

## **COMPARING RADIAL AND CIRCUMFERENTIAL SKIN INCISIONS IN OPEN LATERAL INTERNAL SPHINCTEROTOMY FOR CHRONIC ANAL FISSURES: WOUND HEALING AND COMPLICATION RATES**

**Dr. Umair Ahmad<sup>1</sup>, Dr. Muhammad ZULQARNAN<sup>2\*</sup>, Dr. Aneesa Swaichi<sup>3</sup>, Dr. Babar Sultan Khaghan<sup>4</sup>, Dr. Aaqib Qadeer<sup>5</sup>, Dr Aisha Arshad<sup>6</sup>, Dr. Haseeb Ishrat<sup>7</sup>, Dr. Sajjad Hussain<sup>8</sup>, Dr. Awais Ashraf Sindhu<sup>9</sup>, Dr. Syed Aamer Hussain<sup>10</sup>**

1. Assistant Professor of Surgery, Nishtar Medical University, Multan
  2. Post Graduate Resident Surgery, Bahawal Victoria Hospital Bahawalpur
  3. PGR/MO General Surgery, Bolan Medical Complex Hospital Quetta
  4. Associate professor of General Surgery, Ayub Teaching Hospital Abbottabad
  5. Medical Officer, NAS Neuron Health Services, Dubai, UAE
  6. Consultant General Surgery, Sandeman provincial hospital Quetta
  7. PGR General Surgery, Bahawal Victoria Hospital, Bahawalpur
  8. Post Graduate Resident General Surgeon, Jinnah hospital Lahore Pakistan
  9. Post Graduate Resident General Surgeon, Bahawal Victoria Hospital. Pakistan
  10. Senior Registrar General Surgery, Ayub Teaching Hospital Abbottabad
- Corresponding Author: Dr. Muhammad ZULQARNAN zqriaz25@gmail.com

### **Abstract**

**Background:** The safest and most effective surgery for chronic anal fissures (CAF) is lateral internal sphincterotomy. Chronic anal fissures that have not responded to conservative or medical treatment are often treated with it. Even with this minor surgery, problems can occur. LIS usually requires an intersphincteric incision. Clinical prognosis and wound healing may differ between techniques, although it's unclear. We compared wound healing and other clinical outcomes in LIS patients with radial and circumferential incisions. **OBJECTIVES:** To compare radial versus circumferential skin incisions in open lateral internal sphincterotomy among patients with chronic anal fissures in terms of wound healing and complications. **MATERIALS AND METHODS:** As to operational definitions, 60 patients aged 20–60 with chronic anal fissures had surgery. Both genders were included. Inflammatory bowel illness, diabetes, immunosuppressive medication, previous perianal surgery, AIDS, any immunocompromised condition, and steroids were excluded from the study. Competent surgeons performed LIS on 30 patients per group by the open method. Group A had radial incisions, while Group B received circumferential incisions. Postoperative complications such as fistulas, abscesses, wound healing time, and cellulitis were monitored. **RESULTS:** 30 patients were treated with radial incisions, while the remaining 30 received circumferential incisions. In the group who were treated with circumferential incisions, the wound healing time was less comparative to the radial incision group (19.1 vs. 24.0 days,  $p < 0.001$ ). However, in other variables like cellulitis, perianal fistula, and abscess, the difference was insignificant. **Conclusions:** Our study shows that circumferential skin incisions during LIS are associated with shorter healing times than radial incisions.

## Introduction

An anal fissure is defined as a small breach in the distal anoderm, and the posterior midline of the anal canal is the most commonly affected area. Severe excruciating pain is observed on defecation, sometimes associated with a trace of blood on the stool. Symptoms include pain in the perianal area, which may last for several hours after passing stool and worsens the quality of life (Griffin et al., 2004). There are two types of anal fissures: acute ones improve spontaneously within a period of 6 weeks. While chronic anal fissures (CAFs) last longer and do not heal until surgical intervention is done (Lindsay et al., 2004). The latter ones are wider than earlier and also somehow deeper. The chronic anal fissures have indurated edges along with a skin tag and hypertrophied papilla distally and proximally, respectively (Gordon et al., 2007). Two types of surgical interventions are popular as well as safe and protective for the treatment of CAFs: open lateral internal sphincterotomy and close lateral internal sphincterotomy. In the open technique, the internal sphincter is divided by an incision in the intersphincteric groove, a procedure originally performed by Brodie in 1835 and laterally reported by Eisenhammer in 1935 (Arroyo et al., 2004). Two types of incisions are used in the open technique: radial and circumferential. Although different surgical techniques have been compared that could increase wound healing using open LIS, the comparison of two types of incisions has not been reported much (Ersoz et al., 2011). However, according to Ersoz et al., complete wound healing was slower in radial than circumferential wounds ( $19.44 \pm 6.82$  vs.  $10.59 \pm 3.48$  days) ( $p < 0.0001$ ). Complications were observed in 20.0% of patients in the radial group (4.0 % wound infection, 4.0 % ecchymosis, 8.0 % flatus incontinence, and 4.0 % recurrence) and in 11.0% of patients in the circumferential group (7.4% wound infections, 3.6% flatus incontinence). In a study by Kang et al., (2014) circumferential incisions of the anus reduced the wound healing time compared to radial incisions (19.1 vs. 24.0 days,  $p < 0.001$ ) (Walker., 1985). There were no significant differences between the groups in wound complications such as perianal abscess, fistula, or cellulitis. Clinical outcomes, including recurrence, persistence of fissures, and continence problems, were also similar between the groups (Garcia-Aguilar et al., 1996). The change in the shape of the wound and the possible wound contamination by defecation may be the reason for their report. However, since then, this comparison has not been studied in our setup (Kortbeek, 1996). Therefore, we decided to put up a comparison of these two incisions for LIS and then confirm the results (Kang et al., 2014). The rationale of this study is that the lateral internal sphincterotomy (LIS) technique is considered the optimal surgical treatment for chronic anal fissures (CAFs), although questions remain regarding the best technique. The present study investigated whether the type of anoderm incision (radial or circumferential to the anus) affects wound healing, wound-related complications, incontinence, and recurrence rates in CAF patients undergoing open LIS in our setting, where weather conditions and food intake are different from other region. To date, no local study is available. This will aid us in delineating guidelines for best practices and will also reduce patient morbidity due to illness.

## Objectives

The objective of study was: to compare radial versus circumferential skin incisions in open lateral internal sphincterotomy among patients with chronic anal fissures in terms of wound healing and complications.

## Methodology

In a randomized controlled trial conducted at the Surgical Department of Bahawal Victoria Hospital from May 20 to November 19, 2021, we looked at two skin incision procedures in the setting of open lateral internal sphincterotomy for chronic anal fissures. This study looked at the effects of circumferential and radial skin incisions on wound healing and surgical complications in patients with chronic anal fissures. The study duration allowed for a thorough analysis of the outcomes of different surgical techniques, and randomization was employed to ensure objective results.

## Sample Size

A total of 60 patients (30 in each group) were estimated using an 80% power of the study and a 95% confidence interval. Using the assumptions that the wound healing time SD in Group B (circumferential) is 3.48 days and in Group A (radial) is 6.82 days, we may find a difference of 4 and a ratio of sample size B: A of 1.

## Study Criteria

There were inclusion and exclusion criteria for choosing the study's sample. People with ASA classifications of I or II, aged 20 to 60, regardless of gender, who did not show improvement after six weeks of non-surgical treatment and were scheduled for a lateral internal sphincterotomy, were included in the operational definition of chronic anal fissure. The following conditions were excluded: steroid or immunosuppressive medicine use, diabetes, perianal surgery, and inflammatory bowel disease. In order to guarantee a homogeneous study population and prevent confounding variables that can alter results, these criteria were established.

## Data Collection Procedure

For the study, 60 patients who met the inclusion criteria were chosen. Consent was gained once the ethical committee gave its approval. There was also a thorough historical and demographic data noted. One treatment was randomly assigned to each patient. Open lateral internal sphincterotomies were done with circumferential incisions on Group B and radial incisions on Group A. Under general anesthesia, the same consultant performed each procedure. Patients were moved into post-surgical wards following surgery, and they were treated postoperatively in accordance with established procedures. Results, such as wounds and problems, were assessed every three days until the patient was allowed to go home. Using data stratification, effect modifiers such as age, gender, and fissure duration were taken into account. Every piece of data was input into an organized Performa.

## Analysis

SPSS version 21 was used to enter and analyze all of the data. While gender and problems were reported as frequency and %, descriptive information such as age, fissure duration, and healing time (days) were presented as mean  $\pm$  standard deviation. Age, gender, the length of the fissure,

and post-stratification were used to stratify the data. To evaluate statistical significance, the chi-square test was utilized. A p-value of less than 0.05 was deemed significant.

## Results

### Demographics

Regarding age, gender, fissure and LIS Locations, BMI, ASA CLASSIFICATION, and anorectal manometric results, there was no difference in both groups i.e Radial and circumferential incisions group (Table 1). 43 patients out of 60 (71%) were followed by visits or telephone calls over a period of one year and the difference was not significant in both groups for follow-up (21/30 [70%] vs 22/30 [73.3%]). On average, the entire patients population followed for 34 months and the statistical difference was minor between radian and circumferential incision groups ( $35.7 \pm 31.3$  vs.  $32.3 \pm 28.7$  months, respectively,  $p = 0.169$ ).

**Table 1: Clinical characteristics of patients undergoing lateral internal sphincterotomies (radial vs. circumferential incisions)**

Demographic	Radial incisions (n=30)	Circumferential incision (n=30)	p-value
<b>Age (years)</b>	39.5 ±12.1	38.2±11.8	0.177
<b>Gender:</b>			0.970
Males:	12 (40.9)	13 (41)	
Females:	18 (59.1)	17 (59)	
<b>Location of fissure:</b>			0.284
Posterior midline:			
Anterior midline:	20 (66)	18 (60)	
Both:	05 (16.66)	05 (16.66)	
Lateral:	03 (10)	05 (16.66)	
Multiple:	01 (3.33)	01 (3.33)	
	01 (3.33)	01 (3.33)	
<b>Location of LIS:</b>			0.247
Left lateral:	26 (87)	27 (90)	
Right Lateral:	03 (10)	02 (6.66)	
Bilateral:	01 (03)	01 (03.33)	
<b>BMI</b>	23.7±3.5	23.6±3.3	0.658
<b>ASA CLASSIFICATION:</b>			0.744
1	24 (80)	25 (83.33)	
2	06 (20)	05 (16.66)	
3	00		

Data are presented as numbers (percentages) or means ± standard deviation. LIS, lateral internal sphincterotomies; ASA, American Society of Anesthesiologists;

Patients in both groups developed complications. Wound site cellulitis, postoperative fistula development and perianal abscess were more common in the radial incision group as compared with circumferential incisions group. However, that was not significant statistically.

One patient among who were treated with radial incision, developed perianal abscess while in patients who were treated with circumferential incisions, none developed such complications. This was treated with incision and drainage.

In both groups (radial and circumferential), recurrence rate was same. One patient developed recurrence after a certain period of follow up and they were treated again. (TABLE 2)

#### **Wound healing time:**

There was statistical difference between both groups regarding wound healing time. Patients treated with the circumferential incisions had mean wound healing time of 19.1 days while who were treated with radial incision had mean wound healing time 24.0 days ( $p < 0.001$ ). (TABLE 2)

#### **Postoperative days:**

Among the patients who were treated with the circumferential incisions, 14/30 (46.66%) healed within 14 Postoperative days. While, in the radial incision group, only 9/30 patients (30%) healed within the same Postoperative period. (TABLE 3).

**TABLE 2: Differences in complications and clinical outcomes between patients undergoing lateral internal sphincterotomies with either radial or circumferential skin incisions:**

VARIABLES	RADIAL INCISIONS (n=30)	CIRCUMFERENTIAL INCISIONS (n=30)	p-value
Perianal abscess	1	0	0.379
Recurrence	1	1	0.886
Healing time (days)	24.0 ± 17.0	19.1 ± 12.2	<0.001

**TABLE: 3 Wound healing times following lateral internal sphincterotomies (radial vs. circumferential incisions)**

Postoperative period	Radial incisions (n=30)	Circumferential (n=30)
<14 days	9 (30%)	14 (46.66 %)
14-28 days	15 (50%)	13 (43.33%)
>28 days	6 (20)	03 (10%)

#### **Discussion**

LIS is currently the most widely utilized technique for the therapy of CAFs, having been first proposed by Eisenhammer in 1959 (Shao et al., 2009). For LIS, both open and closed strategies have been applied. At first, open approach was used (Menteş et al., 2003), however later on, some surgeons' implemented closed technique (Lindsey et al., 2003). Most people agree that lateral internal sphincterotomy is a safe surgical technique with few adverse effects. Nonetheless, certain wound complications including abscesses and perianal fistulas may appear (Minguez et al., 2002). According to some surgeons, patients who underwent surgery using a closed approach experienced fewer complications than those who underwent surgery using an open technique (Gandomkar et al.,

2015). Nevertheless, according to reports from other surgeons, there is no statistically significant difference between the two procedures (closed vs. open) in terms of postoperative problems (Brisinda et al., 2003). Moreover, García-Granero et al. find that the internal anal sphincter may be more incompletely resected with closed technique than with open technique (Brisinda et al., 2004). According to García-Granero et al.'s proposal, the open procedure is the preferable method for lateral internal sphincterotomy, and the surgeons' unique preferences and expertise will choose the incision type.

The effects and complications of several open LIS approaches have been compared. Following an open lateral internal sphincterotomy, Aysan et al. claim that primary wound closure reduces the amount of time needed for wound healing (Colak et al., 2002). Nonetheless, there is no discernible difference between secondary healing and primary closure in terms of consequences associated to wounds. Marginal incision sutures have been shown by Kang et al. to decrease wound-related problems following LIS (Richard et al., 2004). Few studies have compared the orientations of the incisions made during lateral internal sphincterotomies. In this context, a well-known study paper that compares parallel (circumferential) incisions with vertical (radial) ones is Esroz et al. When compared to vertical (radial) incisions, circumferential incisions considerably shorten the time it takes for a wound to heal and the amount of time a perianal itch lasts. Our findings corroborated this study and showed that circumferential incisions led to considerably faster wound healing than radial incisions ( $p < 0.001$ ) (Table 2). Fecal matter dilates the anal canal during defecation because of its outward force vectors. The force vectors that divide the wound edges in radial incisions increase the risk of fecal contamination of the wound, which delays the healing process. Furthermore, compared to vertical (radial) incisions, circumferential incisions have less separation of the wound margins, improving wound apposition and, consequently, an earlier wound healing [6], according to Esroz et al. One patient in the radial group in our investigation had wound dehiscence, which could account for fecal contamination and outward force vectors. For this reason, we concur with Esroz et al. that elevated vector forces result in fecal contamination and postpone wound healing in radial incisions. When compared to circumferential incisions, there might be additional causes for greater wound contamination with radial incisions. The radial incision's significantly closer proximity to the anoderm than the circular wounds that expose it to the fecal waste could be one reason for this. Additionally, during the careful dissection via the incision, the anoderm surrounding the wound's edge may tear. There could be a lot of traction to blame for this. In radial incisions, the wound becomes closer to the anoderm and fecal pollution rises, which slows the healing process.

There was no difference in complications between the groups with radial and circumferential incisions, according to Esroz et al. This study and ours were similar in that neither group's problems differed noticeably from the other. Anal mucosa may be punctured during LIS dissection into the intersphincteric space, potentially leading to a perianal abscess or anal fistula. Fecal contamination of the wound may not be the only cause of these problems. Because our surgeons were equally skilled, experienced, and qualified, there was no discernible difference in the complications between the two groups.

## Conclusion

According to the results of this study, circumferential incisions are a better method for performing lateral internal sphincterotomy for chronic anal fissures than radial incisions, with regard to hospital stay, wound healing, and abscess formation frequency. Therefore, in order to minimize the length of hospital stay, speed up wound healing, and lower the incidence of abscess formation, we advise performing lateral internal sphincterotomy for chronic anal fissures through circumferential incisions rather than radial incisions. This will help to lower the morbidity of these patients as well as the workload in the hospital.

## References

1. Griffin N, Acheson AG, Tung P, Sheard C, Glazebrook C, Scholefield JH. Quality of life in patients with chronic anal fissure. *Colorectal Dis* 2004; 6:39–44.
2. Lindsey I, Jones OM, Cunningham C, Mortensen NJ. Chronic anal fissure. *Br J Surg* 2004; 91:270–279.
3. Gordon PH. Fissure-in-ano. In: Gordon P.H., Nivatvongs S. (Eds.). *Principles and Practice of Surgery for The Colon, Rectum and Anus*, third ed., Informa Healthcare USA, New York, 2007, pp. 167e189.
4. Arroyo A, Pérez F, Serrano P, Candela F, Calpena R. Open versus closed lateral sphincterotomy performed as an outpatient procedure under local anesthesia for chronic anal fissure: prospective randomized study of clinical and manometric long-term results. *J Am Coll Surg*. 2004;199(3):361-367.
5. Ersoz F, Arikan S, Sari S, Bektas H, Ozcan O. Type of lateral internal sphincterotomy incision: parallel or vertical?. *World J Surg*. 2011;35(5):1137-1141. doi:10.1007/s00268-011-1044-4
6. Kang WH, Lim CH, Choi DH, et al. Comparison of skin incisions used for open lateral internal sphincterotomies--radial versus circumferential incisions: a retrospective cohort study. *Int J Surg*. 2014;12(11):1141-1145.
7. W.A. Walker, D.A. Rothenberger, S.M. Goldberg, Morbidity of internal Sphincterotomy for anal fissure and stenosis, *Dis. Colon Rectum* 28 (1985)832e835.
8. J. Garcia-Aguilar, C. Belmonte, W.D. Wong, A.C. Lowry, R.D. Madoff, Open vs. Closed sphincterotomy for chronic anal fissure, *Dis. Colon Rectum* 39 (1996) 440e443.
9. J. Kortbeek, J. Langevin, R. Khoo, J. Heine, Chronic fissure-in-ano: a randomized study comparing open and subcutaneous lateral internal sphincterotomy, *Dis. Colon Rectum* 35 (1992) 835e837.
10. Kang WH, Lim CH, Choi DH, Shin HK, Lee YC1, Jeong SK, Yang HK. Comparison of skin incisions used for open lateral internal sphincterotomies—radial versus circumferential incisions: a retrospective cohort study. *Int J Surg*. 2014 Nov;12(11):1141-5.
11. Shao W J, Li G C, Zhang Z K. Systematic review and meta-analysis of randomized controlled trials comparing botulinum toxin injection with lateral internal sphincterotomy for chronic anal fissure. *Int J Colorectal Dis*. 2009;24(9):995–1000. Menteş B B, Irkörüçü O, Akin

- M, Leventoğlu S, Tatlıcioğlu E. Comparison of botulinum toxin injection and lateral internal sphincterotomy for the treatment of chronic anal fissure. *Dis Colon Rectum*. 2003;46(2):232–237.
12. Lindsey I, Jones O M, Cunningham C. et al. Botulinum toxin as second-line therapy for chronic anal fissure. *Dis Colon Rectum*. 2003;46(3):361–366. Minguéz M, Herreros B, Espi A. et al. Long-term follow-up (42 months) of chronic anal fissure after healing with botulinum toxin. *Gastroenterology*. 2002;123(1):112–117.
13. Gandomkar H, Zeinoddini A, Heidari R, Amoli H A. Partial lateral internal sphincterotomy versus combined botulinum toxin A injection and topical diltiazem in the treatment of chronic anal fissure: a randomized clinical trial. *Dis Colon Rectum*. 2015;58(2):228–234.
14. Brisinda D, Maria G, Fenici R, Civello I M, Brisinda G. Safety of botulinum neurotoxin treatment in patients with chronic anal fissure. *Dis Colon Rectum*. 2003;46(3):419–420.
15. Brisinda D, Maria G, Fenici R, Civello I M, Brisinda G. Safety of botulinum neurotoxin treatment in patients with chronic anal fissure. *Dis Colon Rectum*. 2003;46(3):419–420.
16. Colak T, Ipek T, Kanik A, Aydin S. A randomized trial of botulinum toxin vs lidocain pomade for chronic anal fissure. *Acta Gastroenterol Belg*. 2002;65(4):187–190.
17. Richard C S, Gregoire R, Plewes E A et al. Internal sphincterotomy is superior to topical nitroglycerin in the treatment of chronic anal fissure: results of a randomized, controlled trial by the Canadian Colorectal Surgical Trials Group. *Dis Colon Rectum* 2000;43:1048–1057., discussion 1057–1058
18. Tilney H S, Heriot A G, Cripps N P. Complications of botulinum toxin injections for anal fissure. *Dis Colon Rectum*. 2001;44:1721–1724.