



Original research

## Comparison of modified limberg flap and modified elliptical rotation flap for pilonidal sinus surgery: A retrospective cohort study



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### HIGHLIGHTS

- Elliptical rotation flap was used by nessar et al. and the weak points of the technique were described.
- Modified elliptical rotation flap technique and its advantages and superiority over elliptical rotation flap was described.
- The study showed that modified elliptical rotation flap technique is a feasible and effective procedure for pilonidal sinus disease.

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### ABSTRACT

**Background:** Although various surgical procedures have been described for pilonidal sinus disease, the best surgical technique is still controversial. Aim of this study was to compare the short term results of modified limberg flap (MLF) and modified elliptical rotation flap (MERF) for pilonidal sinus disease in terms of postoperative complications, recurrence and patient satisfaction.

**Materials and method:** Two hundred and thirty six patients (43 female, 193 male) who were operated on for sacrococcygeal pilonidal sinus disease between January 2010 to December 2013 were retrospectively analyzed. 115 patients underwent Modified limberg flap (MLF) procedure and 121 patients underwent modified elliptical rotation flap (MERF) procedure. The median follow-up period was 22 months (range, 4–34). Complication and recurrence rate were the mean end points of the study.

**Results:** Surgical area related complications were lower in MERF group than in MLF group, but the difference was not statistically significant. Patients in the modified elliptical rotation flap group had shorter operation time, better cosmetic results and earlier return to normal social life than modified limberg flap group. There were no recurrences in MERF group but one recurrence in MLF group.

**Conclusion:** Modified limberg flap reconstruction is still one of the most commonly performed procedures for pilonidal sinus disease because of its low complication and recurrence rate and higher postoperative quality of life. This study shows that modified elliptical rotation flap technique is at least effective as modified limberg flap reconstruction. Further prospective clinical trials are needed to show the effectiveness of this technique on long term.

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### What does this paper add to the literature?

Modified elliptical rotation flap is a new technique for the treatment of pilonidal sinus disease. It focuses on achieving off-midline suture lines and flattening the natal cleft, which are the most common causes of recurrences in pilonidal sinus surgery.

Short term results seem to have acceptable complication and low recurrence rates.

### 1. Introduction

Pilonidal sinus is an acquired condition with high postoperative morbidity and patient discomfort. The most important predisposing factors for the development of pilonidal sinus are the existence of a deep natal cleft and the presence of hair within the cleft [1,2]. It

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affects men more than women with a peak incidence at the age of 16–25 years [3]. A deep natal cleft is a favorable environment for sweating, maceration, bacterial contamination and penetration of hairs. Although various surgical techniques are described to treat pilonidal sinus, the ideal method is still under debate. By understanding that the disease is acquired in origin, methods for the wide excision of the cyst with all the tracts and sinuses followed by various types of flap reconstruction techniques became more popular. Flap reconstruction techniques eradicate the etiology of the disease by flattening the intergluteal sulcus with much less hairy fasciocutaneous flaps and less perspiration [4–10]. Among them, the most commonly used is the rhomboid excision with the Limberg flap. With this technique of flattening the natal cleft, a tension-free repair is made using a wide, well-vascularized flap. It is reported as one of the best treatment methods, with a 0–16 % of surgical area-related complication and a recurrence rate of 0–5 % [11]. Mentès et al. modified the limberg flap reconstruction by tailoring the rhomboid excision asymmetrically to place the lower pole of the flap 1–2 cm lateral to the inferior midline [12]. Nessar et al. first described the elliptical rotation flap reconstruction for pilonidal sinus disease [13]. In order to facilitate an off-midline closure and to achieve a better natal cleft flattening, we modified the elliptical rotation flap procedure [14]. Aim of the present study is to compare the short term results of the modified elliptical rotation flap and modified limberg flap for sacrococcygeal pilonidal sinus disease.

## 2. Materials and method

Two hundred and forty eight consecutive patients who underwent pilonidal sinus surgery between 2010 and 2013 were included in this study. Data of the patients were collected from the forms, which were created preoperatively and used for postoperative follow up period, for each patient. Twelve patients were excluded because of their need for multiple flap reconstruction due to larger sinus tract formation. The remaining 236 patients who underwent modified limberg flap reconstruction (Group A, n = 115) and modified elliptical rotation flap reconstruction (Group B, n = 121) as the surgical procedure were included in the study. 207 (%87.7) of the patients were male and 29 (%12.3) of them were female. The median ages of the Group A and Group B were 24,4 and 22.7 years respectively. 17 patients (%14.8) in Group A and 23 patients (%19) in group B had previous history of abscess drainage due to pilonidal sinus. The main outcome of this study was to compare the surgical procedures with respect to the surgical area related complications and recurrence rates.

### 2.1. Surgical procedure

The natal cleft was shaved the day before surgery. Before the operation Cefazolin 1gr and Metronidazole 500 mg were administered intravenously for prophylaxis. All operations were performed under spinal anesthesia. Patients were placed in jack-knife position and the buttocks strapped apart by adhesive tapes.

**Group A.** Modified Limberg Flap Reconstruction was performed according to the technique described by Mentès et al. [12]. A rhomboid shaped excision, with inferior apices placed asymmetrically 1–2 cm lateral to the midline on the opposite to the donor area, was carried out. A right or left -sided fasciocutaneous limberg transposition flap, incorporating the gluteal fascia, was fully mobilized on its inferior edge and transposed medially to fulfill the Limberg defect. The subcutaneous layers were approximated with 2/0 vicryl interrupted sutures over a vacuum drain, and the skin was closed with skin staplers.

**Group B.** Elliptical Rotation Flap Reconstruction was previously

described by Nessar et al. [13]. We previously modified the elliptical rotation flap and published short term results of the modified technique [14]. Instead of a vertical elliptical midline excision combined with right or left sided elliptical flap, we planned an oblique elliptical incision and an opposite sided flap to place the lower edge of the flap 1–2 cm lateral to the natal cleft and to flatten the natal cleft. An oblique elliptical incision including all sinus tracts were carried out and after excision, an opposite-sided elliptical transposition flap, which's length/width ratio is 2/1, was tailored, fully mobilized and transposed to fulfill the postsacral defect without any tension. A vacuum drain was used in all cases. The flap was secured to postsacral fascia with interrupted 2/0 vicryl sutures. Subcutaneous tissues were approximated with 3/0 vicryl sutures and the skin was closed either with 3/0 prolene or skin staples.

Opposite sided flap is crucial for flattening the natal cleft and for avoiding the occurrence of recurrences.

Closed suction drains were placed in potential spaces in all patients irrespective of procedure to make a standardization between group A and group B. All patients were discharged on the first postoperative day with antibiotics and pain medication. 100 mg diclofenac sodium was advised twice a day for pain medication. The drains were removed when the drainage decreased to  $\leq 20$  ml/day. Patients were examined routinely on the surgical ward on post-operative days 2,7,10 and 14 for wound inspection and removal of sutures, and on postoperative 1,3,6 and 12 months. At the end of first month, the patients were asked for the satisfaction from the cosmetic results of the operations. This was a subjective evaluation and the patients were asked for the image of the scar, and to define it as 'bad, moderate, good'.

Seroma was defined as the formation of the non-infected fluid collection beneath the flap and diagnosed on clinical examination. Infection was defined as the purulent fluid stream between the sutures and detected on clinical examination. Postoperative examination of the patients were performed by a surgeon who was unaware of the surgical procedure and outcomes of the study. All of the surgical procedures were performed by three surgeons who were experienced in pilonidal sinus surgery by performing at least 100 surgical procedures before the study. The median follow-up period was 22 (range, 4–34) months.

The statistical analyses was performed by using SPSS 16 (SPSS Inc., Chicago,IL,USA). Chi-square statistical analyses was used for nominal datas, Mann–Whitney U statistical analyses was used for ordinal datas and non-parametric numerical datas. A *p* value <0.05 was considered statistically significant.

## 3. Results

The median ages of the MLF and MERF groups were 24,4 and 22.7 years respectively. 96 of the patients were male and 19 were female in MLF group, 111 of the patients were male and 10 of them were female in MERF group. The mean operation time was 36 min (range, 20–55) in MLF group and 31 min (range, 17–44) in MERF group. The difference between groups was statistically significant ( $P < 0.001$ ). Flap ischemia were observed in three patients in MLF group and one patient in MERF group. The difference was not statistically significant ( $p = 0.293$ ). Wound dehiscence and superficial wound infection were more frequent in MLF group than in MERF group, but the difference was not statistically significant ( $p = 0.224$ ,  $p = 0.232$ ). Four patients in MLF group and four patients in MERF group developed seroma. Patients were asked for tightness of the operation area at the end of first week. 10 patients in MLF group and 4 patients in MERF group described tightness of the operation area but the difference was not statistically significant ( $p = 0.08$ ). There were not any statistically significant difference between two groups

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