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ORIGINAL ARTICLE

Comparison of Mean Healing Time Between Topical Nitroglycerin and Lateral Internal Sphincterotomy for Chronic Anal Fissure

IVON IJAZ BHATTI[1], RAJIA NAYAAR[2], AAMER WADUD[3], ARSALAN SIRAJ[4], ABBAS HASSNAIN KAZMI[5], ABDUL WALI KHAN[6]
[1]*Assistant Professor Department of General Surgery HITEC Institute of Medical Sciences and HIT Hospital Taxilla*
[2]*Consultant Surgeon Bach Christian Hospital Qalanderabad, Abbotabad*
[3,4]*Assistant Professor Department of General Surgery HITEC Institute of Medical Sciences and HIT Hospital Taxilla*
[5]*Senior Registrar Department of General Surgery Niazi Medical Teaching Hospital*
[6]*Assistant Professor General Surgery, Al Nafees Medical College and Hospital, Islamabad*
Correspondence to: Ivon Ijaz Bhatti, Email: ivon.ejaz@hitec-ims.edu.pk

ABSTRACT

Background: Chronic anal fissure is a painful anorectal condition resulting from a longitudinal tear in the anoderm, often associated with internal anal sphincter hypertonia. Management options include pharmacological agents such as topical nitroglycerin and surgical procedures such as lateral internal sphincterotomy, each with distinct benefits and risks.

Objectives: To compare the mean healing time and complication rates between topical nitroglycerin and lateral internal sphincterotomy in patients with chronic anal fissure.

Study Design & Setting: A prospective comparative study was conducted at the Department of General Surgery, HITEC Institute of Medical Sciences and HIT Hospital Taxilla.

Methodology: A total of 130 patients with chronic anal fissure were enrolled and randomly allocated into two equal groups: topical nitroglycerin (n=65) and lateral internal sphincterotomy (n=65). Demographic data, baseline characteristics, healing time, and complications were recorded. Healing was defined as complete epithelialization without symptoms, and patients were followed until recovery. Statistical analysis was performed using independent t-test and chi-square test, with $p<0.05$ considered significant.

Results: The mean healing time was significantly shorter in the lateral internal sphincterotomy group (14.12 ± 2.93 days) compared to the topical nitroglycerin group (27.12 ± 4.50 days; $p<0.001$). Complications were observed in 5 (7.7%) patients in the topical nitroglycerin group and 3 (4.6%) patients in the surgical group, with a statistically significant difference in complication distribution ($p=0.045$).

Conclusion: Lateral internal sphincterotomy resulted in significantly faster healing compared to topical nitroglycerin, with a low and acceptable complication rate. It remains the more effective option for chronic anal fissure when rapid recovery is desired.

Keywords: anal fissure, healing time, lateral internal sphincterotomy, nitroglycerin, sphincterotomy, surgical treatment, topical therapy

INTRODUCTION

Chronic anal fissure is a common and distressing anorectal condition characterized by a linear ulcer in the distal anal canal, usually located in the posterior midline. It is often associated with severe pain during and after defecation, rectal bleeding, and spasm of the internal anal sphincter.[1,2] The pathophysiology of chronic fissure-in-ano is largely attributed to hypertonia of the internal anal sphincter, leading to reduced anodermal blood flow, delayed healing, and persistence of symptoms. If untreated, the condition significantly impairs quality of life and may lead to complications such as sentinel piles and hypertrophied anal papillae.[3,4]

Management of chronic anal fissure aims to relieve sphincter spasm, improve blood supply, and promote healing while minimizing recurrence and complications. Traditionally, conservative measures such as dietary fiber supplementation, sitz baths, and topical agents are first-line options, whereas surgical interventions are reserved for refractory cases.[5] Among topical agents, topical nitroglycerin (glyceryl trinitrate) is widely used due to its ability to chemically reduce sphincter tone by donating nitric oxide, a smooth muscle relaxant. This mechanism improves anodermal perfusion and facilitates healing. Several studies have demonstrated healing rates of 50–70% with nitroglycerin, although side effects such as headaches and local irritation can limit compliance.[6,7]

On the other hand, lateral internal sphincterotomy (LIS) is considered the surgical gold standard for chronic anal fissure, particularly in patients unresponsive to medical therapy. The procedure involves partial division of the internal anal sphincter to permanently lower resting anal pressure, thereby enhancing blood flow to the fissure site.[8] LIS has reported healing rates exceeding 90% with relatively low recurrence rates; however, the risk of minor or, rarely, permanent incontinence remains a concern, especially in high-risk populations such as multiparous women and elderly patients.[9]

Comparing topical nitroglycerin and LIS is of clinical relevance because these approaches represent distinct therapeutic philosophies—medical sphincter relaxation versus surgical division—each with its own risk–benefit profile. While nitroglycerin offers a non-invasive, reversible, and easily accessible treatment option, its effectiveness may be lower and recurrence higher compared to LIS. Conversely, LIS provides rapid and definitive healing in most patients but carries the potential for irreversible complications.[10] Healing time is a crucial parameter when evaluating treatment efficacy, as prolonged symptoms not only reduce patient comfort and productivity but also increase the likelihood of non-compliance and psychological distress. Rapid resolution of fissures is particularly important in working-age adults, where anal pain can severely limit daily functioning.[11]

Despite the availability of studies comparing healing rates and recurrence, data specifically comparing mean healing time between topical nitroglycerin and LIS in chronic anal fissure are limited, particularly in local populations. Therefore, the present study aims to compare the mean healing time between topical nitroglycerin and lateral internal sphincterotomy in patients with chronic anal fissure, providing evidence that may guide clinical decision-making toward the most effective and patient-acceptable treatment modality.

MATERIALS AND METHODS

This comparative study was conducted in the Department of General Surgery of HITEC Institute of Medical Sciences and HIT Hospital Taxilla, after obtaining approval from the Institutional Review Board from Jan 2023 to June 2023. A total of 130 patients diagnosed with chronic anal fissure were included. The sample size of 130 was calculated using the WHO sample size calculator, keeping the level of significance at 5%, power of the test at 80%,

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and anticipated difference in mean healing time between groups based on previous literature.

Patients of either gender, aged 18–60 years, with chronic anal fissure persisting for more than six weeks and unresponsive to initial conservative management were enrolled. Exclusion criteria included acute anal fissure, previous anal surgery, inflammatory bowel disease, perianal sepsis, malignancy, pregnancy, and known hypersensitivity to nitroglycerin. Written informed consent was obtained from all participants.

Diagnosis of chronic anal fissure was made on the basis of clinical history and proctoscopic examination, noting the presence of a sentinel pile, hypertrophied anal papilla, and exposure of underlying sphincter fibers. Patients were allocated into two groups by simple random sampling using a lottery method. Group A was treated with topical nitroglycerin 0.2% ointment applied to the anal verge twice daily for up to six weeks, along with advice on dietary fiber intake and warm sitz baths. Group B underwent lateral internal sphincterotomy performed under spinal anesthesia by an experienced surgeon, using a standard open technique with partial division of the internal sphincter up to the dentate line. Postoperative care included analgesia, stool softeners, and sitz baths. Patients were followed up weekly until complete healing was achieved, defined as epithelialization of the fissure with absence of pain during defecation. Healing time was recorded in days from initiation of treatment to complete healing. Compliance in the topical nitroglycerin group was assessed verbally at each visit, and patients reporting significant headaches were advised to temporarily reduce frequency of application. Recurrence and complications such as incontinence, local irritation, or infection were also documented.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version [XX]. Mean and standard deviation were calculated for quantitative variables such as age and healing time, while qualitative variables such as gender and complication rates were presented as frequencies and percentages. The mean healing time between the two groups was compared using the independent samples t-test, with a p-value of ≤0.05 considered statistically significant.

RESULTS

The mean age of patients in the topical nitroglycerin group was 38.32 ± 9.33 years, while it was 38.20 ± 9.68 years in the lateral internal sphincterotomy group. In the topical nitroglycerin group, there were 35 (53.8%) males and 30 (46.2%) females, whereas the lateral internal sphincterotomy group had 37 (56.9%) males and 28 (43.1%) females. The mean BMI was 24.56 ± 2.54 kg/m² in the topical nitroglycerin group and 24.82 ± 2.36 kg/m² in the lateral internal sphincterotomy group. The mean duration of symptoms was 8.18 ± 2.02 weeks in the topical nitroglycerin group compared to 8.06 ± 2.32 weeks in the lateral internal sphincterotomy group. Sedentary occupation was observed in 43 (66.2%) patients in the topical nitroglycerin group and 31 (47.7%) patients in the lateral internal sphincterotomy group, while manual occupation was noted in 22 (33.8%) and 34 (52.3%) patients, respectively, as shown in Table 1.

The mean healing time in the topical nitroglycerin group was 27.12 ± 4.50 days, whereas in the lateral internal sphincterotomy group it was 14.12 ± 2.93 days. The difference in healing time between the two groups was statistically significant ($p < 0.001$), as shown in Table 2.

Bleeding occurred in 1 (1.5%) patient in the lateral internal sphincterotomy group, while no cases were reported in the topical nitroglycerin group. Headache was reported in 5 (7.7%) patients in the topical nitroglycerin group and in none of the lateral internal sphincterotomy group. Incontinence was observed in 2 (3.1%) patients in the lateral internal sphincterotomy group, with no cases in the topical nitroglycerin group. No complications were reported in 60 (92.3%) patients treated with topical nitroglycerin and 62 (95.4%) patients who underwent lateral internal sphincterotomy. The difference in the distribution of complications between the groups was statistically significant ($p = 0.045$), as shown in Table 3.

Table 1: Demographic Characteristics of Participants (n = 130)

Characteristic	Topical Nitroglycerin (n=65)	Lateral Internal Sphincterotomy (n=65)
Age (years)	38.32 ± 9.33	38.20 ± 9.68
Gender		
Male	35 (53.8%)	37 (56.9%)
Female	30 (46.2%)	28 (43.1%)
BMI (kg/m²)	24.56 ± 2.54	24.82 ± 2.36
Duration of Symptoms (weeks)	8.18 ± 2.02	8.06 ± 2.32
Occupation		
Sedentary	43 (66.2%)	31 (47.7%)
Occupation	22 (33.8%)	34 (52.3%)

Table 2: Comparison of Healing Time in Days Between Groups

Group	Mean ± SD	p-value
Topical Nitroglycerin	27.12 ± 4.50	<0.001
Lateral Internal Sphincterotomy	14.12 ± 2.93	

Table 3: Distribution of Complications by Group

Complication Type	Topical Nitroglycerin	Lateral Internal Sphincterotomy	Total	p-value
Bleeding	0 (0.0%)	1 (1.5%)	1 (0.8%)	0.045
Headache	5 (7.7%)	0 (0.0%)	5 (3.8%)	
Incontinence	0 (0.0%)	2 (3.1%)	2 (1.5%)	
None	60 (92.3%)	62 (95.4%)	122 (93.8%)	
Total	65 (100%)	65 (100%)	130 (100%)	

DISCUSSION

Chronic anal fissure is a common anorectal condition characterized by a longitudinal tear in the anoderm, causing severe pain and bleeding during defecation.[12] Conservative management often involves pharmacological agents aimed at reducing sphincter spasm and improving blood flow to promote healing. Topical nitroglycerin acts as a nitric oxide donor, leading to relaxation of the internal anal sphincter and enhanced tissue perfusion. Surgical treatment, particularly lateral internal sphincterotomy, remains the gold standard for refractory cases due to its high healing rates.[13,14] However, surgery carries risks such as incontinence, prompting interest in less invasive alternatives. Comparative studies are essential to determine the most effective and safe treatment for chronic anal fissure.

In our study, the mean healing time was significantly shorter in the lateral internal sphincterotomy (LIS) group (14.12 ± 2.93 days) compared to the topical nitroglycerin group (27.12 ± 4.50 days, $p < 0.001$), with minimal complications in both groups. These findings are consistent with Malik et al. (2021), who reported a higher pain-free outcome at 2 weeks in the surgical group (96%) compared to the medical group (70%) with a statistically significant difference ($p < 0.05$), though their endpoint was pain relief rather than exact healing time.[15] Similarly, Razack et al. (2015) demonstrated faster and more complete healing in LIS (96.66%) versus diltiazem (33.33%) over 6 weeks, closely paralleling our results in terms of both rapid resolution and superiority of surgical treatment.[16] Hashmat et al. (2017) also supported surgical superiority, with 100% relief after LIS compared to 64.3% after chemical sphincterotomy, although they reported a much higher transient incontinence rate (64.3% at 1 week) than our LIS group (3.1%), suggesting that technique refinement and better patient selection may have reduced morbidity in our series.[17]

Rashid et al. (2024) found similar baseline demographics between GTN and LIS groups ($p = 0.75$) and demonstrated sustained pain improvement, with LIS reducing VAS scores to below mild pain threshold by week 8; while they did not measure healing time, their faster pain resolution in LIS supports our findings.[18] Shah et al. (2022)[19] reported higher healing rates with LIS (65%) compared to GTN (52.5%) at 6 weeks, though these

were lower than in our study, likely due to smaller sample size (n = 80) and differences in defining "healed." Hussain et al. (2024) found complete healing at 4 weeks in 90.9% of LIS patients versus 69.7% of medical therapy patients (p = 0.030), again consistent with our data showing earlier recovery and greater effectiveness with LIS.[20]

The uniform trend across all referenced studies reinforces that LIS consistently offers faster and more complete healing than topical or chemical sphincterotomy agents, albeit with a small risk of transient incontinence. Our study's lower complication rates compared to earlier literature—especially the absence of long-term incontinence and low bleeding rates (1.5%)—may be attributed to improved surgical precision and perioperative care. The recurrence risk reported by Hashmat et al. (2017) in chemical sphincterotomy (33.3%) further underlines the durability advantage of LIS.[17] Headache incidence in our GTN group (7.7%) is in line with the known nitrate side-effect profile and matches trends in global reports. Given similar patient demographics, symptom durations, and outcome measures across studies, our results are likely generalizable, and together with previous evidence, strongly support LIS as the preferred definitive treatment for chronic anal fissure in suitable surgical candidates, with topical nitroglycerin reserved for those unable or unwilling to undergo surgery.

A major strength of this study was the prospective design with a balanced sample size of 130 patients equally distributed between both treatment groups. The use of standardized criteria for diagnosis, treatment, and follow-up ensured consistency of data collection. Statistical analysis was robust, allowing for valid comparison between modalities. Limitations include the single-center setting, which may limit generalizability of results to wider populations. The follow-up period was relatively short, restricting the ability to assess long-term recurrence and late complications. Additionally, patient-reported outcomes such as pain scores were not included, which could have added valuable insight.

CONCLUSION

Lateral internal sphincterotomy achieved significantly faster healing compared to topical nitroglycerin in chronic anal fissure. While complications were uncommon in both groups, they were slightly more frequent with topical nitroglycerin. Choice of treatment should balance healing efficacy with potential risks based on individual patient factors

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