Zagazig University Medical Journal
www.zumj.journals.ekb.eg

Volume 29, Issue 2, March 2023, page (192-200) Supplement Issue

Manuscript ID ZUMJ-2012-2048 (R1)
DOI **10.21608/ZUMJ.2021.53659.2048**

ORIGINAL ARTICLE

Anal Advancement Flap versus Lateral Internal Sphenecterotomy for Treatment of Chronic Anal Fissure with High-pressure Anal Canal

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Submit Date 2020-12-14
Revise Date 2021-01-13
Accept Date 2021-02-02

ABSTRACT

Background: Anal fissure is an ulcer-like, longitudinal tear in the anal canal squamous epithelium **.** Nowadays the standard treatment for anal fissure is Lateral internal sphincterotomy (LIS). Anal advancement flap (AAF) procedure is accomplished by transfer of healthy well-vascularized tissue onto the base of the fissure combined with fissurectomy, this improves wound healing and decrease anal stenosis risk.So the aim of this study is to compare the outcome of lateral internal sphincterotomy and anal advancement flap in management of chronic anal fissure.

Methods: Forty patients with chronic anal fissure and hypertonic anal sphincter detected by anal Manometry**.** Allocated randomly into two groups .Lateral internal sphincterotomy group (A) and anal advancement flap group (B) .

Results: A total number of 40 cases (20 cases in each groups). Manometry results showed no significant difference in the preoperative mean resting anal pressure was observed among the two groups. The Mean ± SD for group A was 104.3900 ± 12.93917 and for group B was 107.3900 ± 12.30241 as shown in**.** the operative time in Group A ranged from 8- 12 minutes with a mean operative time 10.0 ± 1.3 minutes. In Group B, the operative time ranged from 25-41 minutes with a mean operative time 32.0 ± 6.01752 minutes**.** As regard hospital stay in this study, no difference was found between both groups.

Conclusions: In conclusion, anal advancement flap is a comparable procedure for LIS for treatment of chronic anal fissure in hypertonic anal canal.

Keywords: Chronic anal fissure; Lateral internal sphincterotomy; Anal advancement flap; feceal insentience; Wexner score.

INTRODUCTION

Anal fissure is an ulcer-like, longitudinal tear in the anal canal squamous epithelium, it runs distally to the level of dentate line up to the verge of the anal canal . a chronic anal fissure (CAF) is defined typically by symptoms lasting longer than eight to twelve weeks, skin tag is often present called sentinel pile , anal papillae is hypertrophied and the fibers of the internal anal sphincter (IAS) were seen in the base of the ulcer [1] . The prevalence rate of the chronic anal fissure is about 30–40% of total anorectal conditions [2] The aim of most management options for CAF is reduction of the anal canal tone. Glyceryl trinitrate(GTN) ointment, calcium channel blockers and botulinum toxin are medical options for managment. Surgical management includes anal stretch, lateral internal sphincterotomy, fissurectomy and advancement flap procedures [3]. Nowadays the standard treatment for anal fissure is Lateral internal sphincterotomy (LIS), which is effective and simple technique resulting in healing in more than 90% of the patients with relieving of their symptoms. However the risk of incontinence after LIS is a major limitation of this procedure, incontinence is reported in nine percentage of the patients after LIS[4]. Incontinence is a potentially debilitating complication which motivated the surgeons to search for 'sphincter-preserving strategies ' which include anal advancement flap (AAF) and fissurectomy. Anal advancement flap (AAF) procedure is accomplished by transfer of healthy well-vascularized tissue onto the base of the fissure combined with fissurectomy, this improves wound healing and decrease anal stenosis risk. In the literature different flap techniques are described, including island advancement flaps, rotation flaps and V-Y flaps[1] . The aim of this work is to compare between the efficacy of fissurectomy with anal advancement flap and the lateral internal sphinecterotomy in the treatment of CAF with hypertonic Anal sphincter . Our primary end point is incontinence score following the

procedure , secondary end point is wound healing and symptoms relief.

METHODS

This clinical trial was prospectively conducted during the period from November 2018 to November 2020 on 40 patients presented with chronic anal fissure (CAF) to the outpatient clinic of GIT surgery unit at Zagazig University Hospitals. after obtaining approval from the institutional review board (IRB) of Zagazig University faculty of medicine. Written informed consent was obtained from all participants. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. The work has been reported in line with consolidated standards of reporting trials (CONSORT) guidelines .The study included all patients confirmed to have CAF triad by local examination and high pressure anal zone detected by anal manometry study and failed medical treatment. Patients with acute fissure , normal and hypotonic anal sphincters , any degree of anal incontinence according to Wexner scoring system, inflammatory bowel disease ,Other anal disease as Hemorrhoids, Fistula in ano and Anal abscesses, Vascular disease, scleroderma, malnutrition, or coagulopathy and previous anal surgery were excluded from the study. Patients, who fulfilled the inclusion criteria, were admitted from outpatient clinic (OPC). All the patients were randomly divided into two groups by using closed envelop method.Bias was decreased in the studyby the fact that the patients do not know the procedure that will be carried for them (single blind randomization). Then the patients were allocated into two groups (group A) patients underwent lateral sphincterotomy and (group B) patients underwent anal advancement flap procedure for chronic Anal Fissure. Preoperative assessment included Complete history taking at which patients were asked about the following symptoms: Pain and its duration and degree evaluated by visual analogue scale (VAS) from 0-10, bleeding, bowel habits and the degree of anal continence assessed by Wexner score **(figure 1).** Also History of previous treatment, history of previous surgery, history of child birth and history of other GIT disorders were included. Clinical examination was done for all patients included general examination and local examination.Local examination was done in left lateral position to confirm the diagnosis of chronic anal fissure by inspection of the sentinel pile the fissure and / or the internal sphincter fibers in the fissure base. Digital rectal examination (DRE) was done using xylocaine gel in cases without acute exacerbation to palpate the indurated fissue edges and the hypertrophied anal papilla.

High resolution anorectal manometry was done in endoscopic unit in surgery department, Banha University Hospital and in motility studies unit in tropical medicine department, Zagazig University Hospital. Manometry was performed using a standard low-compliance water perfusion system and eight channel catheters with a pressure transducer connected to a 5.5-mm manometric probe with spirally located ports at 0.5- cm interval, which measure the pressure along the length of the anal canal. Patients with high pressure anal zone **(Figure 2)** were included in the study. Patients with normal or hypotonic anal zone were excluded from the study. Each patient in the study signed an informed consent to participate in the study after explaining its nature, potential benefits and complications of the procedure that was performed. Rectal enema was done in the early morning of the operation to clean the rectum. A prophylactic antibiotic in the form of third generation cephalosporin (1 gm ceftriaxone IV) is given within 2 hours preoperative. The operation is performed with patients in the lithotomy position under general or spinal anesthesia.

Patients who are enrolled in the study will be randomized into two groups: GROUP A (20 patients) will undergo the conventional open lateral internal sphincterotomy procedure. GROUP B (20 patients) will receive the anal advancement flap.

Technique of surgery: Lateral internal sphincterotomy was done for (Group A) patients by conventional open method **(Figure 3)**. Anal advancement flap was done for (Group B) patients by the following technique : The V-Y advancement flap was performed by making a V-shaped incision from the edges of the fissure extending about 4 cm from the anal verge and away from the midline. The V-shaped flap formed of skin and subcutaneous fat was then mobilized sufficiently to allow advancement into the anal canal in order to cover the fissure defect. Care was taken to preserve enough pedicles to ensure adequate blood supply. The base of the flap was sutured to the lower anal mucosa with interrupted 3/0 Vicryl sutures. The flap edges were sutured to the surrounding skin in Y shape.**(figure 4)**

STATISTICAL ANALYSIS

Data were collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) **(**Statistical Package for the Social Sciences) software for. According to the type of data qualitative represent as number and percentage , quantitative continues group represent by mean ± SD , the following tests were used to test

differences for significance;. difference and association of qualitative variable by Chi square test (X^2) . Differences between quantitative independent groups by t test or Mann Whitney, P value was set at <0.05 for significant results & <0.001 for high significant result.

RESULTS

A total number of 40 cases (20 cases in each groups) fulfilling the inclusion and exclusion criteria were enrolled to compare the outcome of lateral internal sphincterotomy (group A) versus Anal Advancement Flap (group B) in patients of chronic anal fissure with hypertonic anal canal.

Age distribution of the patients showed that 90% (n=18) in Group A and 85% (n=18) in Group B were between 15-39 years of age. While 10% (n=2) in Group A and 15% (n=3) in Group B were between 40-60 years of age. Mean+SD was calculated as 28.0 ± 8.8 for group A and 30.4 ± 9.6 years for group B **(Table 1)**.

Patients were distributed according to gender, it shows that 35% (n=7) in Group-A and 25% (n= 5) in Group-B were male while 65% (n=13) in Group-A and 75% (n=15) in Group-B were females **(Table 1)** Manometry results showed no significant difference in the preoperative mean resting anal pressure was observed among the two groups. The Mean ± SD for group A was 104.3900 ± 12.93917 and for group B was 107.3900 ± 12.30241 as shown in **(Table 2).**

No significant difference in the preoperative maximum squeezing anal pressure was observed among the two groups. The Mean ± SD for group A was 178.40 ± 13.97628 and for group B was 180.00 ± 14.7044 as shown in **(Table 2).** Regarding the clinical presentation there was no statistical difference between group A and group B regarding presence of constipation, bleeding, preoperative incontinence, pain degree, duration of symptoms, number of fissures and site of fissures as shown in **(Table 3).**

Table (4) shows the operative and post-operative data of the studied group, while **Table (5)** shows the post-operative complications of the both groups. By the second day postoperative two cases of group A developed incontinence for flatus with score 2 by Wexner score for both cases. All cases of group B had perfect continence. By the end of third month only one case still has incontinence with score 2 (**Table 5**).

Table 1. Age and sex distribution of the studied patients

Variables	Group A (n=20)	Group B (n=20)	Test of sig.	P
Age(years):			T	
Mean ± SD	28.0 ± 8.8	30.4 ± 9.6	0.8	0.4
Sex, n (%):				
Male	7 (35.0%)	5 (25.0%)	χ^2	0.5
Female	13 (65.0%)	15 (75.0%)	0.5	

Table 2. Mean resting and maximum squeezing pressure of the studied patients

Variables	Group A (n=20)	Group B (n=20)	P
Mean resting pressure: **Mean ± SD**	104.3 ± 12.93917	107.39 ± 12.30241	0.678
Maximum squeezing pressure: **Mean ± SD**	178.40± 13.976	180.00 ± 14.7044	0.352

Table 3. Clinical characteristics of the studied patients

Variables	GroupA (n=20)	Group B (n=20)	Test of sig.	P
Constipation:				
Yes	15 (75.0%)	15(75.0%)	NA	NA
No	5 (25.0%)	5 (25.0%)		
Bleeding:				
Yes	7 (35.0%)	5 (25.0%)	χ^2	
No	13 (65.0%)	15 (75.0%)	0.5	0.5
Incontinence:				
Yes	0 (0.0%)	0 (0.0%)	NA	NA
No	20 (100%)	20 (100%)		

Variables	GroupA (n=20)	Group B (n=20)	Test of sig.	P
Fissure location:				
Anterior	4 (20.0%)	6 (30.0%)	χ^2	
Posterior	12(60.0%)	12 (60.0%)	1.1	0.6
Multiple	4 (20.0%)	2 (10.0%)		
Fissure number:				
Single	16 (80.0%)	18 (90.0%)	χ^2	0.2
Multiple	4 (20.0%)	2 (10.0%)	2.1	
Pain scale:				
Median	6	6	MW	
Range	4 – 8	4 – 8	1.1	0.3
duration(months :				
Median	18.0	12.0	MW	
Range	5.0 – 84.0	5.0 – 60.0	0.6	0.5

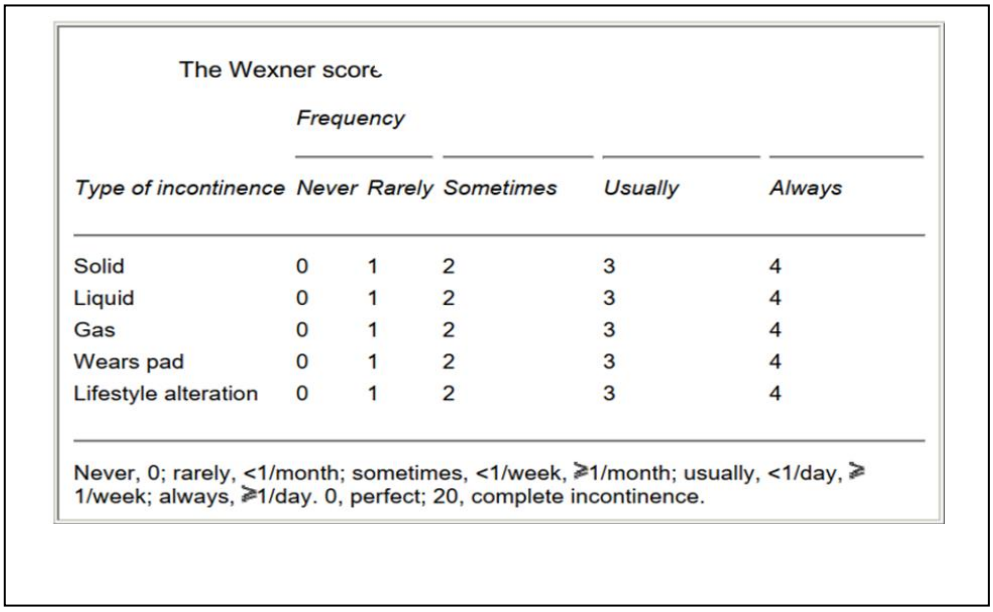
Table 4. Outcome of operation in the studied patients

Variables	Group A (n=20)	Group B (n=20)	Test of sig.	P
Operative time (minutes): Mean ± SD	10.0 ± 1.3	32.0 ± 6.01752	T 13.6	<0.001 HS
Blood loss (ml): Mean ± SD	7.8± 2.26	21.6± 3.015	MW 5.6	<0.001 HS
Length of hospital stay				
1 day	20 (100%)	19 (95.0%)	Fisher	0.99
2 days	0 (0.0%)	1 (5.0%)		
Postoperative pain in 1st day:				
Median	5	4	MW	.0951
Range	4 – 6	4 – 5	1.311	
Pain at first defecation:				
Median	5	5	MW	
Range	4 – 6	4 – 5	0.5815	.28096
Pain after 1 week:				
Median			MW	
Range	2	4	4.747	**< .00001S**
	2-3	3 – 5		
Wound healing after 1 week:				
Healed	15 (75.0%)	18 (90.0%)	Fisher	0.4075
Not healed	5 (25.0%)	2 (10.0%)		
Fissure healing after 1 month:				
Healed	19 (95%)	20 (100%)	Fisher	0.99
Not healed	1 (5%)	0 (0.0%)		

Table 5. Complications in the studied patients

Variables	Group A (n=20)	Group B (n=20)	Test of sig.	P
Infection:				
Yes	4 (20.0%)	2 (10.0%)	χ^2	
No	16 (80.0%)	18 (90.0%)	2.1	0.2
Incontinene in 2nd day:				
Yes	2 (10.0%)	0 (0.0%)	Fisher	0.5

Variables	Group A (n=20)	Group B (n=20)	Test of sig.	P
No	18(90.0%)	20(100%)		
Incontinence after 3 month:		\		
Yes				
No	1 (5.0%) 19 (95.0%)	0 (0.0%) 20 (100%)	Fisher	0.99
Recurrence within 6 months:				
Yes				
No	1 (5.0%) 19 (95.0%)	2 (10.0%) 18 (90.0%)	Fisher	0.99



The Wexner score

Type of incontinence	Frequency: Never	Rarely	Sometimes	Usually	Always
Solid	0	1	2	3	4
Liquid	0	1	2	3	4
Gas	0	1	2	3	4
Wears pad	0	1	2	3	4
Lifestyle alteration	0	1	2	3	4

Never, 0; rarely, <1/month; sometimes, <1/week, ⩾1/month; usually, <1/day, ⩾ 1/week; always, ⩾1/day. 0, perfect; 20, complete incontinence.

Figure (1): wexner score

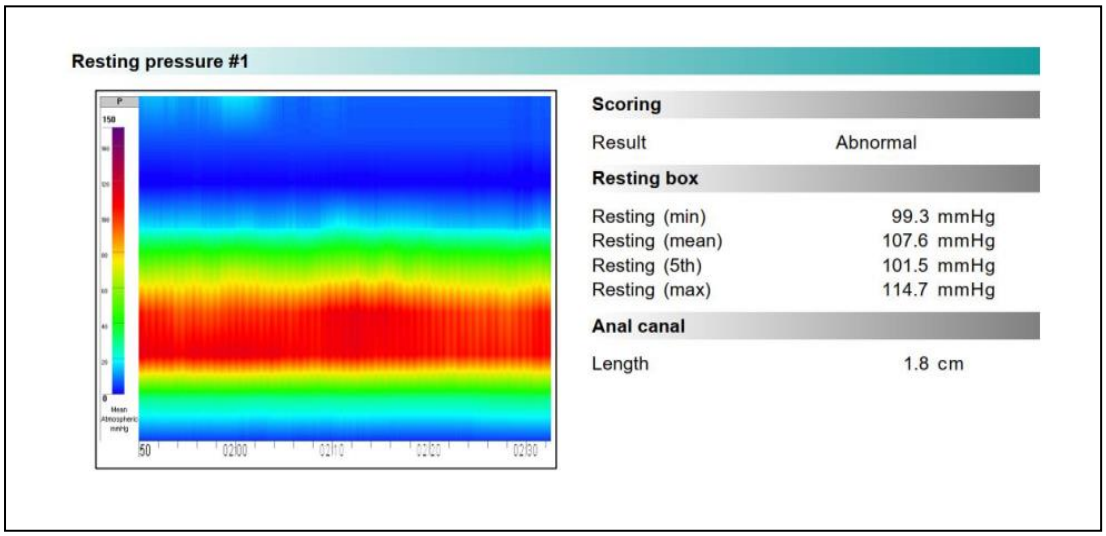


Figure (2): (HRAM) report showing hypertonia of anal canal with high (MRP) 107.6 mm Hg.

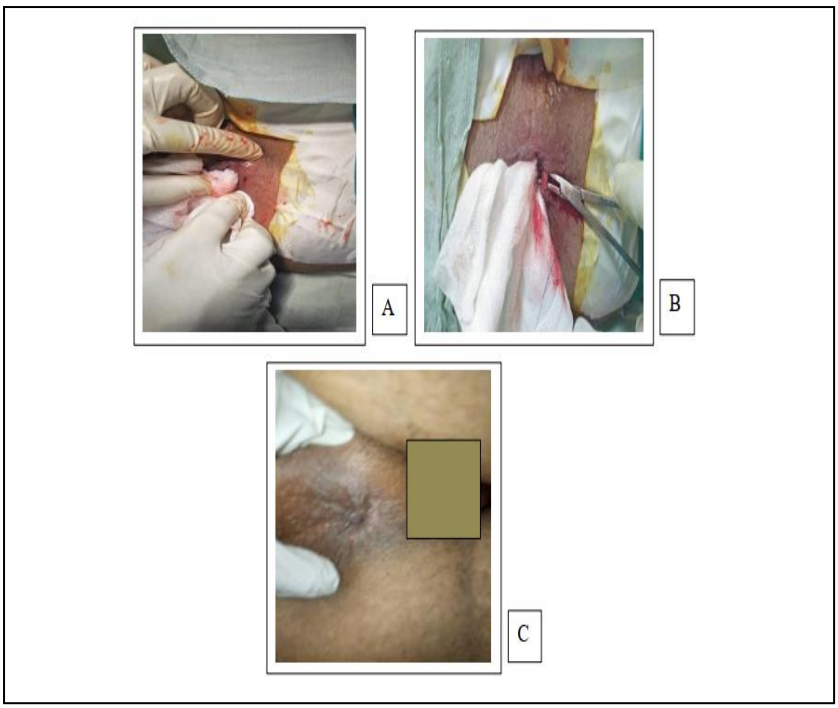


Figure (3): Sphincterotomy case.
A: sphincterotomy incision.
B: dissection and elevation of the hypertrophied sling of internal anal sphincter over an artery forceps then had been cut by diathermy
C: wound healing 10 days after operation.

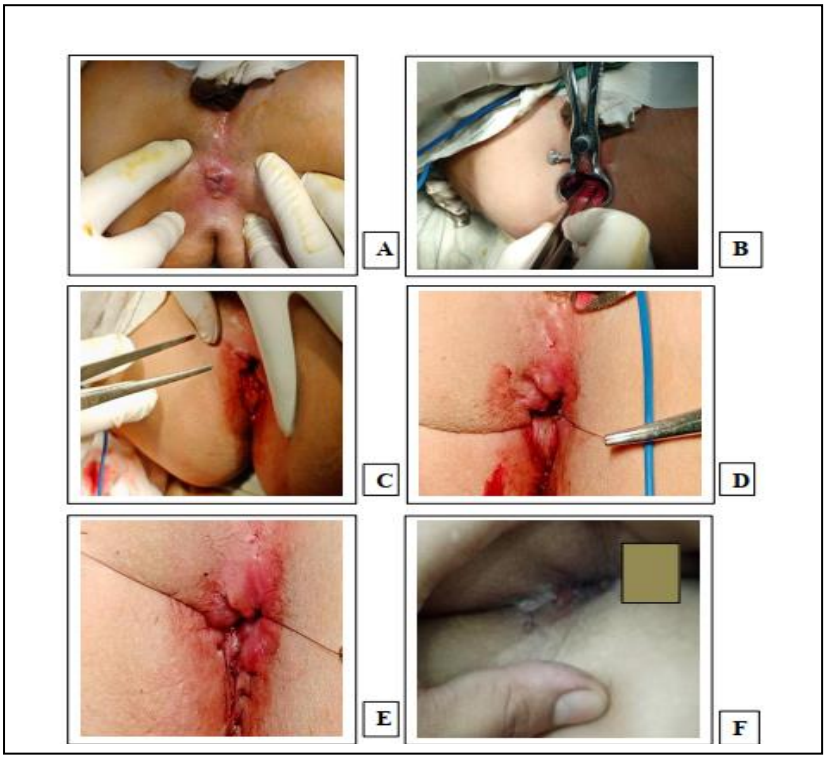


Figure (4) : V-Y AAF. A: chronic posterior AF B: fissurectomy. C: v shaped incision.
D: suturing the angles of the flap. E: suturing the flap in Y pattern. F : flap healing after 1 week

DISCUSSION

Anal advancement flap for the treatment of chronic anal fissure is one of a number of sphincter preserving treatments advocated as an alternative to LIS in order to overcome the high risk of incontinence associated with the latter procedure. Lateral internal anal sphincterotomy is the treatment of choice of chronic anal fissures with a

healing rate 95% in most cases [5]. One of the problems leading to complications and confusion is the extent of lateral sphincterotomy, and the extent of division of IS has not been standardized. An endosonographic study of the extent of IS division during LIS revealed that division of IS was more extensive than intended. The fundamental drawback of LIS is its potential to cause gas, mucus, or, occasionally, stool incontinence, and may be associated with anal deformity [6] . Our study reported the preoperative mean resting anal pressure (MRP) Mean ± SD for group A was 104.3900 ± 12.93917 and for group B was 107.3900 ± 12.30241. Patti and his colleagues study in 2010, reported that the median Preoperative MRP was 99 mmHg with a range of 88 to 120 mmHg. Both studies selected the hypertonic cases, while Patti and his colleagues study in 2009, reported a median preoperative MRP 57.3 mmhg with a range of 88 to 120 mmhg because their study selected only the hypotonic cases. Patti and his colleagues in 2012[7] , classified the cases into Anterior Normo-hypotonia, Posterior Normo-hypotonia, Anterior Hypertonia and Posterior Hypertonia, with different management of each category. Magdy and his colleagues in 2012[6], also enrolled the cases according to the preoperative MRAP into , Group 1 with a median ± SD pressure of 115.1±5.41 (105–125), Group 2 with a median ± SD pressure 114.5±5.23 (104–127) and Group 3 with a median ± SD pressure 116±6.1 (87–126).Each group was managed differently.

Assessment of continence preoperative in our study has shown that 100% of cases had a perfect continence, while Patti and his colleagues study in 2009 [8] , preoperatively reported three patients had a degree of incontinence (two cases A2, and one case A3 according to Pescatori score).

Patti and his colleagues study in 2010[9] , preoperatively, reported two patients with anal incontinence classified as A2 according to the Pescatori grading system. In Patti and his colleagues study in 2012 [7] preoperatively, seven patients were referred for anal incontinence. Among them, according to the Pescatori grading system, one subject was classified as A1, five as A2 and one as A3. In our study the operative time in Group A ranged from 8- 12 minutes with a mean operative time 10.0 ± 1.3 minutes. In Group B, the operative time ranged from 25-41 minutes with a mean operative time 32.0 ± 6.01752 minutes, while in Magdy and his colleagues study in 2012[6] , the Operative time for Group 1 (Conventional LIS) was 14.7±2.9 (10–20) (min),for Group 2(VY advancement flap(V-YAF)) was 32.3±2.3 (25–36) and for Group 3 (tailored lateral internal sphincterotomy (TLIS) and V-YAF) was 31.4±8.7 (30–40). In Hegazi and Soliman study in 2013 [10], the operative time in Group A (LIS) ranged from 10- 22 minutes with a mean operative time 15.6 minutes. In Group B (LIS with V-YAF), the operative time ranged from 25-43 minutes with a mean operative time 33.1 minutes. The operative time was comparable in the three studies and was significantly longer in all procedure that includes creation of AAF either alone or with other procedure. As regard hospital stay in this study, no difference was found between both groups, as all patients were discharged at the same day, except one patient in Group B who had bleeding intraoperative due to elevated blood pressure, that necessitated a pack and another day for observation and removal of the pack by resident. Also in Hegazi and Soliman study in 2013[10] , no difference was found between both groups, as all patients were discharged after one day except one patient in Group There was a statistically significant difference between pain after 1 week with a median 2 (2-3) for group A and 4 (3-5) for group B. Gandomkar and his colleagues in 2015 [11] , compared postoperative pain after PLIS and BD and found more than 50% reduction of pain in 100% of cases of both groups with a VAS score mean±SD 1.2 ± 0.4 for PLIS group and 1.3 ± 0.5 for BD group. Hegazy and Soliman in 2013[10] , found that as regard postoperative pain, it was ranged as mild, moderate and severe. In Group A (LIS), one patient showed mild pain, three patients showed moderate pain, and six patients showed severe pain postoperative. In Group B (LIS with V-YAF) six patients showed mild degree of pain, three patients showed moderate pain and one patient showed severe degree of pain. Statistically significant difference in postoperative pain between both groups was observed, with less severe pain and less time interval and doses for analgesia in Group B.The less improvement in postoperative pain in flap group in our study compared to flap groups in other studies may be attributed to that in our study the flap is done without other procedure that relaxes the sphincter spasm like sphincterotomy in which is present in other studies as, Hegazy and Soliman study in 2013 [10] and Patti and his colleagues study in 2010 [9].Both groups had shown close rates of wound infection (4 (20%) cases in group A and 2(10%) cases in group B. Only two patients in group B showed disruption of one limb of V-Y advancement flap due to infection. These cases were managed conservatively by systemic and local antibiotics and wound hygiene. Complete healing was achieved within 11/2 months. No statistical significant difference was found between the two groups regarding wound infection and wound healing. Patel and his colleagues in

2011[12] , reported postoperative Superficial infection in two (4%) of patients in AAF group and four (8%) patients in LIS group with flap breakdown in two (4%) patients of AAF group.in Patti and his colleagues study in 2012[7] , on AAF they reported five cases(10.5%) of infection and three (6.25%) of partial breakdown occurred. In all cases, the infection was superficial and did not need antibiotics administration. Regarding postoperative continence, our study shows that by the second day postoperative two cases of group A developed incontinence for flatus with score 2 by Wexner score for both cases. One case improved and by the end of the third month only one case still has incontinence with score 2. All cases of group B had perfect continence after operation. No statistical significant difference between both groups regarding continence was found. Patti and his colleagues in 2012 [7], reported that one month after surgery, anal incontinence was found in ten patients. At 24 months, only six patients still had incontinence: three as A1, two as A2 and one as A3 according to Pescatori grading score; at the initial presentation (preoperative), all the six patients had complained of incontinence. There was no faecal incontinence in either group of Patel and his colleagues study in 2011, the groups were (AAF group and LIS group). Maqbool and his colleagues in 2016 [13] , reported that anal incontinence was recorded in 17.5 %(n=14) in Group-A (LIS) and 2.5% (n=2) in Group-B (AAF), p value was calculated as 0.001 showing a significant difference. Hegazy and Soliman in 2013[10] , found that fecal incontinence varied from soiling of under wears by serous or feculent discharge to frank fecal incontinence. All patients in Group A had Soiling on the first and second week except one patient who had incontinence to flatus and stool. In Group B only three patients had soiling on the first day with no soiling afterwards in all patients. They found a statistically significant difference as regard soiling and incontinence in favor of Group B (p=0.005). Follow-up and observation of the patient in Group A with fecal incontinence showed gradual improvement with no permanent incontinence. Follow-up and observation of the patient in Group A with fecal incontinence showed gradual improvement with no permanent incontinence. Most of studies including our study (except Maqbool and his colleagues study in 2016) [13] proved that there was no statistical significant difference between sphincterotomy and flap regarding long term effect on anal continence despite initial high immediate postoperative rate of incontinence in Hegazy and Soliman study in 2013[10] , and Patti and his colleagues study in 2012 [7], as most of cases improved with time.

Three cases of our study had a recurrent anal fissure within the 6 month of follow up at the same site (posterior) and two cases of group B developed recurrence at a different site (was posterior and developed anterior fissure). All of them received a medical treatment. In Magdy and his colleagues study in 2012, recurrence rate was significantly higher in V-YAF than in the other two groups two cases (4 %) for LIS group, 11 cases (22 %) for V-Y AAF group and one case (2 %) for combined LIS and AAF group). Patti and his colleagues in 2012 [7], had found that recurrence occured in hypertonic cases even after improvement of anal tone. They found that at 24 months of follow-up, four recurrences were recorded (8 %). In two cases, primitive CAF was anterior without hypertonia of IAS; their recurrence was localized posteriorly with a normal value of IAS. In the third case, primitive CAF was anterior with hypertonia of IAS and the recurrence was lateral without hypertonia; the last patient had posterior primitive CAF with hypertonia of IAS and its recurrence was anterior with hypertonia. All patients with recurrence of CAF underwent medical treatment with improvement or healing. Most of studies show that most recurrences of anal fissure with AAF were in a different site and increased when the flap is done alone and not combined to a procedure that decreases the tone of the sphincter especially in hypertonic cases.

Limitations of the study: The limitations of our study are small sample size and short term follow up , so we recommend further studies which include larger sample size and long term follow up.

CONCLUSION

In conclusion, anal advancement flap is a comparable procedure for LIS for treatment of chronic anal fissure in hypertonic anal canal.Anal advancement flap is associated with better outcome regarding fissure healing and postoperative continence in comparison to lateral internal sphincterotomy.Anal advancement flap when compared to lateral internal sphincterotomy, cause higher postoperative pain. Also it's associated with higher rates of fissure recurrence.Although these differences are statistically non-significant, yet, they are still important due to their strong impact on patients' quality of life.

Conflicts of interest: no conflicts of interest

Financial disclosures: no disclosures

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To Cite:
Hassan, H, Elshewy, A., Refaat, D., Abdelhady, W. Anal Advancement Flap versus Lateral Internal Sphenecterotomy for Treatment of Chronic Anal Fissure with High-pressure Anal Canal. Zagazig University Medical Journal, 2023; (192-200): -.doi: 10.21608/ZUMJ.2021.53659.2048