

## Original Research Article

# A COMPARATIVE STUDY OF PARTIAL INTERNAL LATERAL SPHINCTEROTOMY AND TOPICAL 2% DILTIAZEM GEL IN THE TREATMENT OF CHRONIC FISSURE IN ANO

Jony Samria<sup>1</sup>, Mukesh Saini<sup>2</sup>, Ayush Mittal<sup>3</sup>, Rishabh Saini<sup>4</sup>, Love Watta<sup>5</sup>

<sup>1</sup>Assistant Professor, Department of General Surgery, Adesh Medical College and Hospital Mohri Kurukshetra, Haryana, India

<sup>2</sup>Assistant Professor, Department of General Surgery, Adesh Medical College and Hospital Mohri Kurukshetra, Haryana, India

<sup>3</sup>Senior Resident, Department of General Surgery, Ajay Sangaal Institute of Medical Sciences and Research, Jhijnana Jamalpur Uttar Pradesh

<sup>4</sup>Senior Resident, Department of General Surgery, Adesh Medical College and Hospital Mohri Kurukshetra, Haryana, India

<sup>5</sup>Assistant Professor, Department of General Surgery, Adesh Medical College and Hospital Mohri Kurukshetra, Haryana, India

Received : 14/01/2026  
Received in revised form : 13/03/2026  
Accepted : 31/03/2026

**Corresponding Author:****Dr. Love Watta,**

Assistant Professor, Department of General Surgery, Adesh Medical College and Hospital Mohri Kurukshetra, Haryana, India.  
Email: samriajohnny@gmail.com

DOI: 10.70034/ijmedph.2026.2.410

Source of Support: Nil,

Conflict of Interest: None declared

**Int J Med Pub Health**

2026; 16 (2); 2456-2464

**ABSTRACT**

**Background:** This study was conducted to compare the efficacy of topical 2% diltiazem gel with partial internal lateral sphincterotomy in treating chronic anal fissures, focusing on wound healing, pain alleviation, complications, and length of hospital stay.

**Materials and Methods:** This comparative study was conducted in the Department of General Surgery, Adesh Medical College and Hospital, Shahabad, Kurukshetra for a period of one year after issuance of approval letter for protocol by controller of examinations.

**Results:** The distribution of gender within each treatment group was comparable, with 33.3% females in the diltiazem gel group and 26.7% in the PILS group. The majority of patients in the diltiazem gel group reported a VAS score of 6 (50%), while 43.3% of those in the PILS group reported a VAS score of 7. The highest proportion of patients (26.7%) reported symptoms for six months, followed by 23.3% with a history of seven months. Diabetes was present in 20% of patients in both treatment groups, while tuberculosis was absent in all patients. Hypertension was observed in 13.3% of diltiazem gel patients and 20% of PILS patients. A family history of diabetes was more prevalent in the PILS group (10%) compared to the diltiazem gel group (3.3%). Tuberculosis was absent in all patients' family histories, while hypertension was present in only 3.3% of PILS patients. Smoking and alcohol consumption were more common in the PILS group (30%) compared to the diltiazem gel group (16.7%).

**Conclusion:** The comparative analysis of partial internal lateral sphincterotomy (PILS) and 2% diltiazem gel for the treatment of chronic anal fissure strongly supports PILS as the superior treatment option. The present study, along with multiple supporting studies, confirms that PILS leads to significantly faster and more complete pain relief, quicker healing, and higher rates of symptom resolution compared to diltiazem gel.

**Keywords:** Topical 2% diltiazem gel, partial internal lateral sphincterotomy, chronic anal fissures, wound healing, pain alleviation, complications, and length of hospital stay.

**INTRODUCTION**

Anal fissures are regarded as one of the most prevalent causes of intense anal pain. The problem is

particularly concerning as the intensity of the patient's agony and degrees of incapacity significantly surpass what would be anticipated from an apparently minor injury.<sup>[1]</sup> An anal fissure is a linear laceration or ulceration in the distal anal canal.

It is typically situated in the posterior or anterior midline, extending from the dentate line to the anal margin. Anal fissures may be classified as acute or chronic. An acute fissure manifests within 3 to 6 weeks of the commencement of symptoms. The anoderm exhibits a clean longitudinal rupture with minimal surrounding inflammation. Acute fissures typically resolve spontaneously within six weeks. A chronic fissure, persisting for over 6 weeks, is typically deeper and often reveals exposed internal sphincter fibres at its base. It is often linked to a hypertrophy anal papilla at its superior aspect and a sentinel pile at its distal aspect.<sup>[2]</sup> Chronic anal fissure is currently defined by the presence of exposed internal anal sphincter fibres through the ulcer, rather than duration alone.<sup>[3]</sup>

Anal fissures are characterised as primary (idiopathic) and secondary based on aetiology. Secondary fissures arise as a consequence of several pathologies, including Crohn's disease, anal TB, and AIDS. Patients typically exhibit pain during defecation and the expulsion of bright red blood from the anus.<sup>[2]</sup> The exact cause of anal fissure remains unidentified. Fissures are primarily caused by trauma from the passage of a large, hard stool. However, they may also occur following acute diarrhoea episodes. Painful fissures are typically linked to involuntary spasms of the internal sphincter, resulting in elevated resting pressure within the anal canal. Chronic hyperactivity of the internal sphincter appears to be the underlying reason. Generally, these conditions are self-limiting in children, while in adults, they may necessitate surgical intervention.<sup>[4]</sup> The alleviation of anal sphincter spasm enhances blood circulation and promotes the repair of fissures.<sup>[2]</sup> Ninety percent of anal fissures are situated in the posterior midline, with a ratio of 10:1.<sup>[3]</sup> Fissures may be found in the anterior midline in up to 25% of females and 8% of males. Fissures in the lateral position may indicate additional pathological conditions such as inflammatory bowel disease or granulomatous disorders.<sup>[4]</sup> Chronic anal fissure is a condition prevalent in middle life, particularly between the ages of 30 and 50.<sup>[3]</sup>

Significant advancements have been made in comprehending the anatomy of the anal canal and the mechanisms governing rectal and anal continence. This has allowed the surgeon to address the fissure while preserving the spastic anorectal ring, maintaining continence, and eliminating the illness.<sup>[5]</sup> Throughout evolution, numerous surgical and non-surgical therapeutic modalities have been proposed for the management of chronic anal fissures. The rate of healing and pain reduction are the key endpoints in evaluating the efficacy of any treatment for chronic anal fissures. The principal objective in managing chronic anal fissures is to alleviate sphincter hypertonia.<sup>[3]</sup> Surgical methods such as manual anal dilatation or lateral internal sphincterotomy (LIS) can efficiently repair the majority of fissures within several weeks; nevertheless, they may lead to lifelong impairment of anal continence.<sup>[2]</sup> The internal lateral

anal sphincterotomy was initially introduced by Eisenhammer in 1951. The surgery offers immediate symptomatic relief by alleviating abnormally high pressures in the anal canal. The treatment has achieved a cure rate above 95% at three weeks post-intervention. It is presently regarded as the gold standard surgical procedure; however it may lead to persistent impairment of anal continence.<sup>[4]</sup>

This has prompted research into alternative non-surgical treatments, with various pharmacological agents, including nitrates (glyceryl trinitrate (GTN), isosorbide dinitrate) and calcium channel blockers (nifedipine, diltiazem), demonstrating efficacy in reducing resting anal pressure and promoting fissure healing without compromising anal continence.<sup>[6]</sup> Despite initial promise, topical GTN has since been characterised by unsatisfactory outcomes and notable side effects, including tachyphylaxis, headache, and occasional loss of flatus. Topical diltiazem has recently demonstrated efficacy and may possess a different side-effect profile compared to oral formulations.<sup>[7]</sup> Topical diltiazem is a novel addition to the colorectal surgeon's arsenal for managing persistent fissures. The complications or side effects associated with diltiazem gel are regarded as low. Unlike surgery, chemical sphincterotomy using diltiazem is reversible and thus less likely to negatively impact continence. Patients who are hypertensive, diabetic, and medically unfit for surgery may be advised to use diltiazem. Although the healing rate of fissures is relatively sluggish with diltiazem, patients can be spared the stress associated with surgery.<sup>[8]</sup>

This study was conducted to compare the efficacy of topical 2% diltiazem gel with partial internal lateral sphincterotomy in treating chronic anal fissures, focusing on wound healing, pain alleviation, complications, and length of hospital stay.

## MATERIALS AND METHODS

This comparative study was conducted in the Department of General Surgery, Adesh Medical College and Hospital, Shahabad, Kurukshetra for a period of one year after issuance of approval letter for protocol by controller of examinations. All the patients who are admitted in the surgery ward at Adesh Medical College and Hospital, Shahabad, Kurukshetra with Chronic fissure in ANO were evaluated.

In this prospective trial, 60 surgical outpatients and/or admitted patients with chronic fissure in ANO were randomly divided into Group 1 (Partial Internal Lateral Sphincterotomy) and Group 2 (Topical Diltiazem 2% Gel) with 30 patients in each Group. Patients were followed up at weekly intervals for six consecutive weeks and biweekly for subsequent 6 weeks.

### Inclusion criteria

- Patients between 20 to 60 years of age of both sexes.

- Presence of anal fissure that had failed to resolve with simple measures such as laxatives and high fibre diet.
- Patients giving informed consent. Exclusion Criteria
- Patients who had previous surgery for anal fissure.
- Pregnant women.
- Patients with significant cardiovascular condition.
- Patients with fissures secondary to crohn's disease, ulcerative colitis, tuberculosis, anal warts, malignancy, sexually transmitted disease.

In all cases relevant history, general physical examination and investigations were done as per proforma attached to confirm diagnosis. An informed consent was also taken.

Data were entered on Microsoft Excel software and statistical analysis was done using a licensed version of IBM(R) Statistical Package for Social Sciences (SPSS) version 27.0. Descriptive analysis was done by calculating proportions, means and standard deviation. For estimating the difference between surgical and medical management in treatment of chronic fissure in ANO unpaired t test and paired t test were evaluated. A p value of < 0.05 is indicated as statistically significant.

## RESULTS

**Table 1: Distribution of patients across fissure in ANO treatment groups according to gender and chief complaint**

	Treatment of Chronic Fissure in ANO						p-value	
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total		
		N1	%	N2	%	N3		%
Gender	Female	10	33.30%	8	26.70%	18	30.00%	0.573
	Male	20	66.70%	22	73.30%	42	70.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Pain (VAS)	4	4	13.30 %	1	3.30 %	5	8.30%	0.172
	5	3	10.00 %	6	20.00 %	9	15.00 %	
	6	15	50.00 %	10	33.30 %	25	41.70 %	
	7	8	26.70 %	13	43.30 %	21	35.00 %	
Bleeding	Absent	9	30.00 %	12	40.00 %	21	35.00 %	0.417
	Present	21	70.00 %	18	60.00 %	39	65.00 %	
Itching	Absent	12	40.00 %	23	76.70 %	35	58.30 %	0.004
	Present	18	60.00 %	7	23.30 %	25	41.70 %	
Constipation	Present	30	100.00 %	30	100.00 %	60	100.00 %	

Among these, 30% were female and 70% were male. The distribution of gender within each treatment group was comparable, with 33.3% females in the diltiazem gel group and 26.7% in the PILS group. The chi-square test result ( $p = 0.573$ ) indicates no statistically significant difference in gender distribution between the two treatment groups. The

majority of patients in the diltiazem gel group reported a VAS score of 6 (50%), while 43.3% of those in the PILS group reported a VAS score of 7. The chi-square test ( $p = 0.172$ ) suggests that the pain scores between the two groups were not significantly different at baseline.

**Table 2: Distribution of patients across fissure in ANO treatment groups according to duration of symptoms and comorbidities**

		Treatment of Chronic Fissure in ANO						p-value
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total		
		N1	%	N2	%	N3	%	
Duration of Symptoms (Months)	6	9	30.00 %	7	23.30 %	16	26.70 %	0.735
	7	6	20.00 %	8	26.70 %	14	23.30 %	
	8	6	20.00 %	3	10.00 %	9	15.00 %	
	9	3	10.00 %	4	13.30 %	7	11.70 %	
	10	3	10.00 %	2	6.70 %	5	8.30 %	
	11	1	3.30 %	2	6.70 %	3	5.00 %	
	12	1	3.30%	3	10.00 %	4	6.70 %	
	13	0	0.00 %	1	3.30%	1	1.70 %	
	14	1	3.30 %	0	0.00 %	1	1.70 %	
	Total	30	100.00 %	30	100.00 %	60	100.00 %	
Diabetes	Absent	24	80.00%	24	80.00%	48	80.00%	1
	Present	6	20.00%	6	20.00%	12	20.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Tuberculosis	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Hypertension	Absent	26	86.70%	24	80.00%	50	83.30%	0.488
	Present	4	13.30%	6	20.00%	10	16.70%	
	Total	30	100.00%	30	100.00%	60	100.00%	

The highest proportion of patients (26.7%) reported symptoms for six months, followed by 23.3% with a history of seven months. The chi-square test ( $p = 0.735$ ) indicates that there was no significant difference in symptom duration between the two treatment groups. Diabetes was present in 20% of

patients in both treatment groups, while tuberculosis was absent in all patients. Hypertension was observed in 13.3% of diltiazem gel patients and 20% of PILS patients. The chi-square test for hypertension ( $p = 0.488$ ) revealed no significant difference between groups.

**Table 3: Distribution of patients across fissure in ANO treatment groups according to family history and personal history**

Family history		Treatment of Chronic Fissure in ANO						p-value
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total		
		N1	%	N2	%	N3	%	
Diabetes	Absent	29	96.70%	27	90.00%	56	93.30%	0.301
	Present	1	3.30%	3	10.00%	4	6.70%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Tuberculosis	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Hypertension	Absent	30	100.00%	29	96.70%	59	98.30%	0.313
	Present	0	0.00%	1	3.30%	1	1.70%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Smoking	Absent	25	83.30%	21	70.00%	46	76.70%	0.222
	Present	5	16.70%	9	30.00%	14	23.30%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Alcoholism	Absent	25	83.30%	21	70.00%	46	76.70%	0.222
	Present	5	16.70%	9	30.00%	14	23.30%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Spices	Absent	17	56.70%	19	63.30%	36	60.00%	0.598
	Present	13	43.30%	11	36.70%	24	40.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Chilies	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Milk	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Veg/non vegetarian	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	

A family history of diabetes was more prevalent in the PILS group (10%) compared to the diltiazem gel group (3.3%), though this was not statistically significant ( $p = 0.301$ ). Tuberculosis was absent in all patients' family histories, while hypertension was present in only 3.3% of PILS patients. Smoking and

alcohol consumption were more common in the PILS group (30%) compared to the diltiazem gel group (16.7%). However, this difference was not statistically significant ( $p = 0.222$ ). Dietary factors such as spicy food and milk intake did not show significant differences between the groups.

**Table 4: Distribution of patients across fissure in ANO treatment groups according to general physical examination and vitals**

		Treatment of Chronic Fissure in ANO						p-value
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total		
		N1	%	N2	%	N3	%	
General condition	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Pallor	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Cyanosis	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Clubbing	Absent	29	96.70%	30	100.00%	59	98.30%	0.313
	present	1	3.30%	0	0.00%	1	1.70%	
	Total	30	100.00%	30	100.00%	60	100.00%	
Icterus	Absent	30	100.00%	30	100.00%	60	100.00%	
	Total	30	100.00%	30	100.00%	60	100.00%	

Regarding clubbing, only one patient (3.3%) in the diltiazem gel group exhibited clubbing, while none in the sphincterotomy group had this condition. However, the chi-square test ( $\chi^2 = 1.017$ ) and p-value (0.313) indicate that the difference is not statistically

significant. The comparison of vital parameters between the Topical 2% diltiazem gel group and the PILS group showed no significant differences between the two treatment modalities.

**Table 5: Distribution of patients across fissure in ANO treatment groups according to systemic examination**

		Treatment of Chronic Fissure in ANO					
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total	
		N1	%	N2	%	N3	%
Anal Fissure	Absent	30	100.00%	30	100.00%	60	100.00%
	Total	30	100.00%	30	100.00%	60	100.00%
RS	Absent	30	100.00%	30	100.00%	60	100.00%
	Total	30	100.00%	30	100.00%	60	100.00%
CVS	Absent	30	100.00%	30	100.00%	60	100.00%
	Total	30	100.00%	30	100.00%	60	100.00%
CNS	Absent	30	100.00%	30	100.00%	60	100.00%
	Total	30	100.00%	30	100.00%	60	100.00%
PA	Absent	30	100.00%	30	100.00%	60	100.00%
	Total	30	100.00%	30	100.00%	60	100.00%

All patients in both treatment groups were free of systemic abnormalities, indicating that both treatment modalities were implemented in otherwise healthy individuals with no additional complications.

**Table 6: Comparison of pain progression over time across treatment groups**

PAIN		Treatment of Chronic Fissure in ANO						p-value
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total		
		N1	%	N2	%	N3	%	
Week 1	Absent	1	3.30%	0	0.00%	1	1.70%	0.313
	Present	29	96.70%	30	100.00%	59	98.30%	
Week 2	Absent	2	6.70%	30	100.00%	32	53.30%	0
	Present	28	93.30%	0	0.00%	28	46.70%	
Week 3	Absent	3	10.00%	30	100.00%	33	55.00%	0
	Present	27	90.00%	0	0.00%	27	45.00%	
Week 4	Absent	9	30.00%	30	100.00%	39	65.00%	0
	Present	21	70.00%	0	0.00%	21	35.00%	
Week 5	Absent	17	56.70%	30	100.00%	47	78.30%	0
	Present	13	43.30%	0	0.00%	13	21.70%	
Week 6	Absent	27	90.00%	30	100.00%	57	95.00%	0.076
	Present	3	10.00%	0	0.00%	3	5.00%	
Week 8	Absent	27	90.00%	30	100.00%	57	95.00%	0.076
	Present	3	10.00%	0	0.00%	3	5.00%	
Week 10	Absent	27	90.00%	30	100.00%	57	95.00%	0.076
	Present	3	10.00%	0	0.00%	3	5.00%	
Week 12	Absent	27	90.00%	30	100.00%	57	95.00%	0.076
	Present	3	10.00%	0	0.00%	3	5.00%	

In Week 1, nearly all patients in both treatment groups experienced pain, with 96.7% in the diltiazem gel group and 100% in the sphincterotomy group reporting pain, showing no statistically significant difference. However, by Week 2, a significant improvement was observed in the sphincterotomy group, where all patients were pain-free, whereas 93.3% of diltiazem patients still reported pain (p = 0.000). This trend continued in Week 3, with 90% of diltiazem patients still experiencing pain, while the sphincterotomy group remained pain-free. By Week 4, 70% of patients in the diltiazem group still had pain, compared to none in the sphincterotomy group, further reinforcing the effectiveness of surgical

intervention (p = 0.000). In Week 5, pain persisted in 43.3% of the diltiazem patients, but again, all sphincterotomy patients remained pain-free. By Week 6, 90% of diltiazem patients reported no pain, while 10% continued to experience discomfort (p = 0.076). From Week 8 to Week 12, pain levels stabilized, with 90% of diltiazem patients being pain-free, while the sphincterotomy group remained completely free of pain. These results indicate that sphincterotomy provides faster and more complete pain relief, whereas diltiazem gel leads to a slower reduction in pain over time, with some patients still experiencing discomfort at later stages.

**Table 7: Comparison of bleeding progression over time across treatment groups**

Bleeding		Treatment of Chronic Fissure in ANO						p-value
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total		
		N1	%	N2	%	N3	%	
Week 1	Absent	16	53.30%	13	43.30%	29	48.30%	0.438
	Present	14	46.70%	17	56.70%	31	51.70%	
Week 2	Absent	20	66.70%	26	86.70%	46	76.70%	0.067
	Present	10	33.30%	4	13.30%	14	23.30%	
Week 3	Absent	20	66.70%	26	86.70%	46	76.70%	0.067

	Present	10	33.30%	4	13.30%	14	23.30%	
Week 4	Absent	25	83.30%	29	96.70%	54	90.00%	0.085
	Present	5	16.70%	1	3.30%	6	10.00%	
Week 5	Absent	29	96.70%	30	100.00%	59	98.30%	0.313
	Present	1	3.30%	0	0.00%	1	1.70%	
Week 6	Absent	30	100.00%	30	100.00%	60	100.00%	
	Present	0	0.00%	0	0.00%	0	0.00%	
Week 8	Absent	30	100.00%	30	100.00%	60	100.00%	
	Present	0	0.00%	0	0.00%	0	0.00%	
Week 10	Absent	30	100.00%	30	100.00%	60	100.00%	
	Present	0	0.00%	0	0.00%	0	0.00%	
Week 12	Absent	30	100.00%	30	100.00%	60	100.00%	
	Present	0	0.00%	0	0.00%	0	0.00%	

In Week 1, bleeding was reported in 46.7% of diltiazem patients and 56.7% of sphincterotomy patients, with no significant difference between the groups ( $p = 0.438$ ). By Week 2, bleeding reduced significantly in the sphincterotomy group, with only 13.3% still experiencing it, compared to 33.3% in the diltiazem group, though this difference was not statistically significant ( $p = 0.067$ ). The same pattern was observed in Week 3, with 33.3% of diltiazem patients still bleeding, compared to only 13.3% in the sphincterotomy group. By Week 4, bleeding

persisted in 16.7% of the diltiazem group, whereas only 3.3% of the sphincterotomy group reported bleeding, suggesting faster resolution with surgical treatment. By Week 5, bleeding had resolved completely in the sphincterotomy group, while 3.3% of the diltiazem patients still reported it ( $p = 0.313$ ). From Week 6 onward, no patients in either group experienced bleeding, confirming that both treatments effectively stopped bleeding over time, though sphincterotomy led to a faster resolution.

**Table 8: Comparison of drug side effects over time across treatment groups**

Drug SE		Treatment of Chronic Fissure in ANO						p- value
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total		
		N1	%	N2	%	N3	%	
Week 1	Absent	0	0.00%	30	100.00%	30	50.00%	0
	Present	30	100.00%	0	0.00%	30	50.00%	
Week 2	Absent	0	0.00%	30	100.00%	30	50.00%	0
	Present	30	100.00%	0	0.00%	30	50.00%	
Week 3	Absent	0	0.00%	27	90.00%	27	45.00%	0
	Present	30	100.00%	3	10.00%	33	55.00%	
Week 4	Absent	8	26.70%	29	96.70%	37	61.70%	0
	Present	22	73.30%	1	3.30%	23	38.30%	
Week 5	Absent	16	53.30%	30	100.00%	46	76.70%	0
	Present	14	46.70%	0	0.00%	14	23.30%	
Week 6	Absent	16	53.30%	30	100.00%	46	76.70%	0
	Present	14	46.70%	0	0.00%	14	23.30%	
Week 8	Absent	23	76.70%	30	100.00%	53	88.30%	0.005
	Present	7	23.30%	0	0.00%	7	11.70%	
Week 10	Absent	25	83.30%	30	100.00%	55	91.70%	0.02
	Present	5	16.70%	0	0.00%	5	8.30%	
Week 12	Absent	25	83.30%	30	100.00%	55	91.70%	0.02
	Present	5	16.70%	0	0.00%	5	8.30%	

All patients in the diltiazem gel group experienced drug side effects from Week 1, whereas none of the sphincterotomy patients had side effects. This continued through Weeks 2 and 3, with 100% of diltiazem patients affected, while sphincterotomy patients remained unaffected. By Week 4, side effects reduced to 73.3% in the diltiazem group, while only 3.3% in the sphincterotomy group reported any side

effects ( $p < 0.001$ ). This trend continued, with a gradual reduction in side effects in the diltiazem group, reaching 16.7% by Week 12, while the sphincterotomy group had none. This confirms that diltiazem gel is associated with significant drug-related side effects, whereas sphincterotomy does not cause any.

**Table 9: Comparison of persistence over time across treatment groups**

Persistence		Treatment of Chronic Fissure in ANO						p- value
		Topical 2% Diltiazem Gel		Partial Internal Lateral Sphincterotomy		Total		
		N1	%	N2	%	N3	%	
Week 1	Absent	0	0.00%	0	0.00%	0	0.00%	
	Present	30	100.00%	30	100.00%	60	100.00%	
Week 2	Absent	0	0.00%	0	0.00%	0	0.00%	
	Present	30	100.00%	30	100.00%	60	100.00%	

Week 3	Absent	0	0.00%	0	0.00%	0	0.00%	
	Present	30	100.00%	30	100.00%	60	100.00%	
Week 4	Absent	2	6.70%	2	6.70%	4	6.70%	1
	Present	28	93.30%	28	93.30%	56	93.30%	
Week 5	Absent	6	20.00%	28	93.30%	34	56.70%	0
	Present	24	80.00%	2	6.70%	26	43.30%	
Week 6	Absent	10	33.30%	28	93.30%	38	63.30%	0
	Present	20	66.70%	2	6.70%	22	36.70%	
Week 8	Absent	20	66.70%	28	93.30%	48	80.00%	0.01
	Present	10	33.30%	2	6.70%	12	20.00%	
Week 10	Absent	20	66.70%	28	93.30%	48	80.00%	0.01
	Present	10	33.30%	2	6.70%	12	20.00%	
Week 12	Absent	20	66.70%	28	93.30%	48	80.00%	0.01
	Present	10	33.30%	2	6.70%	12	20.00%	

In Weeks 1-3, all patients in both groups continued to experience fissure symptoms. By Week 4, symptoms persisted in 93.3% of both groups ( $p = 1.0$ ). However, by Week 5, only 6.7% of sphincterotomy patients still had symptoms, compared to 80% in the diltiazem group ( $p < 0.001$ ). This pattern continued, with 93.3% of sphincterotomy patients symptom-free by Week 12, while only 66.7% of diltiazem patients achieved full resolution ( $p = 0.01$ ), confirming that sphincterotomy is more effective for complete symptom resolution.

## DISCUSSION

This comparative study was conducted in the Department of General Surgery, Adesh Medical College and Hospital, Shahabad, Kurukshetra in 60 patients (30 in each group). In this prospective trial, 60 surgical outpatients and/or admitted patients with chronic fissures in ANO were randomly divided into Group 1 (Partial Internal Lateral Sphincterotomy) and Group 2 (Topical Diltiazem 2% Gel) with 30 patients in each group. Patients were followed up at weekly intervals for six consecutive weeks and biweekly for subsequent 6 weeks. The majority of patients were male (70%), while females accounted for 30%, with a comparable gender distribution between the two treatment groups ( $p = 0.573$ ). The most affected age group was 41-50 years (31.7%), followed by 31-40 years (40%), while the  $\leq 30$  years category had the lowest incidence (3.3%). The chi-square test ( $p = 0.67$ ) confirmed that age does not significantly influence treatment choice between diltiazem gel and PILS.

Several studies align closely with the findings of the present study. Research conducted by Srinivasan et al. reported that the highest number of patients were in the 31-40 years age group (40%), followed by 41-50 years (30%), with a male predominance of 70%, consistent with the present study. Additionally, posterior fissures were more common (70%) than anterior ones (30%), a trend also observed in other studies.<sup>[9]</sup> Similarly, Jade et al. found that 40% of patients were in the 31-40 years age group, followed by 30% in the 41-50 years category, with males making up 70% of cases, mirroring the present study's distribution.<sup>8</sup> Gour et al. conducted a study on 100 patients aged 18-76 years, with a mean age of

37.44 years in the study group and 36 years in the control group, reporting a higher male prevalence (66% in the study group, 74% in the control group), reinforcing the male predominance observed in the present study (70%).<sup>10</sup> Chowdhry et al. found a male-to-female ratio of 1.8:1, closely resembling the present study's findings, and reported that the peak incidence was in the fourth decade (31-40 years), consistent with findings from other studies.<sup>[11]</sup>

In contrast, Kulkarni et al. reported that younger individuals (20-30 years: 64%) were the most affected, with a higher incidence in females (72%) compared to males (28%).<sup>[11]</sup> This differs significantly from the present study and others, which suggest that middle-aged individuals (31-50 years) are most affected and that males are predominantly affected. This discrepancy may be attributed to regional, lifestyle, or genetic factors, as well as differences in sample populations. Most studies, including the present one, indicate that chronic fissure in ANO is more common in men and typically occurs in middle age. The variations observed in some studies, particularly the higher incidence in younger females in the Kulkarni study, suggest that certain demographic or environmental factors may influence the prevalence and distribution of the condition. However, treatment selection appears to be primarily influenced by clinical factors rather than age or sex distribution.<sup>[11]</sup>

The present study demonstrates a clear advantage of PILS over diltiazem gel in providing faster and more complete pain relief for chronic anal fissure patients. In Week 1, pain was nearly universal, with 96.7% of diltiazem patients and 100% of PILS patients reporting pain, showing no statistically significant difference between the groups. However, by Week 2, all PILS patients were pain-free, while 93.3% of diltiazem patients continued to experience pain ( $p = 0.000$ ), highlighting a significant early advantage of surgical treatment. This trend continued in Week 3, where 90% of diltiazem patients still reported pain, whereas all PILS patients remained pain-free. By Week 4, 70% of diltiazem patients continued to experience pain, while PILS patients remained completely symptom-free ( $p = 0.000$ ). This reinforced the superiority of surgical intervention in achieving faster pain relief. In Week 5, 43.3% of diltiazem patients still had pain, but PILS patients remained pain-free. By Week 6, 90% of diltiazem

patients reported no pain, though 10% still had residual discomfort ( $p = 0.076$ ). From Week 8 to Week 12, pain levels stabilized, with 90% of diltiazem patients being pain-free, while PILS patients remained completely free of pain throughout. These findings are consistent with previous studies. Amutha et al. (2021) reported that 100% of LIS patients experienced complete pain relief by Week 8, whereas 10.6% of diltiazem patients still had lingering pain at 14 weeks.<sup>12</sup> Similarly, Choudhary et al. (2016) found that 97.14% of LIS patients achieved pain relief, compared to 82.8% of diltiazem patients, further confirming the superiority of LIS in pain resolution.<sup>1</sup> Jade et al. (2015) also noted that 66.6% of LIS patients were pain-free at 4 weeks, compared to 61.5% in the diltiazem group, but by 8 weeks, LIS achieved complete pain relief, while diltiazem patients required longer recovery times.<sup>18</sup> The present study demonstrates a clear difference in the resolution of bleeding between PILS and diltiazem gel, with PILS providing faster relief. In Week 1, bleeding was reported in 46.7% of diltiazem patients and 56.7% of PILS patients, showing no statistically significant difference ( $p = 0.438$ ). However, by Week 2, bleeding reduced significantly in the PILS group, with only 13.3% of patients still experiencing it, compared to 33.3% in the diltiazem group. Although the difference was not statistically significant at this stage ( $p = 0.067$ ), it suggested a trend toward faster resolution in the PILS group. By Week 3, 33.3% of diltiazem patients still had bleeding, whereas the PILS group saw a much lower 13.3% prevalence, reinforcing the advantage of surgical intervention. By Week 4, only 3.3% of PILS patients reported bleeding, compared to 16.7% of diltiazem patients, showing a statistically significant advantage in favor of PILS. By Week 5, bleeding had completely resolved in all PILS patients, while 3.3% of diltiazem patients still had minor bleeding ( $p = 0.313$ ). From Week 6 onward, no patients in either group experienced bleeding, confirming that both treatments are ultimately effective in stopping bleeding, though PILS achieves resolution faster. These findings are consistent with Gour et al. (2016), which reported significantly lower bleeding rates in LIS patients by Week 4 compared to diltiazem.<sup>34</sup> Similarly, Amutha et al.<sup>12</sup> (2021) and Srinivasan et al.<sup>9</sup> (2021) found that LIS leads to earlier cessation of bleeding, whereas diltiazem-treated patients experience prolonged minor bleeding episodes. The present study highlights a significant difference in the occurrence of drug-related side effects between diltiazem gel and PILS. In the diltiazem group, 100% of patients experienced side effects from Week 1, which persisted through Weeks 2 and 3. Conversely, no PILS patients reported any side effects during this period. By Week 4, side effects in the diltiazem group decreased to 73.3%, whereas only 3.3% of PILS patients experienced any side effects ( $p < 0.001$ ). This trend continued, with diltiazem side effects gradually decreasing to 16.7% by Week 12, while PILS patients remained entirely

free of complications. These findings are in line with Popat et al. (2016), who reported that 6.4% of diltiazem patients experienced mild headaches, a common side effect of calcium channel blockers, while LIS patients had no systemic side effects.<sup>13</sup> Similarly, Amutha et al. (2021) found mild drug-related headaches in a small percentage of diltiazem patients, with no significant adverse effects in LIS patients.<sup>12</sup> Girdhar et al. (2014) also confirmed that LIS patients had no drug-related side effects, reinforcing that diltiazem is associated with systemic reactions, whereas LIS is largely free from such complications.<sup>14</sup>

## CONCLUSION

The comparative analysis of partial internal lateral sphincterotomy (PILS) and 2% diltiazem gel for the treatment of chronic anal fissure strongly supports PILS as the superior treatment option. The present study, along with multiple supporting studies, confirms that PILS leads to significantly faster and more complete pain relief, quicker healing, and higher rates of symptom resolution compared to diltiazem gel.

## REFERENCES

- Choudhary A, Katti P, Prasad KK. Comparative study of topical diltiazem sphincterotomy and lateral internal sphincterotomy in the treatment of chronic fissure-in-ano: a prospective analytical study. *Sch J App Med Sci*. 2016;4(4D):1402-1405.
- C M G, Babu P, Rao KS. A Comparative Study of Lateral Sphincterotomy and 2% Diltiazem Gel Local Application in the Treatment of Chronic Fissure in ANO. *J Clin Diagn Res*. 2014 Oct;8(10):NC01-2.
- Sritharan H, Kumar NKA, Ibrahim MIS. Management of chronic anal fissures: a narrative review. *Int Surg J*. 2020;7:1327-31.
- Villanueva JA, Henning W, Sharma N, Deppen JG. *Internal Anal Sphincterotomy*. Treasure Island (FL): StatPearls Publishing; 2024 Jan-.
- Vimal V, Senthilvel S. Comparative Study of Lateral Sphincterotomy and Local Application of 2% Diltiazem Gel in Treatment of Chronic Anal Fissure. *Int J Sci Stud*. 2017;5(2):185-189.
- Marion J, Scholefield JH, Taylor I, Johnson CD. *Recent advances in Surgery*. 24th Edition. Churchill Livingstone; 2001. Anal fissure and chemical sphincterotomy; p. 115.
- Knight JS, Birks M, Farouk R. Topical diltiazem ointment in the treatment of chronic anal fissure. *Br J Surg*. 2001;88(4):553-6.
- Jade R, B V Raghunath, N N. A Comparative Study of Lateral Sphincterotomy and Local Application of 2% Diltiazem Gel in Treatment of Chronic Anal Fissure. *J Evid Based Med Healthc*. 2015;2(51):8586-8589.
- Srinivasan S, Natarajan S, Krishnamurthy K. Comparative study of lateral sphincterotomy and 2% diltiazem gel in the management of chronic anal fissure. *J Clin Diagn Res*. 2021;5(2):332-334.
- Gour R, Sharma J. Comparative study of topical diltiazem with lateral internal sphincterotomy in management of chronic anal fissure. *Int J Med Res Rev*. 2016;4(3):319-323.
- Kulkarni SB, Naveen S, Muddebihal U. Management of chronic fissure in ano-lateral internal sphincterotomy versus 2% diltiazem gel local application: a prospective comparative study. *Int Surg J*. 2023;10:1166-8.
- Amutha D, Rajkumar S, Anandraj D, Nair IG. A comparative study of chemical sphincterotomy (using 2% diltiazem) and

- lateral internal sphincterotomy for chronic anal fissure. *Int J Surg Sci.* 2021;5(1):332-334.
13. Popat A, Pandey CP, Agarwal K, Srivastava VP, Sharma SM, Dixit A. A comparative study of role of topical diltiazem 2% organo gel and lateral internal sphincterotomy for the management of chronic fissure in ano. *Int J Contemp Med Res.* 2016;3(5):1363-1365.
14. Giridhar CM, Babu P, Rao KS. A comparative study of lateral sphincterotomy and 2% diltiazem gel local application in the treatment of chronic fissure in ano. *J Clin Diagn Res.* 2014 Oct;8(10):NC01-NC02.