

## Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphincter resection for circumferential mixed hemorrhoids

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### Abstract

**AIM:** To identify a more effective treatment protocol for circumferential mixed hemorrhoids.

**METHODS:** A total of 192 patients with circumferential mixed hemorrhoids were randomized into the treatment group, where they underwent Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphincter resection, or the control group, where traditional external dissection and internal ligation were performed. Postoperative recovery and complications were monitored.

**RESULTS:** The time to wound healing was  $12.96 \pm 2.25$  d in the treatment group shorter than  $19.58 \pm 2.71$  d in the control group. Slight pain rate was 58.3% in

the treatment group higher than 22.9% in the control group; moderate pain rate was 33.3% in the treatment group lower than 56.3% in the control group severe pain rate was 8.4% in the treatment group lower than 20.8% in the control group. No edema rate was 70.8% in the treatment group higher than 43.8% in the control group; mild local edema rate was 26% in the treatment group lower than 39.6% in the control group obvious local edema was 3.03% in the treatment group lower than 16.7% in the control group. No stenosis rate was 85.4% in the treatment group higher than 63.5% in the control group; moderate stenosis rate was 14.6% in the treatment group Lower than 27.1% in the control group severe anal stenosis rate was 0% in the treatment group lower than 9.4% in the control group.

**CONCLUSION:** Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphincter resection is the optimal treatment for circumferential mixed hemorrhoids and can be widely applied in clinical settings.

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**Key words:** Milligan-Morgan hemorrhoidectomy; Mixed hemorrhoids; Anal cushion; Internal sphincter

**Core tip:** We treated 96 patients with circumferential mixed hemorrhoids using Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphincter resection, and compared their clinical outcomes with those undergoing traditional hemorrhoidectomy. The differences are significant in favor of the modified Milligan-Morgan technique in terms of time to wound healing, anal stenosis, wound pain, edema and other complications. This approach can be widely applied in clinical practice.

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## INTRODUCTION

The treatment of circumferential mixed hemorrhoids is challenging for medical providers. Despite a number of reports on the surgical options at home and abroad, no effective treatment method is currently available<sup>[1]</sup>. The traditional “external dissection and internal ligation” or Milligan-Morgan technique, is the mainstream treatment for mixed hemorrhoids. However, with larger and more hemorrhoids involved in the circumferential type, surgery becomes more complicated and is inevitably associated with a range of post-operative complications<sup>[2]</sup>. The most common and serious complication is anal stenosis and incontinence, which results in significant pain in affected patients<sup>[3-6]</sup>. We treated 96 patients with circumferential mixed hemorrhoids using Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphincter resection, and compared their clinical outcomes with those undergoing traditional hemorrhoidectomy. The differences were significant in favor of the former group, as shown below.

## MATERIALS AND METHODS

### General information

A select group of 192 patients with circumferential mixed hemorrhoids treated in our department from August 2010 to November 2012 were randomized into two groups, with 96 patients in each group. The 96 patients in the treatment group underwent Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphincter resection, while the patients in the control group were treated with the traditional Milligan-Morgan technique. The patients comprised 98 men and 94 women aged 26 to 65 years, with a mean age of 48.5 years. Disease duration ranged between 7 and 48 mo, with an average of 26.5 mo. The two groups were comparable as there were no significant differences in terms of age, gender, and disease duration.

### Methods

**Treatment group:** Each patient was placed in the lateral position after caudal or spinal anesthesia for routine disinfection and draping. Hemorrhoids of higher grades situated in the 3, 7 and 11 o'clock positions were treated in most cases. A V-shape was made from the body of an external hemorrhoid to the anal margin using scissors. With complete exposure after anal dilatation, each internal hemorrhoid was slightly pulled towards the outside with forceps for high suspension and ligation. To im-

prove the effect of suspension, the rectal mucosa 1-2 cm above the internal hemorrhoid was lifted with tissue forceps, clamped with the base of the hemorrhoid that was carried by curved forceps, and ligated with a 10-gauge silk suture at 0.5 cm away from the dentate line, without injuring it. The internal hemorrhoids at the base were individually ligated in the same way, keeping the ligated bodies at different levels of the anal canal with sufficient mucosal bridges between them to prevent postoperative anal stenosis. Each external hemorrhoid was then lifted with forceps and dissected along the V-shaped incision. Subcutaneous varicose veins were stripped off and bleeding was managed appropriately. All external hemorrhoids were treated in the same way. Sufficient flaps were retained between each incision to avoid anal stenosis due to anal skin defects. Finally, the lower edge of the internal sphincter was divided and cut off at the interscalene in the 3 or 9 o'clock position. A second-generation cephalosporin was administered for 2 d after the procedure to prevent infection.

**Control group:** The traditional external dissection and internal ligation method was used to treat the patients in this group. Postoperative treatment was the same as that in the treatment group.

### Outcome evaluation

The therapeutic efficacy was evaluated according to the Diagnosis and Efficacy Standards in Traditional Chinese Medicine issued by the State Administration of Traditional Chinese Medicine of China<sup>[7]</sup>.

The severity of anal stenosis was classified as: (1) no stenosis: index finger can pass smoothly; stool passes easily, without pain or discomfort; mild stenosis: index finger can pass with difficulty; stool passes relatively easily, without obvious pain; (2) moderate stenosis: only the first joint of the index finger can pass; stool passes with difficulty and anal pain; and (3) severe anal stenosis: only the little finger can pass through; stool passes with difficulty and obvious anal pain.

The degree of pain was classified as: grade 0: no pain; grade 1: mild pain; the anal pain is slight and tolerable without disturbing normal life and sleep; no significant changes in mood; grade 2 (moderate): obvious pain; the anal pain is so intense that analgesics are required, normal life and sleep are compromised, and mood changes are present, such as irritability; the condition is still under control with typical analgesics; grade 3 (severe): severe pain; the pain is intolerable and seriously disturbing normal life and sleep, causing autonomic dysfunction; analgesic drugs are necessary. The degree of anal margin edema was classified into: grade 0: no edema; grade 1: mild local edema, without affecting normal activity; and grade 2: obvious local edema, restricting normal activity.

### Statistical analysis

The data were processed using SPSS 16.0 for statistical analysis with both the  $\chi^2$  test and *t* test. A *P* value of less

than 0.05 was considered statistically significant.

## RESULTS

Following treatment: the time to wound healing was  $12.96 \pm 2.25$  d in the treatment group shorter than  $19.58 \pm 2.71$  d in the control group, the difference was statistically significant ( $t = 32.52$ ,  $P = 0.000$ ). Slight pain rate was 58.3% in the treatment group higher than 22.9% in the control group, the difference was statistically significant ( $\chi^2 = 24.961$ ,  $P = 0.000$ ); moderate pain rate was 33.3% in the treatment group lower than 56.3% in the control group, the difference was statistically significant ( $\chi^2 = 10.194$ ,  $P = 0.001$ ); severe pain rate was 8.4% in the treatment group lower than 20.8% in the control group, the difference was statistically significant ( $\chi^2 = 6.021$ ,  $P = 0.014$ ). No edema rate was 70.8% in the treatment group higher than 43.8% in the control group, the difference was statistically significant ( $\chi^2 = 14.389$ ,  $P = 0.000$ ); mild local edema rate was 26% in the treatment group lower than 39.6% in the control group, the difference was statistically significant ( $\chi^2 = 3.993$ ,  $P = 0.046$ ); obvious local edema was 3.03% in the treatment group lower than 16.7% in the control group, the difference was statistically significant ( $\chi^2 = 9.872$ ,  $P = 0.002$ ). No stenosis rate was 85.4% in the treatment group higher than 63.5% in the control group, the difference was statistically significant ( $\chi^2 = 12.084$ ,  $P = 0.001$ ); moderate stenosis rate was 14.6% in the treatment group lower than 27.1% in the control group, the difference was statistically significant ( $\chi^2 = 4.547$ ,  $P = 0.033$ ); severe anal stenosis rate was 0% in the treatment group lower than 9.4% in the control group, the difference was statistically significant ( $\chi^2 = 7.461$ ,  $P = 0.006$ ).

## DISCUSSION

Arising above or beneath the dentate line, the mixed hemorrhoid is a condition where the internal and external hemorrhoidal plexuses of veins merge, presenting the features of both internal hemorrhoid and external hemorrhoid<sup>[8]</sup>. The circumferential mixed hemorrhoids, as the severe type of the disease, are particularly difficult in surgical treatment. The conventional Milligan-Morgan<sup>[9-11]</sup> hemorrhoidectomy has been the globally recognized "golden standard" for circumferential mixed hemorrhoids<sup>[12]</sup>. However, it is limited by severe pain<sup>[13,14]</sup> after surgery, prolonged wound healing time, and complications such as anal stenosis<sup>[15]</sup>. In fact, it is an extremely painful procedure for the patients, Anal function and feeling fine and other defects be affected<sup>[16]</sup>. Based on these results, there were significant differences in favor of the modified Milligan-Morgan technique in terms of time to wound healing, anal stenosis, wound pain, edema and other complications. Anal stenosis is a critical factor that compromises the treatment effect and wound healing, resulting in significant inconvenience to the patient's life and work. Hence, caution should be taken to reduce

the risk of this complication. It is proved that reduction of the anal cushions may trigger anal incontinence<sup>[17]</sup>. However, the conventional Milligan-Morgan hemorrhoidectomy can not achieve the ring-shaped resection of all external hemorrhoids, and anal stenosis can easily occur due to excessive resection. In addition, the massive damage of the dentate line can result in the change of anal function<sup>[18]</sup>. The modified Milligan-Morgan technique is designed to minimize anal stenosis, anal margin edema, incision pain, and other undesirable factors. During surgery, the anal cushions can be retained by suspending and ligating internal hemorrhoids and mucosa above the dentate line, minimizing injury to the anal cushions<sup>[19]</sup> and the dentate line. Anal cushions are the normal structures above the dentate line. They have certain immune and endocrine functions, and can effectively cause anal reflex, ensuring normal continence and defecation<sup>[20,21]</sup>. Bowel movement is induced at the dentate line, which should be preserved during surgery. Destruction of this area may lead to prolapse and incontinence of anal cushions, thus protection of anal cushions and the dentate line is essential for normal anal function after surgery<sup>[22-24]</sup>. Using the modified operation, only lesions are removed, and normal anal cushions are retained, ensuring normal function of the anus. Sufficient skin bridges and mucosal bridges are required between adjacent incisions to avoid the formation of a mucosal tension band, which may lead to anal stenosis. In addition, as part of the anorectal smooth muscle, the internal sphincter is prone to spasm due to its contractile properties, resulting in spastic pain after surgery and subsequently worsened edema, affecting wound healing. Therefore, the internal sphincter is partially resected during surgery to relieve persistent spasm and reduce the pressure of the sphincter to decrease the anal resting pressure and restore normal blood and lymph circulation. In this way, postoperative anal margin edema can be reduced or avoided, ensuring less pain and better wound healing. Based on our experience, retention of anal cushions and partial resection of the internal sphincter results in considerable benefits in the treatment of mixed hemorrhoids, including: (1) definite efficacy, less invasiveness, faster healing after surgery, and a shorter treatment course; (2) reduced sequelae, less damage to the anal cushions, and maximal retention of the anal canal, anal function and normal structure; (3) fewer complications, effectively reducing the incidence of postoperative hemorrhage, edema, urinary retention and anal stenosis; (4) suspension and high ligation of internal hemorrhoids can elevate the anal cushions that have moved downward in a similar way to the procedure for prolapse and hemorrhoids; this simple and cost-effective operation can be applied in various hospitals of different levels; and (5) with the preserved and elevated anal cushions, external hemorrhoids are also significantly reduced, making it possible for uncompromised, refined postoperative management.

In conclusion, Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphinc-

ter resection is the optimal treatment for circumferential mixed hemorrhoids, as it effectively removes hemorrhoids while retaining the anal canal anatomy and physiology, complying with the physiological function, pathological changes and anorectal dynamics of the anus<sup>[25]</sup>. In addition, this surgical method overcomes the drawbacks of traditional techniques by eliminating continued spasm of the internal sphincter, and reducing postoperative pain, edema, anal stenosis and other complications. This modified technique is a valuable approach in the treatment of circumferential mixed hemorrhoids resulting in a shorter time to wound healing, improved quality of surgery and can be widely applied in clinical settings.

## COMMENTS

### Background

The treatment of circumferential mixed hemorrhoids is a challenging procedure for medical providers. Despite a number of reports on the surgical options at home and abroad, no effective treatment method is currently available. The traditional "external dissection and internal ligation" or Milligan-Morgan technique, is a mainstream treatment for mixed hemorrhoids. With larger and more hemorrhoids involved in the circumferential type, however, the surgery becomes more complicated and is inevitably associated with a range of post-operative complications.

### Research frontiers

The authors treated 96 patients with circumferential mixed hemorrhoids using Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphincter resection, and compared their clinical outcomes with those undergoing traditional hemorrhoidectomy. The differences are significant in favor of the modified Milligan-Morgan technique in terms of time to wound healing, anal stenosis, wound pain, edema and other complications. This approach can be widely applied in clinical practice.

### Innovations and breakthroughs

Milligan-Morgan hemorrhoidectomy with anal cushion suspension and partial internal sphincter resection is an optimal treatment of circumferential mixed hemorrhoids, which effectively removes hemorrhoids while retaining the anal canal anatomy and physiology, complying with the physiological function, pathological changes and anorectal dynamics of the anus. Meanwhile, it overcomes the drawbacks of traditional techniques by eliminating continued spasm of the internal sphincter, and reducing postoperative pain, edema, anal stenosis and other complications.

### Applications

The modified Milligan-Morgan hemorrhoidectomy provides a valuable approach to the treatment of circumferential mixed hemorrhoids with shortened time to wound healing, and improved the quality of surgery, which can be widely applied in clinical settings.

### Terminology

The traditional "external dissection and internal ligation" or Milligan-Morgan technique, is a mainstream treatment for mixed hemorrhoids. PPH stands for "procedure for prolapse and hemorrhoids". With the new PPH or stapled hemorrhoidectomy there is no need to cut out the hemorrhoid tissue at the anus.

### Peer review

In this manuscript, the authors made a good study of 96 cases with circumferential mixed hemorrhoids. The paper is well written and interesting for the readers.

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