Original Article

Effectiveness of Open Lateral Internal Sphincterotomy Versus Topical 0.2% Glyceryl Trinitrate for Chronic Anal Fissure Treatment

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ABSTRACT

Background: Chronic anal fissures represent a prevalent anorectal pathology characterized by longitudinal mucosal tears in the anal canal. These lesions cause considerable patient morbidity through persistent pain, bleeding, and functional impairment. This comparative study evaluated the therapeutic outcomes of open lateral internal sphincterotomy versus topical 0.2% glyceryl trinitrate (GTN) in managing chronic anal fissures**.**

Methods: A prospective comparative study was conducted in the Department of Surgery at Jinnah Hospital, Lahore, over six months. Sixty patients diagnosed with chronic anal fissures were randomized into two treatment arms: Group A received conservative management with topical 0.2% GTN ointment applied digitally using gloved fingers, while Group B underwent open lateral internal sphincterotomy. Treatment outcomes and complications were systematically evaluated and compared between groups.

Results: Complete fissure healing was achieved in 15 patients (50%) in Group A treated with GTN, compared to 28 patients (93.3%) in Group B who underwent surgical intervention. Post-operative complications included flatal incontinence in 2 patients (6.6%) in the surgical group, while no incontinence was observed in the conservative treatment group.

Conclusion: Although open lateral internal sphincterotomy demonstrated superior healing rates (93.3% vs 50%), the associated risk of fecal incontinence warrants careful consideration. Topical 0.2% GTN offers a safer first-line approach with acceptable efficacy, while surgical intervention should be reserved for cases where conservative management fails. The choice of treatment should be individualized based on patient factors and the severity of symptoms, balancing therapeutic efficacy against potential complications.

Keywords: Anal Fissure, Anorectal Surgery, Conservative Treatment, Lateral Internal Sphincterotomy.

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INTRODUCTION

Chronic anal fissures constitute longitudinal mucosal disruptions within the anal canal, extending from the dentate line to the anal verge, typically positioned in the posterior midline. These lesions frequently produce severe pain and bleeding during defecation, accompanied by internal anal sphincter spasm. This spasm may compromise regional blood circulation, resulting in impaired healing processes. While most anal fissures resolve spontaneously, those persisting beyond 4-6 weeks are classified as chronic and necessitate medical intervention[1].

Epidemiological data regarding anal fissures remain limited. A population-based investigation by Mapel and colleagues in 2014 within the United States documented an overall anal fissure incidence of 1.1 per 1,000 person-years, correlating with an estimated lifetime risk of 7.8%, with peak occurrence between ages 15-40 years[2].

Pathophysiological mechanisms underlying anal fissure development include constipation, anal sexual practices, malignancy, chronic diarrhea, trauma, sexually transmitted infections, tuberculosis, local or systemic neoplasms, and inflammatory bowel conditions[3]. Anal fissures characteristically present with episodic defecatory pain that may persist 1-2 hours post-defecation, distinguishing them from other conditions such as abscesses, thrombosed hemorrhoids, and viral ulcerations[4].

Anal fissures are classified as typical or atypical. Atypical fissures occur outside the midline and may be extensive, multiple, or irregularly shaped. Typical fissures involve internal anal sphincter spasm secondary to ischemia, causing intense pain. Sphincter spasm relief correlates with pain reduction and fissure healing without recurrence. Fissures are further categorized as acute or chronic, with acute fissures healing within weeks while chronic fissures typically require surgical intervention, though placebo-controlled surgical studies may be considered[5].

Clinical manifestations include visible anal tears, sharp or burning defecatory pain, bright red blood on tissue or stool, and small lumps or skin tags adjacent to chronic fissures[6]. Diagnosis relies on clinical history, symptom assessment, physical examination including visual inspection and digital rectal examination. Advanced investigations such as colonoscopy, anoscopy, and proctoscopy may be employed to identify associated conditions and complications[7].

Surgical interventions effectively treat fissures in over 90% of patients; however, systematic reviews of randomized surgical trials report 10% incontinence rates. Research indicates sphincterotomy-related incontinence for fissure treatment is minimal. Anal dilatation carries higher incontinence and treatment failure risks compared to controlled sphincterotomy in surgical studies. Anal dilatation should be avoided in favor of partial internal sphincterotomy[9]. For acute and chronic anal fissures, particularly in pediatric patients, chemical sphincterotomy represents a superior alternative to conventional surgical treatment[10]. Chemical sphincterotomy or treatments such as nitroglycerin ointment demonstrate minimal adverse effects[11]. Medical treatments should be considered for patients seeking to avoid surgical intervention for chronic typical anal fissures. Topical calcium channel blockers prove effective, similar to nitroglycerin ointment for anal fissures with minimal pain risk, while topical applications may achieve fissure healing[12]. Fissures frequently recur; completely healed fissures may reappear due to constipation or trauma. Medical conditions including infections, inflammatory bowel disease (Crohn's disease), and anal tumors may produce similar symptoms to anal fissures. When fissure healing fails with treatment, evaluation for alternative disorders becomes essential[13]. This research objective was to compare outcomes of open lateral internal sphincterotomy and 0.2% glyceryl trinitrate (GTN) for treating chronic anal fissures in Lahore, Pakistan's population.

METHODOLOGY

Study Design and Setting

This randomized controlled trial compared chemical sphincterotomy effectiveness using 0.2% topical nitroglycerin with open lateral internal sphincterotomy. The study was conducted at Jinnah Hospital's surgical department in Lahore, Pakistan.

Sample Size

Sixty patients diagnosed with chronic anal fissures participated in this study, divided equally into two groups of 30 patients each. Group A patients received topical 0.2% glyceryl trinitrate (GTN) as conservative treatment, selected from outpatient surgical department visits at Jinnah Hospital, Lahore. Group B patients underwent lateral internal sphincterotomy, a surgical procedure designed to reduce sphincter spasm and promote fissure healing. This division enabled comparative analysis of medical (topical 0.2% GTN) versus surgical (open lateral internal sphincterotomy) treatment effectiveness for chronic anal fissures.

Sampling Technique

Stratified random sampling was utilized, with population selection based on age and gender criteria. Patient consent was obtained using standardized forms prior to sampling during the six-month study period.

Inclusion Criteria

Patients with chronic anal fissures (persistent anal lining tears exceeding 6 weeks duration) of either gender, aged 20-60 years, were included. Complications including anal spasm, pain, bleeding, and defecatory difficulties were considered. Patient history revealed routine use of common analgesics such as paracetamol and ibuprofen for self-managed pain relief.

Exclusion Criteria

Pregnant women, patients with inflammatory bowel disease, recurrent anal fissures, hemorrhoids, and those declining treatment were excluded.

Ethical Considerations

All patients underwent examination and investigation following informed consent. Adequate privacy and chaperone presence were ensured. Permission was obtained from the Ethical Review Board of Allama Iqbal Medical College/Jinnah Hospital, Lahore.

Data Collection Procedure

Random number tables determined case allocation to study groups, with demographic data including name, age, gender, and address recorded. Topical lignocaine gel was applied 5-10 minutes before examinations. Group A patients received conservative management with 0.2% GTN ointment, advised to apply with gloved fingers over six months. Patients were followed at weeks 1, 2, 4, and 6, monitoring pain relief, fissure healing, and treatment side effects. Healing was defined as mucosal breach closure with absence of defecatory pain. Group B underwent open lateral internal sphincterotomy for chronic anal fissure treatment, while Group A received topical 0.2% GTN for 6 weeks.

Data Analysis

All information was recorded on standardized forms and analyzed using SPSS version 22. Variables analyzed included name, age, sex, pain, constipation, and rectal bleeding. Quantitative data were presented as means and standard deviations, while qualitative data were presented in frequency distribution tables. Outcomes were compared using Chi-square tests for qualitative variables, with p-values ≤0.05 considered significant.

RESULTS

Sixty patients diagnosed with chronic anal fissures were included. Participants ranged from 20-60 years with mean age 35±9.4 years. Among 60 patients, 22 (36.7%) were female and 38 (63.3%) were male, with equal gender distribution in each group (11 females, 19 males per group) (Table-1).

Table-1 Gender-wise distribution of patients

			Sex of Respondent		Total
			Male	Female	
Groups	A	Count	19	11	30
		% within group	63.3%	36.7%	100%
	B	Count	19	11	30
		% within group	63.3%	36.7%	100%
Total		Count	38	22	60
		% within group	63.3%	36.7%	100%

Pain was reported by all 60 patients (100%). Moderate pain with constipation occurred in 13 patients (21.7%), while 31 patients (51.7%) presented with rectal bleeding. Regarding fissure location, 49 patients (81.6%) had posterior anal fissures, while 11 patients (18.4%) had anterior fissures. Most anterior fissure patients were female. Clinical examination revealed anal tenderness in all 60 patients (100%).

For treatment, 30 patients (50%) in Group A received 0.2% GTN, while 30 patients (50%) in Group B underwent open lateral internal sphincterotomy. Headache was reported in 20 Group A patients (66%) during GTN treatment.

Table-2 Presentence of Frequency of Pain, Constipation, Bleeding per Rectum and Location of fissure before treatment

	Pain	Frequency	Percentage
1	Moderate	13	21.7 %
	Sever	47	78.3 %
	Total	60	100 %
	Constipation	**No. of Cases**	**Percentage**
2	Present	17	28.3 %
	Absent	43	71.7 %
	Total	60	100 %
	Bleeding per Rectum	**No. of Cases**	**Percentage**
3	Present	31	51.7 %
	Absent	29	48.3 %
	Total	60	100 %
	Location of Fissure	**No. of Cases**	**Percentage**
4	Anterior	11	18.3 %
	Posterior	49	81.7 %
	Total	60	100 %

Group A achieved fissure healing in 15 patients (50%) following GTN treatment, while 15 patients (50%) did not heal. Conversely, 28 Group B patients (93.3%) experienced healing after open lateral internal sphincterotomy, with only 2 patients (6.7%) not healing.

Flatal incontinence occurred exclusively in Group B, with no cases in Group A. Two Group B patients (6.7%) developed both flatal and fecal incontinence as surgical complications. Bleeding was assessed at 2-week intervals post-treatment. In Group A, 13 patients (43.3%) had no bleeding after GTN treatment, while only 2 Group B patients (6.6%) had bleeding at 2-week follow-up. All patients were followed for 6 weeks post-treatment, with 15 Group A patients (50%) remaining uncured, reflecting GTN treatment failure. In Group B, 28 patients (93.3%) were cured at 6-week follow-up, proving lateral anal sphincterotomy's success as the preferred anal fissure treatment (Table-3).

Table-3 Showing frequency of pain and bleeding after treatment, frequency of persistence of headache with treatment, and incontinence to flatus

	Frequency of Pain after Treatment	**Present**	**Absent**	**Total**
1	Group A	13	17	30
	Group B	1	29	30
	Total	14	46	60
	Frequency of headache persistence with treatment	**Present**	**Present**	**Total**
2	Group A	20	10	30
	Group B	00	30	30
	Total	20	40	60
	Persistence of bleeding after 2 weeks treatment	**Present**	**Absent**	**Total**
3	Group A	13	17	30
	Group B	2	28	30
	Total	15	45	60
	Incontinence to Flatus	**Present**	**Absent**	**Total**
4	Group A	0	30	30
	Group B	2	28	30
	Total	2	58	60

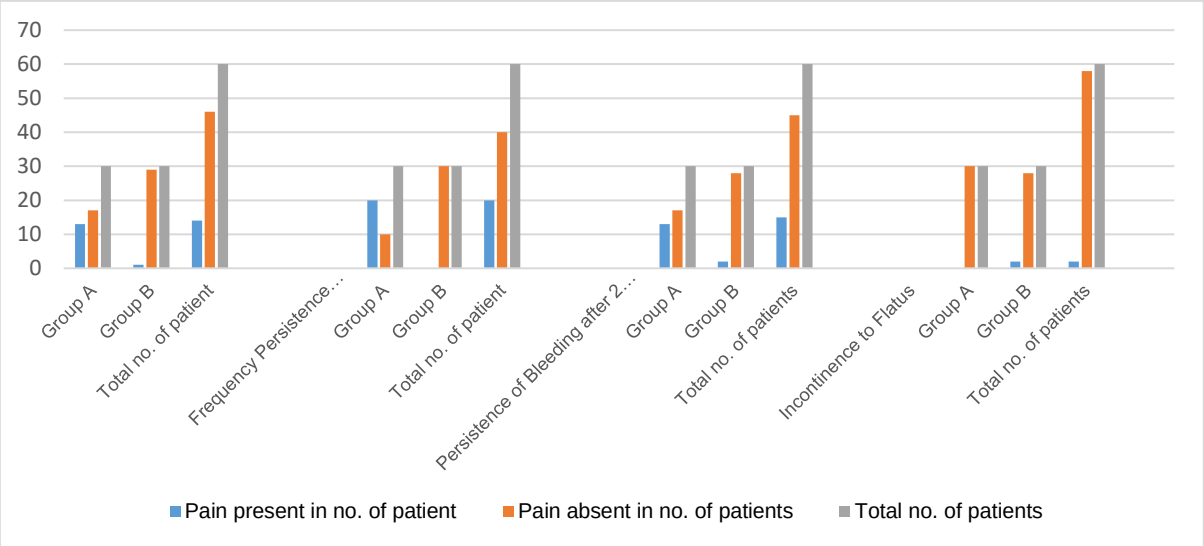

Figure-1 Showing frequency of pain and bleeding after treatment, frequency of persistence of headache with treatment, and incontinence to flatus

DISCUSSION

Initial clinical investigations of 0.2% glyceryl trinitrate demonstrated promising results, suggesting its potential utility in anal fissure management compared to open lateral internal sphincterotomy. Research efforts focused on establishing GTN's role as an exogenous nitric oxide donor, a crucial neurotransmitter facilitating internal sphincter relaxation[14]. Various methodologies were developed to assess 0.2% GTN effectiveness in reducing anal sphincter pressure[15]. Anorectal manometry revealed a 2% reduction in maximum resting pressure, with anal squeeze pressure decreasing by 11%[16]. These observations correspond with our study criteria, where treatment effectiveness was evaluated through subjective improvements in pain relief, bleeding cessation, and fissure healing rather than objective manometric assessments. Lateral internal sphincterotomy remains the most efficacious treatment approach, executable through either open or closed techniques[17].

Conversely, chemical sphincterotomy involves pharmacological anal sphincter tone reduction. Chemical intervention using 0.2% GTN represents a non-invasive, easily administered, cost-effective treatment option[18]. This approach particularly benefits patients who are medically compromised or surgically unsuitable. While avoiding surgical intervention risks, our study demonstrated moderate success rates, with healing occurring in only 50% of patients. Additionally, a substantial proportion of patients (66%) experienced headaches as GTN side effects, potentially affecting treatment compliance and quality of life[19]. Socioeconomic factors, financial constraints, particularly among women reluctant to undergo surgery by opposite-gender surgeons, and various surgical contraindications make GTN an appropriate alternative therapy for specific patient populations.

Lateral internal sphincterotomy demonstrated superior treatment efficacy with 93.3% healing rates[20]. This technique, performable via open or closed approaches, directly reduces internal anal sphincter tone while promoting fissure healing. Open lateral internal sphincterotomy maintains its status as the gold standard, especially for chronic fissure cases[21].

Our investigation compared 0.2% GTN effectiveness with open lateral internal sphincterotomy regarding symptomatic relief and ulcer healing. Sixty patients were recruited from Jinnah Hospital Lahore's outpatient department and randomly allocated into two groups. Group A received 0.2% GTN application, while Group B underwent lateral anal sphincterotomy. Administering 0.5 ml doses of 0.2% GTN twice daily for 6 weeks resulted in 50% patient healing rates. These outcomes align with Sierra-Arango et al. (2023) findings[12]. Although 0.2% GTN proved less effective than surgical intervention for complete fissure healing, it demonstrated efficacy in symptom management, particularly pain reduction during treatment periods[22]. This emphasizes its value as conservative, symptom-relieving therapy, especially for patients where surgery is not immediately indicated. Cerdan et al. concluded that surgical sphincterotomy enhanced healing rates by 89% versus 29% at 6 weeks in their 82-patient trial comparing 0.2% GTN effectiveness with open lateral internal sphincterotomy, supporting our current study results[23].

Temporary continence disturbances occurred in 6.6% of surgically treated patients (Group B), consistent with previous study findings. Although these cases were mild and self-limiting, they emphasize the importance of monitoring potential lateral internal sphincterotomy complications. More objective assessments, such as anal manometry, could have been performed to evaluate sphincter function more precisely. However, clinical symptomatology was considered a more relevant and practical treatment outcome measure in this study. While our findings suggest continence is not significantly affected short-term, further prospective studies with extended follow-up periods and appropriate control groups are warranted to assess long-term continence impact. Recent work by Tomasicchio et al. (2023) supports this need for long-term evaluation[24].

Onderwater et al. (2020) reported high headache incidence associated with GTN use,

consistent with our results where 67% of patients experienced treatment-related headaches[19]. In our study, these headaches were generally manageable with simple analgesics such as Paracetamol and Ibuprofen. GTN causes various adverse effects including nausea, photophobia, yawning, and concentration difficulties. Most cases involved headaches resembling migraine attacks[25]. Patients experiencing migraine-like symptoms, particularly those with prior migraine history, often reported early cognitive disturbances such as concentration difficulties[26]. These early symptoms may serve as valuable clinical indicators for anticipating and managing GTN-related side effects. Onderwater et al. investigated this further by studying pharmacologically induced migraine-like symptoms and associated premonitory signs. Their study included female migraineurs without aura (n=34) and age-matched female controls (n=24). Using semi-structured interview approaches, they assessed 21 premonitory symptoms at 15-minute intervals over 5 hours following GTN infusion at 0.5 µg/kg/min over 20 minutes. Migraine symptoms developed in 28 of 34 migraineurs (82.4%), indicating high GTN sensitivity in this population[19]. These findings underscore the importance of recognizing GTN-induced migraine-like symptoms, especially in susceptible individuals, for timely intervention and symptom control. Common symptoms including yawning, photophobia, and nausea were reported in patients with migraine attacks, representing high GTN sensitivity compared to healthy controls[27]; these symptoms were not associated with open lateral internal sphincterotomy. Mean healing time of 4 weeks was observed in Group B with open lateral internal sphincterotomy, while 6-week healing time was observed in 50% of Group A patients. Minor bleeding commonly occurs during or immediately after open lateral internal sphincterotomy[28'29]; infections may also occur at incision sites or within the anal canal, with possible recurrence requiring repeat surgery or alternative treatment therapy in open lateral internal sphincterotomy cases[30].

Our study directly compared two widely used reatment modalities - open lateral internal sphincterotomy and topical 0.2% GTN - providing clinically relevant insights into their effectiveness and safety profiles. Equal patient numbers in each treatment group (n=30) ensured balanced comparison, reducing allocation bias risk. However, with only 60 participants, the sample size was relatively small, potentially limiting findings generalizability. Conducting the study at a single center may limit external validity and result applicability to different populations or healthcare settings.

CONCLUSION

This randomized controlled trial demonstrates that open lateral anal sphincterotomy surpasses topical GTN application in anal fissure treatment through superior symptomatic relief, enhanced healing rates, minimal side effects, and very low early continence disturbance rates. Future studies should incorporate extended follow-up periods to assess recurrence rates, long-term continence outcomes, and post-treatment quality of life. Including anorectal manometry or imaging could provide valuable objective data regarding sphincter function and treatment impact. To optimize treatment selection, further research could explore patient stratification based on risk factors such as prior fissure recurrence and baseline continence status.

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Author Contributions

Ahmad Naeem Sajed contributed to the conceptualization, methodology, investigation, and drafting of the original manuscript. **Muhammad Arif Pervaiz** provided supervision, validation, key role for open lateral internal sphincterotomy and contributed to the critical review and editing of the manuscript. **Muhammad Waseem** was responsible for data curation, formal analysis, and resource management. **Sundas Arif** conducted the literature review, assisted with data visualization, and participated in manuscript review and editing.

Ethical Approval

This study received approval from the Ethical Review Board (188/3/13-05-20025) of Allama Iqbal Medical College/Jinnah Hospital, Lahore.

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None.

Conflict of Interests
None.

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