

## Comparison of Limberg Flap and Tension-Free Primary Closure During Pilonidal Sinus Surgery

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### Abstract

**Background** Pilonidal disease is an inflammatory disease seen in the intergluteal region. In this study, our aim was to compare the efficacy of the Limberg flap versus a tension-free primary closure.

**Methods** A total of 93 patients were included in this study. The patients were assigned consecutively by the closed-envelope technique to one of two groups: 49 patients in group 1 (excision and Limberg flap) and 44 patients in group 2 (tension-free primary closure). Excision and reconstruction with the Limberg flap was performed in its classic form. For tension-free primary closure after excision of the sinus tract with an elliptical incision, the skin and subcutaneous tissue were released 2–3 cm away from the incision line. The subcutaneous tissue was closed twofold with 2/0 polyglactin sutures. The skin underwent 3/0 polypropylene mattress suturing.

**Results** The median age was 25 years (17–43 years). The median follow-up period was 29.5 months (8–43 months). There was no significant difference between the groups in terms of age, sex, follow-up time, or anesthesia method. One patient in each group experienced wound infection. During the first 6 months of follow-up there was no recurrence. However, at later visits recurrences were seen in two patients in each group (4.1% in group 1, 4.5% in group 2).

**Conclusions** The lower rates of wound infection and recurrence associated with the Limberg flap reported

elsewhere may be associated with healing of the tension-free procedure. In this study, tension-free primary closure was found to be as effective as the Limberg flap reconstruction.

### Introduction

Pilonidal disease is an acute or chronic painful inflammatory disease seen in the intergluteal region. It affects people between the ages of 15 and 35 years and appears in males three to four times more often than in females [1]. According to one study, its incidence was 8.8% among Turkish soldiers [2]. The disease causes morbidity by affecting the quality of life.

The etiology remains controversial, but it is generally accepted that it is an acquired condition. The main etiologic factor is the hair found in the cyst; others are the skin at the site of entrance (maceration, scar, humidity) and the depth of the natal cleft [1, 3].

Medical treatment modalities such as phenol, silver nitrate, and electrocauterization of the cavity are used to treat pilonidal disease. There are also surgical options after excising the cavity, such as primary closure, leaving it to secondary healing, closure by flap, and the Karydakis operation. The search for the ideal treatment modality is ongoing, however, owing to the recurrence rate. In this study, our aim was to compare the efficacy of the Limberg flap versus tension-free primary closure.

### Materials and methods

Between May 2006 and August 2010, a total of 100 patients were enrolled in this study. Patients were

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randomized into two groups by the closed envelope method. The patients who expressed preference for one technique were not included in the study. Seven patients were lost during the follow-up and were excluded from the study. Excision and Limberg flap reconstruction were performed in 49 patients (group 1) and excision and tension-free primary closure in 44 patients (group 2). All operations were performed by the same surgeon. All of the patients were informed about the operative technique and signed the informed consent form.

Operations were performed with the patient in the prone jackknife position and under infiltration or spinal anesthesia. The site of the operation (gluteal and sacral region) was shaved on the day of surgery. For prophylaxis, a single dose of 1 g of sephasolin sodium was administered 30–60 min before the surgery. Bowel preparation was not used in any of the patients.

Excision and reconstruction with the Limberg flap was performed in its classic form, and a suction drain was used in all the patients. For the tension-free primary closure, after excision of the sinus tract with an elliptical incision (Figs. 1, 2), the skin and subcutaneous tissue was released 2–3 cm away from the incision line (Fig. 3). A suction drain was again used in all of the patients. The subcutaneous tissue was closed twofold with 2/0 polyglactin suture, and the skin was closed with 3/0 polypropylene mattress sutures (Fig. 4).

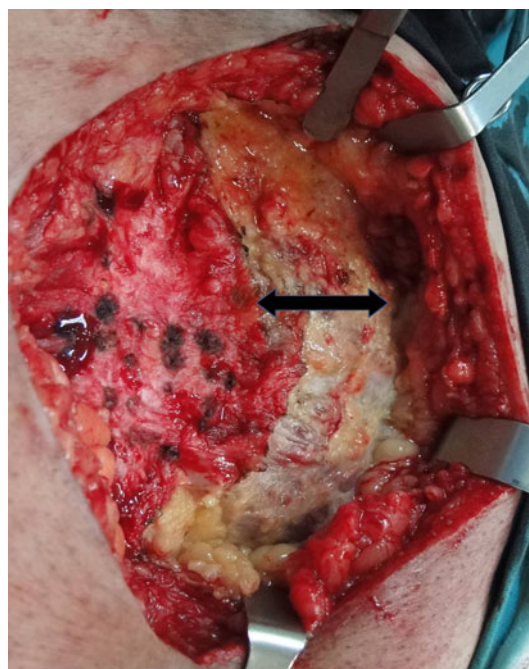
Drainage tubes were removed when the drainage volume was <20 cc/day. The sutures were removed on postoperative day 10. The patients returned for follow-up visits at 10 days and at 1, 3, and 6 months; they were then seen yearly. At each of the follow-up visits, the patients were



**Fig. 1** Elliptical excision of the sinus tract, preoperative view



**Fig. 2** Wound site seen after excision of the sinus tract

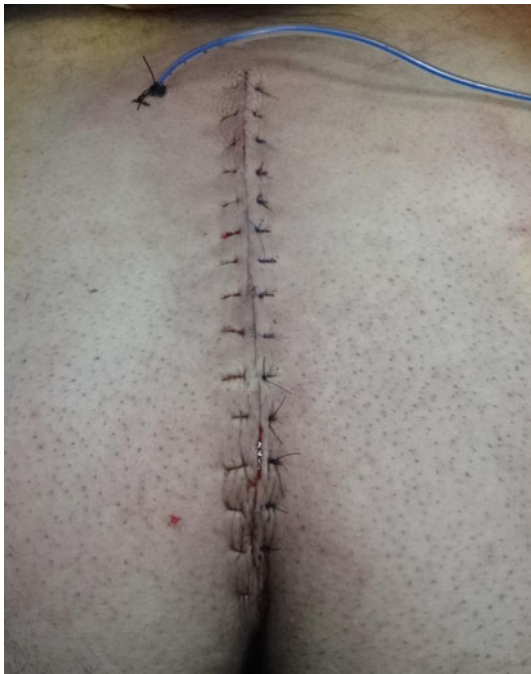


**Fig. 3** Released skin and subcutaneous tissue. *Arrow* shows the distance from the edge of the fascia (the length of the arrow is 3 cm)

reminded to keep the perineal and gluteal region clean and dry.

## Results

In all, 88 of the patients were male and 5 were female. The median age was 25 years (17–43 years). The median



**Fig. 4** Tension-free healing site

follow-up period was 29.5 months (8–43 months). The mean hospital stay was 1.85 days, and the mean time for drain removal was 1.5 days. There were no significant differences between the groups in terms of age, sex, follow-up time, or anesthesia method (Table 1). There was one patient in each group who experienced a wound infection. There was no seroma formation in group 1, whereas it was common in group 2 ( $n = 5$ , 11.1%).

During the first 6 months of follow-up there was no recurrence. However, at later visits, recurrence was seen in 4.1% ( $n = 2$ ) of the patients in group 1 and 4.5% ( $n = 2$ ) of those in group 2. The recurrence rates were not different between the groups.

## Discussion

Pilonidal sinus disease is a chronic inflammatory disease seen in the intergluteal region mostly in the younger

population. It affects the quality of life of untreated patients [4]. The major etiologic factor in the disease is the hair in the lesion. Certain factors facilitate the entrance mechanism of the hair. The loose hair collects in deep regions of the body such as the intergluteal sulcus. The depth of the intergluteal sulcus, the number of the loose hairs, and the stiffness of the hair play important roles in the etiology. Lacerations in the skin due to trauma and erosions due to moisture and friction, large pores, and the weakness of the skin at the midline can facilitate entrance of the hair. The foreign body reaction and inflammation due to the hair then further facilitate the entrance of even more hair [5].

Karydakos described his own method removing the deep sulcus and having no scar tissue at the midline. He reported a complication rate of 8.5% (infection and fluid accumulation) and a recurrence rate of less than 1% [4].

Harlak et al. compared 587 patients with pilonidal sinus disease with 2780 healthy individuals to assess the risk factors for pilonidal sinus disease. They evaluated age, sex, body mass index (BMI), job, time spent daily in the sitting position, frequency of hair, frequency of bathing, and family history. The study concluded that the time spent time in sitting position daily, frequency of hair, and frequency of bathing are significant risk factors for pilonidal sinus disease. In all, 72% of their patients with pilonidal sinus disease had all three risk factors. Only 1% did not have any of the three risk factors. Their results demonstrated that the hygiene of the intergluteal sulcus is important for preventing the disease [5].

In a study by Conray et al., 12 of 14 recurrent cases after surgical treatment were treated by laser epilation and strict local hygiene [6]. After the treatment, none of the cases recurred. Likewise, other studies showed that laser epilation is effective for treating and preventing recurrence after surgery [7, 8]. The patients with recurrence had insufficient hygiene at the intergluteal sulcus [7]. As all of those studies showed, in addition to good surgical technique, elimination of the preventable risk factors is important for preventing recurrence. Therefore, we advised patients in our study regarding the importance of local hygiene.

Primary closure of the wound after excision of the pilonidal sinus is associated with a high recurrence rate. In the literature, the recurrence rate after primary closure has

**Table 1** Comparison of various parameters between the Limberg flap and tension-free primary closure

Parameter	Limberg flap (group 1)	Tension-free primary closure (group 2)	Total	<i>p</i>
Age (years) <sup>a</sup>	24 (17–33)	25.5 (17–43)	25 (17–43)	0.064
Sex (M/F)	48/1	40/4	88/5	>0.05
Follow-up (months) <sup>a</sup>	31.5 (8–42)	28 (8–43)	29.5 (8–43)	0.096
Recurrence (no.)	2 (4.1%)	2 (4.5%)	4 (4.3%)	>0.05

<sup>a</sup> Expressed as the median and range

ranged from 4 to 25% [7, 9–11]. In contrast, the Limberg flap after excision of the pilonidal sinus has been associated with a recurrence rate of 0–5% [12–15].

In a randomized prospective study comparing primary closure and Limberg flap, reported by Akça et al., the recurrence rate was 11% in the primary closure group and 0% in the Limberg flap group. In that study, the Limberg group was superior to the primary closure group in terms of postoperative pain, early mobilization, time to return to work, and postoperative complications [12]. Likewise, in the studies comparing the Limberg flap and primary closure, the Limberg flap was superior in terms of patient comfort, early return to work, and recurrence. In addition, wound dehiscence, infection, longer sitting time at toilet, and late return to work are disadvantages of primary closure [10, 13, 16]. However, in all these studies, the primary closure was made tightly. Therefore, complications such as wound infection and dehiscence were more common.

In the literature there are only a few studies comparing tension-free primary closure and use of the Limberg flap. Muzi et al compared tension free primary closure and Limberg flap in a randomized study. The mean follow up period was 45–47 months and recurrence rate of tension free primary closure was 3.8% and recurrence rate of Limberg flap was 0%. This difference was not found as statistically significant. Tension free primary closure was superior in terms of cost, postoperative pain and hospital stay [13]. Likewise, in a randomized prospective study, tension-free primary closure and the Limberg flap were compared, and the techniques were similar in terms of the early complication rate and recurrence. However, the Limberg flap was more advantageous in terms of patient satisfaction, painless defecation, and early return to work [16].

In our study, the tension-free primary closure was technically different from that described in two other studies. In our study, the subcutaneous tissue was sutured twofold using absorbable suture material. On both sides of the wound, skin and subcutaneous tissue was released, so there was a tension-free healing site at the midline. As in the other two studies, we found tension-free primary closure and the Limberg flap similar in terms of recurrence.

Tension-free primary closure does not have the common disadvantages of primary closure, such as wound dehiscence, wound infection, and recurrence [12, 15]. Also, it has the advantages of a shorter operating time and better cosmesis with a small incision site.

With the Karydakis technique, unilateral release of the skin and subcutaneous tissue provides a tension-free site. In contrast, with the tension-free primary closure, there is bilateral release of skin and subcutaneous tissue, allowing the midline to flatten and there is a more tension-free site. The midline position of the incision can be seen as a

disadvantage, although the recurrence rate is found to be similar to that with the Limberg flap.

## Conclusions

In addition to using a surgical technique with a tension-free wound, eliminating preventable risk factors (e.g., local hygiene education, laser epilation) are important for preventing recurrence. In the literature, the lower recurrence and wound site complication rates associated with flap techniques are related to a tension-free healing site. In this study, tension-free primary closure was found to be as effective as the Limberg flap reconstruction.

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