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Research Article

Modified Limberg Flap versus Bascom Cleft Lift Procedure for Sacrococcygeal Pilonidal Sinus Disease

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ABSTRACT

Background: Pilonidal sinus disease (PSD) is a common, recurrent condition of young adults, and there is no consensus on the best off-midline closure technique. We compared the modified Limberg flap (MLF) with the Bascom cleft lift (BCL) for primary sacrococcygeal PSD.

Methods: This interventional comparative study was conducted in the Department of General Surgery of a tertiary care teaching hospital in India. Forty adults with primary PSD were allocated to BCL (n = 20) or MLF (n = 20). Outcomes were operative time, length of hospital stay, timing of drain removal, wound healing at days 7, 14 and 21, postoperative pain (visual analogue scale, VAS) on days 1, 2 and 12, complications including recurrence, cosmetic satisfaction at day 21, and time to return to work.

Results: Groups were comparable for age, sex, occupation, number of sinus openings and tract length; hair tuft at presentation was more frequent in the BCL group (70% vs 35%). Compared with MLF, BCL had a shorter operative time (95.3 ± 8.6 vs 110.5 ± 11.8 min, $p < 0.001$), shorter hospital stay (5.0 ± 0.7 vs 5.8 ± 0.9 days, $p = 0.003$), earlier drain removal ($p = 0.011$) and lower VAS scores on day 1 (5.35 ± 0.93 vs 6.60 ± 1.50, $p = 0.003$) and day 2 (3.55 ± 0.76 vs 4.90 ± 1.80, $p = 0.005$). Pain at day 12 ($p = 0.53$), complete healing at day 21 (85% vs 90%), overall complications (35% in each group), cosmetic satisfaction ($p = 0.11$) and recurrence (2 vs 1 patients) did not differ significantly. Return to work was 1.5 days earlier after BCL, a borderline difference ($p = 0.054$).

Conclusion: Both procedures were safe and gave similar healing, complication and cosmetic outcomes. BCL offered a shorter operation, shorter admission, earlier drain removal and less early pain. Larger randomised studies with longer follow-up are needed, particularly for recurrence.

Keywords: Bascom procedure, Limberg flap, rhomboid flap

INTRODUCTION

Pilonidal sinus disease (PSD) is a chronic inflammatory condition of the sacrococcygeal subcutaneous tissue in which sinus tracts or cysts contain hair and debris. It was first described by Mayo in 1833 and named by Hodges in 1880 from the Latin *pilus* (hair) and *nidus* (nest) [1]. A congenital origin was long assumed, but current evidence favours an acquired process in which loose hair penetrates the skin of the natal cleft, helped by friction and local trauma, and provokes a foreign-body reaction [1,3]. The disease predominantly affects young men and has been linked to a deep natal cleft, hirsutism, obesity, a sedentary lifestyle and prolonged sitting; its frequent occurrence in military personnel earned it the name “jeep disease” [2–4]. Because it affects people in their most active years, recurrent discharge, pain and abscess formation carry a considerable burden

of lost work and reduced quality of life.

Many operations exist, ranging from excision with healing by secondary intention to primary midline closure and off-midline flap procedures. Midline closure is associated with wound breakdown and recurrence because the suture line lies in the zone of greatest tension and moisture, and off-midline techniques are therefore generally preferred when excision is performed [4,5]. Network and pairwise meta-analyses indicate that flap-based off-midline procedures reduce recurrence and wound complications compared with midline closure [5,6], but no single technique has been shown to be universally superior.

The rhomboid (Limberg) flap, and its modification that lateralises the closure, transposes a well-vascularised fasciocutaneous flap into a rhomboid defect after wide excision. The Bascom cleft lift (BCL) instead excises only the midline pits and a narrow ellipse, then raises a flap that is advanced across the midline so that the suture line is moved off the midline and the natal cleft is flattened [7]. BCL therefore removes less tissue, whereas the Limberg flap is often considered more suitable for extensive or complex disease. Randomised and comparative studies of the two procedures, most of them from Egypt, Turkey and other centres, have reported broadly similar healing, complication and recurrence rates, with shorter operations after cleft lift [8–12]. Data from Indian centres are limited, and the studies differ in design, follow-up and the outcomes reported [13].

We therefore compared the modified Limberg flap with the Bascom cleft lift for primary sacrococcygeal PSD in a tertiary care teaching hospital in North India, with emphasis on perioperative and patient-centred outcomes: operative time, hospital stay, drain duration, wound healing, postoperative pain, complications including surgical site infection and recurrence, cosmetic satisfaction and return to work.

METHODS

This was an interventional comparative clinical study conducted in the Department of General Surgery, Santosh Medical College & Hospital, Ghaziabad, India. Recruitment continued until the pre-calculated sample size was reached. It was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants. Consecutive adults aged 18–65 years with primary pilonidal sinus disease who gave written consent were eligible. Patients without co-morbidities were included. We excluded patients younger than 18 or older than 65 years, those needing emergency surgery for a pilonidal abscess or with an infected sinus, and those with concurrent hidradenitis suppurativa, squamous cell carcinoma arising in a sinus, or spinal deformity.

Sample size was calculated for the comparison of two means at a two-sided 5% significance level and 80% power, with a 1:1 allocation ratio. Assuming group means of 9.8 and 16.5 (a difference of 6.7) and a common standard deviation of 7.4 for 20 patients per group (40 in total) were required. All patients were assessed with a structured proforma covering history (duration of symptoms, discharge, pain, previous abscess or treatment, occupation, sitting habits, hygiene, hair growth), examination of the sacrococcygeal region and routine blood tests. Imaging was performed selectively to define the extent of the tract.

In the MLF group a rhomboid excision was marked around the sinus tract(s) and carried down to the presacral fascia, and all diseased tissue was excised. A fasciocutaneous flap of matching geometry was raised, transposed into the defect without tension and closed in layers over a suction drain, so that the suture line lay off the midline. In the BCL group, the midline pits and sinus tracts were excised through an elliptical incision, a flap of skin and subcutaneous tissue was raised and advanced across the midline, and the wound was closed in layers over a suction drain, flattening the natal cleft and moving the scar off the midline. Patients were advised on wound care and hair control at discharge.

The outcomes were operative time, length of hospital stay, day of drain removal, wound healing graded as good, bad or delayed at days 7 and 14 and as healed or not healed at day 21, pain on a 10-point VAS on postoperative days 1, 2 and 12, post-operative complications, cosmetic satisfaction at day 21 (score out of 10) and days to return to work patients were followed up. Continuous variables are presented as mean ± standard deviation and compared with the independent-samples t-test. Categorical variables are presented as numbers and percentages and

compared with the chi-square test (Fisher's exact test where expected counts were small). A two-sided p value < 0.05 was considered statistically significant.

RESULTS

The groups were similar in age, sex, occupation, number of sinus openings and tract length (Table 1). The mean age was 36.4 ± 11.9 years in the BCL group and 34.8 ± 11.4 years in the MLF group (p = 0.65). Men accounted for 37 of the 40 patients (19 BCL, 18 MLF; p = 0.54). Occupations were diverse and balanced between the groups: students (4 BCL, 6 MLF), office workers (3–4 per group), shopkeepers (3 vs 1), drivers (bus or truck; 2 vs 3), homemakers (1 vs 2), teachers (1 per group) and others (5 vs 4). The number of sinus pits was one in 7 patients in each group, two in 9 BCL and 7 MLF, three in 4 and 5, and more than three in none and 1, respectively. Pus discharge at presentation was present in 15 BCL and 13 MLF patients (p = 0.49). A visible hair tuft was more frequent in the BCL group (14/20, 70%) than in the MLF group (7/20, 35%) (χ^2 = 4.9, p = 0.027; Fisher's exact test p = 0.056).

Table 1. Baseline characteristics

Characteristic	BCL (n = 20)	MLF (n = 20)	p value
Age, years (mean ± SD)	36.4 ± 11.86	34.75 ± 11.37	0.65
Male / female, n	19 / 1	18 / 2	0.54
Sinus tract length, cm (mean ± SD)	3.00 ± 1.02	3.36 ± 1.72	0.42
One / two / three / >three openings, n	7 / 9 / 4 / 0	7 / 7 / 5 / 1	–
Pus discharge, n (%)	15 (75)	13 (65)	0.49
Hair tuft, n (%)	14 (70)	7 (35)	0.027

BCL, Bascom cleft lift; MLF, modified Limberg flap; SD, standard deviation.

Operative and perioperative outcomes

Operative time was shorter with BCL (95.25 ± 8.60 vs 110.45 ± 11.75 min, p < 0.001). Hospital stay was also shorter (5.00 ± 0.65 vs 5.75 ± 0.85 days, p = 0.003). Drains were removed within three days in 8 BCL patients but only one MLF patient, and after day 6 in none of the BCL and 3 of the MLF patients (χ^2 = 9.01, p = 0.011) (Table 2).

Table 2. Operative and perioperative outcomes

Outcome	BCL (n = 20)	MLF (n = 20)	p value
Operative time, min (mean ± SD)	95.25 ± 8.60	110.45 ± 11.75	< 0.001
Hospital stay, days (mean ± SD)	5.00 ± 0.65	5.75 ± 0.85	0.003
Drain removed POD 0–3 / 4–6 / 6–9, n	8 / 12 / 0	1 / 16 / 3	0.011

POD, postoperative day.

Wound healing and complications

Wound healing was good in 19 BCL and 18 MLF patients at day 7 and in 18 and 16 patients at day 14. At day 21, 17 BCL (85%) and 18 MLF (90%) wounds had healed; three and two wounds, respectively, had not (Table 3). Complications occurred in 7 patients in each group (35%). Foreign-body sensation or wound infection was recorded in 2 BCL and 4 MLF patients, skin maceration in 3 and 2 patients, and recurrence in 2 and 1 patients, respectively; 13 patients in each group had no complication (χ^2 = 1.2, p = 0.75). No flap necrosis was recorded.

Table 3. Wound healing and complications

Outcome	BCL (n = 20)	MLF (n = 20)
Good healing, day 7, n	19	18

Good healing, day 14, n	18	16
Healed, day 21, n (%)	17 (85)	18 (90)
Foreign-body sensation / infection, n	2	4
Skin maceration, n	3	2
Recurrence, n	2	1
No complication, n	13	13

Pain, cosmetic satisfaction and return to work

Mean VAS pain scores were lower after BCL on day 1 (5.35 ± 0.93 vs 6.60 ± 1.50, p = 0.003) and day 2 (3.55 ± 0.76 vs 4.90 ± 1.80, p = 0.005) and were similar by day 12 (1.55 ± 0.51 vs 1.65 ± 0.49, p = 0.53) (Table 4). In an analysis stratified by tract length (1.5–3, 3.1–4.5 and >4.5 cm), BCL patients reported lower day 1 and day 2 pain than MLF patients in every stratum, and scores converged by day 12; stratum sizes were small and were not tested formally. Cosmetic satisfaction at day 21 was 8.35 ± 1.09 after BCL and 7.80 ± 1.06 after MLF (p = 0.11). Patients returned to work after 11.85 ± 1.95 days after BCL and 13.35 ± 2.74 days after MLF, a difference of 1.5 days that did not reach conventional significance (p = 0.054).

Table 4. Pain, cosmetic satisfaction and return to work

Outcome	BCL (n = 20)	MLF (n = 20)	p value
VAS, POD 1 (mean ± SD)	5.35 ± 0.93	6.60 ± 1.50	0.003
VAS, POD 2 (mean ± SD)	3.55 ± 0.76	4.90 ± 1.80	0.005
VAS, POD 12 (mean ± SD)	1.55 ± 0.51	1.65 ± 0.49	0.53
Cosmetic satisfaction, day 21 (0–10)	8.35 ± 1.09	7.80 ± 1.06	0.11
Return to work, days (mean ± SD)	11.85 ± 1.95	13.35 ± 2.74	0.054

VAS, visual analogue scale (0–10).

DISCUSSION

In this comparative study of 40 patients with primary sacrococcygeal PSD, the Bascom cleft lift and the modified Limberg flap both produced acceptable healing, a similar overall complication rate and similar cosmetic satisfaction. The cleft lift was associated with a shorter operation, earlier drain removal, a shorter hospital stay and less pain in the first two postoperative days. The one-and-a-half-day earlier return to work after cleft lift was of borderline significance and should be interpreted cautiously.

Shorter operations after cleft lift are the most consistent finding in the literature. Randomised trials report mean operating times of roughly 33–41 minutes for cleft lift compared with 42–61 minutes for Limberg-type flaps, and an Indian comparative series found 37 versus 75 minutes [9–12,14]. The direction and the relative size of the difference (about 14%) in our series agree with these data, which is plausibly explained by the smaller excision and shorter incision of BCL and the additional flap design and transposition of MLF [9,10]. However, our absolute times (95 and 110 minutes) are considerably longer than those reported elsewhere, which may reflect how operative time was measured, differences in surgical set-up and technique, or the experience of the operating team; our figures should not be compared directly with published ones.

Hospital stay was 0.75 days shorter after BCL, and drains were removed earlier. This agrees with the report of Sarhan et al., in which the stay was slightly longer after MLF because of delayed drain removal [8], and with an Indian series favouring cleft lift [13]. In our series both groups stayed about five days, longer than in most published studies, so that discharge was probably tied to drain removal and local practice; stay in a setting with early discharge protocols might differ. Because drain removal drives the length of stay, the two outcomes are not independent.

Pain was lower after BCL on days 1 and 2 and converged by day 12. Güner et al. likewise found better early bodily-pain scores and quality of life after cleft lift [10], whereas other trials found no significant difference in pain [11,12]. A smaller wound and less dissection may explain our result, but we did not record analgesic requirement, which would have been a useful objective complement to VAS scores. Healing at day 21 and the overall complication rate did not differ, in keeping with randomised trials that found no significant differences in complications, healing time or recurrence [8,9,12]. Rabea reported a shorter healing time after rhomboid flap, but with similar complication and recurrence rates [9]. Wound healing was assessed by good, bad and delayed grading, and healing at day 21 was incomplete in 15% of BCL and 10% of MLF wounds.

Satisfaction scores favoured BCL by 0.55 points, which was not significant, and return to work was 1.5 days earlier. These observations are consistent with the low morbidity of off-midline procedures [5,6,10], but the confidence intervals include no difference and the effect on return to work is small compared with the variation between patients and occupations. Strengths are the standardised proforma, prospective collection of patient-centred outcomes and baseline comparability for the main disease-severity variables. Limitations are important. Pain and cosmetic satisfaction were subjective and patients and surgeons could not be blinded. The stratified analysis by tract length was descriptive. The study therefore cannot show that either procedure is preferable for extensive disease, which the literature often assumes for the Limberg flap, and this question deserves a dedicated study.

CONCLUSION

Both the Bascom cleft lift and the modified Limberg flap were safe and effective for primary sacrococcygeal pilonidal sinus disease, with similar wound healing, complication and cosmetic outcomes. The cleft lift was associated with a shorter operative time, shorter hospital stay, earlier drain removal and less early postoperative pain. Adequately powered, randomised, multicentre trials with long-term follow-up are needed to compare recurrence and to define the role of each technique in extensive or complex disease.

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