

Causes and Preventive Strategies of Anal Stenosis after PPH

Jing-Nan Fu¹; Li Zhou^{2*}

¹Department of Minimally Invasive Surgery, Characteristics Medical Center of Chinese People Armed Police Force, Tianjin, China.

²Department of Nephrology, Characteristics Medical Center of Chinese People Armed Police Force, Tianjin, China.

Abstract

Hemorrhoids, including internal hemorrhoids, external hemorrhoids and mixed hemorrhoids, are one of the common perianal diseases in our country, and the formation mechanisms of internal and external hemorrhoids are different. As one of the surgical procedures for the treatment of internal hemorrhoidal prolapse, PPH (Procedure for Prolapse and Hemorrhoids) has been used for more than 20 years, and its therapeutic principle is based on the theory of anal pad displacement. PPH surgery is effective for grade II of repeated prolapse and grade III and IV of annular prolapse, such as internal hemorrhoids and rectal prolapse. However, after PPH, it is found that some patients have difficulties in defecation, anal stenosis and anastomotic stenosis. In order to further improve this complication, we systematically reviewed and analyzed the medical data of 5606 patients who underwent PPH surgery in our hospital from February 2015 to February 2024. There were 113 patients with anal stenosis, with an incidence rate of 2.02%. We analyzed the methods of pouch suture, the depth of suture and the formation of anal stenosis in PPH operation, and summarized clinical prevention and treatment experience through continuous analysis of causes, in order to reduce the occurrence of postoperative anal stenosis.

Keywords: Annular hemorrhoidal mucosa resection; Mixed hemorrhoids; Anal stenosis; Prevention strategy.

Introduction

Hemorrhoids are the most common anorectal pathology, with a prevalence of up to 40% in the general population and the highest incidence in patients aged 45 to 65 years [1]. There are also essential differences in the formation mechanism of internal and external hemorrhoids. Internal hemorrhoids are caused by the displacement of the anal pad, the alteration and displacement of the support structure of the vascular plexus or arteriovenous anastomosis in the anus, while external hemorrhoids are caused by the expansion of the vascular plexus below the dentate line,

blood stasis, thrombosis, or tissue proliferation. If the vascular plexus of internal and external hemorrhoids are found to fuse with each other, mixed hemorrhoids are formed [2,3].

With the in-depth study of the pathogenesis of hemorrhoids, the "anal pad displacement theory" has been recognized and paid attention to, and circular resection of upper hemorrhoidal mucosa (PPH) is an operation based on the anal pad displacement theory [4]. In this operation, the prolapsed rectal mucosa was partially removed by cutting and stapling devices, and then the anal pad was lifted upward, suspended and fixed again, and then the

Manuscript Information: Received: Sep 14, 2024; Accepted: Oct 02, 2024; Published: Oct 09, 2024

Correspondance: Li Zhou, Department of Nephrology, Characteristics Medical Center of Chinese People Armed Police Force, Tianjin, China. Email: 2692158251@qq.com

Citation: Fu JN, Zhou L. Causes and Preventive Strategies of Anal Stenosis after PPH. *J Surgery*. 2024; 4(2): 1178.

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severed ends on both sides were anastomosed. Meanwhile, the operation cut off the main blood supply of the upper rectal artery to the hemorrhoids, resulting in atrophy of the hypertrophied and descending anal pad. PPH surgery can remove part of the rectal mucosa and allow the prolapsed hemorrhoid tissue to recede into the anus without causing damage to the tissue below the dentate line. Therefore, PPH has the advantages of less trauma and less pain, etc. This operation can complete resection and anastomosis at one time without causing excessive trauma to the surgical site, and the amount of blood loss is significantly reduced compared with traditional hemorrhoidectomy. Postoperative patients recover quickly and with little pain [5]. However, clinical studies have found that long-term complications such as anal stenosis, difficulty in defecation, and fecal deformity may occur after PPH. Especially, anal stenosis brings great pain to patients. Therefore, anal stenosis complicated after PPH cannot be ignored. To this end, we systematically reviewed and analyzed the case data of 5606 patients who received PPH surgery in the Special Medical Center of the Armed Police Force from February 2015 to February 2024. There were 113 patients with anal stenosis, with an incidence rate of 2.02%. We carried out various analyses from PPH surgical pouch suture method, suture depth and causes of anal stenosis. Through continuous analysis and summary of experience, we improved surgical operation details to reduce the occurrence of postoperative anal stenosis. In the past three years, the incidence of anal stenosis in patients after PPH surgery in our hospital has been gradually decreasing. The causes and prevention strategies of anal stenosis after PPH were summarized.

Causes of anal stenosis after PPH surgery

Based on the clinical data and relevant clinical studies of patients with anal stenosis at our hospital, the main causes of anal stenosis after PPH surgery at our hospital are as follows: (1) The distance between the anastomosis and the vermiform appendix is too close, and the anastomosis position is too low, thereby destroying excessive tissue around the anal canal, causing scarring of the surrounding skin and subsequent development of anal stenosis. (2) The plane of the suture used during the operation is not perpendicular to the rectal course, and the twisting caused by the suture leads to a narrowing of the rectal lumen and subsequent development of anal stenosis. (3) The depth of the suture used during the operation is too deep, reaching the muscle layer of the rectum, causing excessive removal of circular tissue, and subsequent excessive proliferation of scarring tissue, impairment of the relaxation function of the rectal lumen, and development of anal stenosis. (4) If bleeding is found at the anastomosis site during the operation, if hemostasis by electrocoagulation is ineffective, sutures should be applied to the wound. If the suture needle is sutured too deeply into the tissue and the suturing range is too large, the sutures are too tight, and excessive fibrotic scarring occurs, leading to the development of anal stenosis. (5) Studies have shown that inflammation is one of the main causes of pathological scarring, and the formation of pathological scarring is one of the most common complications of wound healing [6,7]. After PPH surgery, some patients have more exudate from the wound, and the local inflammation stimulation causes the patients to have a sense of urgency to defecate, while some patients have diarrhea, constipation, dysbiosis, etc. The repeated inflammation stimulation leads to the formation of scar hypertrophy, ultimately leading to anorectal stenosis [8,9]. (6) Patients with anorectal ste-

nosis after PPH surgery are also related to their own scarring constitution. Scarred patients are more likely to have excessive scar hypertrophy after PPH surgery, leading to anorectal stenosis [10]. (7) The residual staples after PPH surgery cause chronic inflammation at the anastomosis site, leading to inflammatory anorectal stenosis [11].

Preventive measures for anal stenosis after PPH surgery

Pre-operative patient assessment

The first clinical work for patients upon admission is to assess their condition. Pre-operative assessment plays an important role in the perioperative management of patients. Before surgery, the patient's condition and epidemiological history should be carefully inquired about, and a detailed medical history and specialized physical examination should be collected. If the patient has only external hemorrhoids or mild internal hemorrhoids, or if the patient has a scarred constitution or has had previous anal surgery, it is advisable to reduce the number of PPH surgeries and strictly control the surgical indications.

Standard operating procedures

The standard operating procedures play an important role in the occurrence of postoperative complications in PPH. (1) The choice of suture position during PPH is particularly important. Generally, after enlarging the anus, the suture position should be 2-3 cm above the dentate line. If the suture is too close to the dentate line, it may cause anal stenosis and incontinence. If it is too far away from the dentate line, it will not suspend the puborectalis muscle [12]. (2) The depth of the suture should be properly controlled. The suture should only reach the submucosal layer of the rectum. If the suture is too deep, it may cause anal stenosis. If it is too shallow, it may cause mucosal tear and bleeding complications [13]. (3) The suture should be done as much as possible on the same plane to reduce the incidence of iatrogenic rectal anastomotic stenosis [14]. (4) Bleeding during surgery should be controlled by electrocoagulation as much as possible. If suture ligation is indeed necessary, the number of suture ligation should be minimized to reduce the incidence of postoperative scarring [15].

Pay attention to postoperative management of patients

The occurrence of anal stricture complications after PPH surgery is also closely related to postoperative management. (1) The use of antibiotics after surgery should be precise. Due to the presence of bacteria and secretions in the intestine, the anastomosis is easily contaminated, leading to infection of the anal-rectal anastomosis [16]. Studies have shown that postoperative antibiotics combined with Zhongzhongyiqi Granules, Huangqin, and Jinjinhua, etc., can effectively improve the stability of cell membranes, thereby preventing the proliferation of bacteria and achieving the goal of anti-infection [17]. Therefore, PPH surgery should be strengthened with anti-infection treatment to prevent anastomosis infection and prevent the formation of inflammatory stricture at the anastomosis. (2) Strengthen PPH postoperative analgesia treatment to maintain bowel movement. After PPH surgery, the rectum is pulled, and some patients have partial excision of external hemorrhoids after the procedure. Therefore, postoperative lower abdominal distension and anal pain will occur, and the pain stimulus will cause patients to fear defecation, which will lead to

the absorption of moisture in the stool and the formation of hard stool over time. The mechanical stimulation will then aggravate the defecation pain, forming a vicious cycle, affecting wound healing, leading to scar formation, and causing anastomosis stricture. Therefore, postoperative intravenous and local analgesic drugs should be strengthened to prevent anal stricture [18]. (3) Postoperative anal dilation should be given to prevent anal stricture. The postoperative wound of PPH can be divided into three stages: the local wound reaction stage, which lasts about 3-5 days; the stage of hypertrophy of granulation tissue, which lasts about 6 weeks; and the stage of scar formation and reshaping, which lasts about 1-2 years. Studies have shown that digital examination of the anus can significantly reduce the incidence of anal stricture after PPH, so appropriate dilation should be given during the local wound reaction stage and the stage of hypertrophy of granulation tissue to alleviate inflammatory edema of the wound and prevent the muscle of the anus from spasming, and also to prevent the proliferation of scar tissue and the formation of anal stricture [19].

Treatment measures for anal stenosis after PPH surgery

Anal examination by finger

Anal examination by finger is both a diagnostic measure and a therapeutic measure. We have achieved good results in treating patients with anal stenosis after PPH surgery by finger expansion. During the examination, if the anastomosis shows a trend of narrowing, the examiner can use the index finger to massage the anastomosis in various directions outward. If necessary, an appropriate dilator can also be selected for treatment. If the patient experiences obvious pain, local anesthesia with lidocaine hydrochloride can be given to alleviate the pain. During dilation, the force should be gentle enough to cause a slight tearing sensation of the scar. This method is simple and easy to perform, with the advantages of minimal injury, minimal bleeding, low cost, and good therapeutic effect. It is the main therapeutic method for mild and moderate anal stenosis after PPH surgery, and most patients can be effectively treated through this method.

Remove any remaining titanium pins

We have found in our clinical practice that patients usually have the titanium pins removed from the anastomosis site within 2 weeks after PPH surgery. Some titanium pins may remain for up to 2 months. If residual titanium pins are found, they can cause inflammatory hyperplasia at the anastomosis, leading to stenosis. Therefore, an anal examination should be performed 2 weeks after the surgery to check for residual titanium pins. If any are found, they should be removed as much as possible. This procedure is simple. The patient assumes the appropriate position, and the anal examination is performed using an anoscope. The long forceps or long hemostat is used to remove the titanium pins under direct vision, and local anesthesia with lidocaine may be given as needed [20].

Scar incision and release

For patients with severe stenosis who cannot be relieved by anal expansion, scar incision and scar release can be performed by surgery. Operation method: Under local or sacral anesthesia, anal dilation was performed first, and anoscope was inserted. Under the direct vision of anoscope, scar tissue was cut longitudinal at 3, 6, and 9 o'clock respectively at lithotomy position until it ap-

proached the muscular layer of rectum. Part of scar tissue could be removed if necessary, and anal dilation was performed again until anal stenosis was significantly improved, and the patient was instructed to maintain anal dilation daily [21]. This method can be used in most patients with severe anal stricture after PPH.

Resection of anal stenosis ring

Among the patient data reviewed by us, there were 2 patients with severe anal stenosis who did not fall off the anastomotic nail after PPH operation, and no significant relief was found after scar release, so anal stenosis ring resection was given. Specific procedures: Anal dilatation was performed first under local or sacral anesthesia, and anoscope was inserted. Under the direct vision of anoscope, hemostatic forceps were used to fix and pull the anal stenosis ring tissue, the stenosis ring was completely removed by extending the root of the stenosis ring with an electric knife, and the wound was carefully hemostatic. The patient was instructed to start routine anal dilatation 2 days after surgery. This method is suitable for patients with poor results of scar incision and release, but this method is more traumatic than scar release, and the patient should be asked to undergo anal enlargement in time to prevent anal stenosis.

Conclusion

In summary, anal stenosis is a long-term complication after PPH surgery. Although the incidence is not high, the symptoms of difficult defecation in patients are relatively obvious, which seriously affects the quality of life of patients, and we need to pay great attention to it. There are many reasons for its occurrence and the prevention and treatment methods are also individualized. Therefore, it is necessary to return to the clinic in time after PPH surgery. If scar hyperplasia is found during the return to the clinic after PPH surgery, timely anal dilation treatment should be performed. If the effect of anal dilation treatment due to anastomotic stenosis is not satisfactory, timely surgery should be performed together with postoperative anal dilation treatment to achieve good results.

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