

**Research Article****Comparative Study between Primary Simple Closure and Limberg Flap Technique in Pilonidal Sinus Disease****Gopal Ram<sup>1\*</sup>, Suresh Kumar Saini<sup>2</sup>, Mohmmad Salim<sup>3</sup>, Prabhu Dayal Sinwar<sup>4</sup>**<sup>1,2,4</sup>Senior Resident, Department of General Surgery, Sardar Patel Medical College, Bikaner, Rajasthan, India<sup>3</sup>Professor, Department of General Surgery, Sardar Patel Medical College, Bikaner, Rajasthan, India**\*Corresponding author**

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**Abstract:** Pilonidal sinus disease (PSD) is a common chronic, benign disease of young adulthood. Pilonidal disease is an infection under the skin in the gluteal cleft. Pilonidal literally means a “nest of hair”. Known risk factors include family history, local trauma, sedentary occupation, and obesity. Pilonidal sinus disease is a blind track, which extends from the skin of natal cleft up to the presacral fascia. For treatment, various noninvasive and surgical methods (simple incision and drainage, lying open, marsupialization, excision and primary closure, or rhomboid excision and Limberg flap) have been performed. We perform comparative study between primary simple closer and Limberg flap technique to compare results of wound infection, wound haematoma, and wound disruption, recurrence, hospital stay time. We perform limberg flap technique and primary simple closure of pilonidal sinus. According to the result of our study Limberg Flap is a better technique to reduce recurrence, wound infection rate and wound disruption in comparison to primary simple closure technique.**Keywords:** Pilonidal sinus, Limberg flap, Primary simple closure, Rhomboid excision.

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**INTRODUCTION**

Pilonidal sinus disease (PSD) is a chronic, benign disease of young age group. It is more common in males than in females. It is most frequently seen in the sacrococcygeal region. In its natural course, it results in localized inflammation with abscess formation causing fistulae, sinus and chronic inflammation in the sacrococcygeal region. Although earlier it was considered as a congenital disease but currently known to be an acquired condition [1]. postoperative complications and recurrence are contribute by several factor like poor body hygiene, obesity, smoking and size of sinus [2]. The goal of treatment for pilonidal sinus is low reccurance rate, short hospital stay, early return to work and decrease post operative work [3]. There certain nonsurgical treatment available but now the consensus for treatment is surgery. Outcome of any surgical procedure in treating the sinus, chiefly depend its how much obliterate the cleft-natal space. primary residual sinus tracts, a dead space at the gravitational pit of the cleft, regularity of the hair shave of the cleft, and obesity also have an undoubted contribution to the recurrence of the sinus. In the year 2005, Akca *et al.* [4] did a study to compare the outcome of excision and primary closure with that of rhomboid excision and the Limberg flap procedure in patients with primary sacrococcygeal pilonidal disease (SPD). In the year 2006 Katsoulis *et al.* [5] described that surgical

treatment of pilonidal sinus disease has a significant morbidity and recurrence rate. In the year 2006, Misiakos *et al.* [6] described that Pilonidal disease is a common chronic disorder of the sacrococcygeal area affecting young people. In the year 2008, Akin *et al.* [7] did a study to investigate the results of rhomboid excision and the Limberg flap procedure to treat pilonidal sinus disease. In the year 2008, Mahdy [8] described that controversy still exists regarding the best surgical technique for the treatment of pilonidal disease in terms of minimizing disease recurrence and patient discomfort. In the year 2008, Mentis *et al.* [9] showed that Pilonidal sinus disease is common especially in young adult males. In the year 2009 Aslam *et al.* [10] described that Pilonidal sinus disease has been treated for a long time with conventional open excision technique. The rhomboid flap of Limberg is a transposition flap that has been pleaded for treatment of this condition. In the year 2009 el-Khadrawy *et al.* [11] described that Pilonidal sinus is a common chronic disease of the sacrococcygeal region. Treatment varies according to the clinical presentation of the disease. In the year 2009 Ersoy *et al.* [12] did a study to compare the early postoperative results of the commonly used two surgical flap procedures in pilonidal disease: Karydakos and Limberg. In the year 2009 Jamal *et al.* [13] did a study to compare the outcome of Open excision and secondary healing with rhomboid excision and Limberg flap in the management of sacrococcygeal

pilonidal sinus disease (SPD). In the year 2009 Yamout *et al.* [14] described that rhomboid excision with Limberg flap (RELF) repair has been shown to be effective in the management of pilonidal disease (PD) in adults. Wide excision allows complete removal of diseased tissue, and the rotational flap allows tensionless coverage as well as helps flatten the natal crease, which is believed to contribute to the recurrence of PD. In the year 2010, Darwish and Hassanin [15] described that many procedures have been proposed for the management of sacrococcygeal pilonidal sinus disease. The aim of this work is to evaluate the superiorly based flap (used before for reconstruction of pressure sore) for reconstruction after excision of sacrococcygeal pilonidal sinus and concluded that the use of superiorly based Limberg flap in reconstruction after excision of sacrococcygeal pilonidal sinus is reliable, easily performed, associated with complete cure and low postoperative complications. In the year 2010, Madbouly [16] did a study to analyze the long-term outcome of rhomboid excision with Limberg flap reconstruction (LF) as one-day surgery in treatment of recurrent pilonidal sinus (RPS). In the year 2010 Muzi *et al.* [17] described that the best surgical technique for sacrococcygeal pilonidal disease is still controversial. The aim of this randomized prospective trial was to compare both the results of Limberg flap procedure and primary closure. In the year 2010, Shetty and Payne [18] described that pilonidal sinus disease can sometimes pose a surgical challenge because of prolonged wound healing problems and recurrence rates. In the year 2010, Topgül [19] summarized the general characteristics of pilonidal sinus disease and details of rhomboid flap (RF) technique used in its treatment, and discussed the results of RF methods and its comparison with other techniques, principally with flap technique available in the literature. In the year 2011, Kirkil *et al.* [20] described that cavity drainage has been used routinely in Limberg flap repair for pilonidal disease but there have been few controlled studies on the rationale for routine usage of drains. In the year 2011, Müller *et al.* [21] showed that recent studies have reported excellent healing and low recurrence rates for rhomboid flaps for pilonidal sinus disease. In the year 2011, Osmanoglu and Yetisir [22] described that Pilonidal Sinus Disease (PSD) is an acquired condition usually seen in young adult males. This descriptive retrospective study has been performed to determine effects of primary suture, marsupialization and Limberg Flap for the management of PSD on the outcomes of return to work period, infection and recurrence rates. In the year 2011, Tavassoli *et al.* [23] shows that pilonidal disease is a common chronic disorder, mostly affecting young adult males. Different hypotheses have been introduced for this disease, but acquired pathogenesis is the most acceptable one. In the year 2012 Dass *et al.* [24] did a study to compare elliptical excision with primary midline closure and rhomboid excision with limberg flap reconstruction techniques for the sacrococcygeal pilonidal sinus. In the

year 2012, Horwood *et al.* [25] described that sacrococcygeal pilonidal disease is a common condition afflicting the young male working and student population, resulting in considerable pain, embarrassment and loss of work days. In the year 2012, Okuş *et al.* [26] described that pilonidal disease is an inflammatory disease seen in the intergluteal region. In the year 2013, Afşarlar *et al.* [27] described that Pilonidal disease is a common and frustrating problem among adolescents due to its high recurrence rate. In the year 2013, Altintoprak *et al.* [28] investigated whether there is a factor that can aid determination of the preferred technique by comparing the early and late results of two different surgical techniques for the treatment of pilonidal sinus. In the year 2013, Guner *et al.* [29] described that although various methods have been described for surgical treatment of pilonidal sinus disease, which is best is under debate. Tension-free techniques seem to be most ideal.

## MATERIALS AND METHODS

This study was conducted on 60 patients in Department of General Surgery, S.P. Medical College Bikaner during January 2013 to December 2013. Patients who diagnose Pilonidal sinus disease were divided into 2 groups of 30 patients each based on the technique of Simple Randomization. Patients will be allotted into Groups A and B.

**Group A:** Limberg flap technique

**Group B:** Primary simple closer

### Inclusion criteria

All patients diagnosed with pilonidal sinus disease which were fit to undergo surgery.

### Exclusion criteria

Patients having severe comorbidities i.e. malignancy, diabetes mellitus. Patients having spinal deformities, pediatric Age Group, recurrent and purulent discharging sinuses.

### Limberg flap technique

The skin was marked by a marker pen and after methylene dye injection. The involve area is excised by a rhomboid excision as shown in Fig. 1a, b.

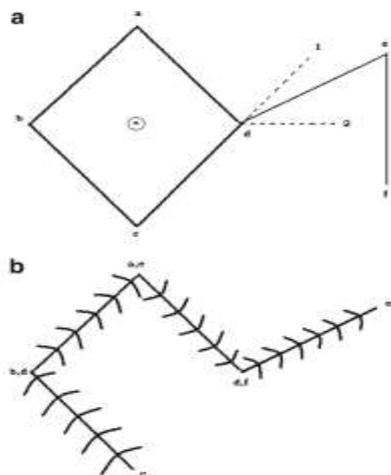
An incision line 'de' equal to the 'ab' which is created midway between extension of line 'cd' and horizontal axis. Another incision 'ef' of the same length is made on the vertical axis. The flap raised at fascio-cutaneous plane and this flap transposed to excised area. The subcutaneous tissue and skin is sutured separately without tension using polyglactin (Vicryl) and polypropylene interrupted suture and compression dressing applied.

### Primary simple closer

The involve area is excised by vertical elliptical incision and primary closer done with interrupted prolene suture.

**Statistical Analysis**

Results of the study were analysed using Chi-square test for categorical data and “t” test for continuous data.



**Fig. 1 a & b: Limberg flap technique**



**Fig. 1: Intraoperative figure showing rhomboid excision with putting the flap in the defect in Limberg technique**



**Fig. 2: Post operative figure on regular follow up on postoperative day 15 showing healthy flap and good results**

**RESULTS AND DISCUSSION**

Although various treatment methods for pilonidal sinus surgery are available, there is still controversy about the best treatment method. Although certain nonsurgical treatment options are available, now the consensus for treating it surgically has preferred. A number of techniques ranging from simple curette to extensive flap techniques have been published so far. Ideal procedure, in addition to eradicating the disease, should also eliminate the natal cleft which is anatomical predisposition for the recurrence of the sinus. The procedure should also considered on other parameters such as technical simplicity, work off and hospitalization period required. However no one of the procedure have been established to be better over others in all aspects.

Comparative studies of the various procedures are being increasingly published for documenting the relative superiority of one over the other. Other important points in the surgical treatment of pilonidal sinus are patient’s aesthetic satisfaction. When considered from this perspective, there was no statistical significance in the hospitalization period between the groups in the current study; on the other hand, time required to return to daily activities such as pain-free walking after the surgery, sitting on the toilet, and return to work, was significantly shorter in the Limberg flap method. However the results of a procedure on the recurrence of the sinus probably depend mainly on the ability of the procedure to obliterate the depth of natal cleft. So, looking that way one expects flap procedures to combat the disease recurrence better than excision with simple closure, keeping in view extensive dissection of the sinus tracts and the shallower cleft that flap procedures provide. Literature has documented a recurrence rate of 0–3% [30] for Limberg flap against a significantly high recurrence of 7–42% [31] for primary closure.

Outcome of our study in terms of recurrence of the sinus is the same as reported by other studies, namely, 36.6% recurrences for the primary closure group against 10% recurrence of the Limberg flap group which was significant ( $p < 0.05$ ). Fist, a drawback of follow-up of less than 3 years for documenting the recurrence mars the such data of many of the studies since most of the recurrences present within 3 years of the primary procedure [32].

The financial burden in the surgical management of pilonidal sinus assumes more considered because the disease is mainly occurred in second and third decades of life. Mean age of Limberg Flap group was  $29.43 \pm 5.63$  years and in primary simple closure group it was  $27.27 \pm 5.01$  years and the difference was statistically insignificant ( $p > 0.05$ ).

Literature published a hospital stay of 1–5 days and 2–4 days for the primary simple closure and

Limberg flap techniques, respectively. In present study, we observed a total hospital stay of  $2.77 \pm 0.43$  days and  $2.30 \pm 0.47$  days for the primary midline closure group and the Limberg flap group, respectively. However substantial material has been published on the Limberg flap technique for pilonidal sinus, there is only few documentation of the operative period for the technique. The difference was found statistically highly significant ( $p < 0.001$ ). Akca *et al.* [4] have published a median operative period 60 min for the Limberg flap group against 45 min for the primary midline closure group and the difference has been found to have p value of 0.001. While Abu Galala *et al.* [33] have found an insignificant difference in the operative time periods of the two techniques. Our study also documented a statistically non-significant difference between operative time periods for the two procedures; a mean of  $42.97 \pm 9.32$  (range 30–60) minutes for primary midline closure against  $51.83 \pm 4.41$  (range 40–60) minutes for Limberg flap. Near similar values of these parameters (operative time and total hospital stay) for the two procedures should render them a less important factor in determining the superiority of one procedure over the other.

So immediate postoperative complication range of the two procedures leads to the conclusion that wound collections (hematoma/seroma) tend to occur with Limberg flaps whereas suppurative wound infections, wound disruptions, and tend to occur more with simple midline primary closure procedure. Published studies documented a wound infection rate and a wound disruption rate of up to 12.4% [34] and 5–10% [35], respectively, for the primary midline closure technique, while published values of such parameters

for the Limberg flap group are 1.5–6.5% [4,9] and 0.9–3.9% [36,37] respectively. In keeping with the published literature, our study observed an immediate complication rate wound infections rate and wound disruptions rate 26.6% and 20% in primary simple closure respectively ( $p < 0.05$ ) and wound infections 10% and disruption rate 3.3% in Limberg flap group. This difference was found statistically insignificant ( $p > 0.05$ ).

From these above data, it is evident that a more morbid immediate postoperative complication has been encountered in the primary closure group than with the Limberg flap group. Does a postoperative indoor patient strategy prevent these complications? Data are still unavailable on the proportion of patients who would actually benefit from postoperative indoor strategy for preventing their immediate postoperative complications. Presumably, it seems that the proportion will be too less to be cost-effective for the procedure, keeping in view the overall immediate complication rates for the procedure and management protocols for such complications [38].

Main technical problem of PS surgery is not the removal of the cyst along with all of the sinuses, but rather reconstruction of the remaining defect area [39]. The reasons for the negative results of the primary closure method are the incision scar in the midline, the inability to flatten the natal cleft, and the tissue tension. A number of flap methods have been described that attempt to eliminate the factors that cause these negative results of primary closure, resulting in lower recurrence rates [40].

**Table 1: Distribution of cases according to age group (years) in both groups**

Age Group (years)	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
≤20	4	13.3	2	6.7	6	10.0
21-30	15	50.0	21	70.0	36	60.0
>30	11	36.7	7	23.3	18	30.0
Total	30	100	30	100	60	100
Mean	29.43		27.27			
SD	5.63		5.01			
t	1.574					
p	0.121					

**Table 2: Distribution of cases according to sex in both groups**

Sex	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
Female	3	10.0	5	16.7	8	13.3
Male	27	90.0	25	83.3	52	86.7
Total	30	100	30	100	60	100
$\chi^2$	0.577					
p	0.448					

**Table 3: Distribution of cases according to religion in both groups**

Religion	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
Hindu	26	86.7	30	100	56	93.3
Muslim	3	10.0	0	-	3	5.0
Sikh	1	3.3	0	-	1	1.7
Total	30	100	30	100	60	100
$\chi^2$	4.286					
p	0.117					

**Table 4: Distribution of cases according to occupation in both groups**

Occupation	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
Driver	14	46.7	15	50.0	29	48.3
Farmer	7	23.3	4	13.3	11	18.3
House Wife	1	3.3	5	16.7	6	10.0
Shopkeeper	2	6.7	0	-	2	3.3
Student	0	-	6	20.0	6	10.0
Teacher	6	20.0	0	-	6	10.0
Total	30	100	30	100	60	100
$\chi^2$	17.519					
p	0.004					

**Table 5: Distribution of cases according to residential area in both groups**

Residential Area	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
Rural	11	36.7	4	13.3	15	25.0
Urban	19	63.3	26	86.7	45	75.0
Total	30	100	30	100	60	100
$\chi^2$	4.356					
p	0.037					

**Table 6: Distribution of cases according to hospital stay (days) in both groups**

Hospital Stay (days)	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
2	21	70.0	7	23.3	28	46.7
3	9	30.0	23	76.7	32	53.3
Total	30	100	30	100	60	100
Mean	2.30		2.77			
SD	0.47		0.43			
t	4.030					
p	<0.001					

**Table 7: Distribution of cases according to wound disruption in both groups**

Wound Disruption	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
No	29	96.7	24	80.0	53	88.3
Yes	1	3.3	6	20.0	7	11.7
Total	30	100	30	100	60	100
$\chi^2$	4.043					
p	0.044					

**Table 8: Distribution of cases according to type of discharge in both groups**

Type of Discharge	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
Purulent with Serous	3	10.0	2	6.7	5	8.3
Serous	27	90.0	28	93.3	52	86.7
Total	30	100	30	100	60	100
$\chi^2$	3.277					
p	0.194					

**Table 9: Distribution of cases according to infection at stitches site in both groups**

Infection at Stitches Site	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
No	27	90.0	22	73.3	49	81.7
Yes	3	10.0	8	26.7	11	18.3
Total	30	100	30	100	60	100
$\chi^2$	2.783					
p	0.095					

**Table 10: Distribution of cases according to postoperative discharge in both groups**

Postoperative Discharge	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
Yes	3	10.0	11	36.7	14	23.3
No	27	90.0	19	63.3	46	76.7
Total	30	100	30	100	60	100
$\chi^2$	5.963					
p	0.015					

**Table 11: Distribution of Cases according to recurrence on follow-up**

Follow Ups	Recurrence	Group				Total		$\chi^2$	p
		Limberg Flap		Primary Simple Closure		No.	%		
		No.	%	No.	%				
6 week	Nil	27	90.0	19	63.3	46	76.7	5.963	0.015
	Yes	3	10.0	11	36.7	14	23.3		
8 week	Nil	30	100	19	63.3	49	81.7	13.469	<0.001
	Yes	0	-	11	36.7	11	18.3		

**Table 12: Demographic Profile of different parameters**

Parameters	Group				t	p
	Limberg Flap		Primary simple closure			
	Mean	SD	Mean	SD		
Hemoglobin	11.97	0.88	12.40	0.85	1.936	0.058
TLC (Thousands)	9.04	12.31	4.52	0.68	2.004	0.050
Platelet Count (Lacs)	1.67	0.16	1.64	0.41	0.321	0.749
Blood urea	22.60	2.39	22.56	7.58	0.028	0.978
Serum Creatinine	1.20	0.14	1.27	0.14	2.074	0.042

**Table 13: Distribution of Cases according to duration of surgery in both groups**

Duration of Surgery (minutes)	Groups				Total	
	Limberg Flap		Primary Simple Closure		No.	%
	No.	%	No.	%		
≤40	1	3.3	19	63.3	20	33.3
41-50	13	43.3	4	13.3	17	28.3
>50	16	53.3	7	23.3	23	38.3
Total	30	100	30	100	60	100
Mean	51.83		42.97			
SD	4.41		9.32			
t	4.709					
p	<0.001					

**CONCLUSION**

According to the results of our study, Limberg flap method has better to decrease recurrence and postoperative morbidity in compared to simple primary midline closure. Therefore, we recommend Limberg flap for treatment of pilonidal sinus disease.

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