

CHRONIC ANAL FISSURE; COMPARISON OF LATERAL ANAL SPHINCTEROTOMY (CLOSED METHOD) VERSUS ANAL DILATATION

DR. MUHAMMAD ALISurgical Specialist
CMH Gilgit**DR. RIAZ AKHTAR**Surgical Specialist
CMH, Gilgit**DR. TAHIR IQBAL MIRZA**

ABSTRACT...Objective: To compare lateral anal sphincterotomy (closed method) with anal dilatation in the management of primary chronic anal fissure. **Study design:** A prospective, comparative, interventional study. **Place and duration:** Department of Surgery Combined Military Hospital Kohat from Jan 2001 to Mar 2002. **Materials and Methods:** During the period, all patients with primary type of chronic anal fissure, who were above 12 years of age and were fit for surgery, were selected for study. They were divided into two groups for both surgical procedures in a randomized manner. After their respective surgical procedures patients were followed up for four weeks on weekly basis. The changes in signs and symptoms were thoroughly reassessed and noted in a separate proforma maintained for each patient for the purpose of comparison. **Results:** The total number of patients was 49 with an average age of 40 years. Male to female ratio was 7:1. In 44 (89.79%) patients the fissure was located posteriorly while in 5 (10.20%) patients it was located anteriorly. Closed lateral anal sphincterotomy (LAS) was done in 28 (57.14%) patients, of which 25 (51.02%) were males and 3 (6.12%) females. While anal dilatation (AD) was done in 21 (42.85%) patients, 18 (36.73%) males and 3 (6.12%) females. In all the patients in whom LAS was done, there was disappearance of all the symptoms and complete healing of ulcer. Those operated by AD, there was disappearance of all the symptoms and complete healing of ulcer in only 8 (38%) patients. Incontinence was present in 9 (18.36%) patients. Three (14.2%) patients had persistence of ulcer while one (4.76%) was having recurrence of ulcer. **Conclusion:** Lateral anal sphincterotomy, especially close method gives excellent results as compared to anal dilatation in terms of ulcer healing, disappearance of symptoms and lower rate of ulcer recurrence or incontinence.

Key words: Chronic anal fissure, anal dilatation, lateral anal sphincterotomy.

INTRODUCTION

Anal fissure is a distinct clinicopathological condition of the lower anal canal. It can be defined as a longitudinal ulcer in the anoderm usually in the posterior midline, less frequently in the anterior midline, and rarely in the lateral position of the anal canal¹⁻⁴. When traction is applied on each side of the anus, the fissure appears to be triangular in shape, with the apex near the dentate line and the base over the lower anal canal^{1,5}.

The fissures can be divided into the idiopathic or primary type and the secondary type. The primary type is most common but the exact cause of this type of fissure is not known^{2,4}. Commonly such type of fissure is present in the midline, posteriorly or anteriorly. If the primary fissure is not treated in its acute stage then permanent organic changes take place in tissues leading to chronic stage. These are indurations of the ulcer margins, fibrosis in the ulcer base, development of sentinel pile and anal papilla. The secondary types of fissures are caused by some pathological conditions of the anal canal such as Crohn's disease, ulcerative colitis, trauma, operation or infection¹⁻⁵. They will heal only when that causative pathology is

removed/ treated. Mostly, such types of fissures are situated eccentrically around the anal margin.

There is no trace of surgery of anal fissure in literature before 19th century. At that time only conservative measures such as high fiber diet and stool softeners were prescribed. Recamier recommended stretching of anal sphincter in 1829, which became popular in 1968 when Lord also used this procedure on a large number of patients^{3,4,5,6}. High ratios of complications lead Eisenhammer to describe internal sphincterotomy by dividing the sphincter in the posterior midline. Due to the comparatively long healing time required for this type of operation Parks described open LAS in 1967. This was further simplified to the closed lateral anal sphincterotomy by Notaras in 1969.

Now days, a plethora of surgical techniques are in vogue worldwide. An ideal management of primary chronic anal fissure continues to be a subject of debate especially for the young surgeons and those working in the peripheral hospitals having limited surgical facilities. The four fingers AD and LAS, especially closed method are being

performed in almost all of the hospitals of our country because of their simplicity and good results. The objective of this study was to find out which one of these two procedures is having better results.

MATERIALS AND METHODS

This was a prospective, comparative interventional study conducted in surgical department combined military hospital Kohat from Jan 2002 to Mar 2003. All patients over 12 years of age were included in the study that presented with symptoms and signs of primary chronic anal fissure. Symptoms included pain during defecation, bleeding P/R or mucous discharge and constipation. The signs included sentinel pile alone or along with anal papilla, fibrosis in the base of ulcer and indurations of ulcer margins.

EXCLUSION CRITERIA

All patients below 12 years of age, patients with secondary type of fissures, those with fissure of less than 6 week duration having no organic changes and patients declared unfit for general or spinal anesthesia and surgery due to other co-morbid factors were excluded from the study.

Thus a total no of 49 patients were collected from both sexes. Patients were completely counseled regarding these two procedures and their outcome with possible complications. They were divided into two groups and were allocated procedures of four fingers anal dilatation and closed method of lateral anal sphincterotomy respectively. After proper consent patients were admitted a day prior to surgery. Routine investigations like Blood CP, Urine RE, and CXR were carried out. Assessment for general/spinal anesthesia was done. The operations were carried out under general/spinal anesthesia. The patients were placed on the operating table in the lithotomy position. Clinical inspection, digital rectal examination and proctoscopy were performed again before conducting the respective surgical procedure.

For anal dilatation fully lubricated index finger of each hand was placed in the anal canal after one and other. Then exerting gentle but continuous out word pressure and with gradual relaxation of the internal sphincter the

middle finger of each hand was also placed in the anal canal. During this procedure the hands repeatedly moved all around in order to relax all the segments of the lower part of the internal sphincter. The procedure was stopped when the internal anal sphincter was so much relaxed that the anal canal was accepting four fingers (two fingers of each hand) at a time without much force.

Closed lateral anal sphincterotomy was performed by inserting a bivalve anal retractor into the anal canal. It was opened to stretch the internal sphincter and expose the lateral walls of the anal canal. The intersphincteric groove was identified by palpation. A small incision was made in the skin overlying the intersphincteric groove at 3 o'clock or 9 o'clock position with a size eleven blade keeping its sharp end downwards, parallel to the wall of the anal canal. It was passed up to the dentate line, avoiding cutting of the tissues around. Then the sharp edge of the blade was turned towards the lumen of the anal canal. The blade was gradually withdrawn by cutting the lower one third of the internal sphincter muscle. Damage to the mucosa overlying the internal sphincter was avoided, which was continuously checked and supported by the index finger of the other hand lying in the lumen of the anal canal. Later on the sentinel pile was cut and paraffin soaked gauze pack was placed in the anal canal and held in place with gynae pad and T-bandage for about six hours.

During surgery the procedures followed were meticulous and precise. It was ensured that all the recommended precautions are taken. Post operatively the patients were kept nil orally till their full recovery from the anesthesia. Effective postoperative analgesia was ensured. Warm water sits baths two times daily were started from the next morning. After their discharge from hospital patients were followed up on weekly basis for four weeks. They were also advised to have high intake of vegetables, salads and fruits in their diets. During every visit any change in symptoms and signs of patients were recorded in their relevant proforma maintained before their discharge from hospital.

RESULTS

The total no of patients was 49. They were between 12

and 60 years of age with a mean age of 40 years. The commonest age group in this series was from 40 to 60 years consisting of 27 patients (44.89%). Out of these 49 patients, 43 (87.75%) were males and 6 (12.24%) were females with a male to female ratio of approximately 7:1. In 44 (89.79%) patients the fissure was located posteriorly while in 5 (10.20%) patients it was present anteriorly. The patients were divided into two groups.

Group one was consisting of 28 (57.14%) patients, 25 (51.02 %) males and 3 (6.12%) females while group two was consisting of 21 (42.85%) patients, 18 (36.73%) males and 3 (6.12%) females. The closed method of LAS was performed on group one patients while the four fingers AD was performed on group two patients. All the patients included in the study were managed according to our laid down procedures.

The analysis of the results was based on the assessment of the symptomatic improvement and healing (epithelialization) of the ulcer. These were carried out on weekly basis for four weeks. The mean stay in hospital following surgery for both the procedures was 1.5 days. The duration of disappearance of symptoms ranged from first post operation day to 21-post operation day, with an average of seven days.

The duration of healing (epithelialization) of ulcer ranged from 2nd post operation week to 4th post operation week, with an average of 3 weeks. The mortality during the period of study was zero (0%) following each procedure but there was a gross difference in their morbidity. At the end of fourth week visit, it was found that there was no symptom and complete healing of ulcer in all the 28 (100%) patients who were operated by closed method of LAS. On the other hand only 8 (38%) out of 21 patients in whom four fingers anal dilatation was performed. had no symptom and complete healing of ulcer. In the remaining 13 (61.9%) patients 4 (19%) were having some degree of incontinence for stools and flatus while 5 (23.8%) had incontinence for flatus only (table I). Three (14.2 %) patients had persisting ulcers and one (4.76%) patient had also developed the signs and symptoms of recurrent fissure-in-ano after its healing in the third post operative week.

Table-I. Symptoms and signs at the end of the study (n=49)

Features	AD		LAS	
	NO	%age	No	%age
Pain	0	0	0	0
Bleeding	0	0	0	0
Incontinence total	9	42.85	0	0
Flatus	9	42.85	0	0
Stool	5	23.89	0	0
Mucous discharge	0	0	0	0
Persistent ulcer	3	14.28	0	0
Recurrence	1	4.76	0	0

DISCUSSION

Anal fissure is a relatively common disease of the anal canal ³⁻⁶. The main cause of the chronicity may be the delay in treatment in the acute stage of the disease due to the ignorance of the patients regarding this disease and its treatment, non-availability of proper medical facilities in the locality, poverty or shyness of the patient in discussing this disease with a doctor. The failure of the conservative and other non-surgical procedures in the acute stage of the disease are also responsible ⁵⁻⁷. It has been also noted that majority of the patients stop the conservative measures as soon as their symptoms disappear, there is repeated recurrence or due to the side effects of the medicines e.g. headache and light headedness after the local application of GTN ointment ⁸⁻¹¹. The results obtained in this study are comparable with other international studies. In our study the patients treated by closed LAS had no pain, bleeding PR or any degree of incontinence after a follow up of 4 weeks. On clinical examination the fissure of each patient was completely healed and there were no signs of recurrence. In contrast those treated by four fingers AD 42.85 % had incontinence, 14.2 % had persistence of ulcer and 4.76% had developed recurrence. In NHS review for the operative procedure for CAF, The Cochrane Central Register of controlled trials and Medline were searched from 1995 to 2005. A total number of 24 trials encompassing 3475 patients were

reviewed. Noting the high rate of incontinence and persistence of fissures after anal stretch in majority of the studies the review concludes that it should be abandoned. LIS is recommended due to the very low complications rate¹². Similarly for the report of AGA Technical Review on the diagnosis and care of the patients with anal fissure 21 different studies from 1980 to 1999 were collected. A total number of 5113 patients were studied. The average success rate after LAS of all these studies was 97.48%, recurrence was 5.8% and incontinence was 9.7%. It was also found that the high number of incontinence noted in some of the studies was as a result of short period of follow up due to which the observers were unable to differentiate transient incontinence from permanent incontinence. That is why the technical review said that the complications after LAS reflect the care and nature of the follow up more than the differences in surgical skills. The review also noted that after AD, recurrence was up to 56% and incontinence was up to 51. It concludes that in the US virtually all authorities advocate LAS as the operation of choice because there are minor continence alterations. On the other hand AD has a high risk of sphincter damage and incontinence¹³. Karandikar S et al made a study to assess the management of chronic anal fissure by an expert group of surgeons.

Finally they concluded that in the selected group of clinicians LAS remains the procedure of choice in both sexes¹⁴. According to Lisa S Portz MD, lateral internal sphincterotomy is the current procedure of choice. She further writes that anal dilatation is rarely performed today because of high complication rate². Same are the views of Saad et al,¹⁵. Syed SA et al, did a study to confirm or refute the validity of the fear associated with anal sphincterotomy for anal fissure and they concludes that anal sphincterotomy can be safely practiced in properly selected patients¹⁶.

To find out the exact cause of incontinence after LAS as claimed in some of the international studies, Joe J Tjandra et al, selected 14 patients who had developed incontinence after LAS for chronic anal fissure and 14 patients as controls who were continent after this procedure. They were evaluated by clinical assessment,

endoanal USG and anorectal physiological studies. It was found that the incontinence was due to the additional co-existing occult defects of the internal and external anal sphincters and not due to the LAS¹⁷. Similarly Edward Ram MD et al, studied internal anal sphincter function following LAS for CAF on 50 patients between 2000 and 2003. 12 patients served as healthy controls. All underwent manometric evaluation. It was found that LAS caused a significant decline in the resting anal pressure (from 138 to 86 mm of HG) initially but at 12 months it gradually increased (110 mm of HG). It was still lower than before surgery but higher than those in the control (110 versus 73). All the patients were free of symptoms and no patient suffered any permanent problem with incontinence. So this decrease may not be clinically significant¹⁸. F.F. Ammari et al, also studied 126 patients of CAF both pre and post operatively after performing LAS. They found that 35 (28%) were incontinent before surgery and 31 (25%) after surgery. They claim that minor degree of incontinence could be a symptom of CAF and not the sequelae of LAS¹⁹. Garcia et al did anal endosonographic evaluation on 10 symptomatic and 41 asymptomatic patients of chronic anal fissure after their treatment by closed lateral anal sphincterotomy. They found that incomplete sphincterotomy was associated with significant symptomatic anal fissure recurrence²⁰.

In a comparative study, after performing anal stretch and lateral subcutaneous internal sphincterotomy on 275 patients with chronic anal fissure, Oeidat-D found that in anal stretch group 23% developed incontinence to flatus or feces and 7% developed recurrence. In closed LAS group incontinence was 4% and recurrence was 3%. He concludes that anal stretch should be discarded due to its high complication rate in terms of incontinence to flatus or feces and recurrence of anal fissure²¹. Nelson R selected 32 randomized controlled trials on the treatment of CAF. After their evaluation he reached to the conclusion that anal stretch significantly increased rates of incontinence as compared to LAS²². Hiltunen KM et al did anal manometric evaluation on 41 patients of chronic anal fissure after performing anal dilatation and lateral subcutaneous sphincterotomy in a random manner. They found that after both the procedures the

basal pressure was significantly reduced, but there were 4 failures, all after anal dilatation²³. Nielsen MB et al, performed anal endoscopy on 20 patients 2-6 years after their treatment by AD. Two of them had developed incontinence due to the AD while 18 were continent. It was found that the 2 of the incontinent group had large defects of the internal sphincter. In the continent group, 11 of the 18 were also having some degree of sphincteric defects. So these patients may also be at risk for incontinence if the sphincter weakens with age or further surgery is done²⁴. Rick Nelson also did a systemic review and he found that anal stretch significantly increased rates of flatus incontinence²⁵.

Some studies shows that LAS especially the closed method can also be performed under LA. This has several socioeconomic advantages e.g. high degree of satisfaction and comfort to the patient, rapid resolution of the problem, no admission to hospital and no pre op studies. According to Sanchez Romero A et al, the procedure under local anesthesia has the same healing and morbidity rate. Thus it may be considered as effective treatment for chronic anal fissure²⁶. Gingold BS performed LAS on 86 patients as an office procedure avoiding hospitalization to cut them edical costs, anatomi can dsymptomatic relief was 96.4%. Hiltumen KM selected 65 patients of CAF and treated them by closed LAS under LA. After 4 months the fissures were healed in all of them except 2 who responded to the same procedure under GA²⁸.

In our study the closed method of LAS was selected because it is easy to perform, takes less time and there is minimum bleeding as compared to the open method of LAS. Shafiquallh et al also compared the results of closed method with the open method of LAS on 100 patients. They conclude at the end of their study that the closed method of LAS is the treatment of choice if performed meticulously²⁹. Similarly Wiley M et al compared the closed and open lateral sphincterotomy and found that more open patients experienced imperfections³⁰. Antonio Arroyo MD et al, performed open and closed lateral anal sphincterotomy as an out patient procedure under local anesthesia for chronic anal fissure. Follow up showed that incontinence was double

in open method³¹.

CONCLUSION

Closed lateral anal sphincterotomy is a superior procedure in the patients who have primary type of chronic anal fissure in comparison with anal dilatation. Lateral anal sphincterotomy, especially close method gives excellent results in terms of ulcer healing, disappearance of symptoms and lower rate of ulcer recurrence or incontinence. Proper preoperative evaluation along with good operative procedure and a post operative care and instructions plays a major role in patient's symptomatic relief and also in healing (epithelialization) of the ulcer.

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REFERENCES

1. Gillet BP, Paidas CN. **Anal Fissure**. [online] March 28 2006 [cited 2007 January 21]. Available from: URL: <http://www.emedicine.com/ped/topic/2938.html>.
2. Portz LS. **Anal Fissure**. [online] June 28 2006 [cited 2007 January 21]. Available from: URL: <http://www.emedicine.com/ped/topic/2938.html>.
3. Legall I. **Anal Fistulas and Fissures**. [online] Oct 18 2005 [cited 2007 January 21]. Available from: URL: <http://www.emedicine.com/ped/topic/2938.html>.
4. Andrew J Malauf, Michael D Cadogan, David C C Bartolo. **Anal Canal**. In John D Corson, Robin C N Williamson eds. Surgery. Spain: Mosby, 2001: 21.10-11.
5. Norman S Williams. **The anus and anal canal**. In R C G Russell, Norman S Williams, Christopher J K Bulstrode, eds. Baily and Love's Short Practice of Surgery. Karachi: National Book Foundation, 2004: 1252-55.
6. Robin Philips, Alastair Windsor, James Thomson. Anorectum. In R M Kirk ed. **General surgical operations**. England: Churchill Livingstone, 2000: 357-58.
7. M A R Al Fallouji. **Post Graduate Surgery: The Candidate's Guide**. Great Britain: Butterworth Heinemann, 1998: 284.
8. Ijaz Ahsen. **Anal Canal**. **Textbook of surgery**. 1997: 204.
9. Margaret Farquharson, Brendan Moran. Farquharson's **Textbook of operative general surgery**. Great Britain: Hodder Arnold, 2005:442-3.

10. Ira J Kodrer, Robert D fry, James W Fleshman, Elisa H Birnbaum, Thomas E Read. **Colon Rectum and Anus.** In Seymour I Schwartz, G Tom Shires, Frank C Spencer, John M Daly, Josef E Fischer, Aubrey C Galloway eds. Principles of surgery. Singapore: McGraw-Hill, 1999: 1298-00.
11. Heidi Nelson, Roger R Dozois. Anus. In Courtney M Townsend, Jr John Woods Harris, R David Beauchamp, B Mark Evens, Kenneth L Mattox eds. Sabistan textbook of surgery. Philadelphia: WB Saunders, 2001: 981-83.
12. Nelson R. **Operative procedures for fissure-in-ano.** In: The Cochrane Library, Issue 2005. Oxford: Update Software. Search date 2001; primary sources Cochrane the Internet, and hand searches of cited reference lists from included reports [Medline].
13. Robert D. Madoff, James W. Fleshman. AGA Technical Review. Gastroenterology 2003; 124: 235-245.
14. Karandikar S, Brown GM, Carr ND, Bevnnon J. **Attitudes to the treatment of chronic fissure in ano after failed medical treatment.** Colorectal Dis. 2003 Nov; 5(6):569-72.
15. Saad AM, Omar A. **Surgical treatment of chronic fissure-in-ano: a prospective randomized study.** East Afr Med J. 1992 Nov; (11): 613-5.
16. Syed SA, Waris S, Ahmed E, Saeed N, Ali B. **Lateral internal anal sphincterotomy for anal fissure: with or without associated anorectal procedures.** J Coll Physicians Surg Pak. 2003 Aug; 13 (8): 436-9.
17. Joe J Tjandra et al. **Faecal incontinence after lateral anal sphincterotomy is often associated with co-existing occult sphincter defects. A study using endoanal Ultra sono graphy.** ANZ Journal of Surgery. Oct 2001; 71(10): 598.
18. F. Ammari, K.E. Bani-Hani. **Fecal incontinence in patients with anal fissure: A consequence of internal sphincterotomy or a feature of the condition?** Surg J R Coll Surg Edinb Irel. 2 August 2004; 225-229.
19. Edward Ram, MD., Dan Alper, MD., Gideon Y. Stein, MD., Zachar Bramnik, MD. And Zeev Dreznik, MD. **Internal anal sphincter functions following lateral internal sphincterotomy for anal fissure.** Ann Surg. 2005 August; 242(2): 208-211.
20. Garcia- Granero E, Sanahuja A, Armengol j, Jimenez E, Esclapez et al, **Anal endosonographic evaluation after closed lateral subcutaneous sphincterotomy.** Dis Colon Rectum 1998 May; 41(5): 598-601[Medline].
21. Oueidat D.A **Comparative study in anal fissure treatment.** J Med Liban. 1999; 47:
22. Nelson R. **Medical Therapies are less effective than surgery for anal fissure.** Cochrane Data base Syst Rev 2003; CD003431& [Medline].
23. Hiltunen KM, Matikainen M. **Anal manometric evaluation in anal fissure. Effect of anal dilation and lateral subcutaneous sphincterotomy.** Ann Chir Gynaecol 1991; 80(4):353-6.
24. Nielsen MB, Rasmussen OO, Pedersen JF Christiansen J. **Risk of sphincter damage and anal incontinence after anal dilatation for fissure-in-ano: an endosonographic study.** Dis Colon Rectum 1993; 36:677-680[Medline].
25. Rick Nelson. **Digestive System Disorders. Anal fissure (chronic).** BMJ Clinical Evidence. 2006 Nov 1; (based on January 2006 search) [Medline].
26. Sanchez Romero A, Arroyo Sebastian A, Perez Vincente F, Serrano Paz P, Candela Polo F et al, **Open lateral internal sphincterotomy under local anesthesia as the gold standard in the treatment of chronic anal fissure. A Prospective Clinical and manometric study.** Rev Esp Enferm Dig. 2004 Dec; 96 (12): 856-63.
27. Gingold BS. **Simple in office Sphincterotomy with partial fissurectomy for chronic anal fissure.** Surg Gynecol Obstet 1987 July; 165(1):46-8.
28. Hiltunen KM, Matikainen M. **Closed Lateral Subcutaneous Sphincterotomy under local anesthesia in the treatment of chronic anal fissure.** Ann Chir Gynaecol 1991; 80(4) 353-6.
29. Shafiqullah et al. **Closed versus open lateral internal sphincterotomy in treatment of chronic fissure. A comparative study of post operative complications and results.** Pakistan J Med Res, Vol 43, No1, 2004.
30. Wiley M, Day P, Rieger N, Stepheos J, Moore J. **Open vs. closed lateral internal sphincterotomy for idiopathic fissure-in-ano: A Prospective, Randomized, Controlled Trial.** Diseases of the colon & rectum. Springer, 2004 Jun; 47(6):847-52.

31. Antonio arroyo MD, Francisco Perez MD, Pillar Serrano PhD, Farnando Candela PhD, Rafael Calpana PhD. **Open versus closed lateral sphincterotomy as an out Patient procedure under local anaesthesia for chronic**

anal fissure. Prospective randomized study of clinical and manometric long term results. Journal of the American College of Surgeons.2004 Aug 20; 199(3):361-7.

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Correspondence Address:
Dr. Muhammad Ali
Combined Military Hospital
Mardan Cantt

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CORRECTION

Correction Prof-1268.wpd

The amendment of the Professional Vol:17, No.02 (Prof-1268) on page 168 is as under;

INCORRECT

DR. SHAZIA QAYYUM, MBBS, MPH

Assistant Professor Community Medicine,
Independent Medical College, Faisalabad.

DR. BUSHRA WAQAS, MBBS

Deputy Manager Green Star
Social Marketing, Faisalabad.

DR. ABDUL SATTAR, MBBS, DPH

Assistant Professor Community Medicine,
Independent Medical College, Faisalabad.

CORRECT

DR. SHAZIA QAYYUM, MBBS, MPH

Assistant Professor Community Medicine,
Independent Medical College, Faisalabad.

DR. BUSHRA MUBEEN, MBBS

Deputy Manager Green Star
Social Marketing, Faisalabad.

DR. ABDUL SATTAR, MBBS, DPH

Assistant Professor Community Medicine,
Independent Medical College, Faisalabad.