Original Research

CLINICAL OUTCOMES OF LIMBERG FLAP CLOSURE FOLLOWING EXCISION OF PILONIDAL SINUS DISEASE: A CASE SERIES

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ABSTRACT

Background: Pilonidal sinus disease is a common chronic inflammatory condition affecting the sacrococcygeal region, predominantly in young adults. Conventional surgical techniques such as excision with open healing or primary midline closure are associated with prolonged wound care and higher recurrence rates. Limberg flap reconstruction has emerged as an effective alternative owing to its favorable healing profile and lower recurrence rates.

Aim: To evaluate the clinical outcomes of Limberg flap reconstruction in patients undergoing surgical management for pilonidal sinus disease.

Methods: This case series included 10 patients diagnosed with chronic pilonidal sinus disease who underwent rhomboid excision with Limberg flap reconstruction at a tertiary care center. Demographic characteristics, clinical presentation, operative findings, postoperative complications, duration of hospital stay, wound healing, and recurrence during follow-up were analyzed.

Results: The study included 7 males and 3 females with a mean age of 23.5 years (range: 18–34 years). The duration of symptoms ranged from 6 to 15 months. Nine patients had primary disease, while one patient presented with recurrent pilonidal sinus following previous excision and healing by secondary intention. Multiple sinus tracts were identified in six patients. Primary wound healing was achieved in 9 patients (90%). One patient (10%) developed postoperative wound infection with mild wound dehiscence, which was managed successfully with conservative treatment. The mean hospital stay was 7.2 days (range: 5–14 days). During a mean follow-up period of 10.4 months, all patients achieved complete wound healing, and no recurrence was observed.

Conclusion: Limberg flap reconstruction is a safe and effective surgical technique for the treatment of primary and recurrent pilonidal sinus disease. The procedure provides excellent wound healing, low postoperative morbidity, satisfactory cosmetic outcomes, and a low risk of recurrence. The findings of this case series support the use of Limberg flap reconstruction as a preferred surgical option over conventional excision techniques for chronic pilonidal sinus disease.

Keywords: Pilonidal Sinus, Limberg Flap, Rhomboid Excision, Recurrence, Wound Healing, Sacrococcygeal Disease.

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INTRODUCTION

Pilonidal sinus disease (PSD) is a frequent chronic inflammatory disease of the subcutaneous tissues of the sacrococcygeal region characterised by hair shafts and cellular debris inside a sinus tract or cyst.[1,2] Epidemiologically, the disease is mainly seen in young men aged between 16 and 25 years.

Although the exact cause is still not known, it is known to be an acquired disease due to friction, local trauma, poor hygiene and obesity. These factors merge into a deep natal fissure that will permit shed hair to penetrate the weakened skin barriers, cause a chronic foreign-body tissue reaction and result in recurrent abscess formation.[1,3]

Surgery is still a challenge for general surgeons in the treatment of PSD. In the past, the high postoperative complication rates and considerable disease recurrence between 7% and 42%.[2] have limited the use of traditional modalities, such as simple excision followed by primary closure in the midline. A deep intergluteal cleft with constant mechanical tension of the tissues is a very ideal environment for the formation of recurrent tracts because of the anaerobic conditions and the constantly moist tissue. In the modern surgical era, therefore, the concepts of surgery have evolved into those that do not involve a midline incision and can successfully reshape the natal cleft anatomy.[4,5]

The first described in 1946, the Limberg flap includes a large rhomboid resection to the presacral fascia of the defective sinus tract and a transposition of a well vascularized fasciocutaneous flap.[4,5] This procedure alters the microenvironment by moving the surgical scar to the side of the midline, and by flattening the intergluteal sulcus, which is where hair shafts usually accumulate. Various clinical reports and retrospective cohorts have shown the clinical benefits of the Limberg flap, such as low wound tension, shorter hospital stay, low rate of flap necrosis (about 0% to 3%), early return to normal work activities, and very low recurrence rates.[6]

Assessment of sequential case series is still important to establish a patient-specific surgical reproducible success and to monitor intermediate complication rate (seroma, hematoma, minor wound dehiscence, etc.) and to improve patient selection criteria.[5,6] The purpose of this case series is to assess the clinical results, postoperative complications and recurrence rates of patients that had wide rhomboid excision with Limberg closure for PSD at our center.

Case Series

Over one year, there were 10 patients with chronic pilonidal sinus which were treated in the Department of General Surgery with rhomboid excision and reconstruction with the Limberg flap. Patients' mean age was 24.9 years (range: 18-34 years). Seven patients (70%) were males and three patients (30%) were females. A single patient was hypothyroid and the rest were without significant medical conditions. A total of all patients were presenting with intermittent sacrococcygeal seropurulent discharge. Symptoms lasted from 6 to 15 months. Pain and swelling preceding spontaneous rupture and discharge were reported by all patients. There was nine cases of primary pilonidal disease and one case of recurrent disease, and this patient had underwent excision and allowed to heal by secondary intention. Initial healing was followed by recurrent symptoms, for which he was referred here for definitive management.

On clinical examination, the sinus openings were found in the areas of natal clefts, but were not a source of acute inflammation. In all patients, further investigation was done using Magnetic Resonance Imaging (MRI), which was used to identify the number of sinus tracts and the extent of the disease. Patients with one sinus tract and one opening were 4, two patients with one sinus tract and multiple opening were 2, two patients with multiple sinus tracts and one opening were 2 and two patients with multiple sinus tracts and multiple opening were 2.

After routine pre-operative investigations and giving prophylactic antibiotics, all patients underwent rhomboid excision with Limberg flap reconstruction under spinal anaesthesia. The technique comprised systematic removal of all sinus tracts to the presacral fascia, careful haemostasis, making of a transposition flap, inserting of closed suction drain and layered wound closure. There was early postoperative mobilization of patients, and they were advised to avoid prolonged pressure on the operative site during the first 3 days of recovery period.

In the hospital, the mean stay after surgery was 6.9 days (between 5–14 days). Nine patients (90%) had primary wound healing. One patient (10%), who had a history of previous surgery for recurrent pilonidal sinus, developed postoperative wound infection with partial wound dehiscence. Scar tissue and the changes in local tissue vascularity that were present from the previous surgical procedure were cited as the cause of the complication. Patient was treated with antibiotics, regular wound care and dressing and thus wound healed completely. None of the patients needed reoperation or flap revision.

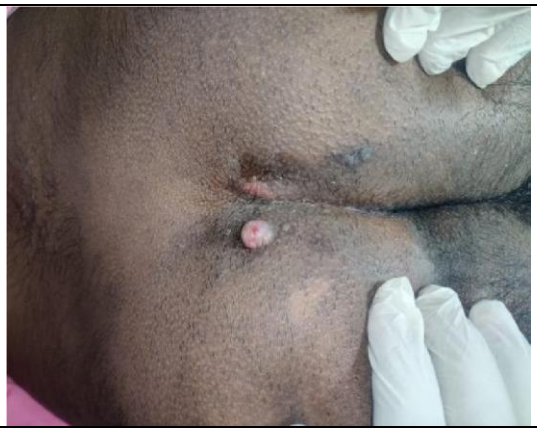
The mean follow-up period was 10.4 months (range 8-14 months). Completely healing of the wounds and satisfactory cosmetic results were obtained in all patients. No recurrence has been seen in the period of follow-up. Patients complained of little pain after surgery and were able to resume their normal daily lives early.

The case series presented shows that the Limberg flap reconstruction after a rhomboid excision is a successful treatment option for both primary and recurrent pilonidal sinus disease. The technique had consistently good wound healing and low morbidity rate in post-operative period, acceptable hospital stay and disease control without any recurrence in the follow up period.

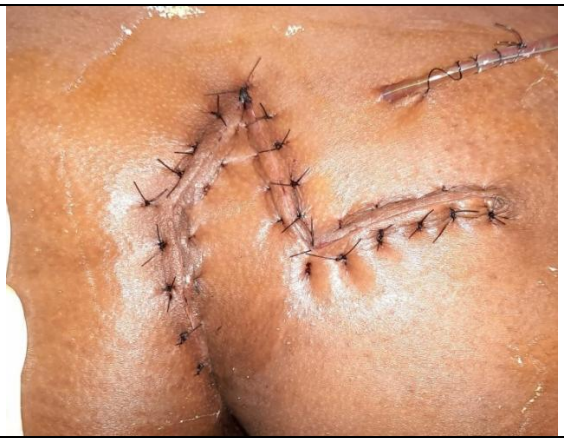
Case	Age/Sex	Duration of Symptoms	Previous Surgery	MRI Findings	Postoperative Outcome	Hospital Stay (Days)	Follow-up
1	26/M	6 months	No	Multiple tracts with multiple openings	Normal healing	8	12 months
2	24/M	6 months	No	Multiple tracts with multiple openings	Normal healing	8	12 months
3	18/F	9 months	No	Single tract with two openings	Normal healing	7	8 months
4	28/M	8 months	No	Multiple tracts with single opening	Normal healing	6	9 months
5	19/M	6 months	No	Single tract with single opening	Normal healing	5	11 months
6	20/M	15 months	Yes	Multiple tracts with multiple openings	Wound infection and mild dehiscence	14	13 months
7	21/F	10 months	No	Single tract with single opening	Normal healing	6	14 months
8	22/M	13 months	No	Multiple tracts with multiple openings	Normal healing	7	8 months
9	34/M	12 months	No	Single tract with multiple openings	Normal healing	6	10 months
10	23/M	10 months	No	Multiple tracts with single opening	Normal healing	5	9 months

Table 1

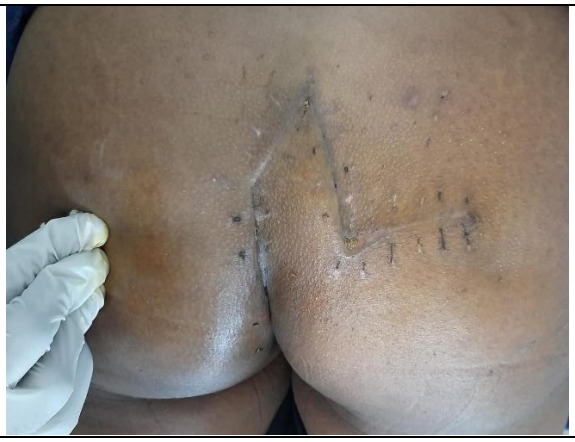
Pilonidal sinus disease (PSD)



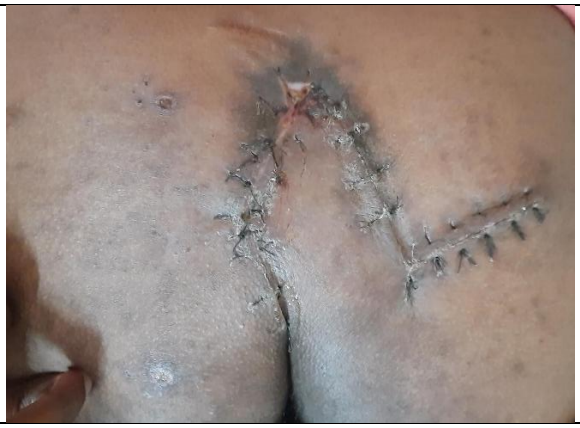
PSD with multiple sinuses



Post limberg flap procedure on POD-2



Post suture removal on POD-14

	
Limberg flap closure for recurrent disease	***Wound dehiscence noted in Limberg done for recurrent disease due to scar tissue***

DISCUSSION

A sacrococcygeal disease that presents with a chronic inflammatory process, is predominantly seen in young adults, and tends to be recurrent, painful, and discharge from the sinus. While various surgical modalities have been described, the ideal surgery will eradicate the disease, reduce the morbidity of the surgery, reduce the time needed to recover, and not recur. Over the past few decades, off-midline flap procedures, such as the Limberg flap, have become more popular than the standard excision procedures due to the positive results that have been obtained.[7] Ten patients with chronic pilonidal sinus disease were treated by rhomboid excision and Limberg flap reconstruction in the present case series. The mean age of the patients was 23.5 years, while the male gender predominated (70%), similar to what was reported in previous studies.[8] Most patients had multiple sinus openings and chronic intermittent discharge, indicating a chronic course of disease.

The basic concept of Limberg flap is complete removal of diseased tissue and reclosure of the wounds along the midline line with the use of well-vascularized rhomboid transposition flap. This will help to straighten the natal cleft, decrease the amount of hair growth there, minimize friction and moisture there, and avoid any midline scar placement, which will help to decrease the chance of scar recurrence.[9] The benefits of using this procedure have encouraged many authors to consider Limberg flap surgery as one of the surgical options preferred for chronic and recurrent pilonidal sinus disease. In this series, primary wound healing was accomplished in nine of ten patients (90%). Mild wound dehiscence occurred in only one patient, who had postoperative wound infection. Interestingly, this patient had a history of previous surgical excisions that healed by secondary intention and had recurrent disease. The scar tissue and change in local vascularity due to previous surgery probably played a role in the poor wound healing. However, it was treated conservatively with antibiotics and frequent dressing and ultimately healed without further surgery.

In the current study, the recurrence rate was 0% with a mean follow-up of 10.4 months. The period of follow-up is brief, but this is in line with the low recurrence rates reported in previous studies after reconstruction with a Limberg flap. In 200 patients, the recurrence rate was 1.5% after a Limberg flap, reported Topgül et al.[10] In fact, 11 out of 50 patients (2.2%) had relapsed after modified Limberg flap repair, as observed by Mentes et al.[11] Aithal et al. reported in another study that there had been no recurrence in the study during follow-up after the Limberg flap reconstruction, while the wound healing was excellent.[12] It's clear that the Limberg flap is better than simple excisions, especially when compared to other flaps. Historically, the excision of these lesions with healing by secondary intention has come with an increased risk of recurrence (8% to 21%),[13,14] discomfort for the patient, delayed return to work, and long-term postoperative care. Similarly, excision with primary midline closure has been reported to have a long-term recurrence rate of 10% – 30% because of the frequent occurrence of deep natal clefts and bad wound healing in the midline.[15]

A comprehensive meta-analysis by Stauffer et al. which involved over 89,000 patients showed significantly reduced recurrence rates with off-midline flap procedures than with primary midline closure. In a review of the literature, the authors reported some of the lowest long-term recurrence rates for the Limberg and Karydakis flap procedures among all surgical procedures.[16] Likewise, Petersen et al. reported that off-midline closure methods were linked with a significantly lower recurrence rate and wound problems than the conventional midline closure.[17] The results are in line with the recently emerging opinion that

flattening and lateralisation of the natal cleft may be better than simple excision. The case series showed that the Limberg flap is a safe and effective surgical approach for both primary and recurrent pilonidal sinus. Good wound healing was noted in all patients, while there was a slight postoperative complication and no recurrence during the follow-up. The mean length of hospital stay was satisfactory and the cosmetic results were good.

The outcomes of Limberg flap reconstruction are better than those of traditional pilonidal sinus surgery for chronic pilonidal sinus disease, with reduced recurrence rates, fewer complications, shorter healing times, and higher satisfaction rates.

CONCLUSION

Our results of this case series indicate that rhomboid excision with a Limberg flap is a safe and effective treatment of primary and recurrent pilonidal sinus disease. The results were satisfactory wound healing, low numbers of postoperative complications, and no recurrence in the follow-up period. The Limberg flap is a tension free closure for the midline closure with reduced incidence of recurrence and wound complications and has better functional and cosmetic results than the conventional closure. It is suggested as a recommended treatment for chronic and recurrent pilonidal sinus.

Author Contribution

1. Dr. Aravinth Ram M. -Conceptualization, Investigation, Case Management, Supervision, Writing - Review & Editing.
2. Dr. Manaazir Rilahasan J. -Data Collection, Patient Management, Writing -Original Draft Preparation.
3. Dr. John Gideon Devapriyam M. -Data Collection, Patient Management, Writing - Original Draft Preparation.
4. Dr. Selvaranjani K. -Literature Review, Writing - Original Draft Preparation.
5. Dr. Sujieve Kumar Ravilla -Technical part correction, Project Administration.

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