

## A COMPARATIVE STUDY OF LATERAL INTERNAL SPHINCTEROTOMY WITH GLYCEROL TRINITRITE OINTMENT APPLICATION LOCALLY IN PATIENTS OF CHRONIC FISSURE IN ANO

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### ABSTRACT,

### BACKGROUND:

While 0.2% topical Glyceryl Trinitrate has been extensively studied for managing chronic anal fissures, less attention has been paid to its specific application methodology, dosage, and patient compliance, potentially contributing to higher recurrence rates and lower cure rates. This study addresses these gaps by comparing the healing outcomes of chronic anal fissures treated with 0.2% Glyceryl Trinitrate (chemical sphincterotomy) versus surgical lateral internal sphincterotomy (surgical sphincterotomy) as its primary objective. Secondary objectives include assessing pain relief, reduction in rectal bleeding, risk of incontinence, and recurrence rates associated with both treatment methods.

### AIM AND OBJECTIVE:

1. To determine the age and gender distribution of anal fissure incidence.
2. To examine the various clinical presentations and types of anal fissures.
3. To assess the efficacy of 0.2% topical Glyceryl trinitrate in relieving symptoms and promoting healing of anal fissures.
4. To compare the effectiveness of lateral anal sphincterotomy versus chemical sphincterotomy in treating anal fissures.

5. To evaluate the potential of Glyceryl trinitrate as a primary treatment option for both acute and chronic anal fissures.

### **PATIENTS AND METHODS:**

The clinical trial was conducted at Maharaja Krushna chandra Gajapati Medical College and Hospital, Berhampur between June 2022 to June 2024. Patients presented with severe cutting pain during defecation and bleeding per anum lasting over six weeks.

Clinical examination included gentle separation of the buttocks to examine the anus for a linear ulcer in the anoderm, with or without a sentinel pile, after taking proper consent.

### **INCLUSION CRITERIA**

Consenting patients aged 18 to 65 years with symptomatic chronic fissure in ano were included. Extreme age groups were excluded to avoid age-related bias.

### **EXCLUSION CRITERIA**

- a. Pregnant or lactating;
- b. Inflammatory bowel disease, tuberculosis, malignancy, or sexually transmitted diseases;
- c. Undergone prior anal surgery or were refractory to 0.2% topical glyceryl trinitrate;
- d. Associated haemorrhoids or fistula;
- e. Significant cardiovascular diseases;
- f. Opted for specific treatments (chemical/surgical).

A total of 185 patients diagnosed with chronic anal fissure and attending the Surgical Out Patient Department were enrolled in the study. Patients were assigned to Group A or Group B based on an alternating pattern of odd and even patient numbers.

- **Group A (Chemical Sphincterotomy):** Patients numbered 1, 3, 5, ..., 185 received treatment with 0.2% Topical Glyceryl Trinitrate.

- **Group B (Surgical Sphincterotomy):** Patients numbered 2, 4, 6, ..., 184 underwent open lateral internal sphincterotomy under spinal or general anaesthesia as inpatients.

The two groups were compared on various parameter like- Fissure Healing Rate, Recovery

of Pain, Recovery of Bleeding per rectum, Recovery time, Risk of Anal Incontinence, Morbid aspects of the treatment, Recurrence rate, Work resume time, Conversion rate and conclusion were drawn.

## RESULTS:

Surgical Sphincterotomy demonstrated statistically significant better healing compared to Chemical Sphincterotomy. Group A had an average pain score of 2.24, whereas Group B had a score of 0.55, indicating complete symptom resolution in Group B.

Both groups showed early recovery by the 2nd week, with final recovery rates of 87.78% in Group A and 98.92% in Group B by the 10th week. Group A resumed work on average in 3.37 weeks, while Group B resumed in 3.19 weeks, showing no statistically significant difference. The average recovery time for fissure healing was 5.18 weeks in Group A and 4.84 weeks in Group B, indicating quicker recovery with Surgical Sphincterotomy. Group B had a higher incidence of fecal incontinence (29.03%) compared to Group A (2.22%, temporary). There was no recurrence in Group B, establishing it as the gold standard treatment. Group A had a recurrence rate of 6.67% and a conversion rate of 16.67%, indicating higher failure rates and the need to switch to surgical treatment.

## CONCLUSION:

Surgical Sphincterotomy (Group B) showed superior recovery and treatment response compared to Chemical Sphincterotomy (Group A), despite a higher incidence of fecal incontinence. However, Chemical Sphincterotomy also demonstrated good recovery with less morbidity.

## INTRODUCTION:

Anal fissure is a common and painful condition of the perianal region, characterized by longitudinal ulcers affecting the lower part of the anal canal. It affects approximately 10% of the population, causing disabling symptoms such as severe cutting perianal pain and rectal bleeding, which can lead to significant physical and psychological distress despite rest and pain relief medication<sup>1</sup>. Chronic fissures tend to persist and recur more frequently compared to acute fissures, which typically heal on their own<sup>2</sup>.

The aetiology of fissures has been extensively discussed in literature, with persistent hypertonia of the anal sphincters widely accepted as a major cause<sup>3</sup>. Current standard treatments aim to alleviate sphincter spasm through surgical or chemical means. Lateral internal sphincterotomy is considered the gold standard for managing chronic anal fissures, boasting healing rates exceeding 95%<sup>4</sup>. However, alternatives are sought to reduce surgical risks and the potential for incontinence. Various chemical agents, such as Glyceryl Trinitrate, which acts as a vasodilator and muscle relaxant, have been developed to achieve similar sphincter relaxation effects<sup>5</sup>.

While 0.2% topical Glyceryl Trinitrate has been extensively studied for managing chronic anal fissures, less attention has been paid to its specific application methodology, dosage, and patient compliance, potentially contributing to higher recurrence rates and lower cure rates<sup>6</sup>. This

study addresses these gaps by comparing the healing outcomes of chronic anal fissures treated with 0.2% Glyceryl Trinitrate (chemical sphincterotomy) versus surgical lateral internal sphincterotomy (surgical sphincterotomy) as its primary objective. Secondary objectives include assessing pain relief, reduction in rectal bleeding, risk of incontinence, and recurrence rates associated with both treatment methods.

This clinical trial was conducted at Maharaja Krushna chandra Gajapati Medical College and Hospital, Berhampur. The study involved patients with chronic anal fissure who attended the Surgical Outpatient Department. Ethical approval was obtained in advance according to the established protocol. The study included 183 patients treated over a period of 25 months (June 2022 to June 2024). Results were analyzed using both descriptive and statistical methods and presented in a clear and comprehensible format for readers.

The discussion of the study findings was contextualized with a review of relevant literature and appropriate references.

#### **AIM AND OBJECTIVE OF THE STUDY:**

1. To determine the age and gender distribution of anal fissure incidence.
2. To examine the various clinical presentations and types of anal fissures.
3. To assess the efficacy of 0.2% topical Glyceryl trinitrate in relieving symptoms and promoting healing of anal fissures.
4. To compare the effectiveness of lateral anal sphincterotomy versus chemical sphincterotomy in treating anal fissures.
5. To evaluate the potential of Glyceryl trinitrate as a primary treatment option for both acute and chronic anal fissures.

#### **METHODS:**

A total of 185 patients diagnosed with chronic anal fissure and attending the Surgical Out Patient Department were enrolled in the study. Patients were assigned to Group A or Group B based on an alternating pattern of odd and even patient numbers.

- **Group A (Chemical Sphincterotomy):** Patients numbered 1, 3, 5, ..., 185 received treatment with 0.2% Topical Glyceryl Trinitrate.

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The two groups were compared on various parameter like- Fissure Healing Rate, Recovery of Pain, Recovery of Bleeding per rectum, Recovery time, Risk of Anal Incontinence, Morbid aspects of the treatment, Recurrence rate, Work resume time, Conversion rate and conclusion were drawn.

**RESULTS AND DATA ANALYSIS:**

In the study conducted at Maharaja Krushna chandra Gajapati Medical College and Hospital, the demographic details of the patients with chronic fissure in ano were as follows:

- Total Patients: 185
- Group A: 90 patients
- Group B:95 patients

**FISSURE HEALING RATES OF GROUP A & B**

The overall healing rates were better in Group B with 97.85% of cure rates when compared to the Group A (84.4%). Also, response was quicker in Group B starting from 4<sup>th</sup> week.

**Table 1 Comparison of Healing Rates in Group A &B**

FISSURE HEALING RATE						
Group	2nd wk	4th wk	6th wk	8th wk	10th wk	Success Rate
		38 (42.2%)	70 (77.78%)	76 (84.4%)	76 (84.4%)	76 (84.4%)
		54 (58.06%)	88 (94.62%)	91 (97.85%)	91 (97.85%)	91 (97.85%)

The p value was found to be significant right from the 4<sup>th</sup> week (0.032\*) and the final cure rate was statistically very significant with a p value of 0.002. Thus, Group B patients undergoing Surgical sphincterotomy had a better cure rate than the Group A patients with Chemical Sphincterotomy.

**AVERAGE RECOVERY TIME**

The average recovery time was earlier in Group B (4.84Weeks) than in Group A (5.18Weeks). The p value 0.041 was statistically significant.

**Table 2 Comparison of Average Recovery Time**

INDEPENDENT SAMPLE TEST		
	t-test for Equality of Means	95% C I of the Difference

<b>Fissure Healing over Weeks</b>	<b>Mean Difference</b>	<b>t</b>	<b>df</b>	<b>p value</b>	<b>Std. Error Difference</b>	<b>Lower</b>	<b>Upper</b>
4thWeek	-0.158	- 2.158	181	0.032*	0.073	-0.303	-0.014
6thWeek	-0.168	- 3.403	181	0.001**	0.05	-0.266	-0.071
8thWeek	-0.134	- 3.286	181	0.001**	0.041	-0.215	-0.054
Final Cure Rate 10 <sup>th</sup> week	-0.123	- 3.093	181	0.002**	0.04	-0.201	-0.045

## PAIN RELIEF

On comparison the Pain relief was much better and faster in Group B compared to Group A. Pain score less than 3 was achieved in Group B by 4<sup>th</sup> week, whereas it was only in the 6<sup>th</sup> week with Group A. The final pain scores were 0.55 in Group B and 2.24 in Group A, indicating that ultimate pain relief was better in Group B.

**Table 3 Comparisons of Pain Scores in Group A And B**

<b>PAIN SCORE MEAN</b>						
<b>Group</b>	<b>Initial</b>	<b>2nd week</b>	<b>4th week</b>	<b>6th week</b>	<b>8th week</b>	<b>10th week</b>
	<b>7.66</b>	<b>3.93</b>	<b>3.41</b>	<b>2.81</b>	<b>2.36</b>	<b>2.24</b>
	<b>7.92</b>	<b>3.4</b>	<b>2.17</b>	<b>1.41</b>	<b>0.83</b>	<b>0.55</b>

From Statistical point of view the Pain relief was significant from the 2<sup>nd</sup> week itself ( $p=0.016^*$ ) and then onwards it was very much significant ( $p=0.0001$ ), clearly depicting that the Pain Relief in Group B was certainly better than Group A.

**Table 4 Statistical p Value for Pain Relief**

<b>INDEPENDENT SAMPLE TEST</b>	
<b>t-test for Equality of Means</b>	<b>95% Confidence Interval</b>

Pain Score	Mean Difference	t	df	p value	Std. Error Difference	Lower	Upper
Initial Pain	-0.18	- 1.441	181	0.151	0.125	-0.427	0.067
2ndweek	0.546	2.42	181	0.016*	0.226	0.101	0.992
4thweek	1.239	5.494	181	0.0001***	0.226	0.794	1.684
6thweek	1.413	5.694	181	0.0001***	0.248	0.923	1.903
8thweek	1.528	6.44	181	0.0001***	0.237	1.06	1.996

### RECOVERY OF BLEEDING PER ANUM

Bleeding per anum became nil for 87.78% of patients in Group A and 98.92% of patients in Group B by the end of 10<sup>th</sup> week, which correlated with the Fissure healing rates. Recovery was better in Group B but appeared to be little faster in Group A during the early course of treatment i.e. first 2 weeks.

**Table 5 Comparison of Recovery of Bleeding Per Anum in Group A & B**

Group	BLEEDING PR RECOVERY				
	2nd Wk	4thWk	6thWk	8thWk	10thWk
A	67 (74.4%)	79 (87.78%)	79 (87.78%)	79 (87.78%)	79 (87.78%)
B	63 (67.74%)	89 (95.7%)	92 (98.92%)	92 (98.92%)	92 (98.92%)

The recovery of Bleeding per anum was statistically significant from the 4<sup>th</sup> week onwards with p value of 0.051. In the (6<sup>th</sup>, 8<sup>th</sup>& 10<sup>th</sup>week) the p value was very significant(p=0.003), showing that the recovery was better in Group B.

**Table 6 Comparison of Recovery of Bleeding Per Anum in Group A& B**

Independent Samples Test	
	<p style="text-align: center;"><b>t-test for Equality of Means</b></p> <p style="text-align: right;"><b>95% Confidence Interval</b></p>

Pain Score	Mean Difference	t	df	p value	Std. Error Difference	Lower	Upper
2ndWk	-0.067	-0.997	181	0.32	0.067	-0.2	0.066
4thWk	0.079	1.963	181	0.051*	0.04	0	0.159
6thWk	0.134	3.03	181	0.003**	0.044	0.047	0.221
8thWk	0.123	3.048	181	0.003**	0.04	0.043	0.202
10thWk	0.123	3.048	181	0.003**	0.04	0.043	0.202

### WORK RESUME TIME

Work resuming Time was little better with Group B (3.19Weeks) over Group A(3.37Weeks) with p value of 0.455, suggesting not much of statistical significance.

### MORBIDITY OF TREATMENT

Each group had its own specific morbid aspects such as Headache & Itching in Group A and Post-operative pain, Surgical site bleeding & Infection in Group B, which could not be compared. Faecal incontinence was the factor specially measured in both groups. Group A patients had better continence profile than the Group B

**Table 7 Faecal Incontinence Comparison**

FAECAL INCONTINENCE			
GROUP	+/-	TEMP	PERMANENT
A	2(2.22%)	2	0
B	27(29.03%)	24(25.80%)	3(3.22%)

And that p value was very much significant (0.0001), suggesting that the incidence of Faecal incontinence in Group A was very rare, while it was common with (Group B) Post-surgical patients.

**Table 8 Faecal Incontinence Comparison p Value.**

INDEPENDENT SAMPLE TEST	
t-test for Equality of Means	95% confidence Interval

	<b>Mean Difference</b>	<b>t</b>	<b>df</b>	<b>p value</b>	<b>Std. Error Difference</b>	<b>Lower</b>	<b>Upper</b>
Incontinence	-0.268	- 5.30 8	18 1	0.0001** *	0.051	- 0.368	- 0.168

### RECURRENCE AND CONVERSION RATE

Recurrence with the Surgical method was nil and its conversion rate due to failure was only 2.15% (2/93). Whereas in Group A, the Recurrence was 6 out of 90(6.67%) and the conversion rate was 16.67% (15 out of 90, including both failures and recurrence cases). The statistical analysis showed that the Recurrence in Group A was significant (p=0.049\*) and the conversion rate was very much significant(p=0.0001\*\*\*).

**Table 8 Statistical p Values of Recurrence & Conversion Rates.**

<b>INDEPENDENT SAMPLE TEST</b>							
	<b>t-test for Equality of Means</b>					<b>95% Confidence Interval</b>	
	<b>Mean Difference</b>	<b>t</b>	<b>D f</b>	<b>p value</b>	<b>Std. Error</b>	<b>Lower limit</b>	<b>Upper limit</b>
Recurrence rate	0.056	1.982	181	0.049*	0.028	0	0.112
Conversion rate	0.16	3.896	178	0.0001***	0.041	0.079	0.24

### DISCUSSION:

In the current study, Group B demonstrated superior overall healing rates, achieving a cure rate of 97.85%, compared to Group A's rate of 84.4%. Fissure healing was typically completed between 4 to 8 weeks in both groups, but Group B showed a faster response starting as early as the 4th week.

When compared with similar studies in the literature, the healing rate of the chemical method using 0.2% Topical Glyceryl Trinitrate ranged from 60% to 89%. The fissure healing rate observed in the present study is comparable to that reported in most of these studies.

**Table 9 Healing Rates with 0.2% Glyceryl Trinitrate in Chronic Fissure in Ano.**

Study	Healing rate with 0.2% Glyceryl Trinitrate
<u>Giridhar C. M</u> Et al 2014 <sup>7</sup>	88.4%
Madhusudhan M. Et 2014 <sup>8</sup>	89.36%
Nelson et al. 2012 <sup>2</sup>	80%
<b>Present study</b>	<b>84.4%</b>

The healing rates with the surgical method consistently exceeded 95% in all of the aforementioned trials, including the present study.

### Recovery time

The average Recovery time with Topical Glyceryl Trinitrate was 5.18 weeks which is one of the lesser recovery time as compared to literature and is very close to that of the Surgical method (4.84 weeks in the present study).

Study	Average recovery time with topical 0.2% Glyceryl Trinitrate
<u>Abd Elhady et al. 2009</u> <sup>9</sup>	5.1±1.13 weeks
<u>Giridhar C. M</u> et al 2014 <sup>7</sup>	5.04 weeks
<b>PRESENT STUDY</b>	<b>5.18 weeks</b>

### Pain Recovery

When comparing the two groups, Group B exhibited significantly better and faster pain relief compared to Group A. Pain scores below 3 were achieved by the 4th week in Group B,

Study	Final Pain Score	% Of Recovery with Glyceryl Trinitrate
Madhusudhan M. et al 2014 <sup>8</sup>	-	89.4%
<u>Giridhar C. M</u> et al 2014 <sup>7</sup>	-	78.26%
<b>PRESENT STUDY</b>	<b>2.24</b>	<b>84%</b>

whereas Group A achieved this by the 6th week. The final pain scores were notably lower in Group

B (0.55) compared to Group A (2.24), indicating superior overall pain relief in Group B. The total percentage of pain recovery in Group A was 84%, which aligns comparably with the literature

## MORBIDITY OF THE TREATMENT

### I. Faecal Incontinence rate

Faecal incontinence was analyzed based on the duration and separately classified as Temporary (<10 weeks) and Permanent (> 10 weeks).

Temporary incontinence was initially reported to be in 2.22% patients of in Group A and 29.03% of patients in Group B. The permanent incontinence was nil in Group A and was about in 3.22% in Group B which correlates with the data available in the literature.

**Table 10 Faecal Incontinence Rate in Surgical and Glyceryl Trinitrate Groups**

STUDY	2% Glyceryl Trinitrate	Surgical Sphincterotomy
<a href="#">Ansar Latif</a> et al 2013 <sup>10</sup>	Nil	6%
Rithin Suvarna et al 2012 <sup>11</sup>	Nil	9.27%
<b>Present Study</b>	<b>Temporary- 2.22%</b> <b>Permanent- Nil</b>	<b>Temporary-29.03%</b> <b>Permanent- 3.22%</b>

### I. Headache

The headache was specifically associated with Group A and its incidence was 22.22% with that of Glyceryl trinitrate (67%) as reported by Rithin Suvarna et al.

**Table 11 Headache in Glyceryl Trinitrate group**

STUDY	Incidence of Headache
Manjunath S Kotennavar et al 2012 <sup>12</sup>	5.71%
Rithin Suvarna et al 2012 <sup>11</sup>	5.49%
<b>Present Study</b>	<b>22.22%</b>

### Recurrence Rate

In the present study, the recurrence rate in Group A (0.2% Glyceryl Trinitrate) was 6.67%, whereas it was nil with the surgical method. The recurrence rate in the current study was much lower than that reported in the literature. The data suggests Chemical sphincterotomy can

definitively be used as an alternative to surgery when used with proper methodology and compliance.

**Table 12 Recurrence Rate in Glyceryl Trinitrate Groups**

Study	Recurrence rate
<b>Madhusudhan M et al 2014<sup>8</sup></b>	2.1%
<b>Rithin Suvarna et al 2012<sup>11</sup></b>	10.43%
<b>Present Study</b>	<b>6.67%</b>

The final inference drawn from these observations is that the Chemical Sphincterotomy using 0.2% Glyceryl Trinitrate has a better side effect profile and good comparable healing rates in the treatment of Chronic Anal Fissures. The drawbacks that could be mentioned are the slower response, longer duration of treatment, and more chances of recurrence. Considering all these parameters it could be recommended that 0.2% Topical Glyceryl Trinitrate is the best available alternative for the Surgical methods in the treatment of chronic fissures in ano. And surgery can be reserved for non-responders alone

#### **CONCLUSION:**

Surgical sphincterotomy and chemical sphincterotomy with 0.2% glyceryl trinitrate (GTN) are two different approaches used to treat chronic anal fissures that haven't responded to conservative treatments. Here are some advantages of surgical sphincterotomy over chemical sphincterotomy with 0.2% GTN:

1. **Higher Success Rates:** Surgical sphincterotomy generally has higher success rates in terms of healing anal fissures compared to chemical sphincterotomy with GTN. This is particularly true for chronic and resistant fissures that have not responded well to other treatments.
2. **Immediate and Permanent Solution:** Surgical sphincterotomy provides a more definitive solution to anal fissures by permanently cutting the internal anal sphincter muscle. This eliminates the high resting pressure in the anal sphincter that contributes to the fissure formation. In contrast, GTN therapy requires an ongoing application and may not provide a permanent resolution.
3. **Predictable Outcome:** The outcome of surgical sphincterotomy is typically more predictable compared to GTN therapy, which can vary in effectiveness from person to person. Surgical intervention allows for direct visualization and treatment of the fissure and the underlying sphincter muscle.
4. **Faster Relief:** Surgical sphincterotomy often provides faster relief of symptoms compared to GTN therapy, which may take weeks to months to show significant improvement.
5. **Reduced Recurrence:** Although any procedure can have risks, surgical sphincterotomy has been shown to reduce the recurrence rate of anal fissures compared to GTN therapy. By addressing the underlying cause (high sphincter pressure), surgical treatment aims to prevent fissure recurrence.

6. Avoidance of Side Effects: GTN therapy can have side effects such as headaches, dizziness, and hypotension due to its systemic absorption. Surgical sphincterotomy avoids these systemic effects since it involves local surgical intervention rather than medication that is absorbed into the bloodstream.

However, it's important to note that surgical sphincterotomy is a more invasive procedure compared to chemical sphincterotomy with GTN. It carries risks such as bleeding, infection, and potential impairment of sphincter function, although these risks are generally low with modern surgical techniques. Also very old age patients, patients unfit for surgery, in those cases GTN Therapy is favorable than operation. The choice between these treatments should be made in consultation with a healthcare provider based on individual circumstances, preferences, and the severity of the anal fissure.

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