

Limberg flap for previously recurrent complex sacrococcygeal pilonidal sinus surgeries

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Summary

Objective: Limberg flap, is a rotational rhomboid flap. A procedure done for people who have either complex or recurrent pilonidal disease. This study has been performed to determine effects of the Limberg flap for sacrococcygeal pilonidal sinus, regarding the wound infection rate, seroma formation, postoperative pain relief, recurrence rates, return to work, its cosmetic final result and patients' satisfaction. **Methods:** A total of 10 patients were operated from January 2022 to March 2023. Patients were selected according to the disease complexity and recurrence, so that the patients selected were classified as complex and at least of a second recurrence of the disease. **Results:** Patients successfully underwent surgery, with mild to moderate postoperative pain, stayed in hospital for 3 days in average, returned to work after 6 weeks, with 5 patients having flap oedema, 1 patient had wound infection, no one had flap necrosis, and there were no recurrences so far for an average follow-up time of about 3 months. Patients with flap oedema took 2–3 weeks to heal with regular dressing only. Patient satisfaction and final cosmetic result were well accepted. Limberg flap for sacrococcygeal pilonidal sinus was found very useful in terms of recurrences. **Conclusion:** Better patients' acceptance and satisfaction despite the increased risk in postoperative pain, infection rates, and longer return to work in comparison to the open procedures.

Key words

limberg flap – sacrococcygeal pilonidal sinus – wound infection – postoperative pain – recurrence – flap oedema

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Introduction

Sacrococcygeal pilonidal disease (SPD) is an epithelium-lined tract, situated a short distance behind the anus, containing hairs and unhealthy diseased granulation tissue [1]. It is due to the penetration of hairs through the skin into the subcutaneous tissue. It is common in hairdressers (seen in interdigital clefts), and Jeep drivers as called in the World War II.

The projected occurrence rate is 26 cases per 100,000 individuals by a study in Norway with catchment area of 250,000 inhabitants [2]. Typically, it manifests as a cyst, abscess, or sinus passage, with or without discharge [3]. The condition tends to affect men more frequently than women, and it is uncommon both prior to puberty and after the

age of 40. On rare occasions, it might occur during the fourth decade of life [4]. Several factors can predict the recurrence of SPD, including the number of midline pits and lateral sinus tracts, in addition to endoscopic approach in patients with complex SPD [5]. Other conditions can mimic recurrent SPD and can be distinguished from recurrent SPD through imaging, these conditions include hidradenitis suppurativa, inflammatory bowel disease, and abscess [6].

A rhomboid flap, also known as a Limberg flap is a rotational flap classified as a local transposition flap that moves laterally about a pivot point into an adjacent defect [1,7]. It was first described by Limberg in 19467 and was subsequently modified by Dufourmentel in 1962 and Webster in 1978. This technique, which

was used to close head and neck defects initially, can be used to close defects almost anywhere on the body including the intergluteal cleft defect resulting after the sacrococcygeal pilonidal sinus surgery [8]. Compared to other techniques, Limberg flap showed an effective reconstruction of large tissue defects, achieve complete lesion resection, and prevent recurrence due to residual sinuses. The procedure is straightforward, with the flap length matching the wound edge, minimizing suture tension and reducing the risk of tension blisters [9]. Due to its minimal rate of complications and satisfactory long-term outcomes, opting for the rhomboid excision and Limberg flap procedure is more favourable when compared to the simple excision and primary closure for treating SPD [10].

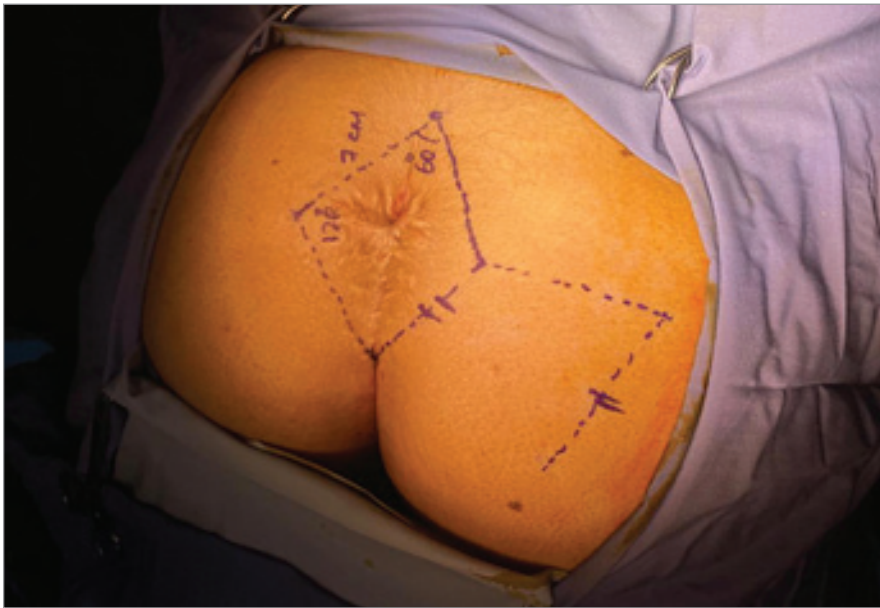


Fig. 1. Patient's intra-operative markings.



Fig. 2. Final result of surgery.

Patients and methods

Procedure

The study was conducted between January 2022 and March 2023 for patients with either complex or recurrent SPD. The procedure was performed under local anaesthesia in an office setting, intravenous sedation, or general anaesthesia. This mainly depends on patient tolerance and the invasiveness of the procedure itself. Patients were put in a prone position with buttocks strapped apart.

Technique

We started by mapping the site of excision, which was done by identifying the extent of the pits and marking the diamond shape with the superior and inferior apices of the diamond just to the left of the midline.

The marking of the flap was from the lateral apex of the diamond, on the right side. Incisions were first made to resect the diamond-shaped tissue down to the sacral fascia. Next, the lipocutaneous flap was raised. Care was taken to ensure that the flap is undermined appropriately to allow for a tension-free closure without creating ischemia.

The flap was secured into place with absorbable sutures. The final layer of the

skin was closed with vertical mattress sutures, and surgical glue. The long axis of the rhomboid in the midline was marked as A–C, C being adjacent to perianal skin, A placed so that all diseased tissues are included in the excision. The line B–D transected the midpoint of A–C at right angles and was 60% of its length. D–E was a direct continuation of the line B–D and of equal length to the incision B–A, and was sutured after rotation. E–F was parallel to D–C and of equal length. After rotation, it was sutured to A–D. The skin and subcutaneous fat were excised down to the deep fascia, and a rhomboid area including the pilonidal sinus was removed. Then the flap was raised so that it included skin, subcutaneous fat, and the fascia overlying gluteus maximus, rotated to cover the midline rhomboid defect.

The defect thus created can be closed linearly. Deep absorbable sutures including fascia and fat were placed over a vacuum drain. Finally, the skin was closed with interrupted sutures.

The operation produced a tension-free flap of unscarred skin in the midline. Antibiotics were given intravenously for 3 days, and then orally. The suction drain was removed after 2 days, the sutures

were removed completely around the 10th day.

Results

In this study, 10 patients were included. There were 4 males and 6 females. The mean age was 30 years (range 20–35 years). Of the 5 patients, all of them came up after having a recurrent complex disease with 4 of them having a previous incision and drainage for abscess. All patients who came with pilonidal sinus in January 2022, were assessed for its severity and investigated, and then they underwent Limberg flap surgery under spinal anaesthesia. Fig. 1 and 2 show examples of the intra-operative markings for planning the surgery and final surgery results.

Postoperatively the patient was made to lie on their sides, then made ambulant after the 1st postoperative day, with drain *in situ*. The patient received antibiotics and regular dressing of the wound. The drain was removed approximately on the 2nd postoperative day. The sutures were removed partially during follow-up around the 7th day and completely at around 14 days.

All patients are followed up initially weekly for 1 month, then monthly for

the next 3 months (Fig. 3). Two patients had flap oedema which took 3 weeks to disappear completely with pressure dressing and usage of antibiotics. All other patients' wounds healed with accepted scarring, with moderate postoperative pain which was managed with multimodal treatment without narcotics. No recurrence was seen till the time of the study and during the follow-up. Most patients returned to work after 6 weeks and were very satisfied with the final result.

Discussion

The presented case series highlights the procedure and outcomes of using the Limberg flap technique for treating sacrococcygeal pilonidal sinus. The choice of local anaesthesia, intravenous sedation, or general anaesthesia was based on patient's tolerance and procedural invasiveness, underscoring the importance of personalized care.

Treating sacrococcygeal pilonidal sinus with a Limberg flap is promising but needs a proper patient selection and a skilled surgeon [3,4]. Good short- and long-term follow-ups are mandatory and eventually reflect on the patient outcome. The lack of comparisons between the flap and other procedures for sacrococcygeal pilonidal sinus at this point is present and needs more work [11,12].

Several series recently reported about the usefulness of this flap in the treatment of sacrococcygeal pilonidal sinus in terms of recurrence, infection, and morbidity [13,14]. In our series, we had 2 patients with flap oedema out of 10 patients, which took 3 weeks to resolve, no recurrences so far, and no unexpected complications. Bali et al. showed that the application of the Limberg flap exhibited a reduced incidence of complications, a briefer hospitalization period, an expedited resumption of work, diminished pain ratings, heightened patient contentment, and improved duration for comprehensive recovery [15]. When dealing with patients characterized by

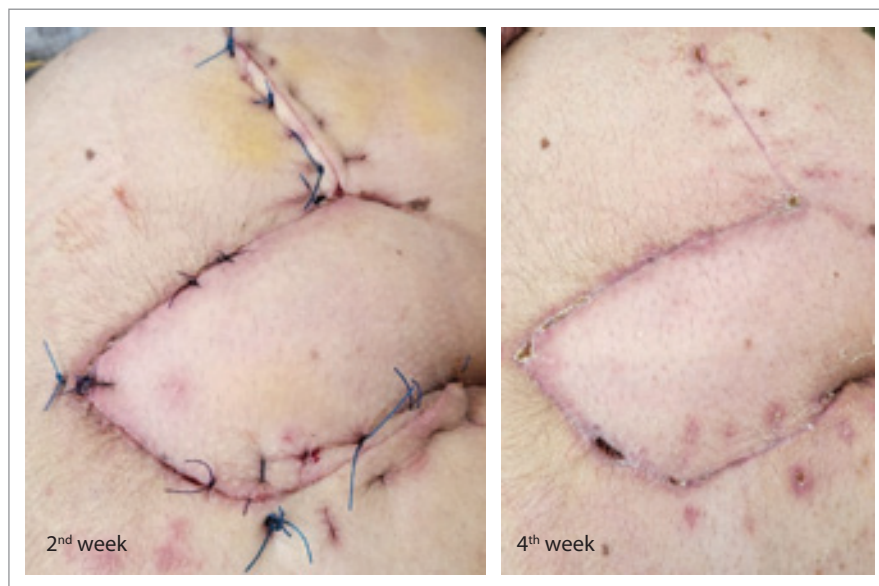


Fig. 3. Follow-up at 2nd and 4th weeks postoperatively.

recurrence and the presence of multiple sinuses, the strategy involves the utilization of lateral flap rotations achieved through the removal of the midline [16].

In a long-term study by Topgul et al. of 200 patients with pilonidal sinus who underwent the Limberg flap, minimal complications were reported, with 6 cases of postoperative necrosis, wound infection, and seroma in 3 patients [11].

Furthermore, the selection of techniques for treating sacrococcygeal pilonidal disease is influenced by several critical patient-related factors, including the presence of comorbidities, expected patient compliance, and the patient's attitude toward the disease [17]. On the other hand, local conditions play a significant role, influenced by factors like the proximity of the condition to the anus, the quantity and location of pits and sinuses, and the history of prior SPD surgery. Expert opinions in favour of specific techniques are often guided by perceptions of low recurrence rates, familiarity with the technique, and the overall positive outcomes experienced by patients [18,19].

It is important to note that an inadequate follow-up period can potentially underestimate complications or recurrences after surgeries. In our study, the

follow-up period was structured to monitor patients initially weekly for 1 month, followed by monthly assessments for the next 3 months. While this period might be shorter than previous studies, a study by Alkurt et al. showed recurrence after 1 year of operation [20]. The recurrence of pilonidal sinus after surgical intervention generally occurs within the first few months postsurgery, and follow-up periods of 3–6 months are considered sufficient to capture early recurrences [21].

Based on our results, the Limberg flap demonstrated favourable outcomes, with all patients experiencing good healing, minimal postoperative complications, and no recurrences during the follow-up period of 3 months. The low complication rate, including only two cases of flap oedema that resolved within 3 weeks, and the lack of recurrence, suggest that the Limberg flap is a reliable and effective surgical option for complex SPD cases. Moreover, our study reported high patient satisfaction, with all patients returning to work within 6 weeks. This further supports the objective of assessing both clinical and patient-centred outcomes. However, longer follow-up periods would be necessary to confirm the long-term success of the procedure.

Conclusion

Sacrococcygeal pilonidal sinus is sometimes challenging to treat, keeping in mind that complexity and recurrence are not rare to deal with, and selecting the proper patients for the proper procedure – including the flap – is mandatory and hard in the lack of strict and clear indications for one procedure over the others. Limberg flap for sacrococcygeal pilonidal sinus is promising and have good outcome in the presence of surgeon and patients cooperation. The technique is not hard to perform, we found it useful mainly for complex and recurrent diseases, with very low complication and recurrence rates. Other advantages are low morbidity and patient satisfaction with the final result.

Roles of the authors

Jehad Aljarrah, Ibrahim Alrawashdeh, and Mohammad Debian – conceptualization, investigation, methodology, project administration, supervision, writing – original draft. Taher Harahsheh, Ala Aldurgham, Laith Alshehabat, and Anas Alrabadi – data curation, formal analysis, validation, writing – review and editing. Abdallah Abu anzeh, Trad Alhalahlah, and Mohammad Abual'anaz – data curation, software, visualization, writing – original draft.

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Ethical approval: This study was approved by the ethical committee at the Jordanian Royal Medical Services (approval number: 11.2023 #7). The study was performed in accordance with the principles of the Declaration of Helsinki, 1975.

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