

Original Article

Clinical observation on treatment of mixed hemorrhoids with milligan morgan hemorrhoidectomy combined with purse-string suture

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Abstract: Objective: To compare the efficacy of traditional Milligan Morgan hemorrhoidectomy (MMH) and its combination with purse-string suture for treating mixed hemorrhoids, and to evaluate the clinical significance of the latter. Methods: A total of 102 patients with mixed hemorrhoids who were admitted to Anorectal Surgery Department of Affiliated Hospital of Beihua University from January 2016 to January 2018 were randomized into three surgical groups (n=34 per group): traditional surgery group, procedure for prolapse and hemorrhoids (PPH group), and traditional hemorrhoidectomy combined with purse suture (combined surgery group). The surgery completion time, healing time, post-operative duration of hospitalization, postoperative pain, postoperative complications, and clinical efficacy were observed. Results: There was no significant difference in the operative times among the three groups ($P>0.05$). The postoperative healing time was the shortest in the combined surgery group ($P<0.05$), followed by the PPH group, and the traditional surgery group had the longest healing time. The duration of hospitalization of the combined surgery group was also significantly shorter compared to both traditional surgery and PPH groups (both $P<0.05$). The 24 h post-operation, first defecation, and 7 days' post-operation pain scores were all significantly higher in the traditional surgery group compared to the PPH and combined surgery groups (all $P<0.05$), and the first defecation pain score in the PPH group was higher than that in the combined surgery group. The incidence of postoperative hemorrhage in the traditional surgery group was significantly higher compared to the other two groups. The incidence of dysuria was significantly lower in the combined surgery group compared to the traditional surgery and PPH groups. The incidences of perianal edema and anal pendant expansion were significantly higher in the traditional surgery group compared to the PPH and the combined surgery groups (both $P<0.05$). There were no significant differences in anal stenosis, difficult defecation and anal prolapse among the three groups (all $P>0.05$). The clinical efficacy of the combined surgery group was better than that of the traditional surgery group ($P<0.05$). Conclusion: MMH combined with purse-string suture can shorten wound healing time, relieve postoperative pain, reduce postoperative complications, and improve clinical efficacy for the treatment of mixed hemorrhoids, and therefore is worthy of further clinical application.

Keywords: Mixed hemorrhoids, purse-string suture, traditional milligan morgan hemorrhoidectomy, procedure for prolapse and hemorrhoids, curative effect observation

Introduction

Hemorrhoids or piles are a common condition manifested as hematochezia, prolapse, pain, perianal discomfort, etc. The epidemiology showed that global incidence of hemorrhoids is currently 49.14%, and affects 4.40% of the world's population [1]. A symposium on hemorrhoid surgery held in the United States in 1980, pointed out that patients with mild symptoms

were recommended no or conservative treatment while surgery was advised for patients with moderate and severe symptoms [2]. The patients who do not show any improvements after the conservative treatment require surgery. Mixed hemorrhoids are a kind of nevus, surgical treatment is various in clinic. The classic procedure for hemorrhoids resection is the Milligan Morgan hemorrhoidectomy (MMH), which is the "gold standard" of hemorrhoid sur-

Treatment of mixed hemorrhoids with MMH combined with purse-string suture

gery [3]. However, due to the large wounds and abundant sensory nerves in the anal area, the incidences of postoperative pain and complications are high [4, 5]. procedure for prolapse and hemorrhoids (PPH) was subsequently developed based on the theory of anal cushion downward shift [6]. The characteristics of this operation are small wounds, less pain, quick recovery and so on [7]. However, PPH has the disadvantages of high long-term recurrence rate and high incidence of postoperative complications [8]. In recent years, purse-string suturing has been combined with traditional Milligan Morgan surgery. The aim of this study was to compare the clinical outcomes and efficacy, and post-operative complications between traditional Milligan Morgan, PPH, and traditional Milligan Morgan combined with purse-string suture.

Materials and methods

General information

A total of 102 patients (58 males and 44 females; average age 42.44 ± 8.67 years, ranging 19-58 years) with mixed hemorrhoids were enrolled from January 2016 to January 2018 in Affiliated Hospital of Beihua University. Sixty patients had grade III mixed hemorrhoids and 42 had grade IV mixed hemorrhoids. The patients were randomized into the traditional, PPH and combined surgery groups (n=34 per group). Traditional surgery group (average age 43.01 ± 8.96 years) included 19 males and 15 females, and 21 patients with grade III and 13 with grade IV mixed hemorrhoids. PPH group (average age 40.81 ± 8.45 years) included 20 males and 14 females, and 18 patients with grade III and 16 with grade IV mixed hemorrhoids. The combined surgery group (average age 43.62 ± 7.95 years) included 19 males and 15 females, 21 patients with grade III and 13 with grade IV mixed hemorrhoids. The three groups were followed up for 3 months. All patients signed the informed consent and the study was approved by the Ethics Committee of Affiliated Hospital of Beihua University.

Inclusion and exclusion criteria

Inclusion criteria: Presence of mixed hemorrhoids of grade III-IV that all met the diagnostic criteria for hemorrhoids [9]; aged between 18-75 years old.

Exclusion criteria: Patients with anal fissure, perianal abscess, anal rash, colorectal cancer, rectal polyps and inflammatory bowel disease; patients with serious heart, liver, kidney and other diseases; patients with mental disorders or cerebrovascular disease that lead to a reduced quality of life; patients with severe coagulopathy; patients with difficult or inconvenient follow-up, or unsuitable for surgery.

Surgery

Preoperative preparation and postoperative care: All patients received routine examination of blood, biochemistry and coagulation function, urine and feces, screening before blood transfusion, and electrocardiogram and chest radiography to exclude those with surgical contraindications. All patients were routinely given antibiotics for 3 days after surgery, along with proper medication and hip bath treatment. The patients were followed up for 3 months after surgery.

Traditional surgery group: The patients were anesthetized at the lumbosacral region, and then placed in a left-lateral position to disinfect and drape the area of operation. Hemorrhoids were exposed in the field of vision after anal expansion, and a V-shaped incision was made at the edge of external hemorrhoids. The skin of external hemorrhoids was incised to a distance of 0.3 cm from the dentate line and lifted upwards with hemostatic forceps to blunt dissection the base of the hemorrhoid nucleus. The hemorrhoid nucleus and venous plexus were released, and the base of the internal hemorrhoid was clamped with medium-bending forceps. Line 7 was used to ligate and retain thread at the root of hemorrhoids, and the hemorrhoid nucleus tissue was cut off with tissue scissors. Other hemorrhoids similarly excised. Adjacent hemorrhoids were separated from the skin membrane by 0.5-1.0 cm to prevent anal stenosis [3].

PPH group: Lumbar anesthesia was performed at the lumbosacral region, and the patient was placed in the left-lateral position to disinfect and drape the area of operation. The anus was fully expanded, and an anal canal dilator was inserted to reset the prolapsed part. The inner core of the dilator was removed, and the skin was sutured at the mucosal prolapse site using a 2-0 absorbable line. The stapler was

Treatment of mixed hemorrhoids with MMH combined with purse-string suture

Table 1. Comparison of general information among the three groups of patients (case)

Item	Traditional surgery group (n=34)	PPH group (n=34)	Combined surgery group (n=34)	χ^2/F	P
Gender				0.228	0.893
Male	19	20	19		
Female	15	14	15		
Age (year)	43.01±8.96	40.81±8.45	43.62±7.95	0.623	0.503
Grade III mixed hemorrhoids	21	18	21	0.429	0.801
Grade IV mixed hemorrhoids	13	16	13		

Note: PPH, procedure for prolapse and hemorrhoids.

unscrewed to its maximum position to allow the head of the pin to penetrate deeply into the upper end of the suture. The tail of the suture was pulled out of the side hole of the stapler and knotted. The suture was then pulled and the prolapsed mucosa layer was placed in the cavity of the stapler. Both the closer and the stapler were adjusted to the safe mode and the prolapsed mucosa was cut off. The incisions were then sutured to stop bleeding and the stapler was removed. The anastomotic stoma was examined for bleeding, and sutured to stop any bleeding that occurred, and the dilator was removed [10].

Combined surgery group: The patient was placed in the right lateral position and lumbar anesthesia was performed in the lumbosacral region. After anesthetization, the patient was brought to a prone position, and the area of operation was disinfected and draped. The skin at the dentate line of hemorrhoid nucleus, and the skin at a distance of 2.0 cm from the anal margin were both clamped with vascular forceps. An incision was made from outside to inside 0.5 cm from the dentate line, to expose the subcutaneous part of the external sphincter. Subcutaneous venous plexus, hyperplastic connective tissue and varicose venous mass were completely removed from bilateral flaps. After dissecting the entire hemorrhoid vascular pedicle, the base of the hemorrhoid nucleus was sutured with a 3-0 absorbable suture, which was then uninterrupted. The purse-string suture was used to suture the anal canal epithelium on both sides of the incision along the basement and knotted with another suture at the root of the nucleus. Two-thirds of the hemorrhoids were moved by a tissue clipper, and the stump of the internal hemorrhoid was returned to the anus. Other hemorrhoid nuclei were removed in the same way [11].

Post-operative efficacy and complications

The main indicators of efficacy were as follows: 1) Operation time, calculated as the time from initial skin incision to the end of the suture. 2) Postoperative bleeding that was recorded at the end of the surgery until the wound healed. 3) Postoperative healing time from the end of surgery to wound healing. 4) Postoperative hospitalization duration i.e. the number of days a patient was hospitalized after surgery. 5) Postoperative pain that was quantified by the linear visual analogue score (VAS). The patients were given a 10.0 cm ruler and asked to point at a marking between 0 and 10 with 0 representing no pain and 10 representing the most severe pain according to the degree of pain they experienced, and the scale values were taken as patient VAS scores. The incidence of pain was recorded at 24 h postoperatively, during the first defecation, and 7 days after surgery [12]. 6) Postoperative complications such as perianal edema, anal pendant expansion, difficulty in defecation, anal stenosis, urinary retention etc. The number of patients presenting complications were recorded. The incidence of each complication = Number of patients with the complication/total number of patients * 100%. 7) The efficacy of the respective operations was categorized as a) cured - complete absence of any symptoms and signs; b) remarkably effective - absent symptoms with improvement in signs; c) effective - improvement in symptoms and signs; d) no effect - no change in symptoms and signs [8].

Statistical analysis

SPSS 17.0 statistical software was used to analyze the data. Continuous variables were expressed as mean \pm standard deviation ($\bar{x} \pm sd$). Data of three groups was compared by

Treatment of mixed hemorrhoids with MMH combined with purse-string suture

Table 2. Comparison of surgical indices among the three groups of patients

Group	Operation time (min)	Healing time (day)	Hospitalization duration (day)
Traditional surgery group (n=34)	29.69±3.65	19.65±4.63	13.63±4.24
PPH group (n=34)	27.63±3.28	16.36±3.21	12.36±3.69
Combined surgery group (n=34)	30.39±4.62	12.36±2.84	10.12±2.84
F	10.022	213.625	31.695
P	0.063	0.000	0.000
P _{TP}	0.126	0.001	0.075
P _{TC}	0.852	0.000	0.036
P _{PC}	0.085	0.000	0.018

Note: PPH, procedure for prolapse and hemorrhoids; P_{TP}, P value between traditional surgery group and PPH group; P_{TC}, P value between traditional surgery group and combination surgery group; P_{PC}, P value between PPH group and combination surgery group.

Table 3. Comparison of postoperative pain among the three groups of patients (score)

Group	Postoperative 24 h	Postoperative first defecation	Postoperative 7 days
Traditional surgery group (n=34)	6.12±0.81	4.65±0.67	2.41±0.67
PPH group (n=34)	3.93±0.72	3.25±0.65	1.52±0.58
Combined surgery group (n=34)	3.41±0.61	2.91±0.69	1.41±0.59
F	261.361	128.364	53.387
P	0.000	0.000	0.000
P _{TP}	0.000	0.000	0.000
P _{TC}	0.000	0.000	0.000
P _{PC}	0.158	0.016	0.125

Note: PPH, procedure for prolapse and hemorrhoids; P_{TP}, P value between traditional surgery group and PPH group; P_{TC}, P value between traditional surgery group and combination surgery group; P_{PC}, P value between PPH group and combination surgery group.

analysis of variance analysis and that of two groups was compared by q test. The counting data was analyzed by χ^2 test. Rank sum test was used as the non-parametric test, and the test level was represented by Z ($\alpha=0.05$). $P<0.05$ is considered statistically significant.

Results

Comparison of general information among three groups of patients

There were no statistical differences in general information among the three groups (all $P>0.05$). See **Table 1**.

Comparison of surgical indices among the three groups of patients

The time of operation was similar for all three types of surgery ($F=10.022$, $P>0.05$). Significant

differences were seen among the patient groups in terms of the wound healing time ($F=213.625$, $P<0.05$) and duration of post-operative hospitalization ($F=31.695$, $P<0.05$). Patients who received the combined surgery had the shortest healing time ($P<0.05$) compared to both the traditional surgery and PPH groups. The healing time of the PPH group was significantly shorter than that of the traditional surgery group ($P<0.05$). The combined surgery also resulted in significantly shorter hospitalization time compared to the other two groups (both $P<0.05$), while no significant difference was seen between the PPH and the traditional surgery groups ($P>0.05$). See **Table 2**.

Comparison of postoperative pain

Significant differences were seen in the 24 h post-operative pain scores among the patient groups ($F=261.361$, $P<0.05$). While the combined surgery

and PPH groups had similar pain scores ($P>0.05$), both groups had significantly lower scores compared to the traditional surgery group (both $P<0.05$).

Postoperative first defecation pain was also significantly different across the three surgery groups ($F=128.364$, $P<0.05$). Patients who received combination surgery had the lowest pain scores, followed by the PPH group, and the traditional surgery group that showed the highest scores (all $P<0.05$).

Finally, significant differences were seen in the post-operative 7-day pain scores among the three surgery groups ($F=53.387$, $P<0.05$). The post-operative 7-day pain scores were similar for the PPH group and the combined surgery group, and both groups presented significantly lower pain scores than the traditional surgery group (both $P<0.05$). See **Table 3**.

Treatment of mixed hemorrhoids with MMH combined with purse-string suture

Table 4. Comparison of post-operative complications among the three groups of patients (n, %)

Group	Postoperative hemorrhage	Micturition obstacles	Anal stenosis	Anal edema	Anal pendant expansion	Difficult defecation	Anal prolapse
Traditional surgery group (n=34)	6 (17.64)	10 (29.41)	2 (5.88)	13 (38.23)	9 (26.47)	5 (14.71)	2 (5.88)
PPH group (n=34)	2 (5.88)	8 (23.53)	1 (2.94)	4 (11.76)	7 (20.59)	3 (8.82)	0
Combined surgery group (n=34)	1 (2.94)	4 (11.76)	1 (2.94)	3 (8.82)	3 (8.82)	2 (5.88)	0
χ^2	11.756	9.854	2.369	28.265	8.369	4.589	3.956
P	0.004	0.006	0.423	0.000	0.016	0.094	0.198
P_{TP}	0.014	0.276	0.956	0.000	0.349	0.489	0.982
P_{TC}	0.006	0.003	0.956	0.000	0.005	0.369	0.982
P_{PC}	0.956	0.038	1.000	0.578	0.047	0.867	1.000

Note: PPH, procedure for prolapse and hemorrhoids; P_{TP} , P value between traditional surgery group and PPH group; P_{TC} , P value between traditional surgery group and combination surgery group; P_{PC} , P value between PPH group and combination surgery group.

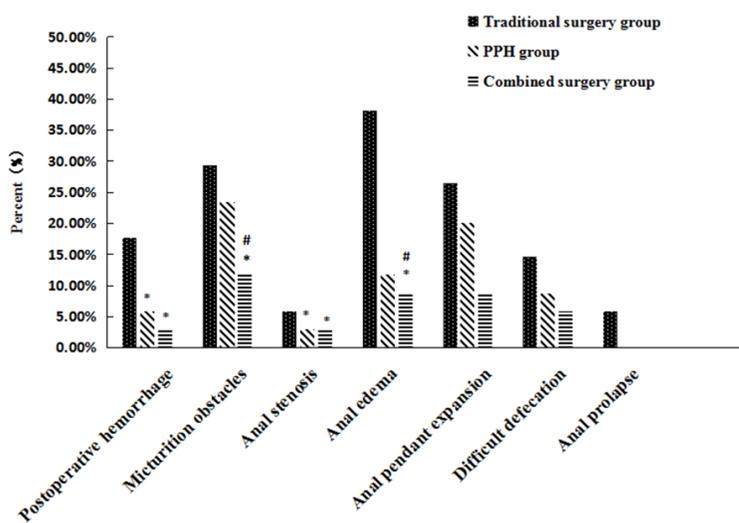


Figure 1. Comparison of post-operative complications among the three groups of patients. Compared with the traditional surgery group, * $P < 0.05$; compared with the PPH group, # $P < 0.05$. PPH, procedure for prolapse and hemorrhoids.

Comparison of post-operative complications

The patient groups showed significant difference in terms of bleeding during postoperative wound healing ($\chi^2=11.756$, $P < 0.05$). Patients who underwent PPH or combined surgery showed significantly lower post-operative bleeding compared to the traditional surgery group (both $P < 0.05$), while no significant differences were seen between the PPH and combined surgery groups ($P > 0.05$). The level of dysuria was significantly different between the groups ($\chi^2=9.854$, $P < 0.05$). While no difference was seen between the PPH and the traditional surgery groups, the dysuria rate of the combined surgery group was significantly lower than both groups (both $P < 0.05$).

No significant differences were seen in anal stricture, defecation difficulties and anal prolapse among the three groups (all $P > 0.05$).

Perianal edema was significantly different across all groups ($\chi^2=28.265$, $P < 0.05$). While the PPH group and the combined surgery group showed similar perianal edema ($P > 0.05$), both had significantly lower rate of perianal edema compared to the traditional surgery group (both $P < 0.05$).

Anal pendant expansion was also significantly different between the patient groups ($\chi^2=8.369$, $P < 0.05$). The PPH and the traditional surgery groups had similar rates ($P > 0.05$),

while the combined surgery group had a significantly lower rate of anal pendant expansion compared to the other two groups (both $P < 0.05$). See **Table 4** and **Figure 1**.

Comparison of therapeutic effects of the three surgeries

In the traditional surgery group, 23 cases were cured, 7 cases were markedly effective, 3 cases were improved, and 1 case was ineffective. In the PPH group, 26 cases were cured, 6 were markedly effective, 1 case was improved and 1 case was ineffective. In the combined surgery group, 29 cases were cured, 4 were markedly effective, 1 was improved, and none was ineffective. Rank sum test showed that the

Treatment of mixed hemorrhoids with MMH combined with purse-string suture

Table 5. Comparison of therapeutic effects of the three surgeries among the three groups of patients (n, %)

Group	Cure	Markedly effective	Improved	Ineffective
Traditional surgery group (n=34)	23 (67.65)	7 (20.59)	3 (8.82)	1 (2.94)
PPH group (n=34)	26 (76.47)	6 (17.65)	1 (2.94)	1 (2.94)
Combined surgery group (n=34)	29 (85.29)	4 (11.77)	1 (2.94)	0
Z		7.065		
P		0.004		
P _{TP}		0.192		
P _{TC}		0.009		
P _{PC}		0.183		

Note: PPH, procedure for prolapse and hemorrhoids; P_{TP}, P value between traditional surgery group and PPH group; P_{TC}, P value between traditional surgery group and combination surgery group; P_{PC}, P value between PPH group and combination surgery group.

efficacies of the three surgery types were statistically different (Z=7.065, P=0.004). Pair-wise comparison showed no difference in the efficacies of PPH and the traditional surgery or between PPH and the combined surgery (both P>0.05), while that of the combined surgery was better than traditional surgery (P<0.05). See **Table 5**.

Discussion

Patients with mixed hemorrhoids who are unresponsive to conservative treatment need surgery. The surgical treatment is varied in clinical practice. For patients with I, II degree or mild rectal mucosal prolapse, sclerotherapy is often used [13]. Rubber band ligation therapy is applicable to patients with I, II, III degree, high-risk hemorrhoids patients and elderly patients; some studies have shown that its operation is simple and safe and has few complications [14, 15]. The gold standard treatment for mixed hemorrhoids is MMH which was subsequently modified into a closed hemorrhoidectomy, suitable for patients with degree III and IV mixed hemorrhoids, with a good recurrence rate and long-term effect [3, 16, 17]. With further advancements in surgical technology, PPH and tissue-selecting therapy stapler have been increasingly used clinically [10]. However, multiple complications have been observed after PPH, along with a high rate of recurrence of the degree IV mixed hemorrhoids [18, 19]. To reduce the complications of MMH and the damage to anal function, this surgical procedure has been combined with the purse-string suture. We carried out a prospective comparative

study of MMH, clinically widespread PPH and the novel combination of purse-string suture with the Milligan Morgan procedure.

Our results showed that although there was no significant difference in the operative times of the three surgeries, the post-operative healing time in the combined surgery group was significantly shorter than both the PPH and the traditional surgery groups, and that of

the PPH was shorter than traditional hemorrhoidectomy. The duration of hospitalization in the combined surgery group was also significantly shorter compared to the other two groups. This may be due to the fact that purse-string suture in the anal epithelium reduces the wound size and speeds up wound healing. These findings are consistent with previous studies [11].

The pain scores of the three groups were compared 24 hours after operation, during first post-operation defecation, and 7 days after operation. The pain score at all times points were significantly higher in the traditional surgery group compared to the PPH and combined surgery groups. The first defecation pain score was significantly higher in the PPH group compared to the combined surgery group. Since the skin of the anal canal is arranged by the spinal nerve, the area is highly sensitive to pain, and the first defecation after surgery stimulates the wound and causes pain. Pain was more pronounced after traditional hemorrhoidectomy, even after 7 days after the operation, likely due to the large wound size and long healing time [4, 5].

In terms of postoperative complications, the incidence of postoperative bleeding in the traditional surgery group was significantly higher compared to the other two groups, also as a result of the larger surgical wounds [4, 5]. The use of purse-string suture reduced the wound size and therefore lowered the risk of postoperative bleeding in the combined surgery group [4, 5]. The incidence of dysuria was also the

Treatment of mixed hemorrhoids with MMH combined with purse-string suture

lowest in the combined surgery group since the lower pain levels resulting from purse string suture reduced the bladder and urethral sphincter reflex contractions [20]. The incidence of perianal edema and anal pendant expansion were the highest in the traditional surgery group due to the large wounds, which damage the blood vessels and muscles around the anus and increase inflammatory exudation. At the same time, because of the high degree of pain, sphincter spasm occurs and affects perianal lymph, blood and hemorrhoids venous reflux, further exacerbating perianal edema and anal pendant expansion. These findings are consistent with previous studies [11].

Our results showed that the clinical efficacy of the combined surgery was better than traditional hemorrhoidectomy, but was similar to that of PPH. This is likely the result of combining the purse-string suture which shrinks the wound, expedites healing, and reduces the incidence of complications, all of which are beneficial to the recovery of the patients. There are several limitations of this study, such as the small sample size and short follow-up duration. Our results therefore need to be validated with larger cohorts and longer follow-up durations in order to study the postoperative curative effect and recurrence rate in the three groups.

In conclusion, the treatment of mixed hemorrhoids with traditional MMH combined with purse-string suture reduces wound healing time, lowers postoperative pain and other complications, and has remarkable clinical efficacy. However, the long-term curative effect and recurrence rate still need to be further observed and studied.

Disclosure of conflict of interest

None.

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Treatment of mixed hemorrhoids with MMH combined with purse-string suture

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