

Case Series

Surgical outcomes of Limberg flap reconstruction for pilonidal disease: a five-case series and literature review

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ABSTRACT

Pilonidal disease is a chronic inflammatory condition of the sacrococcygeal region associated with significant morbidity, wound complications and recurrence. Various surgical techniques have been described, with off-midline closure methods demonstrating improved outcomes. The Limberg flap is widely used because it enables wide excision, tension-free off-midline closure, and low reported recurrence rates. We present a case series of five patients with pilonidal disease treated with excision and Limberg flap reconstruction. Clinical presentation, operative management, postoperative complications, and follow-up outcomes were evaluated. All patients achieved complete wound healing. Three patients developed partial wound dehiscence, which healed by secondary intention with conservative management, and one patient developed a postoperative abscess requiring incision and drainage. No recurrence was documented during the available follow-up period, which ranged from 2 to 4 months. These findings support the Limberg flap as a feasible surgical option for pilonidal disease, including recurrent and complicated presentations, with satisfactory wound healing and manageable postoperative complications.

Keywords: Pilonidal disease, Limberg flap, Surgical management, Recurrence, Case series

INTRODUCTION

Pilonidal disease is a chronic inflammatory condition of the sacrococcygeal region and intergluteal cleft characterized by follicular occlusion, local trauma, and recurrent infection.^{1,2} It remains a significant clinical challenge due to its high recurrence rates and postoperative morbidity.^{3,4} The incidence is estimated at 26 per 100,000 individuals, with peak presentation between 15 and 30 years of age.^{1,5} A male predominance of approximately 3:1 has been reported.⁶ Risk factors include sedentary lifestyle, obesity, poor hygiene, and hirsutism.²

Clinically, patients may present with pain, erythema, discharge, and abscess formation, which can significantly

impact daily activities.^{6,7} Diagnosis is primarily clinical, based on physical examination revealing midline sinus openings.⁸

The pathophysiology is associated with follicular obstruction leading to chronic inflammation and abscess or sinus formation.⁶ Management varies depending on disease severity. Incision and drainage may have recurrence rates up to 40-60%.¹ Excision with secondary intention, marsupialization, and primary closure are also described.¹ However, flap-based procedures such as Karydak, Bascom, and Limberg techniques have demonstrated improved outcomes.^{1,8} According to the ASCRS guidelines, flap-based procedures are recommended after excision of the pilonidal sinus.⁹

The Limberg flap consists of a rhomboid excision followed by flap transposition, allowing closure away from the midline and reducing recurrence to less than 5%.^{2,8,10} Placement of a closed suction drain may reduce complications such as seroma and hematoma.¹¹ The use of methylene blue may help identify sinus tracts and ensure complete excision.¹²

CASE SERIES

Case 1

A 36-year-old female with obesity presented with a one-year history of intermittent pain in the intergluteal region, particularly exacerbated while sitting. Physical examination revealed a left-sided lesion with induration measuring approximately 4 cm in diameter.

The patient underwent excision of the pilonidal sinus with Limberg flap reconstruction under regional anesthesia. Intraoperative findings revealed a sinus tract extending to the presacral fascia with a radial extension of approximately 3 cm. The procedure was completed without complications, and no drain was placed.

The postoperative course was uneventful, and the patient was discharged after 48 hours. However, at two months follow-up, she developed a localized abscess at the inferior aspect of the wound, which required incision and drainage. The patient was followed for approximately four months, achieving complete wound healing with residual hypertrophic scarring and no evidence of recurrent disease (Figure 1).



Figure 1: Late postoperative follow-up after pilonidal sinus excision and Limberg flap reconstruction demonstrating complete wound healing with residual hypertrophic scarring and off-midline closure.

Case 2

A 28-year-old female presented with a two-year history of intermittent swelling in the sacrococcygeal region, which

became persistent over the past year. Physical examination revealed a granulomatous lesion slightly lateralized to the left, approximately 10 cm from the anal margin, with surrounding fibrosis measuring 3 cm in diameter.

The patient underwent surgical excision of the pilonidal sinus with Limberg flap reconstruction under regional anesthesia. Intraoperative findings included a sinus tract extending approximately 4 cm laterally toward the left gluteal region and 5 cm along the midline. Complete excision to the presacral fascia was performed, followed by flap transposition and placement of a closed suction drain.

Postoperative recovery was favorable, and the patient was discharged after 48 hours. During follow-up, the patient developed minimal serous drainage and mild discomfort, with near-complete wound healing. Follow-up examination demonstrated minimal inferior wound dehiscence with surrounding ecchymosis (Figure 2A), which progressively healed by secondary intention with conservative management, achieving satisfactory wound closure during subsequent follow-up (Figure 2B). The patient was followed for approximately two months, achieving complete wound healing without evidence of recurrence.



Figure 2: Postoperative follow-up of Case 2 after Limberg flap reconstruction. (A) Minimal inferior wound dehiscence with surrounding ecchymosis during early follow-up. (B) Progressive healing and satisfactory wound closure after conservative management.

Case 3

A 38-year-old female with a long-standing history of recurrent sacrococcygeal swelling and spontaneous drainage over 12 years presented for definitive surgical management.

A single midline pilonidal sinus without abscess formation was identified. The patient underwent rhomboid excision and Limberg flap reconstruction with Penrose drain placement. Immediate postoperative appearance after Limberg flap reconstruction and Penrose drain placement is shown in Figure 3.



Figure 3: Immediate postoperative appearance after rhomboid excision and Limberg flap reconstruction in Case 3. Off-midline closure with Penrose drain placement is demonstrated.

The postoperative course was uneventful, and the patient was discharged after 48 hours. During follow-up, the patient developed partial wound dehiscence at the inferior aspect of the flap, which was managed conservatively with local wound care and healed by secondary intention. The patient was followed for approximately two and a half months, achieving complete wound closure and remaining asymptomatic, without evidence of recurrence.

Case 4

A 46-year-old female without significant comorbidities, with a history of occasional smoking, presented with a one-month history of pain and swelling in the sacrococcygeal region, later associated with erythema, increased local temperature, and fever. She initially received outpatient antibiotic treatment without clinical improvement and was subsequently referred for re-evaluation. Physical examination revealed a painful, indurated nodular lesion measuring approximately 5 cm in

the intergluteal region, consistent with an abscessed pilonidal cyst. She was admitted at emergency room after our examination; she was hospitalized by general surgery and then surgery department requested our evaluation.

The patient underwent pilonidal cyst excision with Limberg flap reconstruction under regional anesthesia. Intraoperative findings included a tract extending approximately 4 cm toward the left gluteal region and 5 cm along the midline. Complete excision of the fibrotic tissue down to the presacral fascia was performed, followed by placement of a closed-suction drain. Immediate postoperative appearance after Limberg flap reconstruction is shown in Figure 4. The postoperative course was favorable, and the patient was discharged 72 hours after surgery in stable condition with adequate oral intake.



Figure 4: Immediate postoperative appearance after pilonidal cyst excision and Limberg flap reconstruction in Case 4. Adequate off-midline closure and placement of a closed-suction drain are demonstrated.

Seven days later, the drain was removed. The surgical wound appeared well-approximated without signs of infection, although a mild partial dehiscence was observed at the inferior vertex of the flap. During outpatient follow-up, the patient showed progressive healing with gradual suture removal and adequate wound healing. At the 2-month follow-up visit, minimal superficial dehiscence and a keloid scar persisted without evidence of infection or recurrence, and the patient was discharged from follow-up.

Case 5

A 38-year-old male presented with a two-year history of recurrent sacrococcygeal swelling associated with

intermittent pain and spontaneous drainage episodes. Physical examination revealed a $3 \times 3 \times 2$ cm lesion in the sacrococcygeal region consistent with pilonidal disease. During surgery, a pilonidal cyst with a 4 cm extension toward the left gluteal region and a 5 cm extension along the midline was identified. Rhomboid excision with Limberg flap reconstruction and placement of a closed suction drain were performed.

The immediate postoperative result is shown in Figure 5. The patient had an uneventful postoperative course and was discharged 48 hours after surgery. At one-week follow-up, the drain was removed, with the surgical wound showing adequate healing, well-approximated edges, and no evidence of dehiscence or infection. At two months of follow-up, complete wound healing was observed, and the patient was discharged from outpatient care.



Figure 5: Immediate postoperative appearance after rhomboid excision and Limberg flap reconstruction for pilonidal disease in Case 5. A closed suction drain was placed with adequate flap positioning and wound approximation.

Table 1: Clinical characteristics and postoperative outcomes of the five cases.

Case	Sex	Age (years)	Disease Type	Hospital Stay (days)	Drain used	Complication	Recurrence	Follow-up (months)
1	F	36	Primary	2	No	Postoperative abscess	No	4
2	F	28	Primary	1	Closed suction drain	Partial cutaneous dehiscence	No	2
3	F	38	Recurrent	1	Penrose drain	Partial cutaneous dehiscence	No	2.5
4	F	46	Abscessed	3	Closed suction drain	Minimal superficial wound dehiscence	No	2
5	M	38	Recurrent	1	Closed suction drain	None	No	2

DISCUSSION

Pilonidal disease remains a challenging condition due to recurrence and wound complications. Multiple surgical techniques have been described, with off-midline closure methods demonstrating superior outcomes compared to midline closure.^{1,8}

The Limberg flap allows wide excision and tension-free closure, reducing factors such as moisture, friction, and hair accumulation, which are associated with recurrence.^{2,8,10} Studies have reported recurrence rates below 5% with this technique.^{2,8,10} Figure 6 illustrates the geometric design and transposition of the Limberg flap. These characteristics may contribute to lower recurrence and wound complication rates.

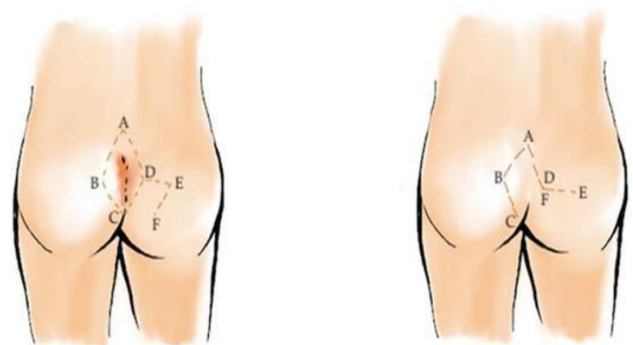


Figure 6: Limberg flap design and reconstruction technique. Schematic representation of rhomboid excision and flap transposition. The design includes 60° and 120° angles, allowing tension-free closure away from the midline. Adapted from Matteucci et al.²

In our series, all patients underwent Limberg flap reconstruction with favorable outcomes. Minor complications were observed, including wound dehiscence and postoperative abscess, which are among the most frequently reported complications.^{4,14,15} Dahmiwal et al in a series of ten cases, documented a postoperative complication rate of 10%, with infection occurring in one patient.¹⁶ In another series of nine cases, Jain and Thambuchetty documented a complication in one patient (11.1%).¹⁷ In our series, three patients developed partial superficial wound dehiscence. In one of these patients, the dehiscence occurred at the flap vertex and was associated with localized skin sloughing and ecchymosis, without extension into the subcutaneous plane.

All patients achieved complete wound healing with no evidence of recurrence during follow-up. Three patients developed partial wound dehiscence that healed by secondary intention, while one patient developed a postoperative abscess requiring incision and drainage, without further complications. These findings are consistent with previously reported outcomes.^{2,8,10}

Postoperative morbidity is influenced by multiple factors, including incomplete excision, infection, and patient-related factors such as hygiene and comorbidities.¹ Despite these risks, the Limberg flap has demonstrated high success rates, good healing outcomes, and high patient satisfaction.¹³

Hospital stay is typically short, with most patients discharged within a few days and returning to normal activities within two weeks.¹¹ These findings are consistent with our results. In our case series, patients have spent between one and three days of postoperative hospital stay and this has been to receive more intravenous doses of antibiotics, control pain and monitor bleeding, three of the patients have had a postoperative stay of only one day.

Although minimally invasive techniques have gained popularity, flap-based procedures remain the preferred approach for complex or recurrent disease due to their lower recurrence rates and reliable outcomes.^{1,8} A systematic review and meta-analysis of eight randomized clinical trials by Ray et al including 2073 patients, concluded that Limberg flap reconstruction was associated with a lower risk of recurrence in extensive pilonidal disease compared with other flap techniques, such as the Karydakis and Bascom procedures (RR, 0.52; 95% CI: 0.29-0.93; $z=2.19$; $p=0.03$).¹⁸ At our institution, the Limberg flap was selected because patients frequently presented with wide lateral extensions and prolonged disease evolution, factors that can complicate extensive transverse resections and limit other reconstructive options. Our postoperative findings support the results reported by Ray et al; however, the small number of cases and short follow-up preclude definitive conclusions. This case series represents the initial phase of broader protocol designed to evaluate outcomes in Mexican patients.

This study has several limitations, including the small sample size, retrospective design, and relatively short follow-up period. Additionally, this represents a single-center experience, which may limit generalizability of the findings. Larger prospective studies with longer follow-up are required to further validate the effectiveness and safety of the Limberg flap in pilonidal disease.

CONCLUSION

The Limberg flap is a safe and effective surgical technique for the treatment of pilonidal disease, offering low recurrence rates and acceptable complication profiles. In our experience, it provided favorable clinical outcomes with manageable postoperative complications. Therefore, it represents a reliable surgical option, particularly in patients with complex or recurrent disease.

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