

## Comparison of outcome of simple excision and primary closure with Limberg Flap procedure in Pilonidal disease

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### ABSTRACT

**Objective:** To compare outcome of excision of pilonidal sinus tract and primary closure with limberg flap procedure done for pilonidal disease.

**Study Design:** Prospective Interventional Comparative Study

**Place and Duration:** Department of General Surgery, Unit I, Services Hospital, Lahore from 06<sup>th</sup> September 2015 to 05<sup>th</sup> July 2017.

**Methodology:** Sixty patients (30 in each group) were included and randomly divided into Group PE (simple excision with primary closure) and Group LF (Limberg flap) using non probability consecutive sampling. Outcome was compared in terms of mean operative time, mean post-operative pain at 24 hours (VAS score) and mean length of hospital stay.

**Results:** Patients were ranged between 18 to 80 years with mean age (years) of the patients was  $37 \pm 7.25$  and  $39 \pm 10.43$  in group PE and LF respectively. Male to female ratio was 5:1 (group PE) versus 9:1 (group LF). Mean operative time (minutes) was  $30.3 \pm 4.64$  (group PE) versus  $47.1 \pm 5.34$  (group LF) ( $P < 0.00001$ ). Mean post-operative pain at 24 hours (VAS score) was  $5.63 \pm 0.72$  (group PE) versus  $2.63 \pm 0.76$  (group LF) ( $P < 0.00001$ ). Mean length of hospital stay (days) was  $5.83 \pm 1.05$  (group PE) and  $2.43 \pm 0.56$  (group LF) ( $P < 0.00001$ ).

**Conclusion:** Limberg flap procedure is better than the simple excision with primary closure in terms of mean post-operative pain and mean length of hospital stay at the expense of relatively increased mean operative time.

**Keywords:** Sacro-coccygeal, Pilonidal sinus, Simple excision, Primary closure, Limberg flap, Operative time, Post-operative pain, Hospital stay

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### INTRODUCTION

Sacrococcygeal pilonidal sinus is a chronic and potentially frustrating disease prevalent among young adults with an estimated incidence of 26:100,00 population<sup>1</sup>. It is mainly seen

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between ages of 15 to 45 years, rarely in upper and lower extremes<sup>2</sup>, affecting males 2 to 4 times more than females<sup>3</sup>. It is common in post-pubertal years, when sex hormones act on the pilosebaceous glands and cause growth of the body hairs. Being considered as an acquired disease, presence of hair in intergluteal cleft is the most important predisposing factor. Retention of hair causes an inflammatory reaction, leading to chronic infection, formation of abscess and multiple sinus tracts or fistulas<sup>4</sup>.

Amongst the several surgical treatment options, the most elementary technique is excision and leaving the wound open for healing by secondary intention. Merit of this technique includes no wound tension which facilitates healing without recurrence if all sinus tracts are included in the excised portion. Contrarily, the wound is closed after excision i.e. primary closure<sup>5</sup>. Primary closure is accomplished either by midline closure techniques (wound lies within the natal cleft) or off-midline techniques with lateralization of the natal cleft, including advancement flaps (Karydak's procedure), V - Y advancement flaps and rotational flaps (Limberg flap, modified Limberg flap (MLF), gluteus maximus myo-cutaneous flap)<sup>6</sup>.

Proponents of primary closure claim faster tissue healing, less operative time and better cosmetic results<sup>7</sup>. However, midline

closure is linked with increased post-operative pain, longer hospital stays, and lengthy healing duration. The Limberg flap, a transposition flap recommended for primary pilonidal disease, bears less morbidity as compared to excision with primary closure. The gist of Limberg technique lies in its easy method and the natal cleft flattening when a well-vascularized pedicle is rotated and sutured without tension. This results in improved local hygiene, reduced intergluteal hair entrapment secondary to friction between the buttocks and subsequent diminution in the anaerobic bacterial content, moisture, maceration, and scarring in the natal cleft<sup>8</sup>.

A study done by Abdelraheem et al displayed that hospital stay (mean days) and post-operative wound infection rates were less in Limberg flap procedure as compared to simple excision. However, recurrence rate in primary excision group was greater than the flap group. Additionally, duration of operation (minutes) was slightly more in Limberg flap<sup>9</sup>. Elshazly et al did a comparative study of Limberg flap with simple excision and primary closure which shows that hospitalization time and post-operative pain are less in Limberg flap procedure as compared to simple excision. However, duration of operation (minutes) was little more in Limberg flap procedure<sup>10</sup>.

The treatment of pilonidal sinus disease includes both surgical and non-surgical techniques but there is no consensus on the single best management plan for the pilonidal disease complex<sup>11</sup>. At present Limberg flap is not a routinely practiced procedure worldwide; there is limited international and local data which can actually compare the efficacy of these two methods of surgery in terms of post-operative pain, hospital stay and duration of surgery. If this study proves the superior efficacy of Limberg procedure over simple excision with primary closure, it will help to improve the present knowledge and sublime the future practices regarding the management of pilonidal disease. So, we have conducted this study with an objective to compare outcome of excision of pilonidal sinus tract and primary closure with limberg flap procedure done for pilonidal disease.

### METHODOLOGY

This prospective interventional comparative study was conducted at Department of General Surgery, Unit I, Services Hospital, Lahore over a period of 22 months from 06<sup>th</sup> September 2015 to 05<sup>th</sup> July 2017. Sample size of 60 cases; 30 in each group was calculated with 90% power of test and 95% Confidence Interval (CI). Non-probability consecutive sampling was used.

Patients of both sexes, ranging between age 18-80 years with pilonidal sinus for the last 1 year were included in this study. Those with acute pilonidal abscess (assessed clinically), recurrent or complex pilonidal sinus (i.e. multiple fibrous tracks lined with granulation tissue or communicating with other organs), history of previous surgery in the respective area, inability to give informed consent, American Society of Anesthesiologists (ASA) class III and IV (on history, examination and laboratory findings e.g. deranged liver and renal function)

and those with ischemic heart disease were excluded.

The patients were allocated in two equal groups, using number tables (group PE and group LF). Informed consent was taken after ensuring confidentiality and expertise required for this procedure. Bias was controlled by assigning these operations to a single surgical team. Outcome was compared in terms of operative time (minutes), post-operative pain at 24 hours (VAS score) and length of hospital stay (days). A Performa was designed to collect all the data.

**Data Analysis:** The collected data was analysed by using SPSS version 17.0. Quantitative variables (age, operative time, post-operative pain and length of hospital stay) were measured in terms of mean  $\pm$  standard deviation (SD) and qualitative variable (gender) was measured in terms of frequency and percentage. Independent sample T-test was used to compare quantitative variables. Stratification of data was done for gender and age. Post-stratification T-test was applied by taking P-value  $\leq 0.05$  as significant.

### RESULTS

A total of 60 patients were included in the study and divided into equal groups (n=30). Similarity in patient characteristics of both groups showed that data was adequately randomized. Out of total 60 patients, 52 (87 %) were male while only 8 (13 %) were female (Table-I).

Mean operative time (minutes) was significantly shorter in Group PE ( $30.3 \pm 4.64$ , 95% CI: 1.73) versus Group LF ( $47.1 \pm 5.34$ , 95% CI: 1.99) ( $P < 0.00001$ ). On the other hand, mean post-operative pain at 24 hours (VAS score) was significantly lower in Group LF ( $2.63 \pm 0.76$ , 95% CI: 0.286) compared to Group PE ( $5.63 \pm 0.72$ , 95% CI: 0.268) ( $P < 0.00001$ ). Moreover, Length of hospital stay (days) was significantly shorter in Group LF i.e.  $2.43 \pm 0.56$ , 95% CI: 0.212, reaching less than half that of Group PE i.e.  $5.83 \pm 1.05$ , 95% CI: 0.39 with  $P < 0.00001$  (Table-I).

**Table-I: Frequency of different Variables and outcome of Procedures in both groups (N=60)**

Variable	Group PE (n=30)	Group LF (n=30)	p-value
Age(years)	37.10 $\pm$ 2.71	39.03 $\pm$ 3.89	
Gender ratio (M:F)	25:5	27:3	
Mean operative time (minutes)	30.3 $\pm$ 4.64	47.1 $\pm$ 5.34	< 0.00001
Mean post- operative pain at 24 hours (VAS* score)	5.63 $\pm$ 0.72	2.63 $\pm$ 0.76	< 0.00001
Mean length of hospital stay (days)	5.83 $\pm$ 1.05	2.43 $\pm$ 0.56	< 0.00001

Values are presented as mean  $\pm$  standard deviation.

\*VAS, visual analogue scale.

Age and gender stratification of mean post-operative pain at 24 hours (VAS score) and length of hospital stay (days) showed statistically significant decreased pain and length of hospital stay in LF group irrespective of age and gender.

**Table-II: Age and Gender Stratification of Clinical Outcome (N=60)**

Clinical Outcome		Mean post- operative pain at 24 hours (VAS Score)				Mean length of hospital stay (days)				Mean operative time (minutes)			
Variable	Group	N	Mean	SD	p-value	N	Mean	SD	p- value	N	Mean	SD	p- value
<b>Age</b>													
<35 years	PE	12	5.33	0.355	< 0.00001	11	5.82	0.87	< 0.00001	12	28.92	2.811	< 0.00001
	LF	10	2.70	0.335	< 0.00001	09	2.22	0.44	< 0.00001	09	49.44	5.812	< 0.00001
>35 years	PE	18	5.67	0.181	< 0.00001	19	5.84	1.17	< 0.00001	18	31.22	5.418	< 0.00001
	LF	20	2.75	0.176	< 0.00001	21	2.52	0.60	< 0.00001	21	46.00	4.8271	< 0.00001
<b>Gender</b>													
Female	PE	4	5.75	0.50	< 0.00001	4	6.25	0.96	< 0.00001	4	29	4.24	< 0.00001
	LF	5	2.40	1.14	< 0.00001	5	2.20	0.45	< 0.00001	5	45	4.12	< 0.00001
Male	PE	26	5.42	1.137	< 0.00001	25	5.80	1.08	< 0.00001	26	30.50	4.74	< 0.00001
	LF	25	2.88	0.927	< 0.00001	26	2.58	0.76	< 0.00001	25	47.44	5.47	< 0.00001

Values are presented as mean with standard deviation.

Furthermore, age and gender stratification of mean operative time (minutes) showed statistically significant decreased time in PE group in irrespective of age and gender (Table-II).

### DISCUSSION

Pilonidal sinus is blind ended epithelial tract lined by granulation tissue, present in the intergluteal cleft containing weak and broken hair. The etiology regarding the formation of pilonidal sinus is still not clear yet. Deep natal cleft, obesity, trauma, excessive sweating, bacterial contamination and a sedentary lifestyle play a definitive role in its development<sup>12</sup>.

Principles of an ideal surgery for pilonidal sinus include removal of all the sinus tracts as well as the contributing factors that lead to the formation of pilonidal sinus. The success of the treatment lies in the minimal tissue injury, mild postoperative pain, short hospital stays, satisfactory cosmetic results, rapid resumption of daily activities, less cost, minimal morbidity, reduced recurrence rate and high patients' satisfaction<sup>13</sup>.

Study done by Kartal et al revealed a median operative period  $54.31 \pm 6.41$  minutes for the Limberg flap versus  $26.94 \pm 5.79$  minutes for the primary midline closure ( $P < 0.001$ )<sup>14</sup>. Karaca et al showed a mean operative time of  $27.26 \pm 6.41$  minutes for primary midline closure and  $59.64 \pm 7.76$  minutes for Limberg flap ( $P < 0.001$ )<sup>15</sup>. Our study showed that mean operating time was significantly shorter in group PE ( $30.3 \pm 4.64$  min) versus group LF ( $47.1 \pm 5.34$  min) ( $P < 0.00001$ ), which is comparable to Kartal et al<sup>14</sup>.

Post-operative pain is another important factor in deciding the procedure of choice in any surgical pathology in terms of more patient satisfaction, better healing of wound and less stress to the patient. Ahmad Alam El-Dein ML et al reported postoperative pain score at 24 hours of  $4.2 \pm 0.77$  in the direct closure group and  $3.8 \pm 0.94$  in the flap group ( $P = 0.2105$ )<sup>16</sup>. Our study displayed a relatively similar result with mean postoperative pain scores that were significantly lower in Limberg flap group ( $2.63 \pm 0.76$ ) compared to primary excision ( $5.63 \pm 0.72$ ) in the first 24 hours ( $P < 0.00001$ ).

Length of hospital stay is an important factor in the treatment of pilonidal sinus in terms of financial burden on the health system

and the patient's family, owing to its incidence in the 2<sup>nd</sup> and 3<sup>rd</sup> decade of life. Early discharge from hospital will result in early return to work and ultimately less financial burden including hospital finances. According to the literature hospital stay is 1–5 days for the primary midline closure and 2– 4 days for Limberg flap techniques, respectively. Study done by Karaca et al depicted a total hospital stay of  $3.05 \pm 3.42$  days for the primary midline closure and  $2.69 \pm 2.32$  days for the Limberg flap group<sup>17</sup>. Our study showed the length of hospital stay was significantly shorter after Limberg flap procedure group ( $2.43 \pm 0.568$ ) which is approximately half the time needed after primary excision group ( $5.83 \pm 1.05$ ) ( $P < 0.00001$ ).

Gender distribution in our study showed that 13% of the total were females and 87% were male making it 08 females and 52 males, who were involved in the study. However, international data shows that males are affected 2.2-4 times more frequently than females<sup>18</sup>. This difference can be rendered to the conservative sociocultural environment, which leads to a smaller number of women presenting with the disease.

Our study showed that in patients who underwent Limberg Flap procedure returned to work and normal activity earlier than those who underwent excision with primary closure and this is attributable to less postoperative pain and shorter hospital stay. Operative time was more in LF group than in PE group that can be improved with experience and performing the procedure more frequently in lieu with the work carried out by Meena et al that presented a less significant difference in the operative time periods of the two surgical procedures i.e.  $36.3 \pm 3.24$  minutes for Limberg flap procedure against  $24.93 \pm 3.06$  minutes for primary midline closure<sup>19</sup>.

In summary, the review and analysis of our data and the literature shows that Limberg flap procedure is significantly better than simple excision with primary closure. It is a preferable technique in treating the pilonidal sinus in terms of reduced postoperative pain, shorter duration of hospital stay at the expense of relatively increased operative time that can be reduced by experience. Henceforth, larger scale studies would be required for further valuation.

## CONCLUSION

Limberg flap procedure is better than the simple excision with primary closure in terms of mean post-operative pain and mean length of hospital stay at the expense of relatively increased mean operative time.

## AUTHOR'S CONTRIBUTION

**Janjua MH:** Conceived idea, Designed research methodology, Manuscript writing

**Mohsin J:** Data collection,

**Fatima J:** Literature review, Data interpretation.

**Siddique U:** Statistical analysis

**Naseem Y:** Literature search

**Gill AJ:** Manuscript final reading

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