



LIMBERG FLAP PROCEDURE FOR PILONIDAL SINUS-A PROSPECTIVE STUDY

General Surgery

Dr. Rahul Dhatarwal

Resident, Department of Surgery, Mahatma Gandhi Medical College, Jaipur

Dr. Mukund Singh Yadav

Resident, Department of Surgery, Mahatma Gandhi Medical College, Jaipur

Dr. Lakshman Agarwal

Senior Professor, Department of Surgery, Mahatma Gandhi Medical College, Jaipur

ABSTRACT

Background: Pilonidal sinus is a common, acquired condition typically affecting young, hirsute males, with a significant impact on patient quality of life due to its associated discomfort and potential for recurrence. Surgical management is the mainstay of treatment, and various techniques have been proposed for reconstructing the defect after excision. Among these, the Limberg flap has gained prominence due to its effectiveness and lower recurrence rates. **Objective:** This study aims to evaluate the outcomes of the Limberg flap technique for reconstructing the sacrococcygeal region following pilonidal sinus excision, with a focus on surgical complications, recurrence rates, pain management, and recovery times. **Methods:** Between January 2023 and July 2024, 40 male patients with pilonidal sinus underwent surgery using the Limberg flap technique. Preoperative assessments included a complete history, clinical examination, and relevant investigations. The patients were followed for complications such as seroma formation, flap necrosis, infection, pain scores, hospital stay duration, and recurrence over a period of 6 months. **Results:** The mean operative time was 55 minutes, with a range of 35 to 85 minutes. Five patients (12.5%) developed complications: two (5%) had seroma formation, one (2.5%) had flap necrosis, and one (2.5%) developed a superficial surgical site infection. The mean pain score was 5.2, and the average hospital stay was 6 days. There were no recurrences, and all wounds healed primarily with minimal scarring. The mean time to return to work was 22 days. **Conclusion:** The Limberg flap technique provides an effective and reliable method for reconstructing defects after excision of pilonidal sinus, with low complication rates, no recurrences, and favorable cosmetic and functional outcomes. It remains a highly recommended option for managing recurrent sacrococcygeal pilonidal sinus due to its ease of performance, low recurrence rate, and high patient satisfaction.

KEYWORDS

INTRODUCTION

Pilonidal sinus is a relatively common condition, typically occurring along the midline of the sacrococcygeal region in young, hirsute males. It is considered an acquired disorder that is associated with significant patient discomfort and morbidity. The term "pilonidal" originates from Latin, meaning "nest of hairs." The reported incidence is approximately 30 per 100,000 individuals. The condition often presents as a cyst, abscess, or sinus tracts, with or without discharge. Males are more frequently affected than females, and the condition is rare in individuals before puberty and after the age of 40 years.

The exact etiology of pilonidal sinus remains a topic of ongoing debate. Initially, the condition was believed to have a congenital origin, thought to be caused by a remnant of an epithelial-lined tract from post-coccygeal epidermal cell rests or vestigial scent cells. However, the prevailing view now attributes the condition to an acquired origin. This shift is supported by the observation that congenital tracts do not contain hair and are lined by cuboidal epithelium. Karydakos proposed that the disease results from three key factors: an increased quantity of hair, excessive mechanical force, and susceptibility to infection. The presence of hair within the gluteal cleft plays a crucial role in the development of the disease, as a deep natal cleft provides a favorable environment for moisture, bacterial contamination, and hair penetration.

Additional risk factors include obesity, local trauma, sedentary lifestyle, family history, poor hygiene, and excessive hairiness. It is widely accepted that pilonidal sinus develops when shed hair penetrates the skin, leading to an infected site. While the disease can be effectively managed with surgery, more extensive cases involving multiple openings, branching tracts, and severe symptoms may require wide excision. Pilonidal sinus is primarily diagnosed based on clinical presentation, with patients often presenting with chronic inflammation, a sinus with persistent discharge, or an acute abscess with multiple subcutaneous tracts.

Despite the availability of several conservative and surgical treatment options, recurrence rates remain a significant challenge. Full excision of the sinus and appropriate reconstruction can lead to a successful recovery. A variety of surgical techniques have been described for managing sacrococcygeal pilonidal sinus, including hair clipping with

proper hygiene, wide excision with packing, excision and primary closure, marsupialization, and several flap techniques like the Limberg flap, modified Limberg transposition flap, elliptical rotation flap, and fasciocutaneous flap.

Among these, flap reconstruction is particularly effective in addressing the underlying causes of the disease. Flap techniques help to flatten the intergluteal sulcus, utilizing less hairy tissue and minimizing perspiration. The most frequently employed method is the rhomboid excision followed by the Limberg flap. This technique has proven successful due to its tension-free repair and the use of a large, well-vascularized flap. It has been associated with complication rates as low as 0-16% and recurrence rates of 0-5%. The current article focuses on evaluating the Limberg flap, which uses superior gluteal and sacral perforators for reconstruction after excision of the pilonidal sinus.

**Figure 1**

METHODS

The study involved 40 consecutive male patients who underwent pilonidal sinus surgery from January 2023 to July 2024. The average duration of symptoms was 4.2 years. Patients underwent a comprehensive evaluation, including medical history, clinical examination, and routine laboratory investigations. Informed consent

was obtained from all participants after explaining the details of the surgical procedure and expected outcomes of the Limberg flap technique. Data were collected using preoperative and postoperative follow-up forms for each patient. Patients with co-existing local conditions, such as eczematous dermatitis, fungal infections, or other deforming pathologies, were excluded from the study. FIGURE 3 All patients underwent surgery using the Limberg flap technique. The median age of patients was 24 years. Twelve patients (30%) had a history of previous abscess drainage due to pilonidal sinus. The primary objective of the study was to assess the procedure in terms of surgical complications and recurrence rates.

Surgical Procedure

Preoperative preparation included shaving the natal cleft the day before surgery. Prophylactic intravenous antibiotics were administered: 1 gram of Cefazolin and 500 mg of Metronidazole. All procedures were performed under spinal anesthesia. The patients were placed in the prone position, with their buttocks separated using adhesive tape. A sterile skin-marking pen was used to outline a rhomboid-shaped excision over the pilonidal sinus, ensuring inclusion of all midline pits and any lateral extensions.



Figure 2

The design of the flap was carefully mapped out (Figure 1). The long axis of the rhomboid incision was labeled as A-C, with C positioned near the perianal skin. Point A was placed to encompass all diseased tissue. A perpendicular line, B-D, was drawn through the midpoint of A-C, measuring 60% of the length of A-C. Line D-E was an extension of B-D, equal in length to B-A, and was sutured after flap rotation. Line E-F ran parallel to D-C, also of equal length, and was sutured to A-D after rotation.

The rhomboid excision of the affected skin and subcutaneous tissue, down to the pre-sacral fascia, was completed using electrocautery (Figures 2). Next, the Limberg flap was elevated based on the superior gluteal and sacral perforators, as outlined by Koshima et al. in their cadaveric study. The level of dissection was at the pre-muscular fascia, and hemostasis was achieved before the adhesive tapes were released. The flap was mobilized and sutured in a tension-free manner to close the defect (Figure 3).



Figure 3

Interrupted 2-0 Vicryl sutures were used to incorporate fascia and fat, with a suction drain placed in the wound. The skin was closed using a stapler. Postoperatively, patients received antibiotics for 7 days, initially intravenously and then orally. The suction drain was removed after 2 days, and staples were removed around the 10th postoperative day. Patients were instructed to avoid placing pressure on the flap for 3 weeks. Follow-up evaluations were conducted at 1 month and 6 months after surgery.

RESULTS

A total of 40 patients underwent pilonidal sinus surgery using the Limberg flap technique from January 2023 to July 2024. The mean operative time was 55 minutes (range: 35 to 85 minutes). Initial follow-up was conducted at 2-week intervals, followed by evaluations at 1 month and 6 months post-surgery. Five patients (12.5%) experienced complications, including seroma formation in two (5%), flap necrosis in one (2.5%), and superficial surgical site infection in one (2.5%). Seromas resolved within 9 days, while the surgical site infection improved over a period of 4 weeks. The patient with flap necrosis underwent repeated debridements and required 10 weeks for healing by secondary intention.

Pain levels were rated between 3 and 9, with a mean score of 5.2. The average hospital stay was 6 days (range: 3 to 15 days). The majority of patients (95%) experienced primary wound healing with minimal scarring and less postoperative pain. No recurrence of the disease was observed, and none of the patients required readmission for pilonidal sinus. The mean time to return to work was 22 days (range: 12 to 35 days).

DISCUSSION

Sacroccygeal pilonidal sinus is known for its potential for recurrence and prolonged morbidity. The ideal treatment should prioritize low pain levels, short hospitalization, minimal complications, and a rapid return to daily activities. It is essential to avoid midline sutures in the natal cleft, as this site has a higher risk of recurrence. The goal is to achieve an off-midline closure, which reduces wound-related complications and recurrence rates.

Flap techniques, particularly the Limberg flap, have become a preferred method of reconstruction due to their ability to flatten the natal cleft and provide a tension-free closure. The Limberg flap technique is simple, quick, and provides a well-vascularized flap, reducing the risk of infection and scar formation in the midline. It is associated with fewer complications and a lower recurrence rate compared to other surgical techniques such as primary midline closure and marsupialization.

The results of this study align with those of previous studies, such as those by Katsoulis and Aslam, which reported low recurrence rates and minimal complications. In our cohort, only 5 patients experienced complications, with no recurrence, supporting the efficacy of the Limberg flap in treating pilonidal sinus. The mean operative time was shorter than that of alternative methods, and the cosmetic and functional outcomes were highly satisfactory.

CONCLUSION

The Limberg flap remains an effective and reliable surgical technique for reconstructing defects after excision of recurrent sacroccygeal pilonidal sinus. It is easy to perform, yields high patient satisfaction, results in complete disease resolution, and is associated with a low incidence of postoperative complications.