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Original Article

Efficacy of posterior median anal incision with incision and drainage of the anal sinus on chronic anal fissure

Wei Li, Jiacheng Xu, Tao Li, Yuhe Bi, Weicai Ren, Shengchao Wei

Department of Anorectal Surgery, Jinan City People's Hospital, Jinan 271199, Shangdong, China

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Abstract: Background: To explore the efficacy of posterior median anal incision plus incision and drainage of anal sinus on chronic anal fissure (CAF), and its influence on incidence and recurrence of postoperative infection. Methods: Altogether 130 patients with CAF treated during January 2017 and January 2021 were included and divided into a research group (RG) and control group (CG). Among them, 80 patients in the RG were treated with posterior median anal incision and expansion plus anal sinus incision and drainage, while 50 in the CG were treated with lateral internal sphincterotomy. Clinical indexes (wound healing time, recovery time of bowel sounds, intraoperative blood loss, length of stay), levels of inflammatory factors (IL-6, IL-8, CRP) before and one week after treatment, changes of psychological and emotional scores (SAS, SDS scores) before and 6 months after treatment, sleep and scores of daily activities after admission and 6 months after treatment, VAS scores at 1 day, 1 week and 2 weeks after operation, compliance, total effective rate, and incidence and recurrence rate of postoperative incision infection were compared between the groups. Results: Compared with the CG, the wound healing time, recovery time of bowel sounds and length of stay were shorter, and intraoperative blood loss was lower in the RG; the levels of IL-6, IL-8 and CRP were lower in RG one week after treatment. Six months after treatment, the SAS, SDS and PSQI scores were lower, the ADL scores were higher, the compliance and total effective rate were higher, and the incidence and recurrence rate of postoperative incision infection were lower in the RG. Conclusion: Posterior median anal incision plus incision drainage of the anal sinus has better efficacy on CAF, and can effectively reduce the incidence of postoperative infection and recurrence.

Keywords: Posterior median anal incision and expansion, anal sinus incision and drainage, chronic anal fissure, lateral internal sphincterotomy, inflammatory factors, quality of life

Introduction

Anal fissure is characterized by longitudinal tearing or defect of anal canal skin at the far end of the dentate line [1]. Generally, patients are diagnosed when they feel pain during defecation and rectal bleeding of different degrees [2]. This can occur in all ages, and has a major impact on young and middle-aged people, without gender preference [3]. Unfortunately, anal fissure not only brings severe physical pain, but also causes tremendous psychological pressure, which leads to an overall decline in quality of life [4, 5]. Chronic anal fissure (CAF), on the other hand, is a common superficial tear in rectum, showing pain in the transitional area of skin and mucosa of anal canal [6]. With the continuation of stimulation events, anal fissure heals slowly, which will bring about further aggravation of the disease, so intervention into CAF is essential [7].

Under normal circumstances, in order to keep the intact function and anatomy of sphincter and reduce the risk of anal incontinence, CAF patients are generally treated with cleft resection or cleft resection plus drug sphincterotomy. Cleft resection or cleft resection plus drug sphincterotomy can effectively reduce the occurrence of incontinence, but unfortunately, it is easy to not only cause a variety of postoperative complications, but also evoke recurrence [8]. In this study, we observed the effect of the combination of two surgical methods on CAF. Median dilatation is a familiar resection method, that is widely applied in cardiac and urethral surgeries [9]. However, there is still a defect in this operation, that is, it is very easy to form

scars after the operation [10]. For abscess of superficial soft tissue, incision and drainage is undoubtedly the best choice [11]. In the treatment of perirectal abscess, incision and drainage can reduce the risk of infection [12]. But for CAF, there are few clinical studies on posterior median anal incision and dilatation and anal sinus drainage in recent years. The purpose of this study was to verify the efficacy of posterior median anal incision plus anal sinus drainage in the treatment of old anal fissure from the aspects of treatment efficacy, incidence of postoperative infection, and recurrence rate.

Methods

General data

The subjects were 130 patients with CAF treated in our hospital from January 2017 to January 2021. In this retrospective study, the patients were randomized into a research group (RG) (80 cases) and control group (CG) (50 cases). The RG was treated with posterior median anal incision plus incision drainage of the anal sinus, while the CG was given by lateral internal sphincterotomy. The general data were similar between both groups (all P>0.05). Inclusion criteria: ① Patients meet the diagnostic criteria of CAF [13]; ② Patients with a disease course of >6 weeks and ineffective conservative treatment efficacy. ③ Patients with an age of 18-72 years old. Exclusion criteria: ① Patients with a history of anal surgery or trauma; ② Patients with severe diabetes, hematologic diseases, cardiovascular and cerebrovascular diseases, liver and kidney and other important organ diseases; ③ Patients with mental diseases; ④ Patients who were pregnant or lactating; ⑤ Patients with perianal skin diseases such as acute and chronic diarrhea or anal eczema. All of the subjects voluntarily participated in this study and signed an informed consent form. This study was approved by the Medical Ethics Committee of the hospital.

Methods

CG: Patients were treated with lateral internal sphincterotomy. First, the sacrum or waist of patients was anesthetized and then placed in the lithotomy position. The anal margin was disinfected with 5% povidone iodine, and the anal canal and lower rectum were disinfected with 0.1% benzalkonium bromide. A 1 cm-long radial incision was made at the 5 or 7 o'clock direction of anus 1 cm away from anal margin. Guided by the left index finger, curved vascular forceps were used to pick out and cut off part of the internal sphincter from the skin of anal margin to the dentate line, and the anal nipple or sentinel hemorrhoid complicated with hypertrophy was cut off. Next, the anal fissure margin was trimmed to ensure smooth drainage and a fresh wound surface.

RG: Patients were treated by partial internal sphincterotomy combined with external muscle amputation. Anesthesia mode and body position were the same as those of the CG. After disinfection, under the direct vision of bileaflet anoscope, a radial incision was made in the middle of the back of the anal canal, which reached the dentate line and slightly exceeded the subcutaneous edge of the external sphincter. Some internal anal sphincters, including the fibrotic internal sphincter, were picked out from the intermuscular groove to the anus with curved vascular forceps. The internal sphincter with a width of about 1 cm was cut off, and then the subcutaneous part of the external sphincter, which can accommodate 4 fingers, was cut off under anesthesia, and the enlarged anal nipple or sentinel hemorrhoid was excised. Finally, in order to ensure that the incision forms a spindle wound with small inside and large outside, we trimmed the wound edge of the incision to ensure smooth drainage. After the active bleeding was stopped, Vaseline gauze was packed with tower-shaped gauze pad and fixed with wide adhesive tape. For patients with anal fissure in anteroposterior position, it is necessary to prolong the fissure, and perform the above operation after fresh fissure and unobstructed drainage.

After treatment, both groups received conventional basic nursing. Patients in both groups needed oral antibiotics for 3-5 days. The patients were given a liquid diet for 1 day, and their stools were controlled for 1 day before returned to normal diet on the second day after treatment. Maren pills were prescribed if the stool was dry. Patients were treated with anti-bovine elements to prevent infection. The patient used a sitting bath after defecation. After each defecation, patients cleaned the anus with 1:5000 potassium permanganate solution, with continuous external use of Mabel

ointment and hemorrhoid suppositories until cured. After discharge, the patients were instructed to return for follow-up for a certain period of time.

Outcome measures

Related clinical indexes after operation: The related clinical indexes of both groups after operation were compared, including wound healing time, recovery time of bowel sounds, intraoperative blood loss and length of stay.

Levels of inflammatory factors: Before treatment and one week after treatment, the inflammatory factors in the blood of the two groups were detected and compared. ELISA was used to compare the levels of interleukin-6 (IL-6), interleukin-8 (IL-8) and serum C-reactive protein (CRP).

Psychological mood of patients: The psychological and emotional changes in the two groups of patients before and 6 months after treatment were compared. Self-rating anxiety scale (SAS) [14] and self-rating depression scale (SDS) [15] were used to evaluate the mental health level of patients. The higher the score, The worse the mental health level.

VAS scores and quality of life: The degree of anal pain during postoperative defecation was assessed by visual analogue scale (VAS) [16] at one day, one week, and two weeks after treatment. The VAS score ranged from 0 to 10, and the patient chooses a number to represent the pain degree according to his own feeling. The higher the score, the severe the pain degree. As for the quality of life of patients, we evaluated the sleep and activities of daily living of patients. Sleep quality was evaluated by Pittsburgh Sleep Quality Index (PSQI) [17], with a score of 0-21. The higher the score, the worse the sleep quality. A score greater than 7 indicates sleep disorder. The activities of daily living were evaluated with Activity of Daily Living Scale (ADL), with a full score of 100. The smaller the score, the worse the self-care ability, and a score less than 60 points means help is needed.

Compliance: The compliance of the two groups of patients during treatment was observed. The compliance evaluation form made by our hospital was used for scoring, which was evaluated by medical staff. Complete compliance: The patients actively cooperate with the medical staff during treatment (100-85 points); Partial compliance: The patients occasionally have irregular behaviors during the operation, but continue to cooperate after being reminded by the medical staff (84-60 points); Non-compliance: The patients do not cooperate with the medical staff at all during the operation (60 points).

Total effective rate: The total effective rates of the two groups were compared 6 months after treatment. Cure: The wound healed after treatment, and the clinical symptoms disappeared completely. Effective: The wound was obviously reduced and the clinical symptoms were obviously improved. Ineffective: The wound surface and clinical symptoms were not obviously relieved after treatment. Total effective rate = cure rate + effective rate.

Incision infection and recurrence rates: The incidence of incision infection and recurrence during the six-month follow-up in both groups was compared. Muscle spasm and contraction, abnormal increase of anal resting pressure, insufficient blood supply of anal canal caused by increased muscle tension, and skin laceration of anal canal after defecation force were regarded as recurrence. After the bacterial culture of the secretion of the surgical incision, any pathogenic bacteria were detected, and the level of inflammatory factors in the patient was elevated, which was considered as infection.

Statistical methods

SPSS 21.0 (Beijing Bizinsight Information Technology Co., Ltd.) software system was used for statistical analysis. Intra-group comparison and inter-group comparison of the measured data expressed as ($\overline{x}\pm s$) were conducted by paired t test and independent sample t-test, respectively. The comparison of the counted data was performed by X^2 test. Significance was set at $P<0.05$.

Results

General data

There was no remarkable difference in general data such as gender, BMI, average monthly

Table 1. General data of two groups of patients [n (%), ($\bar{x}\pm s$)]

Groups	Research group (n=80)	Control group (n=50)	t/X^2	P
Gender			0.80	0.370
Male	32 (40.00)	24 (48.00)		
Female	48 (60.00)	26 (52.00)		
Average age (years old)	45.65±5.36	46.59±4.87	1.01	0.3158
BMI (kg/m^2)	22.43±3.54	21.87±3.91	0.84	0.40
Average monthly income	3207.55±15.43	3203.43±14.89	1.05	0.136
Family residence			0.16	0.686
Villages	30 (37.50)	17 (34.00)		
Cities and towns	50 (62.50)	33 (66.00)		
Family type			0.04	0.851
Others	22 (27.50)	13 (26.00)		
Core family	58 (72.50)	37 (78.00)		
Drinking			0.07	0.793
Yes	53 (66.25)	32 (64.00)		
No	27 (33.75)	18 (36.00)		
Smoking			0.24	0.623
Yes	56 (70.00)	37 (74.00)		
No	24 (30.00)	13 (26.00)		
Eating habits			0.01	0.908
Light	35 (43.75)	23 (46.00)		
Spicy	45 (56.25)	27 (36.00)		

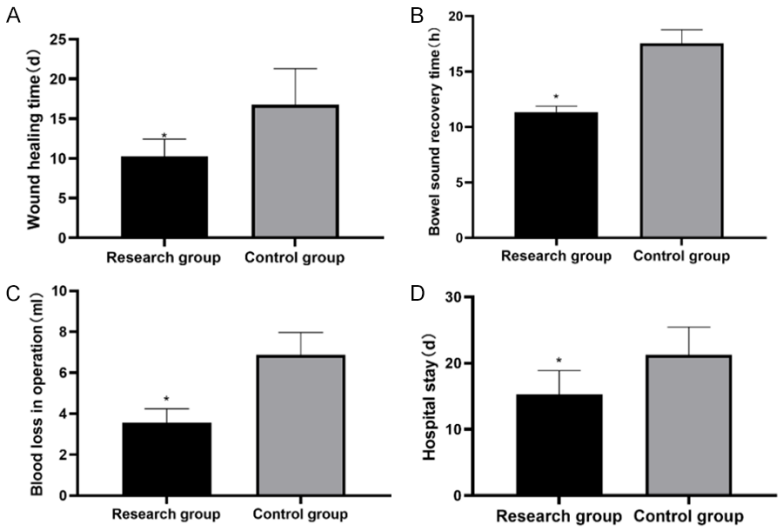

Figure 1. Clinical indicators of two groups of patients. A. Wound healing time: The wound healing time of the RG was shorter than that of the CG (P<0.05); B. Recovery time of bowel sounds: The recovery time of bowel sounds in the RG was shorter than that of the CG (P<0.05); C. Intraoperative blood loss: The amount of intraoperative blood loss in the RG was less than that of the CG (P<0.05); D. Length of stay: The hospital stay in the RG was shorter than that of the CG (P<0.05). Note: *P<0.05.

income, or place of residence between the two groups (P>0.05) (**Table 1**).

Postoperative-related indicators

Compared with those of the CG, the wound healing time, recovery time of bowel sounds, and length of stay were dramatically shorter in the RG (all P<0.05); and the intraoperative blood loss in RG was also significantly lower (P<0.05) (**Figure 1**).

VAS scores and quality of life

The VAS score of the RG was lower than that in the CG at one day, one week, and two weeks after treatment (P<0.05). There was no significant difference in PSQI and ADL between the two groups before treatment (all P>0.05); However, after treatment, the PSQI score was significantly decreased while the ADL score was significantly increased compared with the CG 6 months after treatment (all P<0.05) (**Figure 2**).

Levels of inflammatory factors

The levels of IL-6, IL-8, and CRP in the RG were lower than those in the CG after 1 week of treatment (all P< 0.05) (**Figure 3**).

Psychological affect of patients

The SAS and SDS scores of the RG were lower than those of the CG after 6 months of treatment (all P< 0.05) (**Figure 4**).

Compliance

After comparing the total compliance rate between the two groups, it was found that the compliance rate of the RG was much higher than that of the CG (P<0.05) (**Table 2**).

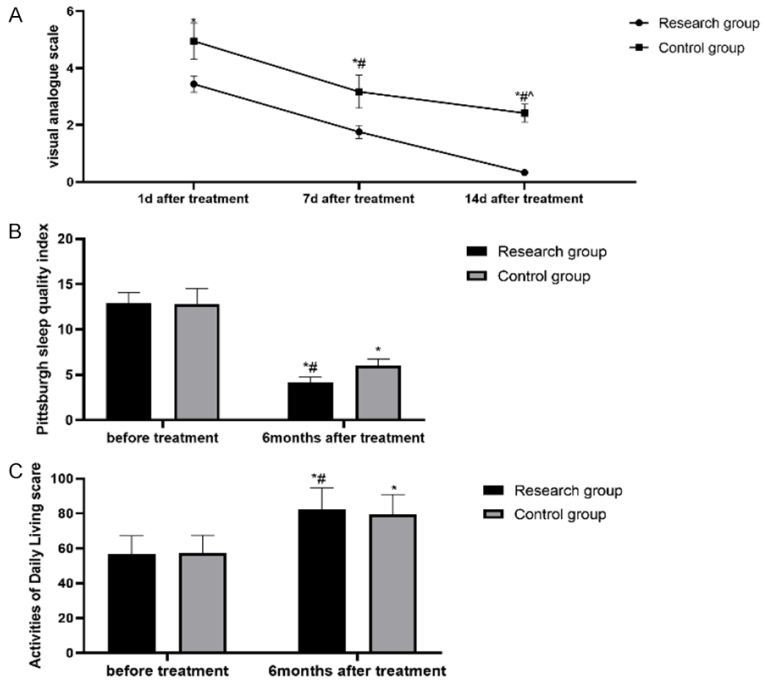

Figure 2. VAS scores and quality of life of patients in both groups. A. VAS scores: The VAS scores of patients in both groups changed after treatment, and the scores in the RG were lower than those in the CG one day, one week, and two weeks after treatment (P<0.05); B. PSQI scores: The PSQI scores of the two groups changed after treatment, and the score of the RG 6 months after treatment was lower than those of the CG (P<0.05); C. ADL scores: After treatment, the level of ADL score in both groups changed, and the score in the RG was higher than that in the CG 6 months after treatment (P<0.05). Note: *P<0.05 compared to the control group; #P<0.05 compared to 1 week and 6 months after treatment; and ^P<0.05 compared to 2 weeks after treatment.

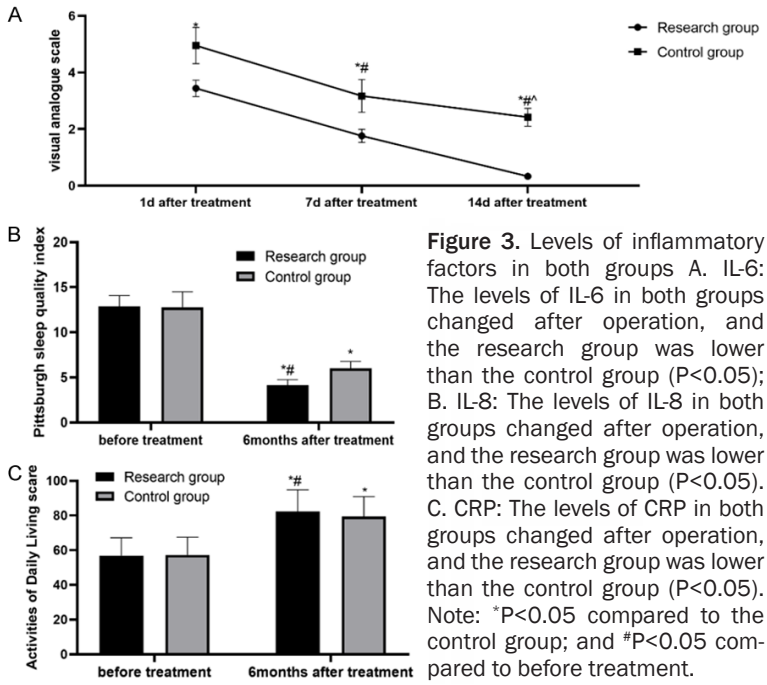

Figure 3. Levels of inflammatory factors in both groups A. IL-6: The levels of IL-6 in both groups changed after operation, and the research group was lower than the control group (P<0.05); B. IL-8: The levels of IL-8 in both groups changed after operation, and the research group was lower than the control group (P<0.05). C. CRP: The levels of CRP in both groups changed after operation, and the research group was lower than the control group (P<0.05). Note: *P<0.05 compared to the control group; and #P<0.05 compared to before treatment.

Total effective rate

After comparing the total effective rates of the two groups, we found that the total effective rate of the RG was higher than that of the CG (P<0.05) (**Table 3**).

Incision infection and recurrence rates

After comparison, it was found that the incision infection and recurrence rates in the RG were lower than those in the control group (all P<0.05) (**Table 4**).

Discussion

Anal fissure is a common cause of anal pain. Most anal fissures heal naturally, but those chronic anal fissures that last more than 6 weeks heal much more slowly, or even fail to heal for a long time [19]. Sphincterotomy is usually used. Although it helps improve the healing speed of CAF, it also easily reduces the tension of internal anal sphincter, and can cause incontinence [20]. Obviously, this has a great impact on the quality of life of patients [21]. This study investigated the effect of resection and expansion therapy plus incision and drainage on CAF. We will combine the results of this study with some principles of CAF to discuss the specific advantages of this therapy compared with traditional sphincterotomy.

It can be seen from the surgical indications that the indexes of the patients in the RG treated by the combination of the two operations were better than those in the CG. In particular, the blood loss and wound healing time in the RG

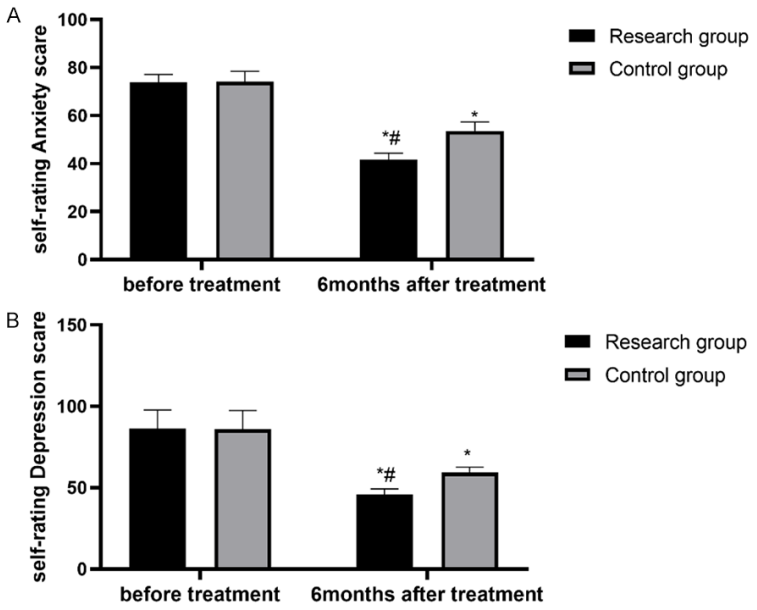

Figure 4. Psychological mood of patients in both groups. A. SAS score: The SAS scores of patients in both groups changed after treatment, and the score of RG was lower than that of CG ($P<0.05$); B. SDS score: After treatment, the SDS levels of both groups changed, and the score of RG was lower than that of CG ($P<0.05$). Note: $^{*}P<0.05$ compared to control group; and $^{\#}P<0.05$ compared to before treatment.

Table 2. Treatment compliance in two groups of patients [n (%)]

Classification	Research group (n=80)	Control group (n=50)	X^2	P
Complete compliance	56 (70.00)	23 (46.00)	-	-
Partial compliance	22 (27.50)	16 (32.00)	-	-
Non-compliance	2 (2.50)	11 (22.00)	-	-
Total compliance rate (%)	78 (97.50)	39 (78.00)	13.00	<0.001

Table 3. Total effective rate in two groups of patients

Classification	Research group (n=80)	Control group (n=50)	X^2	P
Cured	62 (77.50)	25 (50.00)	-	-
Effective	14 (17.50)	13 (26.00)	-	-
Ineffective	4 (5.00)	12 (24.00)	-	-
Total effective rate (%)	76 (95.00)	38 (76.00)	14.42	<0.001

Table 4. Recurrence rate in two groups of patients

Classification	Research group (n=80)	Control group (n=50)	X^2	P
Incision infection rate (%)	3 (3.75)	9 (18.00)	7.46	0.006
Recurrence rate (%)	2 (2.50)	8 (16.00)	7.90	0.005

were dramatically lower than those of the CG. The inflammatory factors of the patients in the RG were dramatically lower than those of the CG. Combined with the two results, it can be found that the treatment of posterior median incision and expansion of the anus plus anal sinus incision and drainage can promote healing and inhibit further inflammation. Most of the CAF occurs in the posterior median position, and the healing time is long. Moreover, bleeding is likely during defecation which can form abscesses, resulting in various infections [22]. Although lateral internal sphincterotomy can effectively eliminate spasm of sphincter and relieve pain to improve healing speed, its ability is limited, and may easily cause increased bleeding and fecal incontinence, thus further deepening the risk of infection [23]. There are few studies on posterior median resection and expansion of the anus. A recent study has shown that median resection and expansion can effectively prevent nerve injury and inflammation during the resection related to oral diseases [24]. Another study on prevention of perianal abscess similar to this study found that incision and drainage could effectively eliminate abscess near anal sinus and further eliminate inflammation [25]. Compared with the results of this study, we can conclude that the combination of posterior median anal incision and anal sinus incision and drainage can combine the advantages of the two treatments, and effectively reduce the inflammatory reaction of patients and the chance of bleeding. In the meantime, because of the characteristics of incision and drainage to eliminate abscess, it can better reduce the occur-

rence of inflammatory reaction in patients. Therefore, compared with lateral internal sphincterotomy, the combination of posterior median incision and expansion and anal sinus incision and drainage can not only make the wound heal better, but also reduce bleeding and inflammation. Combined with the effective results of this study, the total effective rate of the RG is higher, which further proves that the combination of posterior median incision and expansion and anal sinus incision and drainage can have better efficacy.

Other than causing anal fissure, external pathogen infection will also bring about more serious trauma, internal sphincter contracture, chronic inflammatory stimulation and anal stenosis secondary to anal fissure [26]. The anus is an area where bacteria are concentrated. If the patient has anal fissure and does not pay enough attention to personal hygiene, this area can easily get infected after treatment [27], which forms a vicious circle [28]. The results of this study demonstrated that the incidence and recurrence rate of postoperative infection in the RG were dramatically lower than those in the CG. Compared with internal sphincter lateral incision, the combination of anal sinus incision and drainage and posterior median anal incision and expansion has better efficacy on wound healing. Combined with the results, the recurrence rate of the RG was much smaller because of its good efficacy. At the same time, because of its small recurrence rate, the probability of the wound opening again is small, and it will not cause too much postoperative infection.

Nevertheless, there are still some limitations. For one thing, we did not make statistics on some postoperative complications and adverse reactions of patients. For another, we also did not investigate the satisfaction of patients after treatment. This is unfavorable for the research and improvement of treatment methods. In the future research, we should correct the inadequacies of this research and improve the treatment methods constantly. We also need to detect other disease-related factors and explore new treatment modalities.

Conclusion

Posterior median anal incision and expansion plus anal sinus incision and drainage has superior efficacy in CAF. It can effectively reduce the incidence of postoperative infection and recurrence rate.

Disclosure of conflict of interest

None.

Abbreviations

CAF, chronic anal fissure; RG, research group; CG, control group; SAS, Self-rating anxiety scale; SDS, self-rating depression scale; VAS, visual analogue scale; PSQI, Pittsburgh Sleep Quality Index; ADL, Activity of Daily Living Scale.

Address correspondence to: Yuhe Bi, Department of Anorectal Surgery, Jinan City People's Hospital, 001 Xuehu Street, Laiwu District, Jinan 271199, Shandong, China. Tel: +86-13906344134; E-mail: biyuhe0634@163.com

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