

Research Progress on Incision Design of Modified External Dissection and Internal Ligation for Mixed Hemorrhoids

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Abstract: Mixed hemorrhoid is a common disease in anorectal department, so far, one of the most widely used surgical methods is external dissection and internal ligation. The traditional operation is effective, but postoperative complications such as traumatic edge edema, pain and anal stenosis often occur. In recent years, with the deepening of the understanding of the pathogenesis and anatomy and physiology of hemorrhoids, a wide variety of improved surgical methods have been derived from the external dissection and internal ligation in clinical practice, which reduces the severity of postoperative complications of traditional external dissection and internal ligation. By referring to the domestic literature in the past 5 years, the following review is made on the incision design of external hemorrhoids in various improved surgical methods based on external dissection and internal ligation, aiming to further analyze the incision design strategy of external dissection and internal ligation in clinical treatment of mixed hemorrhoids, and provide practical reference for medical practice.

Keywords: mixed hemorrhoid; external dissection and internal ligation; incision

Mixed hemorrhoids are one of the common diseases in anorectal department. The incidence rate of hemorrhoids accounts for 87.25% of anorectal diseases, among which mixed hemorrhoids account for 24.13%. Grade III-IV mixed hemorrhoids are more severe and require surgical treatment. In 1919, Miles first proposed the technique of external dissection and internal ligation, which was later improved by Milligan and Morgan^[2] and called Milligan Morgan surgery. It is the most classic surgical method for treating mixed hemorrhoids, with definite clinical efficacy and high success rate. It is the preferred surgical treatment and "gold standard procedure" for patients with grade III-IV hemorrhoids. However, excessive cutting of the anal margin skin or insufficient drainage of the incision, as well as improper incision position during the surgical process, can cause blood and lymphatic reflux disorders and poor drainage at the local lesion site, significantly increasing the irritation of the wound nerve endings. This can lead to postoperative complications such as wound non healing, anal and anal skin defects, fecal incontinence, swelling, and pain, resulting in unsatisfactory

therapeutic effects. In clinical practice, based on the traditional "V" - shaped incision, a variety of improved surgical incisions have been derived from the external hemorrhoid incision. In 2018, Jiang Xiaoying et al. reviewed and discussed the design of incisions for various improved surgical procedures for external hemorrhoids. They believed that preoperative incision design, combined with the shape of external hemorrhoids and the patient's physical condition, could improve the number and shape of incisions to ensure surgical effectiveness and protect anal function. However, the design of surgical incisions for hemorrhoids is often vague and unclear in current textbooks and works, and there is no standardized standard for the design of drainage incisions. Therefore, this study summarizes the relevant clinical reports on the improved external stripping and internal ligation surgery in China in the past five years, in order to deepen the understanding of this disease, explore more and better surgical methods, make up for the shortcomings of traditional hemorrhoid external stripping and internal ligation surgery, reduce complications such as edema and pain, and innovate



in treatment.

1 Overview of improved incision design for external peeling and internal ligation surgery

Based on the traditional radial "V" incision, with a focus on the shape, size, and length of the external hemorrhoid incision, the design of the mixed hemorrhoid surgical incision has been improved to shorten the cure time, reduce postoperative difficulty in defecation, alleviate postoperative pain, bleeding, and anal margin edema, thereby improving clinical efficacy. At present, there are many understandings and reports on hemorrhoid drainage incisions in the literature, and there are various shapes of incisions, including small "V" - shaped incisions, willow leaf shaped incisions, arc-shaped incisions, "Y" - shaped incisions, "airplane style" tension reducing incisions, etc; Regarding the size of the incision, some advocate making small incisions, while others advocate making sutured incisions; The common practice regarding the length of the incision is to extend it.

1.1 Shape of incision

1.1.1 Small "V" - shaped incision

The small "V" incision refers to the process of not completely removing the external hemorrhoids during the mixed hemorrhoid external stripping and internal ligation surgery, only removing a small portion, and then sharply or purely stripping the subcutaneous varicose vein plexus. Due to the laxity and elasticity of the anal skin, removing an appropriate amount of skin during surgery will not cause anal dysfunction. However, if too much skin is removed, it may lead to anal stenosis. Du Chuanlin et al. used a small "V" - shaped incision to preserve the Treitz muscle for the treatment of 22 cases of mixed hemorrhoids, and randomly compared it with 22 cases treated with traditional external dissection and internal ligation. Finally, from the aspects of tissue level, microvascular density, and nerve fiber count, it was confirmed that the small "V" - shaped incision preservation of Treitz muscle for external dissection and internal ligation can better protect the normal Treitz muscle, help restore the normal shape of the anal cushion, and has the advantages of less postoperative bleeding, less pain, and low recurrence rate. Hu Peng et al. used a small "V" - shaped incision to preserve Treitz muscle external dissection and internal ligation for the treatment of 43 cases of mixed hemorrhoids, and used external dissection and internal ligation for the treatment of a control group of 43 cases. The results showed that the small "V" - shaped incision to preserve Treitz muscle external dissection and internal ligation had significant advantages in shortening recovery time, reducing postoperative edema, pain, etc., which was beneficial for

reducing pain and accelerating anal function recovery. The use of a small "V" - shaped incision can preserve as much of the anal canal skin as possible, preserve the skin bridge to the greatest extent, reduce pain, minimize damage, and facilitate postoperative wound healing; The use of segmented small "V" - shaped incisions for external hemorrhoids results in smaller incisions, better protecting the anal skin and anal margin, and compensating for the minimally invasive nature that traditional external stripping and internal ligation techniques cannot achieve.

1.1.2 Willow leaf incision.

The anal area is narrow and surrounded by a sphincter ring. In addition, the anus often suffers from dual invasion and contamination of feces and bacteria. In order to maximize the preservation of anal canal skin while ensuring smooth drainage, and to make the postoperative anal anatomy closer to normal, Han Yimin et al. proposed the use of a willow leaf incision in a clinical study of 78 patients with mixed hemorrhoids in 2010. The treatment group cut open the external hemorrhoid skin in a willow leaf shape and peeled it off, compared to traditional external peeling and internal ligation surgery. The results showed that the treatment group performed better in postoperative pain, edema, wound healing, anal incontinence, anal stenosis, and other aspects. Compared to the traditional "V" - shaped incision, the willow shaped incision requires the widest point to be set at the most obvious location of the hemorrhoids, and the incision length to be long enough to ensure smooth drainage. For larger hemorrhoids, a small amount of skin can be left on both sides of the hemorrhoids during mobilization to protect the normal skin tissue of the anal canal as much as possible. Similarly, when dealing with external hemorrhoids, Yang Ping also advocates the use of small incision stripping surgery. The incision of external hemorrhoids is slender and willow shaped, and the incision is long enough to ensure smooth drainage of the wound and a small incision. It can also reduce the patient's pain and lower the incidence of anal stenosis.

1.1.3 Curved incision.

In order to thoroughly remove the lengthy skin folds between the two radial incisions, avoid multiple radial incisions, and reduce problems such as anal stenosis and difficulty in defecation caused by excessive damage to the anal skin, Li Min et al. combined the traditional hemorrhoid external stripping and internal ligation surgery with a curved incision skin bridge free treatment for circular mixed hemorrhoids. The key point is to carefully design an external hemorrhoid incision plan based on the type, number, and location of the mixed hemorrhoids. Three to six radial incisions are made from the anal margin to the anal canal to

remove hypertrophic connective tissue, remove thrombi, bluntly peel off excess skin and varicose veins at the anal margin, and make curved incisions between the two incisions and on the outer edge of the external hemorrhoid. The mesothelial bridge of the two incisions is freed, and the skin flap thickness is kept uniform. The subcutaneous varicose vascular plexus is peeled off, and excess skin folds are removed. Zhou Chun used external stripping and internal ligation combined with curved incision skin bridge free surgery to treat 50 cases of mixed hemorrhoids, and randomly compared them with 50 cases treated with traditional external stripping and internal ligation surgery. The results showed that the external stripping and internal ligation combined with curved incision skin bridge free surgery allowed the skin bridge to free, completely remove redundant skin folds, and minimize skin damage to the anal canal. It not only made up for the shortcomings of traditional hemorrhoid external stripping and internal ligation surgery, but also avoided complications such as edema and narrowing of the anal canal diameter, reduced recurrence rate, avoided anal eversion, maintained the aesthetic appearance of the anus, and ensured surgical quality.

1.1.4 Y-shaped incision.

The traditional external stripping and internal ligation technique is used to treat mixed hemorrhoids, but postoperative pain, edema, and other problems are prone to occur. In practice, the traditional external stripping and internal ligation technique has been gradually improved, and the "Y" -shaped design of the external hemorrhoid incision has achieved significant clinical efficacy. In a clinical study targeting female hemorrhoid patients, Ding Xiaohong randomly divided 60 patients into an observation group and a control group, with 30 patients in each group. During the external stripping and internal ligation surgery, the observation group made a "Y" - shaped incision on the perineal side of the fan-shaped external hemorrhoid (the fan-shaped external hemorrhoid was lifted with a vascular clamp at the 11 o'clock position, and the skin was cut in a "Y" - shaped incision after tightening); The control group underwent traditional external stripping and internal ligation treatment (arc-shaped resection and suturing of the external hemorrhoid at the 11 point stone cutting position). The results showed that using a "Y"-shaped incision to treat female perineal side fan-shaped external hemorrhoids can effectively protect the perineal crest and reduce damage to the appearance of the perineum. While completely removing the external hemorrhoids, there is no need for suturing, and the drainage of wound secretions is more smooth, effectively reducing postoperative complications such as anal edge edema and anal pain. It is beneficial to reduce

microcirculation disorders, sphincter spasm, and better protect the appearance of the perineum. Tian Cailing et al. used external stripping and internal ligation combined with a "Y"-shaped incision to treat 60 cases of stage III-IV mixed hemorrhoids, achieving satisfactory results. They also found that using a "Y"-shaped incision for external hemorrhoids can isolate the skin flap between the two branches outside the anal margin during the treatment of mixed hemorrhoids, further reducing the pressure on the anal sphincter during spasms or defecation, thereby facilitating smooth wound drainage, reducing the accumulation of inflammatory factors, relieving pain, and promoting wound healing. This has a positive effect on reducing postoperative anal edema and relieving patient pain.

1.1.5 "Aircraft style" tension reduction incision.

At present, external hemorrhoidectomy and internal hemorrhoidectomy play an extremely important role in mixed hemorrhoid surgery. However, the incision of this procedure is often chosen to start at the obvious location of the mixed hemorrhoid. After internal hemorrhoidectomy, a constriction ring is easily formed between the hemorrhoid nucleus ligation pinch points in mixed hemorrhoids. With the continuous improvement of hemorrhoid surgery methods, the incision design has been improved based on the external stripping and internal ligation surgery, giving rise to the "airplane style" reduced tension incision. It is a longitudinal reduced tension incision of about 1.5 cm long made at the 6-point position while using the conventional external stripping and internal ligation surgery for hemorrhoids, reaching the mucosal lower edge 0.1 cm above the dentate line, releasing part of the internal anal sphincter (anal relaxation and not releasing the sphincter in elderly patients), trimming both sides of the incision, and then making a shuttle shaped 1 cm incision at the 5-point and 7-point positions for external hemorrhoids, forming a wing shape with the posterior midline incision. Li Tingjiang et al. treated 60 cases of mixed hemorrhoids with a combination of external peeling and internal ligation and "airplane style" decompression incision surgery, and compared them with 60 cases treated with conventional external peeling and internal ligation surgery. The analysis results showed that its advantages were fast postoperative recovery time, mild pain, less rectal bleeding, and low degree of anal margin edema. The reason may be that the design of the "airplane style" tension reducing incision at the 5-point and 7-point auxiliary incisions preserves more skin bridges, reducing pain and infection caused by excessive suturing; During the operation, appropriate release of the internal sphincter muscle was performed on the posterior side to alleviate the pain caused by postoperative sphincter spasm; After the release of the internal sphincter muscle, the resting

pressure of the anal canal decreases, the perianal venous return is smooth, and the incidence of anal margin edema, pain, and difficulty in defecation decreases.

1.2 Size of incision

1.2.1 Small incision.

The condition of circular mixed hemorrhoids is complex, and its difficulty lies in pursuing thorough treatment while also considering fine anal function and reducing postoperative perianal discomfort. However, traditional external stripping and internal ligation surgery has certain limitations in treatment. Due to the large surgical wound and damage to the fine anatomical structure of the anus, complications such as slow wound healing and severe pain are prone to occur, which affect the postoperative recovery of anal function in patients. On this basis, Yuan Lijian et al. conducted a clinical trial with 70 patients as observation subjects. The control group divided the hemorrhoids into 3-5 segments according to the internal hemorrhoid boundary, and made a diamond incision into the anal canal based on this; The observation group divided the external hemorrhoids into multiple natural segments according to the concave shape. At a distance of 1-1.5 cm outside the raised edge of the external hemorrhoids, the skin of the external hemorrhoids was clamped and lifted with a medium curved tissue clamp, and a radial vertical incision was made below the dentate line. The results showed that the use of small incision external hemorrhoid dissection for the treatment of circular mixed hemorrhoids was effective, with mild postoperative anal pain and edema, minimal trauma, and fast recovery. Due to the segmented treatment of external hemorrhoids, subcutaneous varicose vein clusters were separated through small incisions, reducing damage to the anal margin and anal canal skin, alleviating postoperative pain, and preserving sufficient skin bridges to ensure the integrity of anal function. Therefore, Zhao Jinxiang et al. advocate that when removing larger symptomatic hemorrhoids, the width of the external hemorrhoid incision should not be limited to the width of the hemorrhoid nucleus, but a small incision (within 0.5 cm) should be used. While preserving the anal canal skin, excess subcutaneous tissue on both sides should be removed. This not only preserves more anal skin, but also reduces the incidence of edema, shortens the wound healing time, and increases the one-time cure rate of hemorrhoids.

1.2.2 Suture the incision.

The traditional Milligan Morgan surgical external hemorrhoid wound adopts an open and open approach. Although the overall treatment is safe and effective, patients have disadvantages such as severe pain, long healing time, and scar like stenosis after surgery. Based on this, the traditional

open surgical approach for external hemorrhoids has gradually been replaced by external hemorrhoid excision and suturing surgery. Shang Qunxian et al. advocated the use of external hemorrhoid incision suturing. They divided 160 mixed hemorrhoid patients into a control group and an observation group according to different treatment plans, with 80 cases in each group. The control group underwent traditional external stripping and internal ligation, while the observation group underwent internal ligation, external cutting, and suturing. It was found that adding external hemorrhoid incision suturing on the basis of traditional mixed hemorrhoid external stripping and internal ligation surgery can prevent postoperative wound bleeding and reduce fecal contamination of the incision, effectively reducing the stimulation of defecation and dressing changes on the wound; Reducing the size of the wound also has a significant promoting effect on wound healing; It can also maintain a fine sense of anal recognition, with a smooth and even skin border that meets the requirements of anal plastic surgery.

1.3 Length of incision

For incisions of external hemorrhoids, it is important to pay attention to lengthening. In clinical practice, incision drainage is poor, with a majority of cases having short incisions. Because during the surgery, the patient's anal muscles relaxed due to anesthesia, causing the position of the anal canal to shift downwards. If the doctor fails to properly handle the spasm of the anal sphincter during surgery or fails to ensure smooth incision after surgery, it may have adverse effects on the patient's recovery, leading to local circulation disorders, affecting lymphatic and venous reflux, and causing anal margin edema. In order to ensure smooth drainage of the wound, the drainage incision should be extended outward, generally to a distance of 2 cm from the original anal margin. This can prevent the anal canal from moving up after anesthesia, resulting in a too short incision. After conducting a study on 120 patients, Chen Feiyun et al. found that using a "V" - shaped elongated incision with a length greater than 2 cm for external hemorrhoids and an incision length less than or equal to 2 cm for external hemorrhoids can promote wound healing and reduce the occurrence of complications. Prolonging the drainage incision, reducing local blood and lymph circulation obstacles, reducing vascular permeability, reducing water retention in tissue gaps, is conducive to the re establishment of the original vein and lymph circulation channels, and thus has a significant effect on reducing or eliminating anal edema after hemorrhoid surgery. Chen Tao et al. demonstrated through surgical treatment using a radial linear incision with an external opening about 2 cm from the anal margin that prolonging the incision not only promotes blood and lymphatic reflux at the local lesion site, but also

alleviates internal sphincter spasm, reduces anal pressure, and reduces nerve endings irritation caused by surgery. The postoperative pain of patients also significantly improves.

2 Conclusion

This study summarizes and summarizes relevant literature from the past five years, recognizing the optimization of external hemorrhoid incision design and the flexible use of various methods to reduce postoperative complications such as anal margin edema and pain in the treatment of mixed hemorrhoids with external dissection and internal ligation. Designing incisions or making skin flaps may be slightly more complex, but conforming to the physiological and normal anatomical structure of the body not only greatly protects the patient's anal function and meets the minimally invasive requirements of anal plastic surgery, but also reduces the occurrence of complications such as anal margin edema, pain, and postoperative anal stenosis. Especially with traditional external excision and internal ligation techniques, when there are too many or too many incisions for external hemorrhoids, anal stenosis is prone to occur. In this case, it is crucial to choose an improved surgical approach, prescribe the right medicine, achieve precision medicine, and further improve surgical efficiency and efficacy.

Various improved external stripping and internal ligation procedures have to some extent made up for the shortcomings of traditional hemorrhoid external stripping and internal ligation procedures, which are in line with the requirements and trends of current anal and rectal surgery development, and have a certain guiding role in standardizing surgical incisions for mixed hemorrhoids. However, there is still a possibility of postoperative complications in the improved external peeling and internal ligation surgery, as both minor and minor flaws are evident. With the in-depth study of the causes of hemorrhoids and anal anatomy in modern medicine, as well as the development of surgical techniques, in clinical practice, the design of external hemorrhoid incisions for external stripping and internal ligation surgery should be based on individual differences and different disease states of patients. It should not be rigid, but should take the strengths of each family and use multiple incision designs in combination to relieve the lesion in one go, reduce or alleviate the occurrence of postoperative complications such as edema, pain, and anal stenosis, promote wound healing, and shorten healing time. This study only searched Chinese databases from the past five years. The next step is to expand the sample size and further research is necessary in terms of incision depth, incision drainage, number of external hemorrhoid incisions, and skin bridge.

Author Introduction

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