the observation group demonstrated higher overall treatment efficacy, reduced wound exudation at postoperative days 5, 7, and 14, lower pain scores at day 14, shorter wound healing time, and significantly lower fistula formation rates compared to the control group. These benefits likely relate to TROPIS ensuring complete infection clearance, thread-dragging maintaining patent drainage, and cotton-padding promoting tissue adhesion.

Anorectal manometry serves as the primary method for assessing anal function, providing objective indicators for pre- and postoperative evaluation [14]. As fundamental and crucial parameters in anorectal manometry, anal resting pressure and anal squeeze pressure significantly contribute to continence maintenance. Anal resting pressure mainly reflects internal sphincter function, while anal squeeze pressure results from external sphincter and puborectalis muscle contraction. The Wexner score

effectively evaluates postoperative fecal incontinence severity [15]. Conventional incision and drainage cause minimal damage to both sphincters and doesn't alter anorectal pressures. In our study, three-month follow-up revealed no statistically significant differences in anal resting pressure or squeeze pressure between groups, indicating that the combined approach minimizes sphincter injury. However, the observation group showed significantly lower Wexner scores ($p < 0.05$), suggesting better preserved anal function postoperatively.

In conclusion, TROPIS procedure combined with thread-dragging and cotton-padding therapy for perianal abscess shortens wound healing time, reduces fistula formation risk, alleviates pain, and better preserves anal function, warranting clinical promotion.

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Disclosure statement

The authors declare no conflict of interest.

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