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Effectiveness of limberg flap verses lay open in sacrococcygeal pilonidal sinus treatment: A prospective clinical study

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Abstract
Aim: to compare the effectiveness of limberg flap vs lay open in sacrococcygeal pilonidal sinus treatment.
Methods: This randomized prospective study was carried out in the Government Hospital Sarwal, Jammu, India among 30 patients. Patients were randomized into two groups; group A with 15 patients was undergone wide local excision followed by limberg flap primary closure while the other group B with 15 patients was undergone wide local excision followed by Lay open flap (healing by secondary intention).
Results: Mean age of the subject of the limberg flap group and lay open group was 22.42 years and 22.38 years respectively. 90% of the patient's (27 patients) of the present study were males. In limberg flap group 53.3% patient achieved complete wound healing around 20-30 days while in lay open group 60.0% patient achieved complete wound healing around 51-60 days post operatively
Conclusions: Excision with primary closure is a better modality than excision with lay open technique in treatment of pilonidal sinus.

Keywords: limberg flap, lay open flap, sacrococcygeal pilonidal sinus

Introduction
In 1880, Hodges coined the term ''pilonidal sinus'' (pilus, meaning hair, and nidus, meaning nest) to describe the chronic sinus containing hair and found between the buttocks [1]. He believed the condition was congenital in origin, representing an imperfect union of the lateral halves of the body and involving the integument only. Buie called it ''jeep disease'' because of the frequent reactivation of the quiescent sacrococcygeal sinuses among military personnel.
Sacrococcygeal pilonidal sickness occurs primarily in young males at a ratio of 3:1 [2, 3]. The anticipated incidence is 26 cases per 100,000 people [3]. The peak incidence is between 15 and 24 years of age.
The management of chronic pilonidal disease is variable, contentious, and problematic. Principles of treatment require eradication of the sinus tract; complete healing of the overlying skin, and prevention of recurrence.
The multitude of surgical measures advocated to eradicate pilonidal disease, combined with the lack of prospective trials, attests to the lack of overall superiority of one method over the others. Time spent off work and perceived recurrence rates, influence the choice of method, which includes the laying open of all tracks with or without marsupialisation, the excision of all tracks with or without primary closure, and the excision of all tracks and then closure by some other means designed to avoid a midline wound.
Over the years, because of perplexity as to the etiology of pilonidal disease, surgeons have approached this condition in a variety of ways, from the most conservative treatments to widespread resection and plastic surgical procedures. Hence this study is done to compare two different surgical modalities in treatment of pilonidal sinus.

Material & Methods
Study Design
A Prospective clinical study was conducted among 30 consecutive patients with pilonidal sinus admitted in Department of General surgery of Government Hospital Sarwal, Jammu, India between.

Ethical approval and Informed consent
The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Inclusion Criteria
- Patients willing to participate in study.
- Patients fit for surgery with all organs functions within acceptable ranges

Exclusion Criteria
- Cases with incomplete data
- Those lost to follow up
- Patients who are not willing to give written informed consent

Sample selection
The sample size was calculated using a prior type of power

analysis by G* Power Software Version 3.0.1.0 (Franz Faul, Universitat Kiel, Germany). The minimum sample size of each group was calculated, following these input conditions: power of 0.80 and $P \leq 0.05$ and sample size arrived were 30 patients i.e 15 per group.

Group A: Patients underwent wide local excision followed by limberg flap primary closure.
Group B: Patients underwent wide local excision followed by Lay open flap (healing by secondary intention)

Methodology
Detailed history of the patients was obtained including the age, sex, and duration of sinus, discharge, pain and other associated problems. General physical examination was done with emphasis on presence of hair and obesity Local examination included the site; number of sinuses, tenderness, any hair protruding from the sinuses, condition of the skin surrounding the sinus was noted. Per Rectal Examination was done to rule out fistula-inano.

Statistical Analysis
The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages.

Results

Table 1: Age-wise distribution of patient of both the study group

Age Group (Years)	Limberg Flap		Lay Open	
	N	%	N	%
20-30yr	12	80.0%	13	86.6%
30-40yr	2	13.3%	1	6.7%
40-50yr	1	6.7%	1	6.7%
TOTAL	15	100.0%	15	100.0%
Mean	22.42		22.38	

In the present study majority of patient i.e 83.3% (25 patients) belong age group of 20-30years. Mean age of the subject of the limberg flap group and lay open group was 22.42 years and 22.38 years respectively which was comparable in both group.

Table 2: Gender distribution of subjects of both the study groups

Gender	Limberg flap		Lay open	
	N	%	N	%
Male	13	86.7%	14	93.3%
Female	2	13.3%	1	6.7%
Total	15	100%	15	100%

It was observed that 90% of the patient's (27 patients) of the present study were males, while the remaining 10% patient (3 patients) were female respectively. Gender wise distribution was comparable in both the groups.

Table 3: distribution of cases according to hospital stay (days) in both groups

Hospital Stay (days)	Groups			
	Limberg Flap		Lay open	
	N	%	N	%
2	3	20.0%	1	6.7%
3	7	46.7%	5	33.3%
4	3	20.0%	6	40.0%
5	2	13.3%	3	20.0%
Total	15	100	15	100
Mean	3.17		4.85	

In limberg flap group 3 patients stayed at hospital for 2 days while 7 patients stayed at hospital for 3 days, 3 patients stayed for 4 days and 2 patients stayed for 5 days. In lay open group 1 patient stayed for 2 days, 5 patients stayed for 3 days, 6 patients stayed for 4 days, 3 patients stayed for 5 days.

Table 4: distribution of cases according to time to complete healing in both study group

Time to complete wound healing (in days)	Groups			
	Limberg Flap		Lay open	
	N	%	N	%
20-30days	8	53.3%	0	0
31-40days	6	40.0%	1	6.7%
41-50days	1	6.7%	2	13.3%
51-60days	0	0	9	60.0%
>60days	0	0	3	20.0%
Total	15	100%	15	100%
Mean	20.86		44.18	

In our study most of the patient in limberg flap group 53.3% patient achieved complete wound healing around 20-30 post-operative day while in lay open group 60.0% patient achieved complete wound healing around 51-60 days post operatively.

Discussion
With the uncertainty as to the aetiology and the complexities often encountered in its treatment, a pilonidal sinus has been considered as a complex disease. Wide varieties of approaches are employed in dealing with this ailment ranging from a conservative treatment to an extensive surgical excision or repair [4, 5]. High chance of cure with minimum discomfort along with low complication rates of wound infection and recurrence is the main aim behind the treatment of pilonidal sinus. Surgery should also avoid prolonged hospital stay and incapacity to resume work for a longer period [6, 7].
Surgical treatment options of pilonidal disease includes open excision, excision with primary closure, just lay open, and excision and flap closure. With all the controversies about best surgical technique for the treatment of pilonidal sinus, an ideal operation should be simple, should make less hospital stay, should not be incapacitating for a long period and should have a low recurrence rate.
In the present study commonest age of presentation is between 20 and 30 (83.3%). This result is consistent with observations made by Onder *et al*. [8] According to the study by Onder *et al*. at Dicle University Medical Faculty, the average age of presentation of pilonidal disease was 20-30. The male to female ratio in the study is 9:1. This result is consistent with the observations made by Onder *et al*. who found that the disease was 5.1 to 9.1 times more in males than in females [8]. This is also consistent with the observations made by Osmanoglu *et al*. [9]
Duration of wound healing was found to be an average of 44.18 days for excision with lay open and 20.86 days for excision with primary closure. This is consistent with the study conducted by Al-Hassan *et al*. [10]
The average length of hospital stay in excision and lay open group was 3.17 days and 4.85 days in the excision and

primary closure group. Fazeli *et al*. had reported that duration of hospital stay was 2.76 days in excision and lay open group when compared to 3.86 days in excision and primary closure group [11]. Similar results were reported by Mohamed *et al*, who observed that the duration of hospital stay is higher in excision with primary closure group [12].

Conclusion

The surgical methods for treatment of pilonidal sinus include two types of surgeries- excision of pilonidal sinus and lay open for secondary healing and excision of pilonidal sinus followed by primary closure. The present study concluded that the Limberg flap is one of the transposition flap used after the excision of pilonidal sinus. It has proven efficacy in the management of the disease with added benefits of requiring less healing time, shorter hospital stay, early convalescence, less complication and recurrence rate.

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