



General Surgery

COMPARATIVE EVALUATION OF LASER ABLATION VERSUS LIMBERG FLAP TECHNIQUE IN THE SURGICAL MANAGEMENT OF PILONIDAL SINUS DISEASE: A PROSPECTIVE CLINICAL STUDY

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ABSTRACT **Background:** Pilonidal sinus disease (PSD) is a chronic condition predominantly affecting the sacrococcygeal region, causing pain, discharge, and recurrent infections. The ideal surgical approach remains debatable, with options ranging from minimally invasive laser ablation to conventional flap procedures like the Limberg flap. **Objective:** To compare the clinical outcomes of laser ablation versus Limberg flap technique in the management of PSD in terms of operative time, postoperative pain, wound healing, complications, and recurrence. **Methods:** A prospective clinical study was conducted involving 40 patients diagnosed with PSD, randomized into two groups (N=20 per group): Group A (Laser Ablation) and Group B (Limberg Flap). Parameters such as operative duration, pain score, healing time, complication rate, and recurrence were assessed over a 6-month follow-up period. **Results:** Laser ablation showed a significantly shorter operative time and faster recovery. The Limberg flap group had a lower recurrence rate but was associated with more postoperative discomfort and longer wound healing time. **Conclusion:** Laser ablation is a promising minimally invasive alternative offering faster recovery and minimal pain, though Limberg flap remains superior in terms of recurrence prevention.

KEYWORDS : Pilonidal sinus, laser ablation, Limberg flap, minimally invasive surgery, recurrence.

INTRODUCTION

Pilonidal sinus disease (PSD) is a common condition of the natal cleft with a higher incidence among young males. The etiology involves hair penetration and chronic inflammation. Traditional treatments include excision with primary closure or flap techniques like the Limberg flap. Recent advances have introduced laser ablation as a less invasive alternative, aiming to reduce morbidity, hospital stay, and improve cosmetic outcomes. This study aims to compare laser ablation with the Limberg flap in the surgical management of PSD.

MATERIALS AND METHODS:

Study Design: Prospective, randomized clinical study.

Sample Size: 40 patients (N=20 in each group)

Inclusion Criteria:

- Age 18–45 years
- Clinically diagnosed PSD
- No previous surgical interventions

Exclusion Criteria:

- Recurrent or complex sinus disease
- Immunocompromised patients
- Coagulopathy or uncontrolled diabetes

Group A (Laser Ablation):

Sinus tracts were ablated using a diode laser (1470 nm)

Group B (Limberg Flap):

Standard excision with rhomboid flap transposition

Follow-up Duration: 6 months

Parameters Observed: Operative time, Pain (VAS), Wound healing, Complications, Recurrence.

Statistical Analysis

Data were analyzed using SPSS v25. Mean $\pm$ SD used for continuous variables. Chi-square and t-tests were applied where appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

Table 1: Operative Time (minutes)

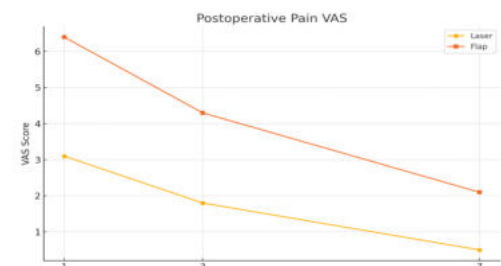
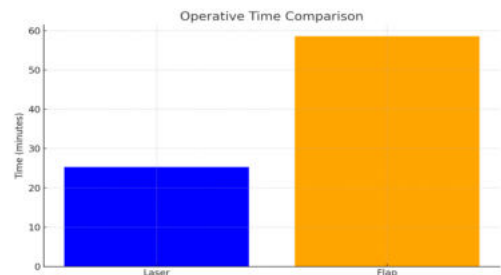
Group	Mean $\pm$ SD (minutes)	p-value
Laser Ablation	25.3 $\pm$ 4.1	<0.001
Limberg Flap	58.6 $\pm$ 7.3	

Table 2: Postoperative Pain (VAS Score)

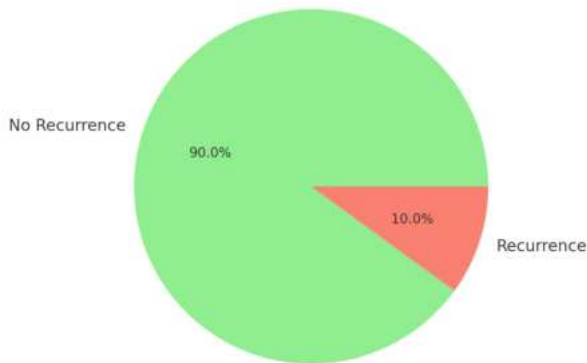
Postoperative Day	Laser Ablation	Limberg Flap
Day 1	3.1 $\pm$ 0.8	6.4 $\pm$ 1.2
Day 3	1.8 $\pm$ 0.5	4.3 $\pm$ 1.1
Day 7	0.5 $\pm$ 0.2	2.1 $\pm$ 0.7

Table 3: Wound Healing Time And Recurrence

Group	Wound Healing Time (days)	Recurrence (%)
Laser Ablation	12.4 $\pm$ 2.3	10%
Limberg Flap	21.6 $\pm$ 3.2	0%



Recurrence Rate - Laser Group



DISCUSSION

This study highlights the advantages and limitations of both techniques. Laser ablation, being minimally invasive, results in shorter operative time, reduced pain, and quicker healing. However, a slightly higher recurrence rate was noted, likely due to the learning curve and incomplete tract ablation in early cases.

Limberg flap surgery, although more invasive, offers a reliable long-term outcome with minimal recurrence, albeit at the cost of prolonged healing and increased postoperative discomfort.

Patient selection and surgeon expertise play a pivotal role in determining the ideal treatment modality.

CONCLUSIONS

Laser ablation is a safe and effective option for PSD with excellent patient tolerance and cosmetic outcomes. The Limberg flap, despite longer recovery, remains a gold standard in terms of recurrence prevention. A patient-centered approach considering disease complexity and expectations is essential for optimal results.

REFERENCES:

1. Stauffer VK, et al. Minimally invasive treatment of pilonidal sinus disease: a systematic review. *Surg Endosc*. 2018.
2. Guner A, et al. Comparison of minimally invasive techniques and the Limberg flap technique in the treatment of pilonidal sinus disease. *Asian J Surg*. 2021.
3. Dessily M, et al. Pilonidal sinus destruction with a radial laser probe: technique and preliminary results. *Tech Coloproctol*. 2017.
4. Bosche F, et al. Long-term recurrence rate after Limberg flap for PSD: a 15-year experience. *Int J Colorectal Dis*. 2019.