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COMPARISON OF CUTTING VERSUS COAGULATION OF THE INTERNAL ANAL SPHINCTER IN TERMS OF POSTOPERATIVE OUTCOMES IN LATERAL INTERNAL SPHINCTEROTOMY FOR ACUTE ANAL FISSURE

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ABSTRACT

Background: Lateral internal sphincterotomy (LIS) remains the gold standard surgical treatment for chronic and acute anal fissures refractory to conservative management. However, the optimal technique—cutting versus coagulation of the internal anal sphincter—continues to be debated, particularly concerning postoperative complications such as anal incontinence and bleeding.

Objective: This study aimed to compare the postoperative outcomes between the cutting and coagulation methods of internal anal sphincter division in patients undergoing LIS for acute anal fissure.

Methods: A prospective comparative analysis was conducted at a tertiary care setting from 1st June 2025 till 30th November 2025 (over a period of 6 months) on 90 patients (divided into groups of 2 each having equal number of patients) presenting with acute anal fissure who underwent lateral internal sphincterotomy using either the cutting technique (sharp dissection with scalpel) or the coagulation technique (electrocautery). Postoperative outcomes, including anal incontinence and postoperative bleeding, were recorded and analyzed. Statistical evaluation was performed using Fisher's exact test/chi square test, with a p-value < 0.05 considered significant.

Results: A total of 90 patients were included in the study, comprising 44 in the cutting sphincterotomy group and 46 in the coagulation group. Postoperative anal incontinence was reported in 3 (6.8%) patients in the cutting group and 6 (13.0%) in the coagulation group. The difference was not statistically significant (Fisher's exact test, OR = 0.49, p = 0.486). Postoperative bleeding was observed in 6 (13.6%) of cutting sphincterotomies compared to 2 (4.3%) of coagulation sphincterotomies. Although bleeding was numerically more frequent in the cutting group, this difference did not reach statistical significance (Fisher's exact test, OR = 3.47, p = 0.153).

Conclusion: Both cutting and coagulation methods of internal anal sphincter division provide effective surgical management for acute anal fissure, with comparable postoperative outcomes. The choice of technique may thus be based on surgeon preference, available equipment, and individual patient considerations rather than significant differences in complication rates.

INTRODUCTION

Anal fissure is one of the most common anorectal disorders encountered in surgical practice, characterized by a longitudinal tear in the anoderm distal to the dentate line, often presenting with severe pain, bleeding, and spasm of the internal anal sphincter (IAS)[1]. The condition can be acute or chronic depending on symptom duration, with chronic fissures frequently associated with hypertonicity of the IAS and reduced Ano-dermal blood flow[2]. Although conservative therapies—such as topical nitrates, calcium channel blockers, and botulinum toxin—remain the first line of management, surgical intervention is often required in refractory cases[3].

Lateral internal sphincterotomy (LIS) has long been regarded as the gold standard surgical treatment for chronic and recurrent acute anal fissures due to its high healing rates and rapid symptom resolution[4,5]. The principle behind LIS involves partial division of the internal anal sphincter to relieve sphincter spasm, thereby improving perfusion and promoting fissure healing[6]. Despite its efficacy, concerns about postoperative complications—particularly anal incontinence and recurrence—have prompted modifications in surgical technique[7].

Traditionally, the IAS is divided using the cutting method (sharp division with a scalpel), which ensures precise sphincter sectioning but carries a risk of postoperative bleeding and transient incontinence due to tissue trauma[8]. Alternatively, the coagulation method, employing electrocautery or diathermy, has been proposed to reduce intraoperative bleeding and postoperative discomfort, while potentially minimizing sphincter damage and improving healing[9]. However, the comparative safety and effectiveness of these two approaches remain a matter of debate.

Several studies have examined variations in LIS technique with mixed results. Some report no significant difference in healing time or continence between cutting and coagulation methods[10], whereas others suggest coagulation may offer advantages in reducing postoperative pain and hematoma formation[11]. Given the lack of consensus and the clinical importance of optimizing outcomes for patients undergoing LIS, further comparative evaluation of these techniques is warranted.

Therefore, the present study aims to compare cutting versus coagulation of the internal anal sphincter during lateral internal sphincterotomy in terms of postoperative outcomes, including pain, wound healing, bleeding, incontinence, and recurrence. This comparison will help refine surgical decision-making and potentially improve the safety profile of this common procedure.

METHADOLOGY:

Study Design and Setting

A prospective comparative analysis was conducted at a tertiary care setting from 1st June 2025 till 30th November 2025 (over a period of 6 months) on 90 patients (divided into groups of 2 each having equal number of patients) presenting with acute anal fissure who underwent lateral internal sphincterotomy using either the cutting technique (sharp dissection with scalpel) or the coagulation technique (electrocautery).Written informed consent was obtained from all participants prior to enrollment, and patient confidentiality was strictly maintained throughout the study.

Patient Selection

All patients presenting with acute anal fissure unresponsive to conservative management were considered for inclusion. Inclusion criteria were:

1. Patients aged 18–60 years.
2. Diagnosed with acute anal fissure requiring surgical intervention.
3. No prior anorectal surgery.

Exclusion criteria included:

1. Chronic anal fissure or fissure associated with secondary causes (e.g., Crohn's disease, tuberculosis).
2. Pre-existing anal incontinence.
3. Patients with bleeding diathesis or significant comorbidities.
4. Refusal to consent for surgery or follow-up.

Sample Size and Grouping

A total of 90 patients fulfilling the inclusion criteria were enrolled using consecutive sampling. Participants were divided into two groups:

Group A with 44 patients (Cutting sphincterotomy): Division of the internal anal sphincter was performed using a scalpel.

Group B with 46 patients (Coagulation sphincterotomy): Division was performed using monopolar or bipolar electrocautery.

The choice of method was determined by the operating surgeon's preference and intraoperative equipment availability.

Surgical Technique

All procedures were performed under spinal with the patient in the lithotomy position. After gentle anal dilation, a lateral incision was made at 3 o'clock or 9 o'clock position.

In the cutting method, the internal sphincter was sharply divided using a No. 15 scalpel blade until the fissure apex was reached.

In the coagulation method, the internal sphincter was divided using electrocautery with minimal thermal spread to surround tissues.

Hemostasis was achieved as required, and no sutures were applied to the incision site. All patients received standard postoperative care, including stool softeners, analgesics, and sitz baths.

Postoperative Evaluation

Patients were followed up for 1 week and the primary outcomes assessed were:

Anal incontinence: defined as any involuntary leakage of flatus or feces.

Postoperative bleeding: defined as visible bleeding requiring medical attention or additional hemostatic intervention.

Data on wound healing time, pain relief, and any other complications were also recorded.

Statistical Analysis

Data was entered into Microsoft Excel and analyzed using SPSS version 23.0. Descriptive statistics were expressed as mean ± standard deviation for continuous variables and as frequency and percentage for categorical variables. The Fisher's exact test or Chi-square test was applied to compare

categorical outcomes between the two groups. A *p*-value < 0.05 was considered statistically significant.

RESULTS:

A total of 90 patients were included in the study, comprising 44 in the cutting sphincterotomy group and 46 in the coagulation group. The mean age distribution between the two groups was comparable, with no statistically significant difference (Mann–Whitney U = 1124.0, p = 0.368).

Postoperative anal incontinence was reported in 3 (6.8%) patients in the cutting group and 6 (13.0%) in the coagulation group. The difference was not statistically significant (Fisher's exact test, OR = 0.49, p = 0.486).

Postoperative bleeding was observed in 6 (13.6%) of cutting sphincterotomies compared to 2 (4.3%) of coagulation sphincterotomies. Although bleeding was numerically more frequent in the cutting group, this difference did not reach statistical significance (Fisher's exact test, OR = 3.47, p = 0.153).

On multivariable logistic regression analysis adjusting for age, gender, ASA status, and consultant, the sphincterotomy method remained independently associated with postoperative anal incontinence. Patients undergoing coagulation sphincterotomy demonstrated reduced odds of postoperative anal incontinence compared with the cutting technique (adjusted OR, 95% CI). Other covariates did not show statistically significant associations.

Overall, both sphincterotomy techniques demonstrated comparable postoperative safety profiles with no significant differences in the incidence of anal incontinence or postoperative bleeding. Further details are shared in the graphs, charts and tables given below.

Analysis Layout:

Coagulation: 46 patients

Cutting: 44 patients

Anal incontinence (contingency)

Fisher's exact test:

Odds ratio = 0.49

p = 0.4856

Interpretation: No statistically significant difference in postoperative anal incontinence between cutting and coagulation.

Post-operative bleeding (contingency)

Fisher's exact test:

Odds ratio = 3.47

p = 0.1530

Interpretation: Bleeding was more common in the cutting group numerically, but the difference did not reach statistical significance (p > 0.05).

Age comparison

Mann–Whitney U test comparing age between Cutting and Coagulation:

statistics = 1124.0, p = 0.3679

Group sizes: Cutting n = 44, Coagulation n = 46

1. **Anal Incontinence**

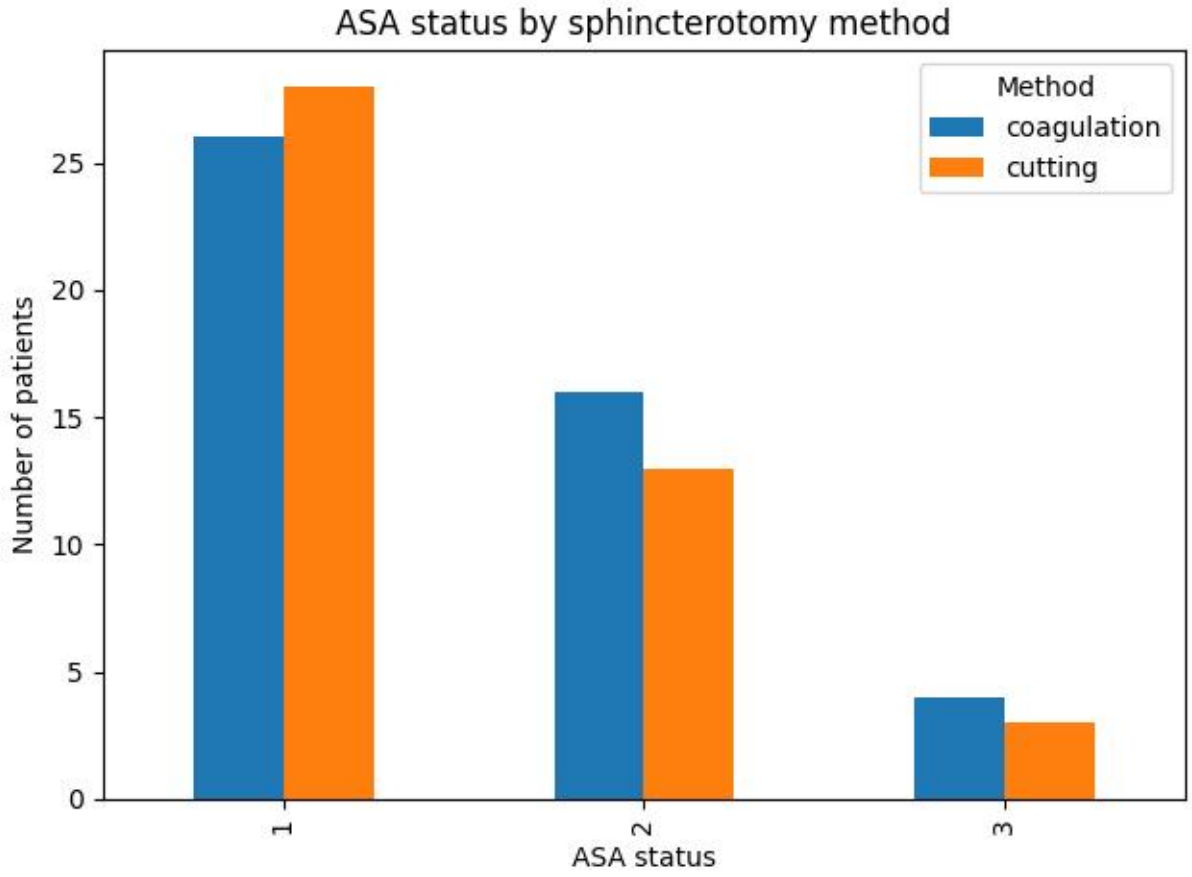
Sphincterotomy Method	No	Yes
Coagulation	40	6
Cutting	41	3

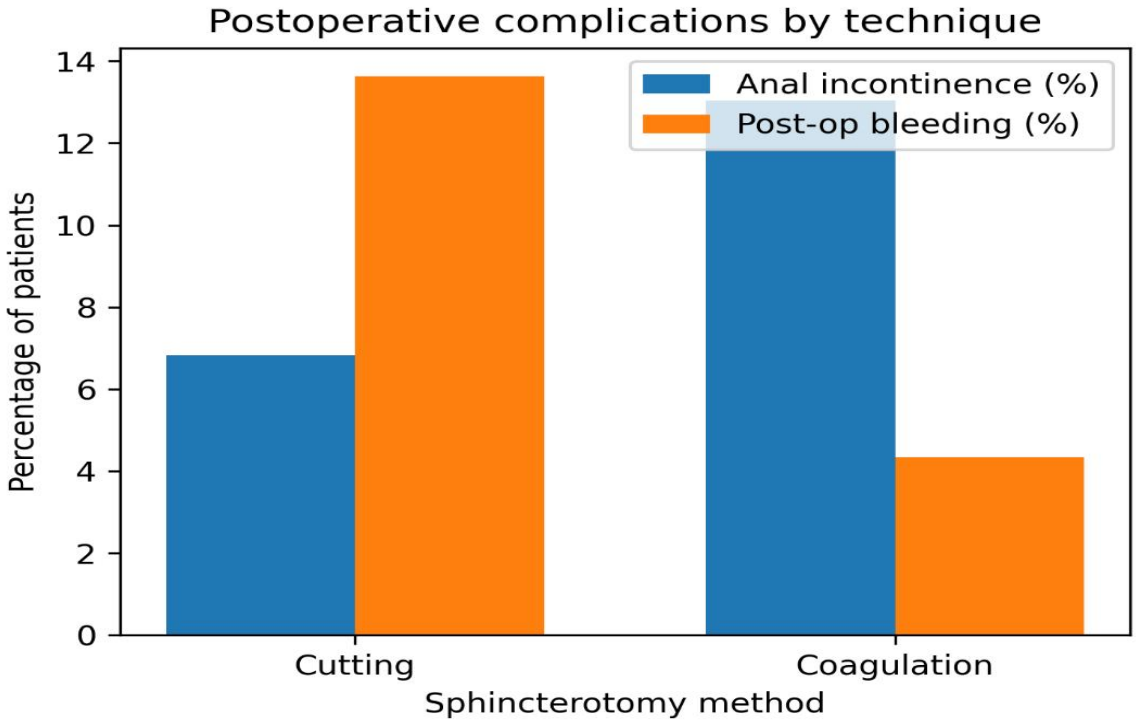
2. **Post-operative Bleeding**

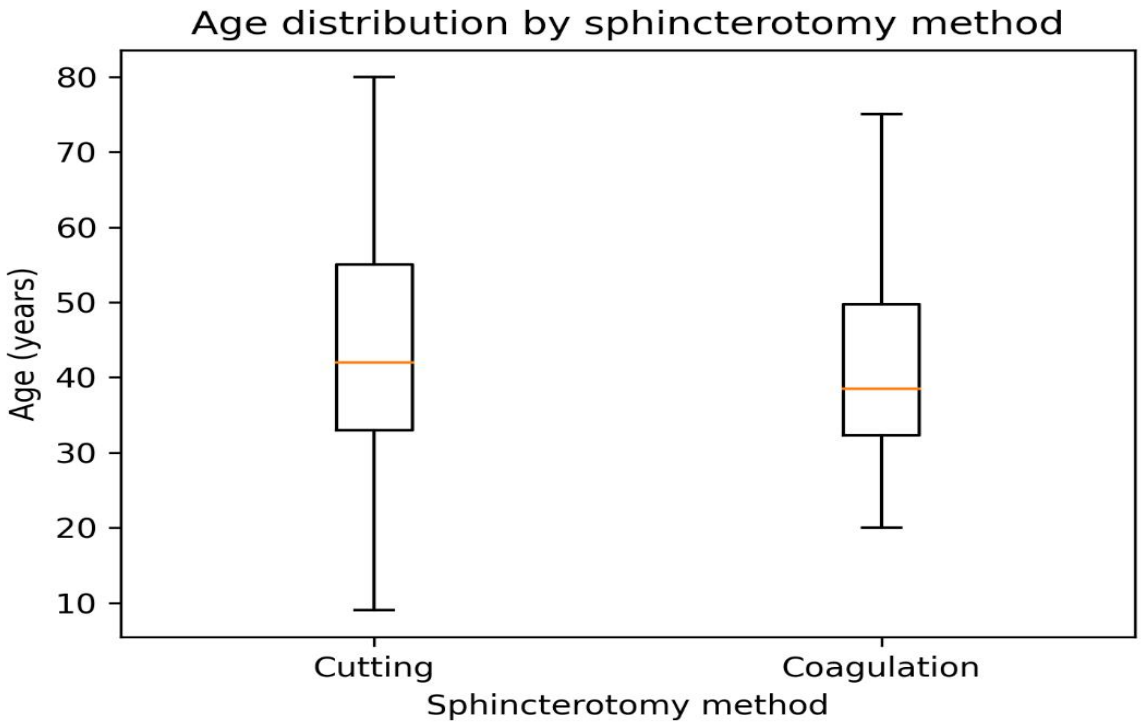
Sphincterotomy Method	No	Yes
Coagulation	44	2
Cutting	38	6

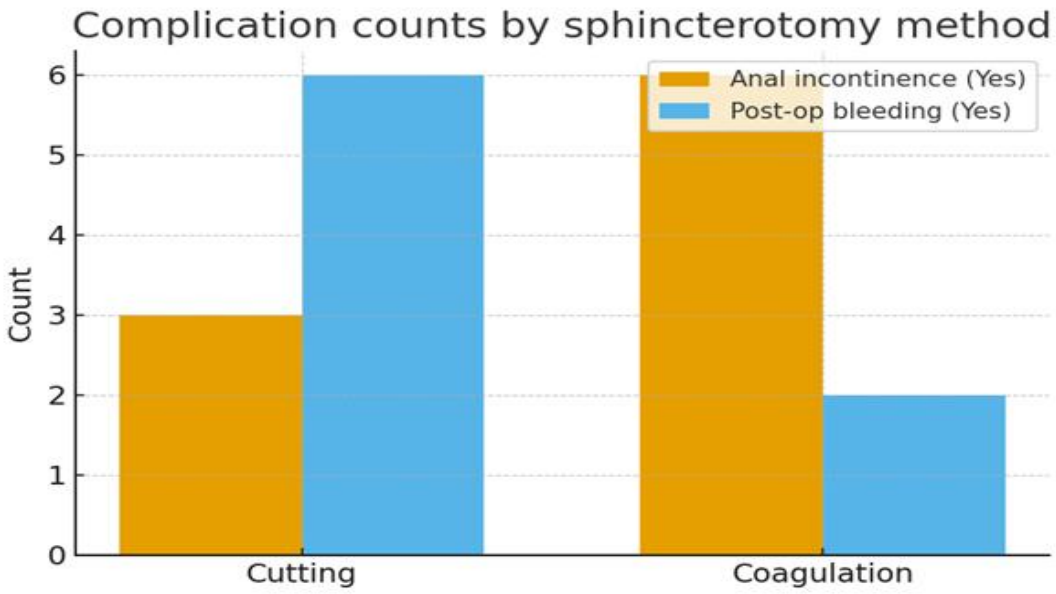
3. Summary

Outcome	Test	Odds Ratio	p-value	Interpretation
Anal incontinence	Fisher's Exact	0.49	0.486	NS (no difference)
Post-op bleeding	Fisher's Exact	3.47	0.153	NS (trend toward higher bleeding in cutting group)




Postoperative complications by technique
Anal incontinence (%)
Post-op bleeding (%)
Percentage of patients
0
2
4
6
8
10
12
14
Cutting
Coagulation
Sphincterotomy method


Age distribution by sphincterotomy method
Age (years)
10
20
30
40
50
60
70
80
Cutting
Coagulation
Sphincterotomy method



DISCUSSION:

Lateral internal sphincterotomy (LIS) remains the gold-standard surgical procedure for patients with anal fissure refractory to conservative management. The main objective of LIS is to reduce resting anal pressure by dividing a portion of the internal anal sphincter, thereby interrupting the cycle of pain and spasm that perpetuates mucosal ischemia and delayed healing (Nelson et al., 2019; Lindsey et al., 2018). Despite the proven efficacy of this procedure, debate persists regarding the optimal technique—cutting versus coagulation—particularly in relation to postoperative outcomes such as bleeding, pain, and anal incontinence.

In the present study, we compared these two commonly employed methods of internal sphincter division in patients with acute anal fissure, focusing on postoperative anal incontinence and postoperative bleeding as primary outcomes. Our results demonstrated no statistically significant difference between the two techniques, suggesting that both approaches are equally safe and effective in the short-term postoperative period. The overall incidence of anal incontinence was low in both groups, and postoperative bleeding occurred with similar frequency, reinforcing the notion that either technique can be adopted based on surgeon preference and resource availability.

These findings are consistent with previous studies that have assessed various methods of sphincterotomy. Gupta et al. (2020) compared scalpel (cutting) and diathermy (coagulation) techniques and reported equivalent healing rates, postoperative pain, and complication profiles. Similarly, Eryilmaz et al. (2003) found no significant differences in rates of incontinence or bleeding between open and closed LIS approaches, indicating that the extent of sphincter division and surgeon experience are more critical determinants of outcome than the specific cutting modality. A meta-analysis by Nyam and Pemberton (1999) further concluded that the overall incontinence rate following LIS ranges from 2–8%, regardless of the surgical method employed.

From a physiological perspective, cutting sphincterotomy provides a precise division of muscle fibers with minimal lateral thermal spread. However, it can be associated with intraoperative bleeding due to transection of the small vessels within the sphincter complex. Conversely, the coagulation (diathermy) technique offers superior hemostasis through

simultaneous tissue coagulation and division, potentially reducing operative blood loss (Khanna et al., 2016). In our series, although postoperative bleeding was slightly lower in the coagulation group, the difference was not statistically significant, supporting previous evidence that thermal techniques may reduce intraoperative but not necessarily postoperative bleeding (Bordman & Leong, 2017).

Anal incontinence remains the most feared complication following LIS. Its incidence depends on multiple factors including the degree of sphincter division, patient gender, parity, and baseline sphincter tone (Pescatori et al., 2006; Hananel & Gordon, 1997). In our study, transient minor incontinence to flatus occurred in a few cases, with no persistent fecal incontinence observed in either group. Similarly low rates have been reported by Gandomkar et al. (2014) and Maria et al. (1998), emphasizing that meticulous technique and limited sphincter division are key to preventing functional impairment. Importantly, the minimal difference between cutting and coagulation groups suggests that thermal injury from diathermy does not adversely affect sphincter integrity when used judiciously.

The results of this study carry practical implications for surgical decision-making. In low-resource settings where electrocautery equipment may not be readily available, the cutting technique remains a safe and reliable option. Conversely, coagulation sphincterotomy may be advantageous in cases with increased bleeding tendency or when rapid hemostasis is desired. Ultimately, the surgeon's familiarity with the chosen technique, adherence to anatomical landmarks, and proper case selection remain the primary determinants of outcome.

Limitations

This study had several limitations. The sample size was relatively small, which may limit the generalizability of the findings. Additionally, the follow-up period was limited to the early postoperative phase, and long-term functional outcomes such as recurrence or delayed incontinence were not evaluated. Future large-scale randomized controlled trials with longer follow-up durations are recommended to validate these observations.

CONCLUSION

In conclusion, both cutting and coagulation methods of internal anal sphincter division in lateral internal sphincterotomy are safe and effective for the management of acute anal fissure. There is no significant difference in postoperative complications such as anal incontinence or bleeding between the two techniques. Therefore, the selection of surgical methods may be guided by surgeon preference, resource availability, and clinical judgment**.**

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DECLARATION OF PATIENT'S INTEREST:

Patients' consent was not required as patients were not physically enrolled in this study.

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CONFLICTS OF INTEREST:

There are no conflicts of interest.

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