

“Limberg’s vs Modified Limberg’s”: Outcomes in Pilonidal Sinus Surgery

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Abstract

Pilonidal sinus is a chronic and debilitating condition requiring effective surgical treatment. Various surgical have been in use for treating pilonidal sinus. However controversies still exist. Limberg's Rhomboid flap reconstruction is widely used technique in pilonidal sinus disease. There were reports stated tht midline of anal region getting infected, macerated and recurrence. To compare outcomes of Limberg's and Modified Limberg's Rhomboid flap reconstruction procedures in patients with Pilonidal sinus. A case series report of 15 patients who underwent surgical treatment using either of the procedures in our institution. Modified Limberg's showed improved wound closure, reduced wound dehiscence and no recurrence. Mean hospital stay was less, and Time spent in the toilet was also significantly more when compared with Traditional Limberg's. The Modified Limberg's procedure offers improved surgical outcomes, less recurrence and reduced complications. Surgeons should consider using the Modified Limberg's procedure as the primary treatment option for sacrococcygeal pilonidal sinus especially in recurrent cases. Further studies are needed to establish its superiority.

Keywords: Case series, Gluteal Cleft, Limberg’s, Modified Limberg’s, Pilonidal Sinus , Tuft of Hair.

Introduction

Sacrococcygeal pilonidal sinus is a common chronic condition usually affecting adult males under 45 years. The incidence of IPD is estimated at 26 cases per 100,000 population. Males are more commonly effected compared to females [1, 4, 5] . The mean age at Pilonidal sinus disease onset is 19 years in women and 21 years in men. The exact cause and development of sacrococcygeal pilonidal sinus are still debated and controversial, but it's considered as an acquired condition. Pilonidal cavities are considered pseudocysts which sinus tracts may be epithelialised [1] .Several factors contribute to its formation, including poor hygiene, excessive hair growth, local trauma in the sacrococcygeal area, and a deep natal cleft [6, 7] . When walking, loose hair shafts can enter skin abrasions in the gluteal sulcus, acting as a foreign body and leading to cavity formation.

Once the cavities/pore becomes infected, an acute subcutaneous abscess develops [1, 8]. In obese individuals, the intergluteal sulcus is more prone to moisture and fragility, making this process more pronounced. Treatment involves complete excision of all sinuses or cavities or pits. Various surgical techniques have been in use for treating pilonidal sinus. However, controversies still exist. Either midline or off-mid-line [12, 13] procedures, such as Z-plasty, V-Y advancement flap , Karydaki’s procedure [14], and rhomboid (Limberg) flap [15], can be used to achieve primary closure. The off-midline sutured wounds take significantly less time to heal and show lower rates of surgical site infection, recurrence, and overall complications, compared to midline sutured wounds [12]. Comparing various surgical approaches for pilonidal sinus management, In this study we analysed Limberg's rhomboid reconstruction

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and its modified version. We aimed to identify the efficiency of Modified Limberg's reconstruction technique by analyzing surgical details and differences, postoperative complications, postoperative hospital stay. Our goal was to determine advantages of Modified technique for improved patient care and quality of life.

Materials and Methods

This is a case series report analyzed between March 2023 to September 2023 in our institution. This study is approved by our Institutional ethical committee board. Informed and Written consents were obtained from all patients before procedures.

Patient population: A Case series of total of 15 patients diagnosed with pilonidal sinus, were divided into two groups of 7 patients for Limberg's rhomboid reconstruction and 8 patients for Modified Limberg's procedure.

Patient Selection

Inclusion criteria: Patients with primary or recurrent pilonidal sinus, aged 18-40 years, were included.

Exclusion criteria : Patients with concurrent medical conditions, immunosuppression, or patients with pilonidal sinus disease who did not agreed for the study were excluded.

Surgical instruments: Standard surgical instruments for rhomboid excision and reconstruction, including scalpels, forceps, and sutures.

Sutures: Single layer closure with delayed absorbable sutures.

Dressing Materials: Sterile dressings and bandages for postoperative wound care.

Surgical Technique: 15 patients with primary pilonidal sinus disease, recurrent pilonidal sinus disease, without active infection were identified and divided into two groups.

Limberg's Rhomboid Reconstruction (Group A): Excision of the pilonidal sinus, followed by rhomboid flap reconstruction and

closure. A classic Limberg flap was used to manage the patients in this group. Every branch of the sinus was marked by injecting methylene blue through the sinus openings. An example of a fasciocutaneous flap, or Limberg flap, covered the gluteal muscle with fascia as well as skin and subcutaneous fat. Right or left gluteal tissue was used to prepare the flap. Suction drains were carefully inserted and covered the presacral fascia following meticulous hemostasis. Interrupted 2-0 vicryl sutures were used to approximate the subcutaneous layer. With the help of interrupted polypropylene stitches or staples, 3-0 ethelon stitches were used to close the skin.

Modified Limberg's Procedure (Group B): In Modified Limberg's procedure, a Rhomboid-shaped marking was made after looking into all the sinuses clearly, making sure all sinuses come within the marking. A Sinus can be identified as a depression or raw area surrounded by a tuft of hair. Wide excision was required to completely excise the sinus, which would be like an iceberg phenomenon with multiple small sinus tracts and a tuft of hair. Commonly this tuft of hair which leads to sinus formation is usually seen in the gluteal cleft. Long axis of the rhomboid in the midline as A-B, with A being adjacent to the perianal skin and B was marked at a 2cm lateral point from the midline, by making sure that all sinuses or pits included in the excision. The length of AC was typically 10-12cm, ensuring the inclusion of all sinuses and tracts. A vertical diagonal line B-D transects the midpoint of A-C at right angles and is 60% of its length, forming a rhomboid when joined with all 4 points. The lower quadrant modification is made to ensure the midline scar falls away from the midline, with a convex line drawn from B-C and a concave line from C-D to minimize the risk of recurrence due to underlying dehiscence. D-E, extended laterally which is of equal length to B-A, and line E-F is made parallel to D-C and of equal length to A-B. The angle between the end point of DE and the start of the EF line is obtuse

(Fig 1). The incision was made and deepened, using cautery till the presacral fascia is reached and was excised. The raw area is checked for sinus tracts. Fascio-cutaneous flap was made and raised, with point E on the flap approximated to A and the remaining flap sutured linearly. Drain tube kept. The vascularity of the flap is checked twice before finalizing the approximation. Single layer closure with delayed absorbable sutures was used. Patients are advised to be in a prone position for 48 hours to avoid pressure on the flap. Drainage tubes are removed on the second or third postoperative day, and patients are discharged from the hospital. Sutures are removed on the tenth postoperative day, and regular follow-up is advised to assess the progress of healing, complications, and risk of recurrence.

After Preoperative Anesthesia assessment and preparation, Patients were planned for the procedure. Patients were instructed to fast and receive intravenous fluids. They were also given preanesthetic medication and admitted to

the hospital on the day of surgery. Under spinal anaesthesia, patients were positioned prone in a Jack-knife position, with adhesive straps applied to each gluteal region to laterally retract the tissue. The surgical site was prepared with povidone-iodine. Additionally, a prophylactic antibiotic, ceftriaxone (a third-generation cephalosporin), was administered 30 minutes prior to the operation.

Surgical Outcome Assessment: Wound healing, complications, recurrence rates, and patient satisfaction were evaluated at 1 week, 1 month, 3 months, and 6 months postoperatively.

Data Analysis: Statistical analysis was performed using SPSS software, with $p < 0.05$ considered significant.

Informed Consent: Patients provided written informed consent before surgery.

Institutional Review Board Approval: The study was approved by the institutional review board.

Confidentiality and Anonymity: Patient data were kept confidential and anonymous.

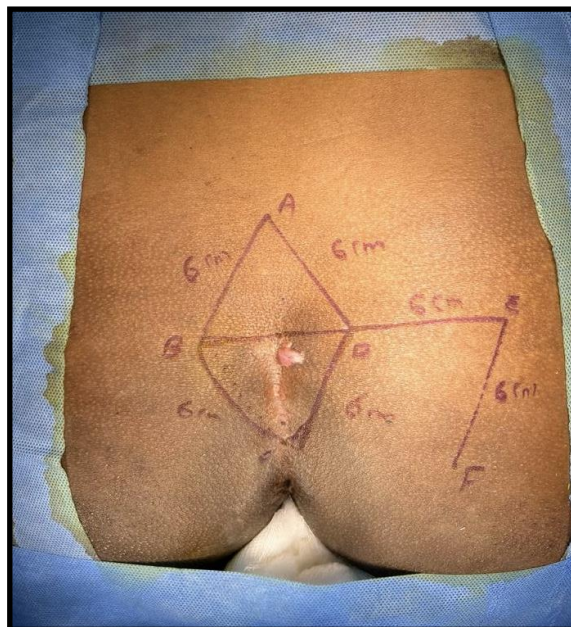


Figure 1. Modified Limbergs Flap Schematic Diagram.



Figure 2. Modified Limberg's POD 0 with Drain tube, Single Layer Closure.



Figure 3. Modified Limberg's POD28, Scar Healthy.



Figure 4. Limbergs Flap (Group A), Sinus Formation (see circle).

Results

Both groups had similar age and gender distributions. In Limberg's group, 5 out of 7 patients had successful wound closure and 2 out of 7 had wound dehiscence. In Modified Limberg's group, 7 out of 8 patients had successful wound closure. No wound necrosis and no wound dehiscence were noted in the Modified group (fig. 2, 3) , Whereas in Limberg's 2 out of 7 had skin necrosis. In Limberg's group, 3 out of 7 patients had wound infections (fig. 4) , and 1 out of 7 had seroma.

In Modified Limberg's group, 1 out of 8 patients had wound infection and no seroma. In Limberg's group, 3 out of 7 patients had recurrent pilonidal sinus. Whereas in Modified Limberg's group, there is no recurrence. 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. There was no statistically significant difference between the two groups of patients regarding the time taken to sit on the toilet without pain postoperatively (Table 1).

Table 1: Outcomes Between Two Groups

OUTCOME	Limberg's (n=7)	Modified Limberg's (n=8)
Successful Wound Closure	5 (71%)	7 (88%)
Wound Dehiscence	2 (29%)	0 (0%)
Wound Infection	3 (43%)	1 (13%)
Seroma	1 (14%)	0 (0%)
Recurrence	3 (43%)	0 (0%)
Skin Necrosis	2 (29%)	0 (0%)

Discussion

Pilonidal sinus disease is a prevalent condition affecting young adults, with a male predominance. it is a benign illness that adds to the socioeconomic burden and morbidity. The condition has been managed using a variety of techniques, including flaps, excisional techniques, and conservative treatment. Many authors asserted that lay-open and primary closure procedures are inferior than flap techniques. But as of yet, no ideal strategy with minimal problems and recurrence rates has been found [8, 9].

By using the lay-open approach, secondary intention healing takes place in the wound. Both the length of hospital stays, and the recurrence rate are reduced using this method.

On the other hand, some study data has found that postoperative infection occurs more often with the lay-open technique than with primary closure or flap transposition techniques [3, 9, 10].

The technique of excision and primary closure is a straight forward one. High recurrence rates and limited overall operation success can result from hair collection in the deep midline cleft and strain on the suture line [8, 11].

High recurrence rates are frequently linked to straight forward operations including excision and packing, excision with partial closure, excision with primary closure, and marsupialization [7]. The pilonidal sinus predisposing factors were not eliminated by these straightforward methods. According to

Hodgson and Greenstein [12], recurrence occurred in 60% of their patients who had excision combined with marsupialization or incision and drainage. A 5-year review of local excision by Edwards [13] revealed a 46% overall recurrence rate.

By flattening the natal cleft with significantly less hairy fasciocutaneous flaps and less sweating, flap procedures not only seal the wound following the removal of the sinus area but also provide a tension-free closure and eliminate the disease's etiology [6, 14–16].

The intergluteal cleft is flattened by the Limberg flap. The comparatively poor wound healing at the lower pole of the Limberg flap, which is located in the midline close to the anal canal and exhibits severe maceration and wound dehiscence, is one of the most upsetting drawbacks of the procedure [17]. This could be a factor in the recurrence following the Limberg flap procedure. The existence of a midline wound that serves as a doorway for hair invasion may be a factor in recurrence [18].

Asymmetric rhomboid excision was performed on the Limberg flap, with the lower angle of the rhomboid positioned 1-2 cm lateral to the natal cleft. It was anticipated that this adjustment would lower the rate of maceration and recurrence along the suture line [17]. Lower quadrant was modified as convex on side and concave on opposite side, to prevent maceration and suture line in the midline.

In our study, Patients were divided into two groups into group A and group B, analyzed two groups where Modified Limberg's procedure was performed in group B. Different steps were used in both the groups. Modifications like midline marked away from cleft to avoid scar over the cleft to avoid wound dehiscence, When compared to Normal Limberg's procedure, No skin necrosis was noted in Modified group. In case of Traditional Limberg's where skin closed in two layers (separate subcutaneous closure and skin closure) compromised vascularity of the flap by ligating the subcutaneous vessels, resulted in Skin necrosis

in 2 cases. Whereas in Modified group Single layer closure was done using delayed absorbable sutures. Wound healing time was less and no seroma collection as we placed subcutaneous drain, and no necrosis noted.

In research by Akin et al. [19], patients treated with the modified Limberg flap had a recurrence rate of 0.97% (2/205 patients) compared to 4.7% (10/211 patients) among patients with the original Limberg flap; this difference was statistically significant with a P value less than 0.05.

Hussain et al. [20] conducted a study on 21 patients with primary pilonidal sinus treated by the modified Limberg flap, They found that 2/21 (9.5%) patients had wound dehiscence that required surgical closure under local anesthesia. Also, the incidence of wound hematoma in their study was 1/21 (4.8%) and the recurrence rate was 1/21 (4.8%). A study carried out by Heggy et al. [21] showed that there was no recurrence among 18 patients treated by the modified Limberg flap.

According to Tavassoli et al. [22], the Limberg flap group required 6.9 days less time to sit on the toilet pain-free. This was a lot shorter than what the main repair group did.

In a study conducted by Orban et al [23], A total of 92 patients divided into two groups (Limbergs vs Modified Limbergs). Wound maceration was higher in Limbergs than in Modified Limbergs, 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).

Limitations

15 cases may not represent large population, results may not be generalizable. Study only evaluated limited number of cases where we could not find any significant statistical differences. So, studying with large population would have helped for better results.

Conclusion

This case series report compared the outcomes of Limberg's and Modified Limberg's procedures for pilonidal sinus treatment. Our results showed that both procedures are effective in treating the condition, but the Modified Limberg's procedure had several advantages. This Modified Limberg's procedure appeared to be a superior treatment option for sacrococcygeal pilonidal sinus due to its lower recurrence rate and lower complication rate. Surgeons should consider using the Modified Limberg's procedure as the

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primary treatment option for sacrococcygeal pilonidal sinus. Patients should be informed of the potential benefits and risks of available treatment options to make informed decisions about their treatment. More studies with larger sample sizes and longer follow-up periods are needed to evaluate the long-term efficacy of both procedures.

Conflict of Interest

No conflict of interest.

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