

COMPARATIVE STUDY BETWEEN LATERAL SPHINCTEROTOMY AND
BOTULINUM TOXIN INJECTION IN TREATMENT OF CHRONIC ANAL FISSURES*¹Ahmed Ihsan Alaa, ²Bassam Jumaa Naji, ³Mustafa Raed Muhi, ⁴Ali Kamal Ghanim*^{1,2,3,4}General Surgery Department / Al-Mahmoodiya General Hospital / MOH, Baghdad, Iraq.

Article Received: 05 May 2026

Article Revised: 25 May 2026

Article Published: 01 June 2026



*Corresponding Author: Ahmed Ihsan Alaa

General Surgery Department / Al-Mahmoodiya General Hospital / MOH, Baghdad, Iraq.

DOI: <https://doi.org/10.5281/zenodo.20444640>

How to cite this Article: *¹Ahmed Ihsan Alaa, ²Bassam Jumaa Naji, ³Mustafa Raed Muhi, ⁴Ali Kamal Ghanim (2026) Comparative Study Between Lateral Sphincterotomy And Botulinum Toxin Injection In Treatment Of Chronic Anal Fissures. World Journal of Advance Healthcare Research, 10(6), 161–166.

This work is licensed under Creative Commons Attribution 4.0 International license.

ABSTRACT

Background: Anal fissures are common anorectal conditions characterized by a tear in the anoderm, often leading to significant pain and discomfort. Chronic anal fissures, typically defined as those persisting for more than six weeks, may require intervention beyond conservative measures. **Aim of the study:** This study aims to evaluate the effectiveness of lateral sphincterotomy and Botulinum toxin injection techniques in the treatment of anal fissures. **Methods:** This prospective study was conducted at Al-Imamain Al-Kadmain Teaching Hospital. Data was collected for 69 patients treated between 2022 and 2024, meeting strict inclusion and exclusion criteria. The LS group underwent surgical sphincterotomy under anesthesia, while the BTX injection group received 20 units of BTX via local injection. Follow-up assessments over six months included pain evaluation using the Visual Analog Scale, complication rates, and fissure recurrence. **Results:** Patients treated with LS had significantly lower rates of fissure recurrence (5.1% vs. 96.7%, $p < 0.001$) and fissure pain beyond six months (5.1% vs. 93.3%, $p < 0.001$) compared to the BTX group. Urine retention was more common in the LS group (35.9% vs. 0%, $p < 0.001$), while fecal incontinence rates were similar between groups ($p > 0.9$). **Conclusion:** Lateral sphincterotomy is more effective treatment for anal fissures in the long term than BTX injection. It is associated with significantly lower rates of recurrence and long-term pain. However, BTX injection may be preferred in specific clinical situations due to its lower complication rate, particularly regarding urinary retention.

KEYWORDS: Anal fissure, lateral sphincterotomy, Botulinum toxin injection.

INTRODUCTION

Anal fissure is a superficial tear in the skin distal to the dentate line and is a cause of frequent emergency department visits. In most cases, anal fissures are a result of hard stools or constipation, or injury. Anal fissures are common in both adults and children, and those with a history of constipation tend to have more frequent episodes of this condition and can be acute (less than 6 weeks) or chronic (more than 6 weeks).^[1] Causes of anal fissures commonly include constipation, chronic diarrhea, sexually transmitted diseases, tuberculosis, inflammatory bowel disease, HIV, anal cancer, childbearing, prior anal surgery, and anal sexual intercourse. The majority of acute anal fissures are

thought to be due to the passage of hard stools, sexually transmitted infection, or anal injury due to penetration.^[2] On the other hand, chronic anal fissure typically is a recurrence of an acute type. It is thought to be also caused by the passage of hard stools against an elevated anal sphincter tone pressure, with symptoms lasting greater than 6 weeks. Underlying conditions such as inflammatory bowel disease, tuberculosis, HIV, anal cancer, and prior anal surgery are predisposing factors to both acute and chronic atypical fissures.^[3] About 40% of patients who are present with acute anal fissures progress to chronic anal fissures and can present in any age group; however, they are mostly identified in the pediatric and middle-aged people. Gender is equally affected, and

about 250,000 new cases are diagnosed per year in the United States.^[4] The diagnosis of an anal fissure is typically based on history and physical examination, without the need for more investigations in most cases. Patients are commonly present with severe tearing pain during defecation, often accompanied by a small amount of bright red blood on the stool or toilet paper. A digital rectal examination is usually unnecessary and often contraindicated due to pain.^[5] However, further evaluation with anoscopy, imaging (e.g., CT, MRI, or endoanal ultrasound), or biopsy may be required in cases where the fissure is not visible, the diagnosis is uncertain, there is significant bleeding with risk factors for colorectal cancer, or features suggest a secondary anal fissure.^[6] While surgery remains the gold standard for the treatment of anal fissure, medical therapy is still considered as first-line, including frequent sitz baths, analgesics, stool softeners, and a high-fiber diet are recommended. Prevention of recurrence is the primary goal.^[7] Other options include topical analgesics such as 2% lidocaine jelly, topical nifedipine (works by reducing anal sphincter tone, which promotes blood flow and faster healing), topical nitroglycerin (acts as a vasodilator to encourage increased blood flow to the fissure area), or a combination of topical nifedipine and lidocaine compounded by another medication.^[8]

Contemporary management for chronic anal fissure focuses on reducing the spasm of the internal anal sphincter and relief of symptoms. LS, which provides symptomatic relief and healing, is highly effective but can be associated with permanent complications. Auxiliary medical and non-invasive approaches have been proposed to treat this condition without any risk of permanent internal sphincter injury.^[9] One of these methods is chemical denervation with BTX, which may decrease anal pressure for three months or more, permitting the fissure to restore to the healthy tissue and avoiding the need for surgery. BTX and LS are the main therapeutic options for refractory fissures. BTX is a safe and effective treatment, well-tolerated, minimally invasive and administered on an outpatient basis. Currently, there is no consensus on dosage, the precise site of administration, or the number of injections performed.^[9]

Patients and Methods

Study design and settings

A prospective study was conducted to compare the outcomes of lateral sphincterotomy and Botulinum toxin injection for the management of chronic anal fissures. A total of 69 patients diagnosed with chronic anal fissures were enrolled from the records at Al-Imamain Al-Kadmain Teaching Hospital over three years, from 2023 to 2025.

Inclusion criteria

- Age between 18 and 80 years.
- Underwent LS or BTX for chronic anal fissure.

- Completed at least 12 months of follow-up post-treatment.

Exclusion criteria

- Presence of complicated anal fissure (e.g., stenosis, abscess, fistula, or hemorrhoids).
- Diagnosis of acute anal fissure.
- Treatment with modalities other than LS or BTX.
- Immune deficiency.
- Diagnosis of inflammatory bowel disease, tuberculosis, leukemia or large bowel malignancy.
- Pregnancy.

Intervention groups

1) Botulinum Toxin Injection Procedure

Thirty patients in this group received a total of 20 units of BTX. The injection was administered at two sites: 10 units at the 3 o'clock position and 10 units at the 9 o'clock position to the internal anal sphincter. The procedure was performed while the patients were in a lithotomy position. No sedation or local anesthesia was used during the procedure. Following the injection, conservative measures, including sitz baths and/or the use of anal tampons, were recommended to aid healing, especially during the first weeks.

2) Lateral Sphincterotomy Procedure

Lateral internal sphincterotomy was performed for 39 patients under either general or spinal anesthesia with the patient in the lithotomy position. The procedure involved making a circumferential incision laterally to the skin outside the anal verge. The anoderm and inter-sphincteric groove were carefully dissected and carefully divided a portion of the internal anal sphincter muscle while preserving the external sphincter. The surgical wound was either left open or closed using interrupted sutures, based on the surgeon's preference.

Follow-up and outcome assessment

Patients were followed for six months to evaluate short-term and long-term outcomes.

➤ Post-Procedural Assessments

- During the first six months, patients were assessed for symptoms and signs, including bleeding and pain during defecation. Pain severity was quantified using the Visual Analog Scale (VAS), ranging from 0 (no pain) to 10 (worst pain).
- Complications such as urinary retention and fecal incontinence were documented.

➤ Recurrence Assessment

- After six months, all patients were evaluated for the recurrence of anal fissures.

Ethical issues

Ethical and scientific approval for the research was obtained from the Scientific Committee at the Department of General Surgery, Iraqi Board for Medical

Specialization. Additionally, approval was secured from the administration of the aforementioned hospital.

Data collection

All relevant data were collected prospectively, including demographic details, type of anesthesia used for lateral sphincterotomy, and follow-up findings.

Statistical analysis

Continuous variables were expressed as means and standard deviations. Categorical variables were expressed as frequency and percentages. The Welch's t-test was performed to test the differences in means between two independent variables. The difference between categorical variables was investigated using either the χ^2 test or Fisher's exact test, depending on the context. A P-value less than 0.05 was considered

statistically significant. R software packages (dplyr, gt_summery and ggplot) were used for data processing, visualization, and statistical analysis ("R version 4.3.0, R Foundation for Statistical Computing, Vienna, Austria").

RESULTS

A total of 69 patients were included, with 30 patients having received BTX and 39 having undergone LS. The mean age of all patients was 37.5 ± 13.1 years, with BTX patients averaging 34.6 ± 10.8 years and LS patients averaging 39.6 ± 14.4 years ($p = 0.10$). Regarding gender distribution, 66.7% of patients were male and 33.3% were female across both techniques, with no significant differences observed ($p > 0.9$). Table 1.1 summarized the sociodemographic characteristics of patients in both groups.

Table 1.1: Sociodemographic characteristics of the patients among both techniques.

Characteristic	Overall, N = 69	BTX N= 30	LS N= 39	P-value
Age, years	37.5 ± 13.1	34.6 ± 10.8	39.6 ± 14.4	0.1
Gender				
Male	46 (66.7%)	20 (66.7%)	26 (66.7%)	0.9
Female	23 (33.3%)	10 (33.3%)	13 (33.3%)	

The current study revealed that fissure pain within the first week post-intervention was absent in the BTX group but was reported by all patients (100%) in the LS group. Over the first six months, 20% of the BTX group reported fissure pain, compared to none in LS group ($p = 0.005$). Beyond six months, pain was significantly more in the BTX group (93.3%) compared to the LS group (5.1%), with a highly significant p-value (<0.001). For

urine retention, there was a significant difference ($P < 0.001$). All patients in BTX group (100.0%) had no urine retention, whereas 35.9% of LS patients experienced this complication. Fecal incontinence rates were similar between the two groups ($p > 0.9$), with 6.7% of BTX patients and 7.7% of LS patients reporting this issue. As illustrated in table 1,2

Table 1.2: Signs and symptoms of anal fissure during different times post-intervention of both techniques.

Signs and symptoms	BTX (n= 30)	LS (n= 39)	P-value
Fissure Pain			
Early post-intervention (within one weak)	0 (0)	39 (100%)	
Within the first 6 months	6 (20%)	0 (0)	0.005
After 6 months	28 (93.3%)	2 (5.1%)	0.001
Urine retention			
Absent	30 (100%)	25 (64.1%)	< 0.001
Present	0 (0%)	14 (35.9%)	
Fecal incontinence			
Absent	28 (93.3%)	36 (92.3%)	0.9
Present	2 (6.7%)	3 (7.7%)	

In the BTX group, 96.7% of patients experienced fissure recurrence, whereas only 5.1% of patients in the LS group had recurrence. This difference is statistically significant, with a p-value of <0.001 , indicating a much higher recurrence rate associated with the BTX intervention compared to LS. As illustrated in Table 1.3 and figure 1.1.

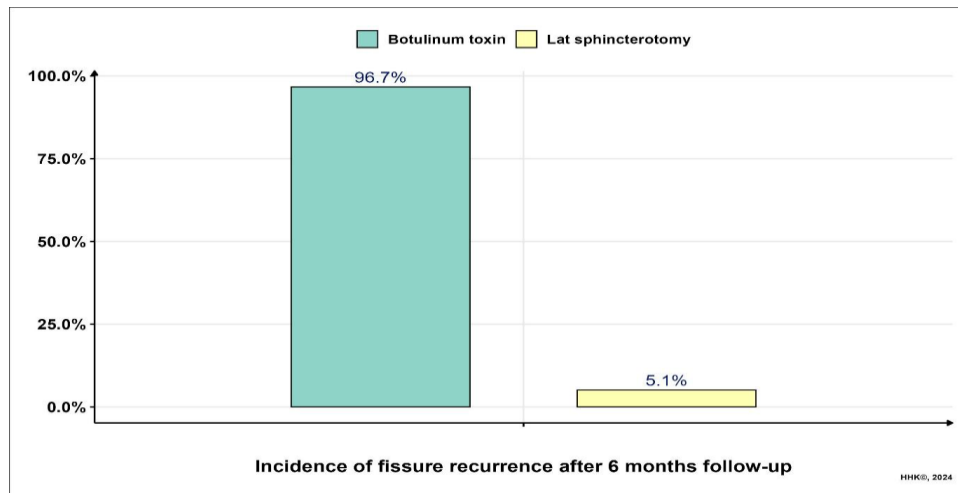


Figure 1.1: Proportion of Fissure recurrence rate after 6 months in both study groups.

Table 3.4: Fissure recurrence rate among Botulinum toxin injection and lateral sphincterotomy procedures.

Incidence of fissure recurrence after 6 months follow-up	BTX (n= 30)	LS (n= 39)	P-value
	29 (96.7%)	2 (5.1%)	< 0.001

DISCUSSION

Over the years, various hypotheses have been presented regarding the development of anal fissures. From anal trauma to internal sphincter hypertonia and resultant local ischemia resulting in non-healing have been postulated as the contributing factors. Many treatment are available, including pharmacological and surgical interventions. Whatever the mode of treatment, the principal aim is to decrease the tone of the internal anal sphincter that increases local blood flow, subsequently leading to healing.^[9]

In this study, no significant differences in age or gender were observed between the BTX and LS groups, confirming the comparability of their sociodemographic characteristics. The mean age of patients was 37.5 ± 13.1 years, with BTX patients averaging 34.6 ± 10.8 years and LS patients averaging 39.6 ± 14.4 years (p = 0.10). Gender distribution showed 66.7% males and 33.3% females, with no significant variation between the groups (p > 0.9). Similarly, Mohamed et al study observed a comparable findings, with the LS group having a mean age of 39.5 ± 3.8 years (80% males and 20% females), and the BTX group having a mean age of 40.4 ± 3.7 years (84% males and 16% females), without significant differences in age or gender between the treatment groups.^[10]

This study reported that, patients who underwent BTX injection had a higher incidence of fissure pain than those who underwent LS. Specifically, fissure pain was more frequent after six months (93.3% vs. 5.1%, p < 0.001). Moreover, the recurrence rate of anal fissures was substantially higher in the BTX group (96.7% vs 5.1%, P<0.001), highlighting its lower long-term effectiveness. Regarding complications, urine retention was significantly more common in the LS group, whereas

BTX did not cause any such issues. Fecal incontinence rates were similar across both groups.

A meta-analysis conducted by Chen et al. demonstrated that LS is superior to BTX injection regarding healing rates and lower recurrence rates.^[11] Similarly, Rashad et al study reported that chronic anal fissures can be effectively treated with LS, achieving a 90% healing rate within two months and no recorded recurrence. In comparison, BTX injections resulted in a 70% healing rate and a 20% recurrence rate.^[12] Moreover, Jin et al study concluded that LS consistently had the highest odds of achieving healing compared to BTX and medical therapy across all follow-up periods. However, sphincterotomy was also associated with the highest likelihood of fecal and flatus incontinence.^[13] Moreover, Mentis et al study corroborated these results, demonstrating significantly higher early (two months) and late (one year) healing rates in the LS group. Nevertheless, LS was associated with a higher complication rate, including eight cases of anal incontinence, compared to none in the botulinum toxin group.^[14]

Some studies contradict the current findings. For instance, a prospective study by Zngana et al study in Erbil, Iraq, reported that the outcomes of LS and BTX injection were similar. However, LS required hospitalization, time off work, and carried anesthesia-related risks, whereas these risks were absent with BTX.^[9] On the other hand, Giral et al study,^[15] and Mohamed et al study,^[10] also concluded that LS and BTX injection are both equally effective treatments for chronic anal fissure.

The discrepancies between these findings and prior studies could be attributed to differences in study design, follow-up durations, or definitions of outcomes.

Furthermore, the decision between LS and BTX injections may depend on patient-specific factors. For instance, BTX injections remain a valuable alternative for patients at higher risk of surgical complications, such as anticoagulant therapy.

The LS is considered the gold standard for managing chronic anal fissures. However, BTX injections into the internal sphincter are often utilized as an alternative in specific cases. This approach is preferred for patients at higher risk of surgical complications (such as those undergoing chemotherapy, significant cardiac issues, or on anticoagulant therapy). Additionally, BTX is an option for patients who opt to avoid surgery altogether.^[16] Overall, while LS is consistently associated with superior long-term efficacy and lower recurrence rates, BTX injection offers a safer profile with minimal complications, making it a viable option in select clinical scenarios. These nuances underline the importance of tailoring treatment decisions to individual patient needs and risk profiles.^[17]

Limitations of the Study

- The study is observational and lacks randomization, which may introduce selection bias.
- The study did not account for potential confounding factors, such as the severity of the fissures at baseline, which could influence treatment efficacy and patient outcomes.

CONCLUSION

LS appears to be a more effective treatment for anal fissures in the long term compared to BTX injection. It is associated with significantly lower rates of fissure recurrence and long-term pain. However, BTX injection may be preferred in specific clinical situations due to its lower complication rate, particularly regarding urinary retention.

Recommendation

- Considering LS for chronic anal fissures, recurrent cases, or when conservative treatments fail.
- Future research should focus on conducting randomized controlled trials with longer follow-up periods to validate these findings and minimize biases.
- Exploring the potential benefits of combining both treatments could provide valuable insights for improving patient outcomes.

REFERENCES

1. Salem AE, Mohamed EA, Elghadban HM, Abdelghani GM. Potential combination topical therapy of anal fissure: development, evaluation, and clinical study. *Drug Delivery*, 2018; 25(1): 1672-82.
2. Choi YS, Lee DH, Lee JB, Lee EJ, Lee SD, Song KH, et al. Clinical characteristics and incidence of perianal diseases in patients with ulcerative colitis. *Annals of coloproctology*, 2018; 34(3): 138.
3. Jamshidi R. Anorectal complaints: hemorrhoids, fissures, abscesses, fistulae. *Clinics in colon and rectal surgery*, 2018; 31(02): 117-20.
4. Khan S-ZS, Martin S, Doh CY, Stein SL, Steinhagen E. Trends in Management of Anal Fissures. *The American Surgeon™*, 2024; 90(3): 393-8.
5. Mansour OS, Al Kharabsheh SEM, Al Khlifat LS, AlNsour D, Hrahsheh TM, Al Khlifat LS, et al. Assessing the epidemiological and clinical characteristics of primary anal fissure among Jordanian patients: A cross-sectional study. 2026.
6. Brilliantino A, Renzi A, Talento P, Iacobellis F, Bruscianno L, Monaco L, et al. The Italian Unitary Society of Colon-proctology (SIUCP: Società Italiana Unitaria di Colonproctologia) guidelines for the management of anal fissure. *BMC Surg.*, 2023; 23(1): 311.
7. Qureshi W. *Diagnosis and management guide for anorectal disease: A clinical reference*: CRC Press, 2024.
8. Wang C, Ni J, Xiong Y, Chen J, Li B, Xu L. The efficacy of diltiazem, glyceryl trinitrate, nifedipine, minoxidil, and lidocaine for the medical management of anal fissure: a systematic review and network meta-analysis of randomized controlled trials. *Int J Surg.*, 2025; 111(4): 3020-9.
9. Zngana AM, Hiwa B. A comparative study between lateral internal anal sphincterotomy and botulinum toxin injection in the treatment of chronic anal fissure. *Zanco Journal of Medical Sciences (Zanco J Med Sci)*, 2021; 25(2): 513-9.
10. Mohamed IAE-F, Shalamesh MI, Badawy ASM. Comparative Study Between Lateral Internal Sphincterotomy vs. Botulinum Toxin Injection In The Treatment Of Chronic Anal Fissure. *Al-Azhar International Medical Journal*, 2023; 4(10): 41.
11. Chen H-L, Woo X-B, Wang H-S, Lin Y-J, Luo H-X, Chen Y-H, et al. Botulinum toxin injection versus lateral internal sphincterotomy for chronic anal fissure: a meta-analysis of randomized control trials. *Techniques in coloproctology*, 2014; 18(8): 693-8.
12. Rashad AM, Nafady HA, El-Gaabary TM. Comparative study between surgical lateral internal sphincterotomy and botulinum toxin injection in the treatment of chronic anal fissure. *The Egyptian Journal of Surgery*. 2020; 39(4).
13. Jin JZ, Bhat S, Park B, Hardy M-O, Unasa H, Mauiliu-Wallis M, et al. A systematic review and network meta-analysis comparing treatments for anal fissure. *Surgery*, 2022; 172(1): 41-52.
14. Menteş BB, İrkörücü O, Akın M, Leventoğlu S, Tatlıcıoğlu E. Comparison of botulinum toxin injection and lateral internal sphincterotomy for the treatment of chronic anal fissure. *Diseases of the colon & rectum*, 2003; 46(2): 232-7.
15. Giral A, Memişoğlu K, Gültekin Y, İmeryüz N, Kalaycı C, Ulusoy NB, et al. Botulinum toxin injection versus lateral internal sphincterotomy in the treatment of chronic anal fissure: a non-

- randomized controlled trial. *BMC gastroenterology*, 2004; 4(1): 7.
16. Acar T, Acar N, Güngör F, Kamer E, Güngör H, Candan MS, et al. Treatment of chronic anal fissure: Is open lateral internal sphincterotomy (LIS) a safe and adequate option? *Asian journal of surgery*, 2019; 42(5): 628-33.
 17. Ebinger SM, Hardt J, Warschkow R, Schmied BM, Herold A, Post S, et al. Operative and medical treatment of chronic anal fissures-a review and network meta-analysis of randomized controlled trials. *Journal of gastroenterology*, 2017; 52(6): 663-76.