

Prevention and Treatment of Anastomotic Strictures After Procedure for Prolapse and Hemorrhoids

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Abstract: Procedure for Prolapse and Hemorrhoids (PPH), also known as circular stapled hemorrhoidectomy, is a common method of treating hemorrhoids due to its low risk of complications and minimal postoperative pain. Several complications have appeared alongside the rise of treated cases, however, and this has led to a progressive slowing of the clinical use of PPH in recent years. Anastomotic stenosis is one of the most common complications of PPH, but the greater amount of tissue removed and the speed with which it can heal make it the best choice for patients with severe prolapsed annular hemorrhoids or rectal mucosal prolapse. Therefore, academics continue to comprehensively study PPH to take advantage of annular resection and reduce complications. In this paper, we analyzed the causes, intraoperative warnings, and postoperative therapy of anastomotic stenosis induced by PPH, with an eye toward scientific application in the anorectal field, based on the experience of clinical applications.

Keywords: anastomotic stricture, hemorrhoid, prevention, treatment

Introduction

The common but debilitating condition of hemorrhoids has a major impact on people's day-to-day lives. Hemorrhoids affect between 4% to 55% of the population, according to a US epidemiological survey, and 51.65% of the population in China.¹ Hemorrhoid incidence rises with age, peaking between the ages of 35 and 59 in China.² Hemorrhoids seem to affect both sexes equally, and there is no clear evidence linking gender to the condition. It is generally accepted that the main causes of hemorrhoids are a weakening of the anal pad and supporting tissue and a spasm of the internal sphincter. Hemorrhoids are classified as internal, external, or mixed depending on the site of the condition. Internal hemorrhoids and the external hemorrhoid vascular plexus can fuse over the dentate line to generate a mixed hemorrhoid, which exhibits symptoms of both types of hemorrhoids. Annular hemorrhoid prolapse occurs when the condition is severe. Dietary changes, improved bowel hygiene, and intravenous administration of active medications are all non-invasive options for dealing with hemorrhoids. Clinically, the most severe symptoms, the highest prevalence, and the greatest overall impact are all associated with mixed hemorrhoids.

Although there are several options for treating hemorrhoids, surgery is the most common intervention in treating severe.^{3,4} In recent years, Procedure for Prolapse and Hemorrhoids (PPH) has gained popularity as a viable option among the several surgical methods for treating annular prolapsed hemorrhoids.^{5,6} This procedure is being used more frequently in all healthcare settings. However, a number of postoperative complications have been identified⁷ as its clinical application has expanded over the past two decades. Anastomotic stricture (AS), rectal tenesmus, and hemorrhage are among of the most frequently encountered complications. Patients with scar constitutions (unrestrained scar growth) have a higher prevalence of AS.⁸ It can have a major effect on defecation after surgery, and in certain cases a second procedure may be necessary to fix the AS. It increases financial burdens, causes more pain, and reduces the quality of life of

patients. In order to provide ideas and support for clinical medicine, this paper provides a review the prevention and postoperative management of AS following PPH for hemorrhoids.

Reasons for AS After PPH

While estimates place the prevalence of postoperative AS anywhere from 2.5% to 10%, Jun reported an incidence of 3.8%.⁹ However, up to 22% of patients who have undergone a circular stapled hemorrhoidopexy (CSH) procedure develop AS.¹⁰ Scarring and stenosis at the PPH anastomotic staple line have been documented by Dowden in four cases following PPH.⁵ This led to a ball-valve effect in three patients, as the mobile, excessive proximal rectal mucosa prolapses past this relatively immobile location. Postoperative anal stenosis was found to be larger in the PPH group (13.68%; 26/190) than in the Doppler ultrasound-guided hemorrhoidal artery ligation group (5.79%; 11/0190).^{7,11} ASD develops between one to three months following surgery. Hyperplasia, thickness, and rigidity of the granulation tissue surrounding the anastomotic stoma after surgery cause the stoma to narrow. The reasons for development of AS after PPH are:

1. The depth of the purse-string suture is likely too great in PPH, as suggested by the results of multiple investigations.^{12,13} This results in a scar that is excessively big and a conspicuous concentric contracture, both of which contribute to stenosis. To avoid this, the rectum must be sutured using mucosal and submucosal sutures. However, the muscularis mucosa should be avoided.
2. The anastomotic stoma is rigid; therefore, the patient has loose stools after surgery. Watery stools can cause AS because the anastomotic stoma is unable to undergo the normal mechanical dilation that occurs during defecation.¹⁴ Therefore, it is important to properly manage patients' postoperative stools and to encourage continued bowel movements to prevent the development of AS.
3. Anal stenosis can develop after surgery, as documented by Wu,¹⁵ which is linked to the consumption of laxatives out of apprehension of defecation pain. As a result, effective postoperative analgesia for patients is crucial.
4. As reported by Li, the titanium staples used in the stapler restricted the anastomotic stoma, causing the anastomosis to be unreliable.¹⁶ Therefore, it is imperative to ensure the quality of the stapler.
5. Chen¹⁷ believes that the metal staples in the anastomotic stoma have little to no flexibility, which is the primary cause of anastomotic stenosis. Furthermore, postoperative anastomotic edema, infection, and scar tissue proliferate, leading to the formation of anastomotic stenosis.

According to some researchers, all patients have scars and strictures at their major anastomosis site.⁵ Rejifu¹⁸ retrospectively studied 112 patients who developed anastomotic stenosis following PPH and discovered that it was caused by a combination of various risk factors. Scar structure and postoperative unformed stool were independent risk factors for AS following PPH. The network meta-analysis system was used to evaluate multiple databases of Chinese and other literature, and it was concluded that AS after PPH may be related to the patient's own scar constitution, the position of the purse-string suture is too high or too deep, postoperative infection, postoperative stool irregularity, and other related factors.^{13,19,20}

Prevention of AS

Change Anastomosis from Closed to Open Loop

The open loop can leave a blank (leak) space when the purse is sutured. Some researchers suggest that hemorrhoids prolapse less at the 6 o'clock position in the lithotomy position, where AS is most obvious. By keeping the mucosa in place, the expanded normal tissue can be reserved for the ring-like stenosis, avoiding the continual production of scars by the staples and the metal providing a reinforcement effect owing to density. To construct a cutting barrier, Li employed a large handle in the vacant space from 5:30 to the 6:30 position.²¹ It was employed to preserve the posterior rectal wall, together with self-made protective pads or baffles and an alloy tongue depressor.^{22–26} One or more protective pads could be chosen based on the internal hemorrhoids and prolapse to block the inconspicuous

areas of prolapse while selectively eliminating the hemorrhoid mucosa and preserving some usual mucosal bridges (Figure 1). This eliminates the creation of the AS ring as a result of scar spasms following the procedure. According to the findings of the study, the incidence of AS, anal fall, and subsequent bleeding was much reduced in the group that retained the posterior rectal mucosa compared to the conventional PPH group. Chen¹⁴ used an electric surgical knife to cut the anastomotic ring down to the submucosa and removed 1–2 titanium staples at the 3 o'clock and 9 o'clock positions to break the closed loop. A large C suture used during PPH surgery has been shown to be a reliable approach for treating mixed hemorrhoids, with no incidence of AS in any patient.⁶ Open-loop PPH has the same efficacy as PPH in treating severe hemorrhoids but is less painful and has fewer post-surgery complications, according to a study of 1798 patients with severe hemorrhoids at four hospitals. It is a type of treatment that is both safe and effective.²⁷

Tissue Selective Therapy (TST)

PPH is the foundation of TST. TST is less invasive than PPH and has less postoperative problems, hence it offers clear advantages in preventing AS. TST, as a modified PPH procedure, preserves the mucosa and skin bridge. He et al²⁸ performed TST in 100 cases of severe hemorrhoids and found no anal stenosis. Zhang conducted a meta-analysis of PPH, Milligan-Morgan (M-M), and TST treatments on 3511 patients. According to the findings, TST appears to be the best method for avoiding anal stenosis. Furthermore, earlier research has indicated that TST can help prevent anal stenosis.²⁹ Palidan retrieved 45 studies and ranked the prevalence of anal stenosis from highest to lowest as external stripping and internal ligation, then PPH, followed by TST.²¹

Improved Purse-String Suture Technique

Yang modified the height of the purse-string anastomosis based on the size of the hemorrhoids to limit the occurrence of AS, so that the anastomotic stoma was no longer in the same plane.³⁰ Zheng et al carried out a two-year study with 72 patients separated into three groups. They discovered that when the height of the PPH purse-string suture was 2–3 cm, the period for hemorrhoids to vanish and atrophy, as well as symptom relief, was greatly shortened,³¹ and postoperative complications such as anal stenosis were less likely to occur. Lin performed PPH surgery for annular mixed hemorrhoids using the modified single-purse four-point traction method;³² Xin performed single or double purse suture based on the size of the hemorrhoids and the degree of hemorrhoid prolapse, and the sutured purse was in the shape of a wave.³³ Song used the parachute-shaped single-purse 3-point traction suture technique.³⁴ Yu examined the correlation between the height of the purse-string suture and the surgical outcome of selective hemorrhoid mucosal anastomosis and discovered that the best outcome was attained when the purse-string suture was 3 cm on the dentate line;³⁵ the prevalence of prolapse and rectal stricture decreased. Lu separated 140 patients who underwent PPH into two groups, one receiving single purse sutures and the other receiving double, but he found no statistically significant difference in the long-term overall efficacy or complication rate.³⁶

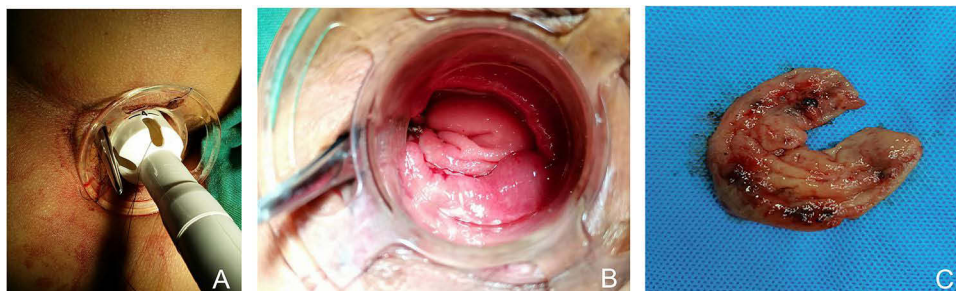


Figure 1 Open-loop PPH surgery. (A) A protective pad is placed at the location where hemorrhoid mucosal prolapse is not evident in the patient to prevent the mucosa from being cut at this site and to preserve the normal mucosal bridge. (B) View of the anus after removal of hemorrhoid tissue. (C) Non-annular mucosal tissue after Open-loop PPH surgery.

Thread-Drawing Therapy

Thread drawing therapy is a traditional Chinese medicine therapeutic procedure. Its original application was in anal fistula surgery, wherein sick tissue was wrapped with manufactured silk thread, medical silk thread, or a rubber band, and the tight force of a “hanging wire” was employed to cut the fistula and sinus tract or slowly necrose the ligation tissue. When compared to conventional open surgery, this method can lessen bleeding and postoperative pain. This technique is used in PPH surgery to sever the continuity of the anastomosis through ligation of the silk thread across the anastomosis and subsequent chronic cutting of the anastomosis (Figure 2). The most common types of thread used for threading are silk thread and rubber thread. Solid threading strength characterizes the threading here. Threading might be single, double, or multiple depending on the type of anastomosis being performed. Postoperative stenosis following PPH surgery is a circular stenosis because the wound surface is a circular anastomosis. By using a glove rubber band hanging thread, Liang et al³⁷ were able to diminish the incidence of AS via a portion of the internal and external sphincter and the first and second anastomosis.

Simultaneously, we performed a randomized controlled trial spanning 4 years on 400 patients with stage III–IV mixed hemorrhoids that had previously been treated with PPH. The patients were split into four groups: intraoperative anastomotic hanging suture plus postoperative anal dilation, simple intraoperative anastomosis, PPH, and postoperative anal dilation. Each group had 100 patients. The patients in the hanging suture group underwent longitudinal anastomotic stoma ligation at 2, 5, 7, and 10 points using thread seven; the suture was cut chronically and anastomotic. The results showed statistically significant differences in the AS between the four groups.

Treatment of AS After PPH

Anal Dilation

By increasing the inner diameter of the anal canal with one’s fingers, scar tissue can be released, spasms of the internal sphincter can be relieved, and the risk of anal stenosis can be reduced.^{38,39} Anal stenosis following annular mixed hemorrhoids surgery can be avoided with continuous progressive dilatation, as demonstrated by Wen et al.⁴⁰ Manual anus dilation was shown to be successful in 94.1% of 119 patients by Yang et al.⁴¹

In order to increase drainage, Yu et al⁴² employed a balloon catheter to enlarge the anus. He et al⁴³ utilized a metallic anal expander to enlarge the anus. Some experts recommend utilizing gastrointestinal balloon dilators for high rectal anastomotic strictures. It has been suggested that scarring due to granulation hyperplasia in the lower rectum, rather than excessive membranous stenosis, is the root cause of AS, and that gastrointestinal balloon dilators are ineffective at treating the condition.¹²

Manual dilation, as opposed to mechanical dilation, allows for a more accurate assessment of the internal and external sphincter’s elasticity, tissue expansion, sphincter spasm relief, time for elastic retraction, and protection against severe stretch injury.⁴⁴

After surgery for AS, several experts recommend expanding the anus with the fingers at least twice weekly for a minute or two each time until the scar is only mildly noticeable. Until the stenosis is relieved, the treatment can only be performed through touch. Some scholars suggest that the minimum time for the anus to be expanded in this manner is

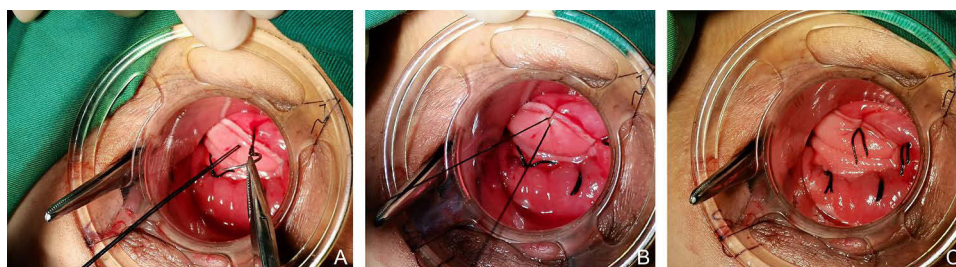


Figure 2 Post-PPH thread-drawing therapy. (A) Longitudinal suture across anastomosis with No. 7 silk thread. (B) After tying and wrapping the silk thread anastomotic tissue. (C) Thread-drawing therapy was performed at four locations in the anus to break the continuity of the anastomosis and prevent the formation of stenosis.

between three and five minutes. Zhang et al found that anal dilation should be done once a week for the first month after surgery, and then every two weeks for the following month. The chance of stenosis recurrence is low if there is no stenosis.⁴⁵

We established through years of clinical observation that it is best to undertake digital anal dilation within two to three weeks after surgery. In this case, stenosis is typically membranous, and the anastomosis can be easily dilated. Restenosis will set in after only one or two anal dilations, making further dilation extremely challenging after that time frame.

Anastomotic Incision

The extent and degree of constriction dictate whether the incision should be shorter or longer. Most surgeries for rectal stricture involve either longitudinal incision of the rectal stricture ring or rectal stricture thread-drawing, or the excision and suturing of an endorectal scar.⁴⁶ Scar release and other forms of stenosis with weak superficial elasticity only require a superficial incision, but deep incisions into the muscle layer are necessary to prevent re-stenosis in cases of severe stenosis. However, it is necessary to prevent the intestinal leak from cutting through the intestinal wall. In cases with tubular stenosis, a longer incision is recommended. To decrease stress in the incision and prevent restenosis, Shao used a modified longitudinal and transverse suture, leaving the central area open.⁴⁷ In terms of scope, longitudinal and transverse sutures with narrow dentate lines should be cut to 1 cm on the dentate line. To reduce tension, a “cross” incision can be made for patients with narrow dentitions. A longitudinal incision made in the middle of the stenosis can be used to sever the complete stiff stenosis if the anal canal is just partially stenotic or semi-circular. A longitudinal incision can be made at the front and back of the anal canal for annular stenosis. To prevent re-stenosis, the anus needs to be dilated with fingers after the operation, and 2 to 3 fingers should be able to fit within the anus.⁴⁸

The number of endoscopic ring incisions for stenotic narrowing has risen in recent years. In a study on postoperative AS, Zhong compared endoscopic balloon dilation to incision and concluded that the latter was more successful, avoided numerous dilations, patient suffering, financial burden, and bleeding.⁴⁹

Thread-Drawing Therapy

Similar to the technique of thread-drawing therapy for anal fistula, the strangling effect of the “thread” is used to treat AS, if repeated attempts at anal dilation have been unsuccessful. In cases of extreme stenosis, it may be possible to hang the line in sections. The amount of thread-drawing needed depends mostly on the severity of the stenosis and the rigidity of the scar.⁵⁰ Additionally, this technique helps stop bleeding caused by the direct incision made using electrocautery. Luo discovered that, in contrast to direct incision of the stenotic ring, thread-drawing can minimize bleeding and prevent the severed end from re-adhesion stenosis when treating AS following PPH.⁵¹ Chen compared 60 cases of AS, and found that the longitudinal and transverse sutures combined with thread-drawing has a better clinical effect, shorter healing time and fewer complications than simple longitudinal and transverse sutures.⁵² Similarly, for low AS, Liu cut the stenosis ring and hung the thread in two to three places, to prevent restenosis in the short term.⁵³

Conclusion

Disagreements can arise readily between doctors and patients when postoperative AS and poor defecation following PPH create discomfort. The explanation for the observed variations in AS reports across geographic locations remains unclear at present. Early manual anal dilation following surgery is effective for treating anastomotic scars because they are primarily membranous stenosis in their early stage. In cases when anastomotic stricture (AS) is suspected, immediate anal dilation should be performed, and titanium staples should be withdrawn from the anastomotic stoma to avoid inflammation from stimulating excessive growth of granulation tissue. Severe AS can be avoided with intraoperative preventative measures like thread-drawing. In addition, favorable long-term outcomes and increased patient satisfaction can be achieved through careful case selection and careful surgical techniques.

Data Sharing Statement

All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author.

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Disclosure

The authors declare that they have no competing interests.

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