

## **Axial Superiorly Based Fasciocutaneous "Limberg" Flap in Reconstruction of Sacrococcygeal Defects**

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### **ABSTRACT**

The aim of this work was to evaluate the use of the superiorly based axial flap (described before for reconstruction of sacral pressure sore) for reconstruction of different sacrococcygeal defects. Between January 2004 and February 2007, twenty nine male patients, median age 43 years (range, 14 to 65 years), underwent surgical reconstruction of the defect by perforator based fasciocutaneous "Limberg flap" (based on the superior gluteal or sacral perforators). Twenty four patients had pilonidal sinus (82.8%), 3 patients had pressure sores (10.3%) and 2 patients had post-traumatic soft tissue loss (6.9%).

Primary healing occurred in 26 patients (89.6%) and 2 patients (6.9%) had seroma with negative bacterial cultures; which healed completely with bed side drainage and conservative treatment. A further one patient (3.4%) had superficial wound infection that were treated by appropriate antimicrobial therapy. Complete healing of all cases occurred without recurrence during the follow-up period. The mean operative time was 44 minutes (range, 39-72). There was no ischemia or necrosis of the flaps and all flaps remained viable. The mean length of hospital stay was 2 days (range, 1-5 days). The mean time to return to normal activity was 10.5 days (range, 9-15 days). There was no recurrence during the follow up period (range, 8-30 months).

### **INTRODUCTION**

There are many causes for development of sacrococcygeal lesions. Pilonidal sinus is among the most common lesions at that area. The major predisposing factors for the development of a pilonidal sinus are existence of a deep natal cleft, the presence of hair within the cleft and the rolling movement of contiguous surfaces of the buttocks [1]. Also, poor hygiene, excessive hairiness and local trauma plays an important role in its development [2]. Although many surgical and non-surgical treatment methods have been described, the ideal treatment method has not yet been established. Among these techniques are; excision and packing, excision and primary closure, [1,3] marsupialization (lay-open), [4] and flap techniques such as "Limberg" flap, [5] "modified Limberg"

transposition flap, [6] elliptical rotation flap, [7] and rotation advancement fasciocutaneous flap [8]. Leow et al. [9] described the superior gluteal artery perforator (SGAP) flap in the closure of sacral pressure sores, based on a study done by Koshima et al., 1993 [10] on a cadaver dissection. This flap is reliable and gives the option of further reconstructive possibilities in sacrococcygeal region [9].

This study will present a fasciocutaneous rhomboid or rhombic (Limberg) flap, which is based on the superior gluteal or sacral perforators, for reconstruction of the sacrococcygeal defects after excision of pilonidal sinus, pressure sores and post-traumatic soft tissue loss.

### **PATIENTS AND METHODS**

Between January 2004 and February 2007, 29 male patients (median age, 43; range, 14 to 65 years) who had sacrococcygeal defects due to excision of pilonidal sinus (24 patients), pressure sores (3 patients) and post-traumatic soft tissue loss (2 patients), underwent surgical reconstruction by "Limberg" flap technique (Table 1). A written consent was obtained from all patients after explanation of the procedure and expected appearance of the scars in this area. All patients were subjected to complete history taking and routine clinical examination and lab investigations.

All patients were admitted to the hospital the day before surgery. Pre-operatively, one or two para-sacral perforators were identified with a Doppler probe and marked. Under general anesthesia, the patient was placed in the prone position. In cases of pilonidal sinus the trunk was slightly jackknifed at the hips and the buttocks retracted with adhesive tape to allow wide exposure of the operative field. Patients with pressure sore and post-traumatic soft tissue loss was put in the same position without separation of the buttocks. All

patients received "Ceftriaxon" 1gm IV, at induction and post-operatively once daily for the next 5 days. After skin preparation, the anus was excluded from the operative field by surgical drapes. Using a sterile skin-marking pen, the pathologic area in pilonidal sinus or the edges of the wound in cases of pressure sore or post-traumatic soft tissue loss to be excised and the flap lines were mapped on the skin (Fig. 1A). In pilonidal sinus cases, a rhombic shaped excision of the sinus bearing skin and subcutaneous tissue up to the pre-sacral fascia guided by electro-cautery was done (Fig. 1B).

Elevation of perforator based "Limberg flap" (based on the superior gluteal or sacral perforators according to a study done by Koshima et al., on a cadaver dissection [10]) was done (Fig. 1C). The level of dissection was at pre-muscular fascia. The adhesive tape, which was retracting the buttocks, was released to allow suturing of the flap without tension. Good haemostasis was achieved and a suction drain might be inserted. The wound was closed in layers (Fig. 1D). The facial and deep subcutaneous layers were approximated with 4-0 Vicryl sutures. The skin was closed with 4-0 Prolene sutures. No special decubetus was advised post-operatively and the patients were allowed to lie on the back. The suction drain, if used, was removed

about the fourth post-operative day. The sutures were removed between the eighth and twelfth post-operative day.

**RESULTS**

Primary healing occurred in 21 patients with pilonidal sinus (21 out of 24), 3 patient with pressure sore (3 out of 3) and 2 patients with post-traumatic soft tissue defects (2 out of 2) (Fig. 2A), when reviewed at the time of suture removal. Two patients with pilonidal sinus (6.9%) had seroma with negative bacterial cultures, which healed completely with bed side drainage and conservative treatment. A further one patient (3.4%) had superficial wound infection that was treated by appropriate anti-microbial therapy. Complete healing of the rest of the cases occurred without recurrence during the follow-up period (Fig. 2B).

The mean operative time was 44 minutes (ranged between 39-72 minutes, according to the size of the lesion). There was no ischemia or necrosis of the flaps and all flaps remained viable. The mean length of hospital stay was 2 days (range; 1 to 5 days) and the mean time to return to normal activity was 10.5 days (range; 9 to 15 days). There was no recurrence during the follow-up period (8-30 months).



Fig. (1-A): A case of multiple pilonidal sinuses. Mapping of the expected defect and flap.



Fig. (1-B): The defect after excision of sinuses bearing skin.



Fig. (1-C): Fasciocutaneous flap elevation.



Fig. (1-D): Flap transposition and wound closure.



Fig. (2-A): Post-traumatic skin and soft tissue sacral defect.



Fig. (2-B): Same patient after complete healing of the wounds and flap (4 weeks post-operatively).

Table (1): Different presentations.

Presentation	Number	Percentage
Pilonidal sinus	24	82.8
Pressure sore	3	10.3
Post-traumatic wound	2	06.9

Table (2): Complications

Complications	Number	Percentage
Seroma	2	6.9
Wound infection	1	3.4

## DISCUSSION

There are many causes for occurrence of sacrococcygeal lesions. Pilonidal sinus is among the most common lesions at that area. Different techniques for curing pilonidal sinuses have been described [1-8]. With the recent development of perforator flaps, it was found that the major pedicle vessels of skin flaps can be replaced by small perforators and many muscles in musculocutaneous flaps and major vessels have been preserved without decrease in the skin territories of these flaps [10,11]. Mu et al. [12] studied the numbers, position and course of the superior and inferior gluteal artery perforators in five cases of 10 sides of adult cadavers. Several main perforators (between 10 and 15) of large caliber were found in the para-ischial and central portion of the gluteal muscle. The length of these vessels varied from 3 to 8cm and their diameters from 1 to 1.5mm. These significant perforators passed through the muscle itself and the facial portion of the muscle to the overlying skin on the gluteal region.

Leow et al., described the superior gluteal artery perforator (SGAP) flap in the closure of sacral pressure sores, based on a study done by Koshima et al., on a cadaver dissection [10]. This flap is reliable and gives the option of further reconstructive possibilities in sacrococcygeal region [9].

Several series with the rhomboid or rhombic flap technique including more than 50 cases have reported recurrence rates from 1% to 7% [5,6,13]. The flap consists of skin and subcutaneous fat and is constructed by extending the incision to the gluteal muscle fascia. The advantage of this reconstruction is that it flattens the natal cleft with a large, well-vascularized pedicle that can be sutured without tension [13]. Katsoulis et al. [14] presented their experience with the "Limberg" technique for both primary and recurrent pilonidal sinuses. The

sinuses were excised in a rhomboid fashion and the defect was closed using a transposition flap (inferiorly based) designed to obliterate the midline cleft. There was a single recurrence (4%) of a pilonidal sinus, which required further surgical excision and 16% complications in the form of wound dehiscence, haematoma and wound infection in a study of 25 patients.

In this study, there were no recurrence in 29 patients and less complication rate (6.9% seroma and 3.4% superficial wound infection). Iesalnieks et al., [15] studied the long-term results after excision of a pilonidal sinus and primary midline closure compared with the open surgical procedure in 73 patients. There was a high recurrence rate (42%) after excision of a pilonidal sinus and primary midline closure.

All the previous studies [5,6,13,14,16-18] of "Limberg" flap for reconstruction after excision of pilonidal sinus was performed with random pattern inferiorly based flaps. In our study the flap was axial superiorly based with more anatomical and better cosmetic appearance. Leow et al., described the same flap in reconstruction of bed sores [9]. He suggested to use this flap for other reconstructive procedures in this region. We used this flap for reconstruction of the sacrococcygeal region defects with different indications (pilonidal sinus, pressure sore and post-traumatic skin and soft tissue loss).

El-Khatib and Al-Basti, [19] reported a series of 8 cases of pilonidal sinus reconstructed by bilobed perforator based flap with an operative time of 90 minutes. It is time consuming with longer scars.

In this study, the flap was axial pattern flap; easily elevated and sutured without tension. It flattens the natal cleft with a large, well-vascularized pedicle with more anatomical and better cosmetic appearance. The mean operative time was 44 minutes, with complete cure of the disease and very low complication rate, compared with the previous studies.

### Conclusion:

Superiorly based, axial, fasciocutaneous "Limberg" flap in reconstruction of the defects in sacrococcygeal region, is a reliable and easily performed technique. It has a very high cure rate and low post-operative complications. Also, it is associated with shorter hospital stay, earlier healing and shorter time off work. It is a new application of an older idea.



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