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Pilonidal sinus: comparative analysis of outcomes for limberg flap versus open healing techniques

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Abstract

Objective: To investigate the surgical outcome for patients of pilonidal sinus disease undergoing limberg flap technique versus open healing in terms of healing times, return to work and overall satisfaction.

Methods: This is a retrospective review of prospectively collected data. 69 patients were operated between January 2009 and December 2014 at Peshawar Institute of Medical Sciences, Habib Medical Centre. Patients underwent excision of the pilonidal sinus with closure as limberg flap technique (group A) or healing by second intention (group B). Data was collected in a prospective manner and the patients were followed for two years. The operative and postop data was collected for procedure time, length of stay (LOS), return to work (RTW) time, total healing time (THT), the occurrence of complications, recurrence and overall patient satisfaction on a five point Likert scale.

Results: A total of 69 patients were included, 40 (58.0%) in group A (Limberg flap repair) and 29 (42.0%) in group B (open technique). Overall mean age was 27.6 years ±5.78 SD. All patients were male. Mean operative time group A was 67.28 minutes ± 14.29 SD while for group B it was 38.66 minutes ± 4.90 SD. There was a significantly shorter duration in rates of wound healing (p <0.0001), return to work (p<0.0001) and total hospital stay (p = 0.001) for the limberg flap group as compared to open healing group. There was a significantly higher satisfaction rates for limberg group (p = 0.005).

Conclusion: Limberg flap technique is an effective method of pilonidal sinus surgical treatment with significantly shorter hospital stay, early return to work and rapid wound healing. Patient satisfaction is higher for Limberg flap technique as compared to open wound healing.

Keywords: Pilonidal sinus, Limberg flap, open healing, patient satisfaction

Introduction:

Pilonidal sinus is a chronic insidious skin condition caused by persistent trauma with infolding and sequestration of hair follicles, forming a blind ending tract which could get infected and have high morbidity in terms of absence from work and costs of treatment.[1]It is commonly encountered in young age groups, with majority of males at a rate of 26 per 1,00,000 per year. Obesity, sedentary job and family history are strong predictors for its development.[1,2]

Surgical treatment is the mainstay of treatment with high success rates and low costs.[3] Historically, the surgical treatment has remained in the favour of excision of sinus tract and leaving the wound open to heal by second intention.[4] The proponents of this technique have stated that it is a simple procedure, easy to learn and quick to perform while secondary healing techniques render the skin less vulnerable to recurrence or development of new follicular lesions because of absence of hair follicles completely.[5] However, with the advent of new plastic surgical techniques and consideration to the impact of several weeks of morbidity due to open wound, absence from work, risks of infection and abscess formation and costs of the treatment due

to local care of the wound as well as the need for systemic treatment in case of infection has stimulated research into designing new methods of surgical treatment with less morbidity, quicker healing rates and early return to work.[6-9] Several innovative techniques besides the traditional midline primary closure have been introduced, namely, the Karydakis flap technique, Limberg flap technique and the Bascom procedure.[6,7,9]

Professor AA Limberg introduced in 1963, his versatile rhomboid (Limberg) flap technique which has been utilised for skin closure in a diverse variety of excision surgeries.[10] Chasmar LR et al[11] has conducted a literature review and has reported 54 studies which employed this technique for a variety of conditions, 9 of which used this closure technique after excision of pilonidal sinus.[11] Since then, an increasing number of surgeons have written on the utility of this technique and reported successful outcomes in a large number of patients.

We aimed to conduct a non-randomised comparative analysis of the surgical outcomes in patients who presented with pilonidal sinus disease and underwent either closure with the Limberg flap technique or open healing method. A comparative analytical study will highlight the salient benefits or disadvantages of these techniques. Moreover, a comparative patient satisfaction data is essential to decide as to adopt which procedure in order to obtain optimal results.

Methods:

The study was conducted at Habib Burn Centre from January 2009 to December 2014 (72 months). Patients of pilonidal sinus disease after sinus tract excision either underwent primary closure with the limber flap technique (detailed below) or left to heal by second intention. Data, which was collected in a prospective manner for two years was analysed retrospectively. Follow-up time ranged from 3 to 24 months. The study was conducted after the approval of the institute's research and ethical review committee. Informed consent was obtained from patients included in the study.

Inclusion Criteria:

Patients with age range of 16 to 65 years, irrespective of their gender with a confirmed diagnosis of pilonidal sinus disease.

Exclusion Criteria:

Recurrent pilonidal sinus, soft tissue tumours with sinus tracts, spinal dysraphism, peri-anal abscess and those in the paediatric age groups were excluded. Patients who underwent other techniques of skin closure were also excluded.

Surgical Procedures

Position:Prone jack-knife position with buttocks strapped for wide exposure.

Group A (the Limberg flap group):

The area to be excised was marked preoperatively as the classic Limberg flap lines. Incision was made over those lines and the sinus tract was excised as a whole. The dissection was made up to the sacral and gluteal fascia. After the excision of the sinus tract(s), the flaps were rotated and sutured in place with interrupted 2/0 Vicryl in a subcutaneous layer and with interrupted 2/0 Prolene mattress for final wound closure. A Radivac drain was placed before flap closure.

Open technique (Group B):

Under GA or spinal anaesthesia and after aseptic technique, with administration of IV antibiotics, the sinus tract was injected with 1-2 mL of hydrogen peroxide as is described by Aldaqal SM et al[12] in order to delineate the sinus tract for better excision. An elliptical incision was made around the sinus tractincluding the opening within the incision margin. The sinus tract excision and dissection was done with the help of monopolar diathermy. In case of co-existent abscess cavity, initial incision and drainage was performed at the peak of the swelling and later the procedure was commenced as above. In case of multiple opening, all tracts were identified as described above and dissected away along with the involved dermal area. In this group the wound was left open with a povidone patch over the wound bed, covered by thick padded dressing.

Table I: *Overall satisfaction levels for the two treatment methods*

Satisfaction level	Limberg flap (Group A)		Open healing (Group B)	
	Frequency	Percent	Frequency	Percent
1 (Not Satisfied)	2	5.0%	-	-
2 (Less satisfied)	5	12.5%	10	34.5%
3 (Neutral/Mixed)	8	20.0%	11	37.9%
4 (Satisfied)	11	27.5%	6	20.7%
5 (Highly Satisfied)	14	35.0%	2	6.9%

Table II: *OAn independent samples Mann-Whitney U test statistics for the presenting features and outcome variables (Group A versus Group B)*

Clinical variable	Mann-Whitney U	Z score	Significance (p value)
Pain	496.0	-1.342	0.17
Fever	497.0	-1.284	0.19
Discharge	543.0	-0.536	0.59
Swelling	568.0	-0.173	0.86
Abscess	558.0	-0.482	0.63
Overall Complications Rate	342.0	-3.416	0.001
Recurrence	551.0	-1.213	0.22
Satisfaction	355.0	-2.819	0.005
Patient Age	577.0	-0.037	0.97
Symptoms duration	613.0	0.402	0.68
Procedure time	12.50	-6.903	<0.0001
Length of stay	856.5	3.45	0.001
Return to Work time	1155.5	7.008	<0.0001
Total healing time	1160.0	7.06	<0.0001

Post-operative care:

The patients remained in the ward in a prone or lateral position in order to minimise shear on the wound. Broad spectrum antibiotics were given in cases where there was infection of the tract or abscess collection. Dual intravenous analgesia was given for pain control initially. At discharge the patients were switched to oral analgesics.

Follow-up and data collection:

After discharge from the hospital the patients were followed-up at initial 2-week interval in the outpatient department and later at 1 & 3 monthly interval. Wound status and development of complications were assessed. Stitches were removed at day 10-14. Wound healing was assessed by looking for epithelialisation. Patients were advised to report any recurrence. Overall patient satisfaction was assessed at 3-month follow-up using a five point Likert scale (not satisfied, little satisfied, neutral, satisfied, highly satisfied). Data was collected about patient demographics, clinical features, surgical procedure and operative time. The postoperative outcome was assessed by recording LOS, return to work time (RTW), total healing time (THT), complications, recurrence and overall satisfaction.

Data Analysis:

Data was analysed using IBM SPSS Statistics version 22.0. Parametric and non-parametric tests were used to analyse outcome for the two treatment groups in terms of the outcome variables listed above. Statistical significance was defined as a p-value ≤0.05.

Results:

Study Population:

A total of 69 patients were included, 40 (58.0%) in group A (Limberg flap repair) and 29(42.0%) in group B (open technique). Overall mean age was 27.6 years ±5.78 SD. All patients were male gender. (Table 1)

Treatment Group A:

Mean age in group A was 29.45 years ±6.54 SD with a mean latest symptoms duration of 9.4 days ± 4.37 SD. Mean procedure time for this group was 67.28 minutes ± 14.29 SD and a mean length of stay of 3.35 days ± 1.35 SD. Mean healing time was noted to be 11.48 days ± 2.25 SD while mean satisfaction was 3.75 ± 1.21 SD. The mean return to work was 10.70 days ± 2.58 SD. Mean follow-up duration was 9.93 months ± 5.65 SD. Table 1

32 (80%) patients reported pain as the presenting feature which was followed by fever in 14 (35%) and swelling with discharge in more than 60% of patients. A subcutaneous abscess was found in 4 (10%) patients.

The commonest complication was seroma formation in 9 (22.5%) cases which was followed by superficial wound infection in 6 (15.0%) and

necrosis in 3 (7.5%) patients. Only 2 (5.0%) patients required reoperation due to wound dehiscence while the rest of complications were managed conservatively. Overall recurrence rate was 5.0% (n=2). (Table 1)

Treatment Group B:
In this treatment arm, the mean age was 29.69 years ± 7.33 SD with a mean latest symptoms duration of 10.07 days ± 5.03 SD. The mean procedure time was 38.66 minutes ± 4.90 SD and a mean length of stay of 5.31 days ± 2.32 SD. Mean return to work was 27.93 days ± 6.19 SD and a mean healing time of 52.45 days ± 5.45 SD. Mean follow-up duration was 15.21 months ± 7.03 SD. The mean satisfaction level at the end of follow-up was 3.0 ± 0.93 SD. Table 1

Pain was reported as the most predominant presenting feature in 19 (65.5%) patients which was followed by swelling in 18 (62.1%) and discharge in 17 (58.6%) patients. Fever was present in only 6 (20.7%) patients. 4 (13.8%) patients were found to have subcutaneous abscess formation. Wound infection was the only complication which was reported in 4 (13.8%) cases. There were no cases of recurrence during the follow-up period.

Detailed Analysis:
A Mann-Whitney U test was run to determine if there was a differences in the distribution of procedure time, length of stay, return to work time, total healing time and the achieved satisfaction levels after Limberg flap technique and open healing technique. The limberg flap group (Group A) was statistically significantly different in the above mentioned parameters as compared to the open healing technique group (Group B). The detailed analyses are shown in Table 2with significance values, Mann-Whitney U value and Z test score.

Similarly, Mann-Whitney U test was run to determine differences in the distribution of clinical features as well as the occurrence of complications across the two groups (Group A versus Group B). Although the distribution of gender, age, symptoms duration and clinical features were not statistically significantly different between the groups, it was found that the occurrence of complications was higher in Group A as compared to Group B. The recurrence rate though noted for the limberg flap group was not statistically significant ($p = 0.22$). However, the overall satisfaction levels at the end of the follow-up were significantly higher for the limberg flap group as compared to open healing group. Table 2

Discussion:
Pilonidal sinus by virtue of its incidence in the younger age groups of patients has a significant impact upon the main workforce of a community in terms of absence from work and economic impact of the treatment costs. Moreover, in our society, the occurrence of a disease near socially private body parts is taken with considerable concern and patients usually presents late due to the feelings of embarrassment, especially in the females. Late presentation has its own consequences, as most patients may present with frank infection, cellulitis or abscess formation. These factors need special focus, and public health campaigns should be launched to educate the communities about benefits of seeking early help.[13,14,15]

A diverse variety of surgical techniques are available for the surgical treatment of pilonidal sinus, namely, excision and healing by second intention to marsupialisation, the Karydakis technique, Limberg flap and others.[3,16,17,18] The selection of a particular procedure is dependent upon several factors, most important of which are the rapidity of healing, total hospital stay period, complication rates, recurrence chances, cost affordability of patients and cosmesis.[19] These factors are not exhaustive and the final decision depends upon the surgeons' experience, local skin status (presence or absence of infection, abscess) and patient preference.[20]

The overall demographic and clinical features of patients with pilonidal sinus are grossly comparable to local and international studies, as the commonest age of presentation is in the late twenties or early thirties while majority of

patients are male gender. Similarly, most patients present with local pain at the sinus site with swelling and discharge in majority of them. Rarely some patients present with frank abscess formation or local cellulitis. These findings are comparable in our study to other studies such as those by Jamal A et al[21], Kaser SA et al[22] and Bessa SS[23].

In a randomised clinical trial by Akca T et al[24] where comparative effectiveness of limberg flap was evaluated against primary midline closure, it was shown that though limberg flap technique took more surgical time, the overall pain scores, return to work, healing time, length of hospital stay and complications rates were lower for limberg flap technique.[24] These findings are in agreement with our study where we noted a significantly longer procedure time for limber flap technique, however, hospital stay, healing time and return to work time was significantly better. On the contrary, we found that local wound complications were higher for limberg flap technique as compared to open healing technique where only wound infection was the main problem. Seroma formation is the most significant problem in limberg flap technique which according to some authors can be reduced by using meticulous closure technique and with the use of drains for the first 24 to 48 hours.[25] Seroma could also be the result of a high Body Mass Index (BMI).[26] Another worrying complication of limberg flap technique is the occurrence of superficial wound edge necrosis leading to ultimate dehiscence which require reoperation and reclosure after wound toilet. These complications, though occurred in a few number of patients are sometimes very concerning for the patient and can be reduced by focussing on the detail of aseptic technique and good closure method. However, if the local wound problems of an open healing wound are taken in to consideration, it becomes evident that managing open wound with daily dressing and the avoidance of sitting and supine posture for well above 2-week time results in greater nuisance to patient. This is why the overall satisfaction rates for patients with limberg flap were higher as compared to open healing group.[27]

In a recent study by Duman K et al[27], the overall level of satisfaction and the presence of anxiety and depression were compared between limberg flap patients and patient who underwent primary closure.[27] They have shown that patients who underwent limberg flap closure of pilonidal sinus wound scored high overall satisfaction scores (SF-36) and lower anxiety and depression scores (Beck Anxiety, Depression scores).[27] The findings of our study are in agreement with the above mentioned study where we noted overall higher satisfaction scores as compared to open healing group. Patient satisfaction is primarily related to lower bodily pain and good overall mental health, which could be affected by the duration of wound healing as well as overall cosmesis. These both factors are present in the limber flap, which on one hand gives perfect cosmesis and on the other hand is rapidly healed with early return to work. In majority of cases, return to work time is at least 7-10 days while for the open healing group it is more than 25 days.

Conclusion:

Limberg flap technique is a very attractive primary excision and repair technique. Though it required longer operative times with relatively increased number of wound complications, in experienced hands it can be very effective for achieving shorter healing times and early return to work as compared to open healing techniques.

Conflict of interest: None

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Role and contribution of authors:

Dr Habibullah Shah, FCPS (Plastic & Reconstructive Surgery), Habib Burn Center, Hair Transplant and Plastic Surgery Clinic, Zia Medical Complex, University Road, Peshawar, KPK,

Pakistan, conceive the idea and did the initial maping out the article. Dr Muhammad Iftikhar, FCPS (General Surgery), Department of General & Laparoscopic Surgery, Peshawar Institute of Medical Sciences, Peshawar, helped in collecting the data, writing methodology and helped in writing the results and conclusions.

Dr Huma Gul, MBBS, M. Phil Scholar, Institute of Basic Medical Sciences, Khyber Medical University, Peshawar, collected the refrences and helped in discussion writing.

Dr Rashid Khan, FCPS-II (Plastic Surgery) Department: Plastic & Reconstructive Surgery, Hayatabad Medical Complex Peshawar, helped in collecting the referecnes, helped in data analysis, and also helped in discussion writing.

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