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Research Article

Limberg Flap vs Modified Limberg Flap in the Management of Pilonidal Sinus-A Retrospective Comparative Study

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Abstract

Background: Young individuals with a male preponderance often suffer from sacrococcygeal pilonidal sinus illness, which has a high morbidity rate. The best way to treat pilonidal sinuses does not exist. The lower end of the wound, located at the midline close to the anus, is susceptible to maceration, infection, and serves as an entrance for loose hair, increasing the risk of recurrence. The Limberg flap is a technique for managing the pilonidal sinus that eliminates the sinus and provides tension-free wound closure

Patients and Methods: Two groups of 20 individuals with primary pilonidal sinus disease were created. The traditional Limberg flap was used to treat patients in group 1, while a modified Limberg flap was used to treat patients in group 2.

Results: Group 1 included 10 patients with a mean age of 25.48 ± 5.403 years and 10 patients in group 2 with a mean age of 24.15 ± 4.789 years. The disease duration was 14.2174 ± 5.8686 months in group 1 versus 15.6739 ± 5.812 months in group 2; P values were 0.216 and 0.235, respectively. Wound maceration was higher in group 1 than in group 2, P value of 0.014. There was disease recurrence in two patients in group 1 while there was no recurrence in group 2 (P = 0.495).

Conclusion: One effective treatment for pilonidal sinus disease is the modified rhomboid flap procedure. By moving the bottom portion of the incision away from the midline, it lessens wound maceration and may lessen the likelihood that the disease would reoccur.

Keywords: Limberg Flap; Pilonidal Sinus; Natal Cleft

Introduction

Sacrococcygeal pilonidal sinus is a common disease in young adults with male predominance causing significant morbidity. The incidence is ~26 per 1 00000 people [1,2]. Pilonidal sinus disease is rare both before puberty and after the age of 40 years. It can be presented with a variety of symptoms. It may be asymptomatic or may be presented with acute abscess formation. In its chronic phase, there is intermittent or continuous purulent or serous discharge from the sinus openings, either the midline (primary) opening or from an eccentric (secondary) opening [3]. The aetiology of the pilonidal sinus is a matter of controversy. This condition was suggested to be congenital in origin. Now it is generally considered an acquired pathology. A widely accepted view is that the disease is caused by local trauma, poor hygiene, excessive hairiness, and the presence of a deep natal cleft [4,5]. Till now there is no ideal method for the management of pilonidal sinus. Limberg flap is a tech-

nique for managing the pilonidal sinus that provides eradication of the sinus and tension-free wound closure. Moreover, it eliminates the predisposing factors for pilonidal sinus formation by reducing the depth of the natal cleft [6,7]. The lower end of the wound after its closure using the Limberg flap is found at the midline near the anus. This wound site is liable to maceration, infection, and acts as an entry for loose hair. In this study, we aimed to compare the classic Limberg flap with the modified Limberg flap technique where the lower end of the excised rhomboid is shifted 2 cm paramedian.

Patients and Methods

This is Retrospective Comparative study. The study was conducted from November 2022 to November 2024 in the Kanyakumari Government Medical College Hospital's General Surgical unit. Informed Written consent was acquired before the procedure. The study was approved for ethical clearance by the ethical committee of the Medical College:

Patient population

Ttotal 20 patients were involved in the research diagnosed with pilonidal sinus, were divided into two groups of 10 patients for Limberg's rhomboid reconstruction and 10 patients for Modified Limberg's procedure.

Patient selection

Inclusion criteria:

- All patients with primary pilonidal sinus disease.
- Willing for the study
- Age between 15-50years

Exclusion criteria:

- Unwilling/Unfit for surgery
- Recurrent pilonidal sinus
- Acute worsening of the Disease
- Diabetes
- Obesity (BMI > 35)
- Severe co morbidities and bleeding disorders.

The rhomboid's long axis in the midline is marked as A-B, with B next to the perianal skin. Marking A and B allows for easy identification of all diseased tissues be included in the excision. Line C-D is 60% of the length of A-B and forms a right angle with the midpoint. The line D-E extends directly from C-D and is the same length as the incision C-A. It will be sutured following rotation. E-F is parallel to D-B and has equal length. After rotation, it will suture from A to D.

Limberg's rhomboid reconstruction (Group 1)

Excision of the pilonidal sinus, then rhomboid flap reconstruction and closure. Patients in this group were managed using a standard Limberg flap. Every branch of the sinus was identified by injecting methylene blue via the sinus apertures. A fasciocutaneous flap, also known as a Limberg flap, covered the gluteal muscle with fascia, skin, and subcutaneous fat. The flap was prepared using either right or left gluteal tissue. Suction drains were carefully inserted and placed above the presacral fascia after cautious hemostasis. Interrupted 2-0 vicryl sutures have been used to approximate the subcutaneous layer. To seal the skin, 3-0 ethilon stitches were used along with interrupted polypropylene or staple stitches.

Modified Limberg's Procedure (Group 2)

The patients in this group underwent a modified Limberg flap, with the lower angle excised rhomboid switched paramedian by 2 cm. To cover the rhomboid defect, the anatomic bands between the dermis and underlying fascia of the midline sulcus were totally released. The Limberg flap was then transposed. The Limberg flap was removed from the opposite side of the shifted lower angle of the excised rhomboid. This approach resulted in no midline wound and relocated the lower section of the sutured incision away from it.

For 7 days, all patients received postoperative cefoperazone sulbactam 1.5g IV twice daily and metronidazole 500 mg IV three times each day. Wounds were dressed every other day until the stitches were removed. The suction drain was removed once it drained 30 ml or less of serous fluid.

Patients were followed up in the outpatient clinic weekly for the first month and every 2 months for at least 6 months after surgery.

Statistical analysis

The collected data were analysed by a computer using the Statistical Package of Social Services, version 25 (SPSS). Data were represented in tables. The results were considered statistically significant when the significant probability was less than 0.05 ($P < 0.05$) and a P value more than or equal to 0.05 was considered statistically insignificant.

Figure a

A) Sacrococcygeal pilonidal sinus

B) Preoperative marking for the modified Limberg flap. Notice the lower angle of the rhomboid was shifted off the midline, 2 cm to the right

C)Modified Limberg flap before skin closure.

D)The final picture of the modified Limberg flap after skin closure. Note the lower end of the wound was shifted away from the midline.

Figure 1: Showing the picture of Modified Limberg flap after 2 Weeks.

Results

Group 1 comprised 10 patients with an average age of 25.48 ± 5.403 years, while group 2 consisted of 10 patients with a mean age of 24.15 ± 4.789 years. The duration of the disease was recorded as 14.2174 ± 5.8686 months for group 1, compared to 15.6739 ± 5.812 months for group 2. Statistical analysis revealed no significant differences between the two groups in terms of age and preoperative disease duration, with P values of 0.216 and 0.235, respectively (refer to Table 1). Wound maceration occurred more frequently in group 1, affecting 4 out of 10 patients, compared to 0 out of 10 patients in group 2 (Figure 1), with this difference being statistically significant (P = 0.014). The instances of wound maceration were localized at the lower end of the wound, situated in the intergluteal sulcus in group 1, only one patient experienced a wound infection, whereas group 2 reported no cases of infection, with a P value exceeding 0.05. Disease recurrence was observed in two patients from group 1, while group 2 showed no recurrences; however, this difference was not statistically significant (P = 0.495) (refer to Table 2). The recurrences were noted at the lower end of the suture line during the postoperative follow-up at the second and fourth months. The duration required for patients to sit on the toilet postoperatively without experiencing pain was 4.2174 ± 0.94 days in group 1, compared to 4.54 ± 1.26 days in group 2. No statistically significant difference was found between the two groups regarding the time taken to sit on the toilet without pain postoperatively (P = 0.163) (refer to Table 1). Additionally, there were no instances of flap ischemia or wound dehiscence reported in either group.

	Groups	Mean	SD	*P* value
Age	Group 1	25.48	5.403	0.216
	Group 2	24.15	4.789	
Disease duration in months	Group 1	14.2174	5.86861	0.235
	Group 2	15.6739	5.81207	
Time to sit freely on the toilet after surgery	Group 1	4.2174	0.94076	0.163
	Group 2	4.5435	1.25974	

Table 1: The patient age, preoperative disease duration, and the time to sit on the toilet without pain after surgery.

	Groups	[n (%)]	P value
	Group 1	Group 2	
Maceration			
No	6 (60)	10 (100)	0.014
Yes	4 (40)	0	
Infection			
No	9 (97.83)	10 (100)	0.538
Yes	1 (2.17)	0	
Recurrence			
No	8 (95.65)	10 (100)	0.495
Yes	2 (4.35)	0	

Table 2

Discussion

Pilonidal disease is a common disorder affecting young adults with male predominance. It is a benign disease that causes morbidity and socioeconomic burden. Several methods have been used for the management of the disease including conservative treatment, excisional methods, and flaps. Many authors claimed that flap techniques are superior to primary closure and lay-open techniques. However, no optimal approach with low complications and recurrence rates has been achieved yet [8,9]. The lay-open technique allows the wound to heal by secondary intention. This technique has a shorter length of hospital stay and a lower rate of recurrence. The disadvantages of this method include prolonged wound healing and the requirement of wound dressing for a longer period. However, some studies have reported that postoperative infection is observed more frequently in the lay-open technique than in the primary closure or methods involving flap transposition [3,9,10].

Excision and primary closure technique is a simple procedure. The tension on the suture line and hair accumulation in the deep midline cleft can limit the overall success of the procedure and lead to high recurrence rates [8,11]. Simple procedures that include excision and packing, excision and partial closure, excision with primary closure, and marsupialization are often associated with high recurrence rates [7]. These simple techniques did not eliminate the predisposing factors for pilonidal sinus. Hodgson and Greenstein [12] reported that 60% of their patients treated by incision and drainage or excision with marsupialization had recurrence. Edwards [13] reported a 5-year evaluation of local excision and found an overall recurrence rate of 46%.Flap techniques not only close the wound after the excision of the sinus area but also offer a tension-free closure and eradicate the etiology of the disease by flattening the natal cleft with much less hairy fasciocutaneous flaps and less sweating [6,14-16].

The Limberg flap serves to flatten the intergluteal cleft. A significant drawback associated with the Limberg flap is the relatively inadequate wound healing observed at the lower pole of the flap, located in the midline adjacent to the anal canal, where severe maceration and wound dehiscence can occur [17]. This issue may play a role in the recurrence of conditions following Limberg flap surgery. The recurrence may be exacerbated by the existence of a midline wound that facilitates the entry of hair [18]. To address these concerns, the Limberg flap has been modified through the implementation of an asymmetric rhomboid excision, positioning the lower angle of the rhomboid 1–2 cm lateral to the natal cleft. This alteration is believed to reduce both the rates of maceration and recurrence at the suture line [17].

In this study, there was a significantly higher rate of wound maceration at the lower end of the suture line in group 1. This was in agreement with a study conducted by Akin., *et al.* [19] on 416 patients comparing the classic Limberg flap and its modification. They found the maceration rate to be higher in the classic Limberg flap (9.04%) than the modified Limberg (1.95%). But rate of wound maceration was higher in both groups in our study than that in the study of Akin., *et al*. [19].

In this study, neither hematoma nor wound dehiscence was observed in patients from both groups. Only one patient in group 1 experienced a wound infection, which was effectively managed through conservative treatment involving repeated dressing changes. Group 2 did not report any recurrences, whereas group 1 had two patients (4.35%) with recurrence. Although the recurrence rate was higher in those treated with the classic Limberg flap, this difference was not statistically significant. Hussain., *et al*. [20] investigated 21 patients with primary pilonidal sinus who underwent treatment with the modified Limberg flap, finding that 2 out of 21 patients (9.5%) experienced wound dehiscence necessitating surgical intervention under local anesthesia. Additionally, the occurrence of wound hematoma in their research was noted in 1 out of 21 patients (4.8%), with a recurrence rate of 1 out of 21 patients (4.8%). A separate study by Heggy., *et al*. [21] reported no recurrences among 18 patients treated with the modified Limberg flap. Furthermore, Akin., *et al.* [19] found a recurrence rate of 4.7% (10 out of 211 patients) for those receiving the classic Limberg flap, compared to 0.97% (2 out of 205 patients) for those treated with the modified Limberg flap, a difference that was statistically significant with a P value of less than 0.05.

In this study, the time taken to sit on the toilet postoperatively without pain was 4.2174 ± 0.94 days in group 1 versus 4.54 ± 1.26 days in group 2 (P = 0.163). There was no significant difference between both groups.

Tavassoli., *et al*. [22] reported a shorter period to sit on the toilet without pain, 6.9 days in the Limberg flap group. This was significantly shorter than the primary repair group.

Conclusion

The modified rhomboid flap technique represents an effective approach for addressing pilonidal sinus disease. This method relocates the inferior aspect of the wound away from the midline, thereby reducing the risk of wound maceration and potentially lowering the likelihood of disease recurrence.

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