

# Comparison of Cleft lift procedure with Limberg Flap technique for management of pilonidal disease of the natal cleft: A retrospective study

Mughal M, Shah ST, Iqbal S, Saadah T, M Farooq

Department of General Surgery, University Hospital Hairmyres, Eaglesham Road, East Kilbride, Glasgow, United Kingdom

## Abstract

**Background:** This is a retrospective study of management of Pilonidal sinus disease (PNS) of natal cleft and to evaluate the outcome of each mode of treatment in terms of recurrence of the disease

**Material/Methods:** This is a retrospective study of a series of patients treated for Pilonidal sinus disease from 2012 to 2016. In this series, a total of 122 patients were operated for pilonidal sinus disease, of which 63 patients who underwent cleft lift procedure and 59 patients who underwent Limberg's flap technique were evaluated. Both of these procedures were done at a single centre by two different teams, each team had 2 surgeons and both surgeons in one team were performing only one type of procedure. The demographic characteristics, previous operations, duration of symptoms, perioperative complications, duration of operation and hospital stay, duration of draining of all patients, and recurrence of PNS were recorded. Mean follow up time was 2.39yrs and median 2yrs.

**Results:** The mean operation time was  $45.34 \pm 6.15$  min in the cleft lift group (CLS) and  $43.41 \pm 5.17$  min in the Limberg flap surgery (LFS) ( $p < 0.05$ ). No wound dehiscence was found in either group. The average number of days that the drain was kept in place was  $1.78 \pm 0.723$  days in the CLS and  $2.31 \pm 0.582$  days in LFS ( $p < 0.05$ ). These patients were admitted in the morning of procedure with an intent to stay in the hospital for one or two days. The average hospital stay was  $1.83 \pm 0.642$  days in the CLS and  $2.7 \pm 0.582$  days in the LFS ( $p < 0.05$ ). Two patients in the CLS and three patients in LFS had Superficial wound infection and no recurrence was reported in both groups during the 2-3 year follow up time.

**Conclusions:** Both methods in the treatment of recurrent PNS can be preferred because of low complication and recurrence rates. As no recurrence was found in either group, the choice of the type of surgery can be left upon the personal preference of the surgeon and the procedure that they are comfortable with.

**Keywords:** Pilonidal sinus disease (PNS), Cleft lift surgery (CLS), Limberg flap surgery (LFS)

## Introduction:

The etio-pathogenesis of Pilonidal disease was simplified by Dr John Bascom, proving it to be an acquired pathology and is accepted by most in the medical fraternity<sup>[1,2]</sup>. Dr Bascom proposed various procedures<sup>[3]</sup> and expanded his work in the understanding of the disease. He concluded that depth of the cleft is the cause of disease, which provides an anaerobic atmosphere for the microorganisms to grow. If there is no cleft, the disease will have less chance to recur. The distention of follicles due to keratin causes micro-abscesses to form in the epithelial tubes. The opening in the skin is added by

the depth of cleft and pressure phenomenon due to opening and closing of clefts while different postures of the body cause hairs to migrate into these epithelial tubes and promote acute abscess. These abscesses rupture and recur, leading to chronicity of disease. It could be inferred from the pathophysiology that the depth of the clefts predisposes to this disease and that this is a disease of skin not of deeper structures. Sacrococcygeal pilonidal sinus disease (PNS) has an incidence rate of 26/10000. It is more common in young men<sup>[4]</sup>. PNS of natal cleft is a difficult disease to treat for a surgeon due to its high recurrence rates. It is distressing for the patients, doctors, staff

## Corresponding Author:

**Dr Majid B. Mughal**

Department of General Surgery, University Hospital Hairmyres, Eaglesham Road, East Kilbride.  
Glasgow, UK, Post code: G75 8RG  
E-mail: drmbm@yahoo.com

and family also due to follow up every week to know the condition of the wound moreover it is more distressing for the patients who have to go for daily dressing and blood/pus-soaked clothes. In general, these patients are unhappy and stressed. There are many procedures for chronic Pilonidal Sinus disease. The previously preferred technique of leaving the wound open after primary repair had high recurrence rates and prolonged wound healing times and has been replaced by many techniques from surgical excision only to primary repairs with rotational flaps to even skin grafting, but none can be satisfactorily considered the best as almost all have controversies surrounding them. Several off-midline procedures and cleft lift with modifications are also used in pursuit of the final procedure. The most commonly used types of asymmetric lateral oblique flaps are the Karydakias flap procedure and the cleft lift procedure described by Bascom<sup>[5,6]</sup>. Among full-thickness flaps, the Limberg flap, fascio-cutaneous VY advancement flap, Z-plasty, and rotation flaps are used in the treatment of PNS<sup>[4,7]</sup>. The cleft lift procedure described by Bascom is a successful method for the treatment of recurrent as well as new cases of PNS. In contrast to other full-thickness flaps, Bascom's initial results did not reveal any recurrence after the cleft lift procedure, in which the defect was closed only with the skin flap after the excision<sup>[5]</sup>. The Limberg flap is a full-thickness flap that is preferred method of covering large defects and can be applied unilaterally or bilaterally. Recurrence rates in PNS have been reported to range from 0% to 1.1%<sup>[6-8]</sup>. In this retrospective study we compared cleft lift procedure with Limberg technique in the management of the PNS of natal cleft.

### Material and Methods

Patients who presented to the General Surgery Clinic of our Hospital with the diagnosis of pilonidal sinus disease between 2012 and 2016. Informed consent was taken in the form of a questionnaire. The main inclusion criterion was the presence of pilonidal sinus disease in patients. We then retrospectively reviewed the results of 122 consecutive patients who underwent either the cleft lift surgery CLS or Limberg flap surgery LFS for treatment of recurrent PNS, as shown in Figure 1 below. Patients whose data were unavailable and patients who had Pilonidal abscess were excluded from the study. We evaluated the 59 patients who underwent the Limberg Flap surgery procedure and the 63 patients who underwent the cleft lift procedure. The demographic characteristics (sex and age), complications (seroma, wound infection and recurrence), duration of operation, draining time and length of hospital stay of all patients

were recorded. Examination records of each patient at 3 months after the operation were reviewed and findings suggesting recurrence were recorded. All the patients participating in the study were contacted by telephone in August 2016 and any symptoms that suggested recurrence were recorded with a verbal consent for the study.

Data was collected from the patients' case notes, which included pre-op, operative and post-op records as well as the out-patient follow-up clinic visits.

Patients were examined in outpatient clinics of the General Surgery Department and were diagnosed preoperatively. Diagnoses of all patients were confirmed by histopathological examination of specimens. A single dose of prophylactic antibiotic (Cephalaxin 1g and metronidazole 500mg) was administered 30 minutes before the start of the operation. All patients were operated on using the jack-knife position under General anaesthesia. Hairs in the operation area were clipped on the operating table.

### Operative Techniques:

In each study groups, prophylactic intravenous antibiotics was intravenously administered 30 minutes prior to surgery.

### Cleft lift Group (Figure1)

Surgery was done under general anaesthesia primarily with occasional Xylocaine plus adrenaline. Patients were put in prone position with buttocks strapped apart. Safety lines were marked preoperatively with the patient in a standing position and gluteal muscles fully contracted to compress the buttocks. Skin flap was raised from unaffected or least affected side (Figure 1). The skin of the cleft up to the marked area was completely excised. The granulation tissue was removed by scraping with gauze on the finger. All the tracts were opened and scraped. Efforts were made to save the underlying fat tissue and healed scar tissue, which would be used for a cleft lift later on. The healed fibrous tissue in the base was incised in multiple cubes to relieve the post-op pain of contractures. The cavity was thoroughly washed with diluted Hydrogen peroxide, saline and Povidone Iodine. In 23 patients, a size 14 French channel suction drain was kept and brought out through upper lateral part of the buttock where ever thought necessary. The drain was removed after 24-48hrs.

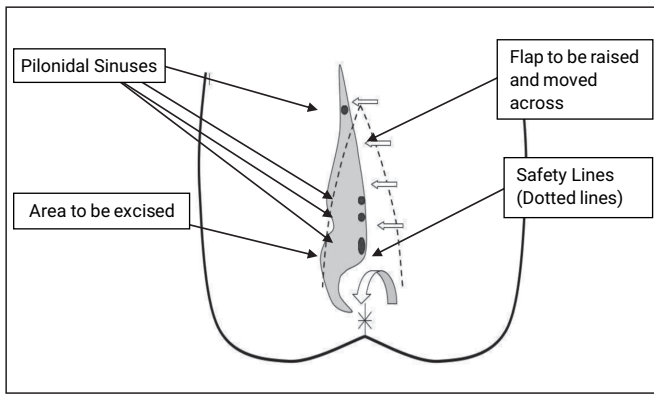


Figure 1.

**Limberg Flap group (Figure 2)**

The area to be excised was mapped-out and the flap was designed. The area to be excised was mapped on the skin in a rhomboid form. The skin incision was deepened to the presacral fascia. Tissue was then removed *en bloc*. After removing the rhombic excision, the Limberg fascia cutaneous flap was prepared through the right or left-side gluteus maximus fascia. The flap was fully mobilized and transposed medially to fulfil the rhombic defect without any tension. Haemostasis was accomplished. A 12F low-suction drain was sited and the wound was closed in two layers: the subcutaneous tissue with 3/0 Polysorb absorbable suture and the skin with 3/0 polypropylene interrupted mattress sutures. Drain remained in situ till the time that drainage amount decreases below 20 ml/day approximately 24-72hrs anytime, as shown in Figure 2 below.

All patients were mobilized on the same day. They were allowed eat and drink when awake after the operation. Sutures of all patients were removed on the 12th day after surgery and patients were advised to attend hospital in case of any problems with the wound and were reviewed at 3 months.

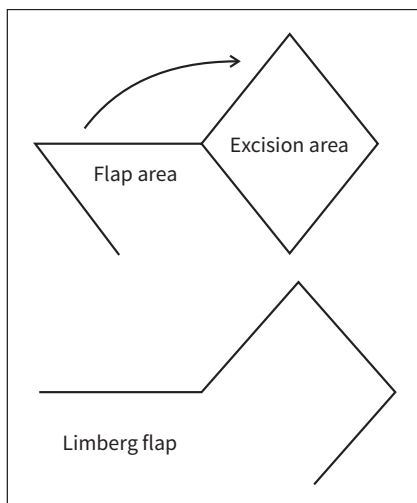
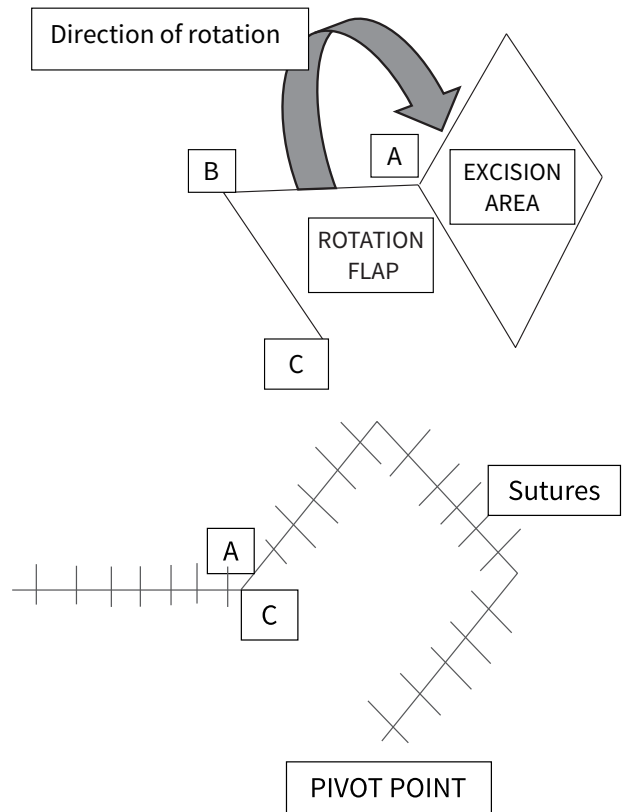


Figure 2



**Results**

A total of 122 patients were included in the study: 63 in the CLS and 59 in the LFS. Both of these procedures were done at a single centre by two different teams, Team A and B. Team A performed CLS while Team B performed LFS. Each team had 2 surgeons each and both surgeons in each team were performing only one type of procedure. Procedure was timed by the theatre staff notes. Mean age was 22.37 in the CLS and 22.1 in the LFS, and the difference was not significant ( $p > 0.05$ ). There were 59 males and 4 females in the CLS and 54 males and 5 females in the LFS, and the difference was not significant ( $p > 0.05$ ). The mean durations of operation were 37.02 minutes in the CLS and 47.71 minutes in the LFS. There was a statistically significant difference between the 2 groups in terms of the duration of operation ( $p < 0.05$ ). In the CLS, operation times were shorter. Draining time was calculated in days. The shortest time the drain stayed in was one day and longest time was 4 days. The mean drain time was 1.58 days in the CLS and 2.34 days in LFS. A statistically significant difference was found between the 2 groups ( $p < 0.05$ ). The drains were removed earlier in the CLS. Three patients (5%) in the CLS and 4 patients (7%) in the LFS had seroma and the difference was not statistically significant ( $p > 0.05$ ). Superficial wound infection occurred in 2 patients (3%) in the CLS and 3 patients (5%) in the LFS, and the difference was not significant ( $p > 0.05$ ).

The mean hospital stay was 1.8 days in the CLS and 2.63 days in the LFS. Statistically, there was a significant difference between the 2 groups ( $p < 0.05$ ). CLS patients were discharged sooner. The Patients were followed-up at 3 months and were advised to attend in case of recurrence of symptoms. Telephone calls were made for any recurrence whatsoever. The patients mean follow up period was 46.3 versus 48.4 months, respectively. No recurrence was observed in either of the groups.

**Table 1: Comparison between study groups**

	CLS	LFS	p-value	t-value
Number of Patients	63	59		
Gender (Male/Female)	59/4	54/5		
Age	22.37	22.1	0.3363	0.42352
Mean operative time	37.02 min	47.71 min	< 0.00001	-16.30617
Hospital stay (day)	1.8	2.63	<0.00001	-8.76863
Duration of drain	1.58	2.34	<0.00001	-9.37537
Wound infection	2	3	>0.05	
Seroma	3	4	>0.05	
Recurrence	0	0		

## Discussion

According to the current literature, the main aetiology of the PNS disease is the anaerobic environment and moisture of the deep natal cleft<sup>[8,9]</sup>. However, this etio-pathogenesis of the disease is still controversial. Regarding to eliminate the pathogenesis of the disease, many surgical techniques have been noted in literature for an optimal management algorithm with low recurrence and complication rates, but it has still not been accomplished<sup>[10]</sup>.

During the last decades, flap techniques became more popular for the treatment of the PNS disease, and literature has shown the benefit of the flap techniques are superior to conventional open techniques or primary closure procedures<sup>[11,12]</sup>. Among these flap techniques, LFS technique have gained the favour of many surgeons with low recurrence and complication rates compared to other flap procedures<sup>[10,13-15]</sup> since Azabet *al.*<sup>[16]</sup> reported their results. The main purpose of off-midline procedures is to use oblique or asymmetrical flaps to retain incision scars out of the midline in order to overcome tension associated problems. Moreover, recent studies regarding flap techniques reported that, off- midline techniques look like to be related to reduced pain compared to

conventional midline closure techniques<sup>[17,18]</sup>.

Another off-midline flap technique is the CLS procedure which was first described by Bascom in 2002<sup>[19]</sup>. The author mentioned that, this technique reduces the recurrence rate by flattening the natal cleft by medial mobilization of a tension free fasciocutaneous flap on the gluteal region which removes a key factor of the pathogenesis for the disease, thus, many authors noted that the CLS technique is safe and feasible with low recurrence rates and cosmetic results<sup>[20-22]</sup>.

There are studies reporting the comparison of LFS with primary closure techniques in which LFS causes less post-operative pain and recurrence rates<sup>[12,23]</sup>. Although there is still insufficient data in the literature regarding the compare of CLS procedure with LFS technique.

In our study, the compare of two techniques showed that both techniques were similar in terms of complications, rate of recurrence, length of hospital stay, and duration of suction drains, however, there was a statistically significant difference between two groups related to operative time which was longer in LFS. According to the literature, the surgical site infection rate is 11.9% to 12.8% after PNS surgery<sup>[24,25,26]</sup>. Our wound infection rate was less than the literature with a rate of 4.09% in both of the groups.

A recent Cochrane review has demonstrated benefits of off-midline primary closure techniques compared to midline closure techniques or lay- open techniques<sup>[17]</sup>. Moreover, Horwood *et al.* reported considerable benefits of the use of LFS procedure for the management of chronic PNS disease over the other treatment modalities<sup>[26]</sup>. However, in another prospective randomized study, Guneret *al.* reported that the CLS procedure presents a better early quality of life and a shorter operation time than LFS technique<sup>[27]</sup>. When we compare our results with the literature, we noted that, the results of our study were similar to Guneret *al.*<sup>[27]</sup> in which we demonstrate that Cleft lift procedure is a reliable technique similar to LFS technique with the advantage of shorter operative time and better cosmetic results. The main limitations of our study included it being a retrospective design, lack of cosmetic results, post-operative pain scores, time off from work, small sample size and single institution experience.

**Conclusion:** In conclusion, both methods may be preferred because of their low complication and recurrence rates in treatment of PNS. Cleft lift procedure was found to be as effective as the LFS reconstruction with the advantages of shorter operative time, being less invasive, less need for

drainage and better cosmetic results. We believe that our study provides benefits of Cleft lift technique but further prospective randomized studies will be needed for more accurate compare for these two techniques.

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