



## Lateral Internal Sphincterotomy versus V-Y Anoplasty in the Treatment of Chronic Anal Fissure: A Comparative Trial Based on Manometry Results

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### Abstract

**Background:** For chronic anal fissure (CAF), the first line of treatment is conservative treatment. Patients who fail conservative treatment are offered surgical treatment in the form of lateral internal sphincterotomy (LIS) or V-Y anoplasty. This prospective study aimed to compare LIS and V-Y anoplasty in the treatment of CAF based on the baseline resting anal pressures of patients.

**Methods:** Female patients with CAF were investigated via anal manometry. Patients with elevated resting anal pressure were treated with LIS, while patients with normal or low resting anal pressure were treated with V-Y anoplasty. Data regarding the healing of anal fissure, reduction in pain score, continence disturbance, and complications were recorded on follow-up at three months.

**Results:** Twenty-four female patients with a mean age of 37.6 years were included in this study. Sixteen patients underwent LIS (group I), while 8 underwent V-Y flap (group II). Both groups required comparable time to achieve complete healing. Both groups showed significant decreases in pain scores at follow-up (Group I:  $6.1 \pm 0.85$  to  $0.93 \pm 0.7$ ,  $P < 0.0001$ ; Group II:  $5.6 \pm 0.83$  to  $0.62 \pm 0.7$ ,  $P < 0.0001$ ). Similar rates of postoperative FI were recorded in the two groups (6.25% vs. 0%,  $P = 1$ ). Significant decreases in anal pressure were noted in group I postoperatively, whereas the change in anal pressure in group II was not statistically significant.

**Conclusion:** Both LIS and V-Y anoplasty achieved excellent outcomes in regard to symptom control and healing of anal fissure. None of the patients who underwent V-Y flap developed FI, though 6% of patients who underwent LIS developed this complication.

**Keywords:** Chronic anal fissure, Lateral internal sphincterotomy, V-Y, Anoplasty, Manometry

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## Introduction

An anal fissure is a longitudinal ulcer in the dry, sensitive anoderm, extending from below the dentate line to above the anocutaneous line. It mainly occurs in the posterior midline (in about 90% of cases). The second most common location of anal fissure is the anterior commissure (1).

If an anal fissure persists beyond four weeks, it is identified as a chronic anal fissure. A chronic anal fissure is characterized by the presence of indurated edges, visible internal sphincter muscle fibers at the base of the fissure, a sentinel polyp at the distal end of the fissure, or a fibroepithelial polyp at the apex (2).

The pathophysiology of chronic anal fissure has not been clearly established. (3). The initial theory was that anal fissure is caused by anal canal trauma, most commonly induced by the passage of hard stool or bouts of diarrhea. Subsequent studies have revealed two additional factors that may account for the persistence of chronic anal fissure. The first factor is the presence of persistently high basal internal sphincter tone in the majority of individuals with chronic anal fissure. The second factor is the presence of ischemia, which prevents the healing of the anal fissure (4).

The treatment of chronic anal fissure usually starts with conservative measures including a high fiber diet, Sitz baths, and topical agents that induce chemical sphincterotomy such as glycreyl trinitrate cream. However, the success of conservative treatment is variable, with many patients failing to respond, particularly those with long-standing anal fissure (5).

Other options for treatment of chronic anal fissure include injection of botulinum toxin, lateral internal sphincterotomy (LIS), and V-Y anoplasty (6). Although LIS is considered as the gold standard in the treatment of chronic anal fissure, it can be associated with minor fecal incontinence (FI) in up to 14% of patients (7). To select the optimal treatment modality for patients with chronic anal fissure, some factors should be considered, the most important of which are the resting anal pressure and whether internal anal sphincter hypertonia exists or not.

The present study aimed to compare LIS and V-Y anoplasty in the treatment of chronic anal fissure. The selection of each procedure was based upon the basal resting anal pressure. We hypothesized that patients with elevated resting anal pressure would benefit from LIS, whereas patients with normal or reduced resting anal pressure would be better treated with V-Y flap to avoid continence disturbances.

## Patients and Methods

### *Study Design and Setting*

This prospective, non-randomized controlled trial was carried out in the Colorectal Surgery units and General Surgery departments of Mansoura

University Hospitals in the period of January 2016 to October 2017 after obtaining approval from the Institutional Review Board (IRB) of Mansoura Faculty of Medicine. The study protocol conforms with the ethical guidelines of the 1975 Declaration of Helsinki, as reflected in a prior approval by the institution's human research committee.

### *Eligibility Criteria*

Adult female patients with chronic anal fissure aged between 18 and 60 years were included. We excluded patients with a history of previous anal surgery, patients with an associated anorectal pathology other than anal fissure, patients with FI of any grade, and pregnant females.

### *Preoperative Assessment*

Patients were asked about the following symptoms: anal pain and its degree from 0-10 on a visual analogue scale (VAS); bleeding; perianal swelling; bowel habits; pruritus ani; anal discharge; obstructed defecation; pelvic organ prolapse; history of previous treatment; history of previous anal surgery; history of associated colonic disorders; and childbirth. The degree of anal continence was assessed using the Wexner Continence Grading Scale (8).

Anorectal examination was done in the left lateral position. Inspection of the perineum was done to detect anal fissure, determine its position, and exclude any other associated conditions. Digital rectal examination (DRE) was done to palpate the induration at the base of the fissure, detect anal sphincter spasm, and exclude any anal lesions. In the case of an acute exacerbation of the anal fissure, DRE was not performed.

Conventional manometry was performed using a standard, low-compliance water perfusion system and eight-channel catheters. Following the pull-through technique, the functional length of the anal canal, mean manometry resting pressure (MRP), and mean manometry squeezing pressure (MSP) were recorded. The normal range of MRP was considered as 40-80 mm Hg, while that of MSP was considered as 80-160 mm Hg.

### *Patient's Selection*

Based on the results of anorectal manometry, patients with anal fissure were subdivided into two groups:

1. Patients with elevated resting anal pressure (>80 mmHg); these patients underwent LIS.
2. Patients with normal or low resting anal pressure (<40 mmHg); these patients underwent V-Y anoplasty using advancement flap.

### *Preoperative Preparation*

All patients included in the study signed informed consent forms after the nature, potential benefits and complications of the respective procedures were explained to them. Patients were prepared by

restriction of oral intake to clear liquid diet 24 hours before surgery, in addition to single rectal enema at the night prior to surgery.

### *Technique of Surgery*

Both groups underwent surgery in the lithotomy position under spinal anesthesia. One gram of clindamycin was given intravenously with induction.

Group I (LIS): Lateral internal anal sphincterotomy was performed with the open technique as follows: After gentle anal massage and dilatation, an anal retractor was inserted for clear visualization of the fissure. After identification of the fissure, the intersphincteric groove was palpated laterally. A 1 cm lateral incision was made just inside the perineal skin lateral to the border of the internal anal sphincter (IAS) at the 3 o'clock position.

Subcutaneous tissues were gently mobilized away from the sphincter, and the transverse fibers of the internal sphincter were picked up with an Allis clamp. A tailored internal sphincterotomy was then performed by dividing the lower third of the internal sphincter fibers superficially by electrocautery until the apex of the fissure. The wound was then left open to allow drainage. Skin tags were excised at the end of the procedure.

Group II (V-Y anoplasty): A V-shaped incision encompassing the anal fissure and extending from the anal canal caudally was made with its base equal to the base of the anal fissure. A V-shaped flap was then mobilized and advanced to cover the site of the anal fissure. The flap was then fixed in place using polyglactin 3/0 sutures after removing the part that included the fissure, giving the final Y shape to the incision.

### *Postoperative Care*

Patients started liquid diet four hours after the operation; anal dressing was removed eight hours after the operation, with application of local anesthetic cream before defecation. Patients were discharged on the next postoperative day on high residue diets, stools softeners, analgesics, and instructions to perform Sitz baths twice per day.

### *Outcomes*

The primary outcome evaluated in the study was the effectiveness of the procedure, which was by a decrease in the VAS of pain as well as the healing of the anal fissure, which was defined as complete epithelialization of the site of anal fissure. Secondary outcomes evaluated included operation time, complications such as FI as assessed using Wexner incontinence score and flap necrosis or disruption, and changes in anal pressures.

### *Follow Up*

Patients were followed-up in the outpatient clinic at one week as well as one, two and six months postoperatively. During every follow-up visit, an assessment was done as regards the healing of the anal

fissure site, the state of the flap, and improvements in symptoms. Patients were asked about the degree of anal pain according to the VAS, and assessment of continence was done at every visit using the Wexner incontinence score. Anal manometry was done at three months postoperatively and, the mean postoperative resting and squeeze anal pressures were measured in both groups.

### *Statistical Analysis*

Data were analyzed by SPSS version 23 (IBM corp; Chicago, USA). Continuous data were expressed in the form of mean  $\pm$  standard deviation (SD), or median and normal range, while categorical data were expressed as number and proportions. Student t-test was used for analysis of quantitative data, while Fisher's exact test or Chi-square test were used to analyze categorical data. P-values less than 0.05 were considered significant.

## **Results**

### *Patient Demographics*

Twenty-four female patients with chronic anal fissure and a mean age of  $37.6 \pm 10.6$  (range: 20-58) years were included in this study. All patients complained of anal pain preoperatively, with a mean preoperative VAS score of  $5.66 \pm 1$ . Twenty patients (83.3%) complained of chronic constipation, 9 (37.5%) of bleeding per rectum, 9 (37.5%) of pruritus ani, and 2 (8.3%) of anal discharge. The mean duration of symptoms was  $22.9 \pm 2.12$  (range: 2-120) months.

Eleven (45.8%) patients had a history of pregnancy and normal vaginal delivery. None of the patients included complained of obstructed defecation symptoms, or had a history of rectal or pelvic organ prolapse.

Sixteen patients underwent LIS (group I) and 8 underwent V-Y flap (group II). There were no significant differences between the two groups with regard to age, clinical presentation, site of anal fissure, and preoperative pain score (Table 1).

### *Preoperative Anal pressures and Group Subdivision*

For the entire cohort studied, the mean preoperative resting anal pressure was  $82.1 \pm 16.2$  mm Hg, while the mean preoperative squeeze anal pressure was  $135.3 \pm 28.3$  mm Hg.

The mean resting anal pressure was significantly higher in group I than group II owing to the selection criteria of the study ( $90.7 \pm 19.8$  vs.  $64.8 \pm 6.4$  mm Hg;  $P=0.0017$ ). The mean squeezing pressure was also significantly higher in group I than group II ( $144.5 \pm 28.6$  vs.  $116.8 \pm 24.7$  mm Hg;  $P=0.03$ ) (Table 2).

### *Postoperative Outcome*

As shown in Table 3, both groups required comparable time to achieve complete healing ( $4.9 \pm 5.6$  vs.  $4.7 \pm 1.7$  weeks;  $P=0.92$ ) and had comparable improvements in symptoms. Postoperative pain

**Table 1:** Preoperative patients' characteristics

Variable	Group I (n=16)	Group II (n=8)	P value	
Mean age in years	39.2±3.5	36.1±4.2	0.06	
Symptoms	Pain (%)	16 (100)	8 (100)	1
	Constipation (%)	15 (93.7)	5 (62.5)	0.09
	Bleeding (%)	7 (43.7)	2 (25)	0.65
	Discharge (%)	1 (6.2)	0	1
	Pruritus' (%)	8 (50)	1 (12.5)	0.17
Mean duration of symptoms in month	21.2±33.4	26.6± 38.9	0.73	
Site of anal fissure	Anterior (%)	6 (37.5)	6 (75)	0.19
	Posterior (%)	10 (62.5)	2 (25)	
Mean preoperative pain VAS	6.1±0.85	5.6± 0.83	0.18	
Previous vaginal deliveries (%)	7 (43.7)	4 (50)	1	

**Table 2:** Preoperative anal sphincter pressures

Variable	Group I (n=16)	Group II (n=8)	P value
MRP* (mmHg)	90.7±19.8	64.8±6.4	0.0017
MSP** (mmHg)	144.5±28.6	116.8±24.7	0.03

\*MRP: Mean resting pressure; \*\*MSP: Mean squeezing pressure

**Table 3:** Postoperative outcome in both groups

Variable	Group I (n=16)	Group II (n=8)	P value	
Operative time	15±3.6	31.25±5.2	0.0001	
Time to complete healing in weeks	4.9±5.6	4.7±1.7	0.92	
Complete healing at 3 months (%)	16 (100)	8 (100)	1	
Fecal incontinence	1 (6.25)	0	1	
Postoperative pain VAS	0.93±0.7	0.62±0.7	0.42	
Postoperative Symptoms	Constipation	3 (18.7)	1 (12.5)	1
	Bleeding	1 (6.25)	0	1
	Discharge	0	0	1
	Pruritus	2 (12.5)	0	0.5
Recurrence at 12 months	0	0	1	

**Table 4:** Changes in anal pressures in the two groups

Variable	Group I (n=16)	Group II (n=8)	P value
Preoperative MRP* (mmHg)	90.7±19.8	64.8±6.4	0.0017
Postoperative MRP* (mmHg)	64.7±5.8	61.5±10.5	0.34
P value	<0.0001	0.46	-----
Preoperative MSP** (mmHg)	144.5±28.6	116.8±24.7	0.03
Postoperative MSP** (mmHg)	102.5±17.6	97.5±15.8	0.5
P value	<0.0001	0.08	-----

\*MRP: Mean resting pressure; \*\*MSP: Mean squeezing pressure

scores were comparable across both groups (0.93±0.7 vs. 0.62±0.7; P=0.42). Both groups showed significant decreases in pain scores at the three-month follow-up (Group I: 6.1±0.85 to 0.93±0.7, P<0.0001; Group II: 5.6± 0.83 to 0.62±0.7, P<0.0001)

Both groups achieved similar rates of postoperative FI (6.25% Vs 0%, P=1). Flap disruption occurred in 2 (25%) patients of group II after six weeks, with complete healing being achieved after eight weeks. No recurrence of anal fissure was recorded in both groups at the six-month follow-up.

Significant decreases in MRP and MSP were noted in group I postoperatively, whereas the changes in anal pressures were not statistically significant in

group II (Table 4).

## Discussion

The present study included twenty-four female patients with chronic anal fissure. We chose to include only female patients since this patient group is more prone to experience disturbance in the continence state after anorectal surgery, particularly internal sphincterotomy for anal fissure. The reason for such vulnerability of females to FI after sphincterotomy may be due to weaker anal sphincters than males in addition to the impact of vaginal deliveries on the anal sphincter, especially with difficult and repeated deliveries.

Patients were non-randomly divided into two groups based on the preoperative anal pressures. Patients with hypertensive anal sphincters were assigned to undergo LIS, whereas patients with normotensive or hypotensive anal sphincters underwent V-Y anoplasty without division of the anal sphincters. The patients were allocated to the groups in a 2:1 ratio since patients with hypertensive anal sphincters were more prevalent than patients with normal or reduced resting anal pressure, in whom chronic anal fissure is probably attributed to ischemia rather than anal sphincter spasm.

The study postulated that selecting the type of surgical treatment for patients with chronic anal fissure according to their preoperative resting anal pressure would help achieve the best outcomes in terms of healing of the fissure and relief of anal symptoms while not compromising the continence state of the patients, which will serve to improve the patients' quality of life.

V-Y flap had significantly a longer operation time than LIS, which is understandable given the time needed for dissection, advancement and fixation of the flap. This finding is in line with that of a previous randomized trial comparing V-Y flap with LIS (9).

The duration of healing of anal fissure after both procedures was comparable. Anal fissure healed after both techniques in around five weeks, which is shorter than the time required to achieve complete healing using topical agents that induce chemical sphincterotomy (5). Similarly, no significant difference in postoperative pain scores was detected between both groups, indicating equal efficacy of both procedures in symptom control.

Although time to complete healing should predictably be shorter in the flap group than the LIS group since a well-vascularized flap was advanced to cover the site of the anal fissure, the healing time in both groups was comparable. This is probably attributed to the different mechanism by which each method of treatment addresses the pathogenesis of anal fissure. In patients with hypertensive anal sphincters, the main reason for persistence of the anal fissure is the IAS spasm, in which case relief of this spasm by LIS would hasten healing and relieve anal pain. On the other hand, in patients with chronic anal fissure associated with normal or reduced resting anal pressures, ischemia is the main cause of persistence of fissure as Schouten et al. (10) have reported; hence, a well-vascularized flap could help relieve mucosal ischemia and improve healing of anal fissure.

At three months of follow-up, all patients in both groups showed complete healing. The healing rate of anal fissure treated by LIS is reported to be up to 98% - similar to the current study. In a recent meta-analysis (6), healing rates after LIS and V-Y anoplasty were 91% and 80%, respectively.

FI is the most dreaded complication of surgery for anal fissure as it can occur in 20% of cases after

anal dilatation and in up to 14% of patients treated with internal anal sphincterotomy (7). In the present study, minor flatus incontinence was reported in one patient after LIS, which was transient and improved within 6 weeks after healing of the fissure without permanent residual damage; this is in agreement with previous studies (11, 12). A systematic review (13) reported that flatus incontinence occurred in 9% of patients after LIS, which is close to the incidence of FI after LIS found in the present study. On the other hand, none of the patients who underwent V-Y advancement flap experienced FI, matching the findings of previous clinical trials (9, 14, 15).

On measuring anal pressures before and after surgery, the mean anal pressure in the group that underwent LIS was significantly higher than the flap group, which justified the performance of internal sphincterotomy in the first group. The decreases in the resting and squeeze anal pressures were significant after LIS, which was reflected as significant improvements in anal pain and healing of the fissure. Conversely, non-significant changes in the anal pressures were observed after V-Y flap, which is logical since the anal sphincters were not divided or compromised.

This study followed the ACPGBI guidelines (16) that recommend anal advancement flap to be used in the treatment of patients with normal or low-pressure sphincters who have failed medical management. Although Chambers and coworkers (17) advocated that the V-Y advancement flap be used as a first-line treatment for chronic anal fissure regardless of sphincter pressures, V-Y flap is technically more demanding than LIS, involving meticulous dissection of flap and multiple suture lines, which can be intolerable for some patients.

Limitations of the present trial include its non-randomized design, which is associated with risk of selection bias. However, since the treatment method was selected based on preoperative resting anal pressure to avoid continence disturbance, the study design may be justified. The small number of patients in both groups is another limitation that warrants the conduction of larger trials involving multiple centers.

## Conclusion

Both LIS and V-Y anoplasty achieved excellent outcomes in regards to symptom control and healing of anal fissure. While none of the patients who had V-Y flap developed FI, around 6% of patients who underwent LIS complained of minor FI though they already had elevated resting anal pressure before surgery. This observation further underscores the importance of tailoring surgical treatment of anal fissure to each patient according to certain preoperative factors, particularly the resting anal pressure.

**Conflict of Interests:** None declared.

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