

Transanal Suture Mucopexy for Hemorrhoids

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BACKGROUND: Core factors involved in the treatment of hemorrhoids include the engorgement of hemorrhoids, prolapse, recurrence, and pain.

OBJECTIVE: The goal of this study was to assess the safety, pain, and efficacy of the transanal suture mucopexy for the treatment of hemorrhoids.

DESIGN: This was a retrospective study over a 13-year period.

SETTING: This procedure was performed, and data collected, from medical records at six centers in India.

PATIENTS: This study includes 5634 patients who had grade II to IV symptomatic hemorrhoids. Patients suffering from thrombosed hemorrhoids, inflammatory bowel disease, anal strictures, and anorectal carcinoma were excluded.

INTERVENTIONS: Hemorrhoidal swelling was reduced by manual massage and a steep Trendelenburg position under saddle block. The reduced hemorrhoids were fixed to the muscles of the rectal wall using sutures. Each suture measured 0.5 to 1.0 cm in length; double-locking continuous sutures were used, along the complete circumference of the rectum, at 2 and 4 cm proximal to the dentate line.

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MAIN OUTCOME MEASURES: Pain assessed using the visual analog scale and hemorrhoid recurrence served as outcome measures.

RESULTS: The transanal suture mucopexy procedure was performed for 5634 patients with symptomatic hemorrhoids. A dull pain compatible with a visual analog score of 2 to 3 was reported in 126 (2.2%) patients; in the remaining 5508 (97.8%) patients, the visual analog score was 1 to 2. Effective treatment without complications occurred for 5541 patients (98.65%). A recurrence rate of 1.3% was recorded in 5634 cases with a mean follow-up of 7 ± 6 years.

LIMITATIONS: Utilization of a self-illuminating proctoscope or Brinckerhoff or anal speculum is essential.

CONCLUSION: Transanal suture mucopexy, designed with 2 suture rows, is a safe procedure with a short learning curve. It is associated with minimal pain, low recurrence rate, and fewer complications. See **Video Abstract** at <http://links.lww.com/DCR/B841>.



MUCOPEXIA TRANSANAL CON SUTURA PARA ENFERMEDAD HEMORROIDAL

ANTECEDENTES: Los factores centrales involucrados en el tratamiento de la enfermedad hemorroidal incluyen congestión de hemorroides, prolapso, recurrencia y dolor.

OBJETIVO: Evaluar la seguridad, el dolor y la eficacia de la mucopexia transanal con sutura para el tratamiento de la enfermedad hemorroidal.

DISEÑO: Estudio retrospectivo durante un período de 13 años.

ESCENARIO: Este procedimiento se realizó y se recopilaron datos de expedientes médicos en seis centros en India.

PACIENTES: Este estudio incluye 5634 pacientes con enfermedad hemorroidal sintomática grado II a IV.

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Se excluyeron pacientes que padecían hemorroides trombosadas, enfermedad inflamatoria intestinal, estenosis anales y carcinoma anorrectal.

INTERVENCIONES: La inflamación hemorroidal se redujo mediante masaje manual y posición Trendelenburg profundo bajo bloqueo caudal. Las hemorroides reducidas se fijaron a los músculos de la pared rectal mediante suturas. Cada sutura midió 0.5 a 1.0 cm de longitud, se utilizaron suturas en surgete continuo de doble anclado, a lo largo de la circunferencia completa del recto, a dos y cuatro cm proximales a la línea dentada.

PRINCIPALES MEDIDAS DE RESULTADO: El dolor se evaluó mediante la escala de puntuación analógica visual y se evaluó la presencia de recurrencia.

RESULTADOS: El procedimiento de mucopexia transanal con sutura se realizó en 5634 pacientes con hemorroides sintomáticas. Se informó un dolor sordo compatible con una puntuación analógica visual de 2-3 en 126 (2.2%) pacientes; en los 5508 (97.8%) pacientes restantes, la puntuación analógica visual fue de 1-2. La mayoría (5541 pacientes [98.65%]) tuvo un tratamiento eficaz sin complicaciones. Se registró una tasa de recurrencia del 1.3% en 5634 casos con un seguimiento medio de 7 ± 6 años.

LIMITACIONES: La utilización de un proctoscopio autoiluminado o de Brinckerhoff o espéculo anal es esencial.

CONCLUSIÓN: La mucopexia transanal con sutura es un procedimiento seguro diseñado con dos filas de suturas asociadas con dolor mínimo y baja tasa de recurrencia con menos complicaciones. Tiene una curva de aprendizaje corta. Consulte **Video Resumen** en <http://links.lww.com/DCR/B841>. (Traducción—Dr. Jorge Silva Velasco)



KEY WORDS: Long-term follow-up; Minimum pain for hemorrhoids; Short stay; Suture mucopexy.

Hemorrhoids are a common medical condition affecting 4.4% to 36.4% of the population.¹ Milligan and Morgan described hemorrhoidectomy in 1937, which is accepted as the gold standard procedure; however, it is a painful procedure.²

The major vascular contribution of hemorrhoids is derived from the terminal branches of the internal hemorrhoidal plexus of the superior rectal artery and middle hemorrhoid artery.^{3,4} The vascular plexus is located submucosally, extending from the upper border of the anatomical anal canal to the dentate line.^{5,6} Patients with symptomatic hemorrhoids exhibit significantly larger blood vessels, increased blood flow, and increased velocity compared to those of healthy volunteers.⁷ The hemorrhoid grades correlate with arterial caliber and blood flow. The porto-systemic,

arteriovenular anastomosis, and sinusoids form a complete cylindrical sheet called the corpora-cavernosa recti.^{8,9}

Normal positioning of hemorrhoidal cushions is maintained by Treitz's muscle, which is comprised of two distinct parts: the anal submucosal muscle, whose fibers fix the cushions to the floor (internal sphincter) of the hemorrhoids, and the mucosal suspensory ligament (Park's ligament), which penetrates the internal sphincter to fix the cushions to the conjoined longitudinal muscle.⁴ Fragmentation of Treitz's muscle may be caused by shearing forces during prolonged and repeated downward straining at defecation. The causative factors for the prolapse of hemorrhoids are those associated with excessive straining and/or increased intra-abdominal pressure due to constipation and hard stools.^{6,7} The theory of sliding of the anal canal lining is well accepted.^{4,10} Grade II to IV hemorrhoids are an excellent example of prolapsing hemorrhoids.

The change from anal cushions to hemorrhoids gives rise to many pathological changes, including venous dilation, thrombosis, degeneration of collagen and fibroelastic tissues, and distortion and rupture of the anal subepithelial muscle. Histopathological examination of the hemorrhoidal specimens reveals ulcerated mucosa, a severe inflammatory reaction involving the vascular wall and surrounding connective tissue, ischemic necrosis, and oedema.¹¹ With blockage of an artery at one site, there is dilation of proximal and shrinkage of distal branches, resulting in positive and negative pressure in these vessels. Naturally, small and side branches join to form collaterals.¹² The hypervascularization remains the same after hemorrhoidectomy.¹³

A comprehensive study of hemorrhoids revealed that the following core factors are necessary to address in the treatment of hemorrhoids: engorgement of hemorrhoids, prolapse, recurrence, and pain.

Transanal suture mucopexy consists of 2 circumferential rows of sutures. These sutures fix the prolapsed rectal mucosa to the internal sphincter muscles by creating fibrosis between these structures at two levels, reducing recurrences. The same sutures ligate all the vascular elements of the vessels, reducing engorgement of the hemorrhoids. As the sutures are double locked, they prevent a purse-string effect. Transanal suture mucopexy is an established procedure that was been published in the *Indian Journal of Surgery* in 2012.¹⁴ We report results of our 13-year multicenter experience.

MATERIALS AND METHODS

Study Design

This is a multicenter retrospective study performed at six centers in India from January 2007 to December 2019 with follow-up through March 2020. The protocol was approved by the clinical research review boards of the respective hospitals. Patients' written informed consent was obtained for the procedure after explanation about its

safety, possible complications, and results. Permission was also granted by the patients for presentation of data at conferences and publication in journals. The data on operated patients were collected from hospital records.

All study centers followed a single protocol for clinical examinations, investigations, preoperative work-up, procedures, and patient follow-up. The procedure was designed by Dr. Chivate, who explained, demonstrated, and gave hands-on training to other surgeons for the procedure during operative workshops. These surgeons assisted at least 5 cases and thereafter were assisted by the trainer for the next 5 cases. Later, they performed 5 cases independently under supervision of the trainer.

Patients with symptomatic grade II-IV hemorrhoids undergoing treatment were included in this retrospective study. Hemorrhoid grading and the presence of symptoms of bleeding, prolapse, pain, and burning were recorded.

Patients with thrombosed hemorrhoids and those suffering from inflammatory bowel or other granulomatous disease were excluded from the study. Other exclusion criteria included strictures of the anal canal, very narrow android pelvic outlets, and malignancy of the anorectum.

All patients were clinically examined by the operating surgeon for suitability for surgery, and a written medical record was maintained for each patient. Rigid sigmoidoscopy was performed in all cases to rule out any other diseases.

Proctoscope

The proctoscope is comprised of polycarbonate, hard plastic material modulated in a tube with a 3.8-cm inner and a 4-cm outer diameter. A fiberoptic cable can be connected to a light source to make it self-illuminating. The tube is molded with a blind, smooth conical shape at one end for easy introduction into the anal canal with an obturator. A 5-cm-long and 3.5-cm-wide window is present 4.5 cm from the open end opposite to the fiberoptic cable (Fig. 1). The proctoscope retracts the anus and rectum and compresses hemorrhoidal engorgement up to



FIGURE 1. Proctoscope and inside view in situ.

the dentate line and reduces bleeding. The proctoscope can be sterilized by ethylene oxide or in an autoclave.

Surgical Technique

All patients were given clear liquids and 3 doses of lactulose (60 mL) at 4 hourly intervals on the prior day of the procedure. One gram of cefoperazone 1 gram was administered intravenously before induction. Under saddle anesthesia, the patient was placed in a steep Trendelenburg position. Engorged hemorrhoids were compressed, massaged manually, and reduced in size (Fig. 2). Deflated hemorrhoids were pushed in by the proctoscope and repositioned above the dentate line to their original position (Fig. 1). Suturing was performed through the aperture within the proctoscope; the repositioned rectal mucosa was fixed to muscles of the rectal wall 2 cm proximal to the dentate line. The suturing material used was 2-0 polyglycolic acid, on a tapered, 30-mm half-circle needle. Suturing can be started at any point. The first step is to place and tie the initial 0.5- to 1-cm suture. The tied suture is then pulled tight so that it creates a tent of the fixed mucosa and muscle. Next, a suture of the same length is started, overlapping the first suture by several mm. Once the needle is brought out, the suture is locked twice through the loop, the thread pulled, and the knot tightened. Similar sutures are continued by double-locking after each suture along the entire circumference of the rectum at the same level. The 2 circumferential rows of sutures are placed 2 and 4 cm proximal to the dentate line (Figs. 3 and 4). Precautions are taken so that sutures should go through part of the sphincter muscle but not beyond it. The proctoscope is rotated after completion of suturing in the aperture. There should be no skip area between any two sutures, as that may cause a purse-string or plication effect and may lead to bowel obstruction. The sutures may cut through and cause bleeding among fragile hemorrhoids. The sutures can be repeated at the same site. Oozing from needle pricks can be controlled by wet gauze soaked in saline.

Skin tags, sentinel piles, or polypoid tissues were coagulated and very swollen; tender and thrombosed external hemorrhoids were excised with the help of diathermy.

Follow-up

Follow-up was conducted via telecommunication every 6 months by a medical social worker. A set of questions regarding bleeding per rectum, prolapse, pain, tenesmus, incontinence, and satisfaction were asked and patients experiencing problems were asked to come in for in-person examinations.

Statistical Analysis

SPSS version 23 was used for statistical analysis of data.

RESULTS

Transanal suture mucopexy was used in 5634 consecutive patients with symptomatic hemorrhoids at six referral



FIGURE 2. Reduction of hemorrhoid enlargement after Trendelenburg position and massage. Right, hemorrhoid engorgement. Left, reduced hemorrhoid.

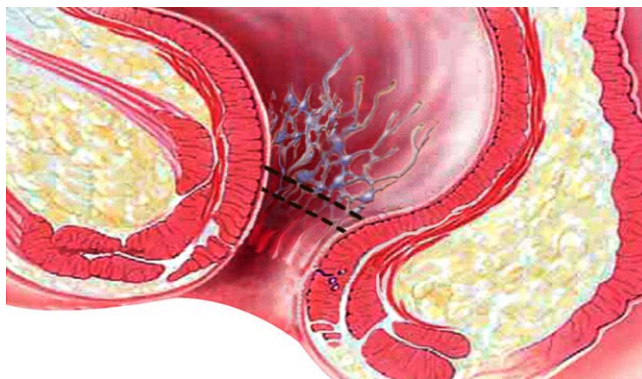


FIGURE 3. Pictorial presentation of transanal suture mucopexy.

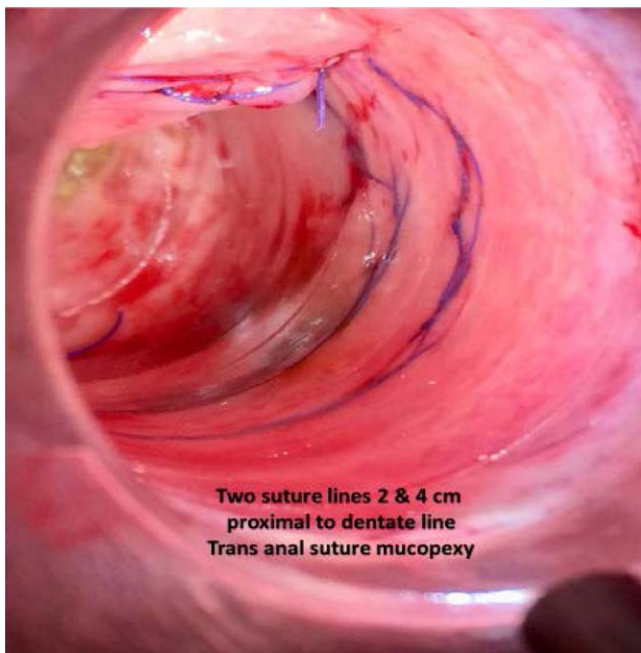


FIGURE 4. Two suture lines 2 and 4 cm proximal to dentate line.

centers in India over a 13-year period from January 2007 to December 2019. Patient follow-up occurred through March 2020. The series included 2032 females (mean age

= 42.5 y; range = 21 to 84 y) and 3602 males (mean age = 48.25 y; range = 20 to 91 y). The hemorrhoid grade distribution was as follows: 1522 grade II patients, 2541 grade III patients, and 1571 grade IV patients.

All patients experienced frequent episodes of bleeding and hemorrhoidal prolapse. Pruritis ani was present in 792 grade II patients, 1254 grade III patients, and 693 grade IV patients. Mucoïd discharge and soiling of clothes were reported by 792 grade II patients, 1254 grade III patients, and 693 grade IV patients. Heaviness and pain were present in 1881 cases—353 in grade I patients, 660 in grade III patients, and 868 in grade IV patients. Overall, the hemorrhoid grades and symptoms were not related to each other (Table 1). The most common assumption is that patients with 3 hemorrhoids have engorged cushions; however, this was present in only 20.1% of cases (Table 2). Sigmoidoscopy was done in all cases to exclude malignancy and other pathology.

All patients were discharged 24 hours postoperatively. Hemorrhoid engorgement was reduced by 70% to 80% on the operating table, and further reduction occurred within 3 to 7 days (Fig. 5). During operations, minor oozing was observed from some of the mucopexy stitches in 281 patients (5.1%). It was controlled by manual compression with saline-soaked gauze. In most cases, the anal sphincter was relaxed and allowed introduction of the proctoscope. Proctoscopy performed 1 week postoperatively did not reveal ischemia or stenosis in the area between the two circumferential suture rows.

Postoperatively, a visual analog pain score of 2 to 3 was reported in 126 (2.2%) cases; in 5506 (97.7%) cases, minimal pain of visual analog pain score 1 to 2 was reported. Minor bleeding was noted during the first and second week in 108 (1.9%) cases and was treated conservatively. Oral cefoperazone (0.5 gram) twice daily for 5 days and daily laxatives (lactulose 30 mL) were continued for 15 days. Patients were satisfied with the new, less painful procedure. Out of 5634 patients, 17 died of unrelated causes. In 76 (1.35%) cases, recurrence of symptomatic hemorrhoids was noted from 1 to 13 years follow-up.

TABLE 1. Preoperative symptoms among 5634 total patients

Symptoms	All hemorrhoid cases (Number of patients)	Grade II hemorrhoids (Number of patients)	Grade III hemorrhoids (Number of patients)	Grade IV hemorrhoids (Number of patients)
Bleeding	5634	1522	2541	1571
Prolapse	4620	1186	2541	1571
Itching	2409	792	1254	693
Discharge	1320	528	528	396
Pain	1881	353	660	868

DISCUSSION

Hemorrhoids are a common clinical entity; minor improvement in their treatment will benefit many people. Transanal suture mucopexy has addressed the core factors in the treatment of hemorrhoids by simple, repeatable suturing, and it avoids excision of engorged hemorrhoids, rectal mucosa, or anoderm. Pain is the major changing factor in the treatment of hemorrhoids. Transanal suture mucopexy was used in 5634 consecutive cases of hemorrhoids. Minimal pain of visual analog score 1 to 2 was noted in 5308 cases, and 126 (2.2%) patients reported a dull pain of visual analog score 2 to 3 on the second postoperative day. They were given paracetamol (500 mg) as an analgesic. Transanal suture mucopexy is a less painful procedure than conventional hemorrhoidectomy. As there is no perianal or anal wound, no painful dressings or sitz baths are required.

We compare this new procedure primarily with the Milligan Morgan hemorrhoidectomy, stapled hemorrhoidopexy, and Doppler-guided hemorrhoid artery ligation procedures with respect to pain, safety, bleeding, hospital stay, recurrence, incontinence, cost, and early resumption of work.

The Milligan-Morgan hemorrhoidectomy—the gold standard procedure—is painful and requires 2 to 3 days' hospitalization in India. Sitz baths, dressings, and heavy analgesics or sedation are necessary.¹⁵ Stapled hemorrhoidopexy was described by Longo¹⁶ as a less painful procedure; however, postoperative pain has been observed in 25% and local discomfort in 38% of cases. Intervention for the removal of granuloma, infection, or staples is

required in 3% to 11% of patients to reduce pain.¹⁷ In 1995, Morinaga reported a new technique to locate the terminal branches of the superior hemorrhoid artery by Doppler. These are identified and ligated using a figure 8 suture at the Doppler-located position, 4- to 6-cm proximal to the dentate line. It is a less painful procedure. The anorectal repair procedure, involving plication of the anal mucosa, is used for prolapsed grade III and IV hemorrhoids and is associated with a certain amount of pain.¹⁸

Over the past 13 years, transanal suture mucopexy has been performed in 5634 cases, has shown no untoward events, and has proven quite safe. Doppler-guided hemorrhoid artery ligation is a safe procedure and has less evidence of complications.^{18,19} The conventional Milligan-Morgan hemorrhoidectomy is considered safer than stapled hemorrhoidopexy. With stapled hemorrhoidopexy, the incidence of severe pelvic sepsis and life-threatening perineal sepsis,²⁰ severe pelvic sepsis with rectal perforation,²¹ uncontrolled torrential bleeding,²² gas in the retroperitoneum and mediastinum, septicemia,²³ and requirement of stapled transanal rectal resection (STARR) were reported as rare but sometimes fatal (5 deaths) complications. It elicited severe concerns regarding the safety of the procedure.²⁴

The mucosa and submucosa of the rectum are the weakest part of the rectum, and they are autosutured in stapled hemorrhoidopexy; this may result in dehiscence and bleeding. Hemorrhage from the staple line after firing the stapler occurs in 18% to 37% of cases and hemorrhage due to mucosal tears and dehiscence of the staple line in 5.9%.²⁵ Bleeding during Milligan-Morgan hemorrhoidectomies is reported in between 0.3% to 3% of cases.²⁶ Transanal suture mucopexy was associated with minor oozing from some sutures in 2.2% of cases, which was controlled by manual compression.

In the Milligan-Morgan hemorrhoidectomy, mucosal bridges are preserved between 2 excised piles to prevent stricture formation. Secondary piles are usually left alone; they may continue as a recurrence.²⁷ Doppler-guided hemorrhoid artery ligation is a deficient treatment for hemorrhoids; as ligation at only 1 level and at 6 points, it does not reduce vascularity to the hemorrhoids. It fixes the mucosa with only 6 sutures and is unable to prevent prolapse of the anal lining.²⁷

TABLE 2. Number of patients by hemorrhoid grade and number of hemorrhoids

Hemorrhoid grade	Number of hemorrhoids				Total	χ^2	p
	1	2	3	>3			
Grade II	208	802	488	24	1522	2914.85	0.001
Grade III	261	331	582	1367	2541		
Grade IV	11	21	63	1476	1571		
Total	480	1154	1133	2867	5634		

Three hemorrhoids were noted in 20.1% cases. χ^2 test revealed that the grades and numbers of hemorrhoid masses are dependent on each other with a statistically significant result.

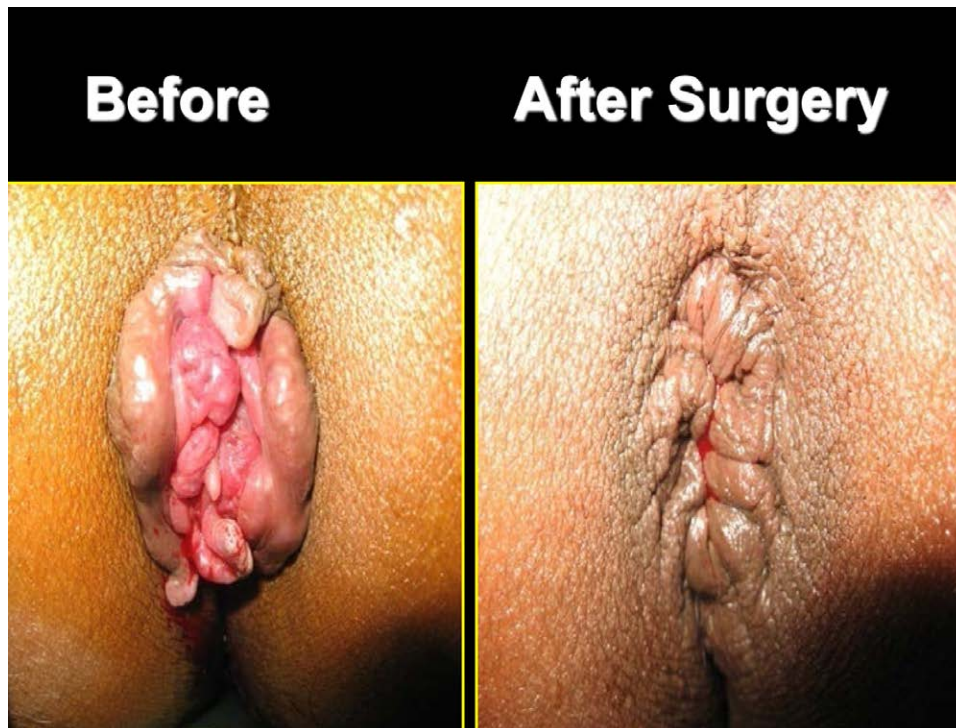


FIGURE 5. Hemorrhoid engorgement before and after transanal suture mucopexy.

Avoiding collateral formation is a basic factor to reduce hypervascularity in operated cases.^{14,28} If an artery is occluded at 2 sites, a long segment of an artery is occluded, and the proximal and distal branches are not available for collateral formation.¹² In transanal suture mucopexy, all the vascular elements nourishing the hemorrhoids are blocked at two levels, at 2 and 4 cm proximal to the dentate line. We think, hypothetically, that there is less chance of revascularization and recurrence (Fig. 6). With stapled hemorrhoidopexy, there is no ligation of blood vessels and blood flow continues after the procedure. Similarly, with both the Milligan-Morgan hemorrhoidectomy and Doppler-guided

hemorrhoid artery ligation, as ligation of the blood vessels is at one site, vascularity remains the same, as shown with anatomical dissection by Aigner et al.^{7,8,28}

In 76 (1.35%) cases, symptomatic recurrence was noted during follow-up from 1 to 13 years after the procedure. The Milligan-Morgan procedure with the additional use of an energy source has not reduced the rate of recurrence, which has remained about 1.7% to 18%.²⁹⁻³² In stapled hemorrhoidopexy, the sliding mucosa is not fixed. The overall incidence of recurrent hemorrhoidal symptoms as early as <6 months postoperatively with stapled hemorrhoidopexy vs Milligan-Morgan hemorrhoidectomy

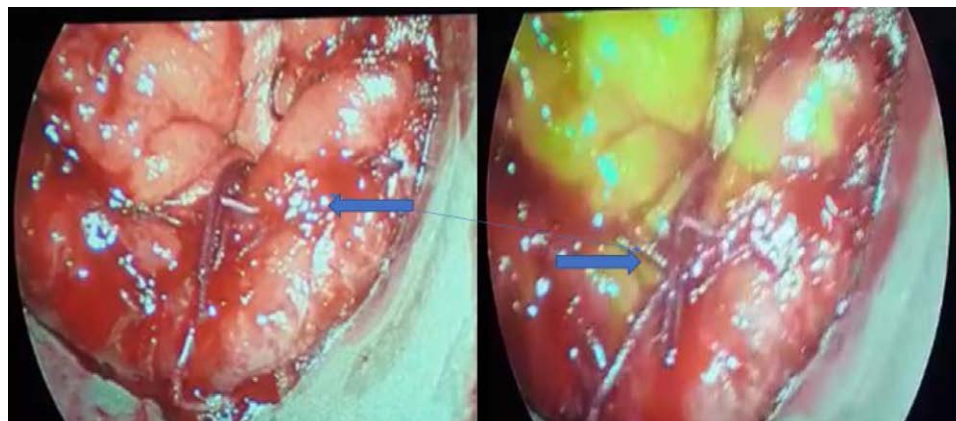


FIGURE 6. Testing vascularity by injection of indocyanine green. Blue arrows show proximal suture line.

is 25.3% vs 18.7%; recurrence as late as 1 year or more with stapled hemorrhoidopexy vs conventional hemorrhoidectomy is 31.7% vs 24.85%.³³ With Doppler-guided hemorrhoid artery ligation, prolapsed mucosa is fixed only at 6 sites and is associated with a 12% rate of recurrence. In grade III and IV hemorrhoids, recurrence is reported to be between 12% to 40% during the first year of follow-up.³⁴

The overall complication rates of stapled hemorrhoidopexy ranged from 3.3% to 81%, with 5 documented cases of mortality.³⁵ Stapled hemorrhoidopexy is not safe and is also an inefficient technique to treat grade IV hemorrhoids.³⁶ A remarkable incidence of stapler failure after firing during stapled hemorrhoidopexy has been recently reported, with an incomplete resection of the prolapsed tissue, because of the limited volume of the stapler casing.³⁷

No impairment of fecal continence has been reported following transanal suture mucopexy or Doppler-guided hemorrhoid artery ligation. In one series, fecal soiling/leakage was observed in 15.5% of cases and fecal urgency in 28% of cases following stapled hemorrhoidopexy.^{38,39}

The recurring cost of disposables in a stapler and the cost of the instrument is very high with Doppler-guided hemorrhoid artery ligation. Transanal suture mucopexy requires only 2 polyglactin 2-0 sutures as a recurring cost.

With transanal suture mucopexy, the patient can resume their usual activities in 48 to 72 hours, whereas following a Milligan-Morgan hemorrhoidectomy, usual activities can be resumed after 1 to 6 weeks. If there are no complications, normal activity can be resumed in 2 to 3 days following stapled hemorrhoidopexy and within 2 days following Doppler-guided hemorrhoid artery ligation.

No incontinence, recurrent bleeding, frequency of stool, or tenesmus was reported following transanal suture mucopexy. We presented pooled data from 6 centers and compare complication and pain data from each center against aggregate data and noted no significant differences.

CONCLUSION

Transanal suture mucopexy is a very simple suturing procedure that involves no excision of any anorectal tissue. It is effective and successful with all grades of hemorrhoids with minimum complications and recurrence. The new procedure will be an excellent option for the treatment of grade II to IV hemorrhoids. Patients are satisfied because transanal suture mucopexy results in minimal pain, a short hospital stay, and early resumption of their normal activities. This procedure was performed in 5436 patients with low recurrence noted over a long follow-up period.

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