

Comparison of excision and primary closure (primary closure) versus modified Limberg flap (modified limberg flap) repair in the treatment of sacrococcygeal pilonidal sinus disease (sacrococcygeal pilonidal sinus disease)

Durr-I-Chaman, Muhammad Akram, Muhammad Faisal Bilal Lodhi, Abid Rashid, Sumaira Kanwal, Haseeb Ahmed Khan

ABSTRACT

Objective: To compare excision with primary closure and excision with modified limberg flap repair in the treatment of sacrococcygeal pilonidal sinus disease. **Design:** Quasi experimental study. **Setting and duration of study:** Surgical Unit-I at Allied Hospital, PMC, Faisalabad, from April 2011 to July 2012. **Methods:** A total of 60 patients with sacrococcygeal pilonidal sinus disease, 30 underwent Excision with primary closure, and 30 had Excision of sinus with modified limberg flap repair.

Results: Though modified limberg flap group

was associated with comparatively longer operative time (48.57 vs 32.57 minutes) and longer hospital stay (5.90 vs 4.17 days) . However, post op analgesic requirement in either groups was comparable (33.3% vs 40%). There was a significant difference in recurrence rate in both groups (20% vs 3.3%). **Conclusion:** For the surgical treatment of sacrococcygeal pilonidal sinus disease, modified limberg flap repair is a better technique due to less chances of recurrences, in maiaing sacrococcygeal pilonidal sinus disease **Keywords:** Pilonidal Sinus, Excision, Primary closure, Modified Limberg Flap repair.

INTRODUCTION

Sacrococcygeal pilonidal sinus disease is a chronic intermittent inflammatory condition that is predominantly located in the sacrococcygeal region¹. Patients may present with small pits on or off the midline near the coccyx or sacrum. They are generally heavy hirsuate males who perspire profusely, while working in a hot humid environment.

It affects younger persons resulting in long term loss of productive years. Surgery for sacrococcygeal pilonidal sinus disease carries a considerable risk of complications, recurrence and cosmetic sequelae².

It also has a high rate of morbidity because there is no standard treatment approved by all surgeons. The treatment of recurrent and extensive disease is difficult. The ideal treatment should be associated with short hospital stay, minimal complication rates, and no disease recurrence¹.

There are many methods described for the treatment of sacrococcygeal pilonidal sinus disease³. Various techniques including incision, excision with primary closure, and excision and healing with secondary intention have been developed to treat this condition⁴. Conventional therapeutic techniques including total excision of the sinus and leaving the defect open for secondary healing have been reported with varying success rates. Secondary wound healing after large excision results in a chronic wound that requires cleansing and change of dressings for a long time. The condition also negatively affects the patient's social life¹. Either open packing or marsupialisation leaves the patient with painful

Corresponding Author:

Dr. Durr-I-Chaman
Senior Registrar, Surgical Unit-I
Allied Hospital, Faisalabad
Tel. +92 333-8379380
E-mail: chaman.khan@yahoo.com

wounds, slow to heal and marsupialization has a reported recurrence rate of 10%.

Excision and primary closure for chronic sacrococcygeal pilonidal sinus disease is superior to excision and healing by secondary intention⁵. Wounds heal more quickly after primary closure than after open healing and there is early return to work but at the expense of increased risk of recurrence^{6,7}. Alternative operative techniques creating a lateral wound or various skin flap procedures are promising alternatives⁸. Benefits were clearly shown with off-midline closure compared with midline closure. In asymmetric excision, the natal cleft is flattened, and the incision scar and the incision line is transferred from the midline to the lateral side by performing the asymmetric excision and primary closure, and thus the essential cause of pilonidal sinus is eliminated. The procedure is simple, the complications and recurrences are very low.

With the progression of the reconstructive techniques, the lowest recurrence rates for the treatment of extensive disease have been reported after local flap usage¹. The rhomboid flap of Limberg is a transposition flap that has been advocated for treatment of this condition⁹. This flap produces a tension free flap of unscarred skin in the midline¹⁰. This method is particularly useful for complex sinuses with extended tracts, where radical excision leaves a large defect. It is also suitable for cases where simpler operations have failed and carries a low risk for recurrence. Excision plus a classical Limberg flap or modified limberg flap reconstruction proved to be superior to excision plus primary closure in terms of infection, mobilization time, discharge from hospital, and time off-work¹¹. Because of its low recurrence rate and acceptable long term results, rhomboid excision and Limberg flap procedure is preferable to simple excision and primary closure in the treatment of sacrococcygeal pilonidal sinus disease¹².

Also called as "jeep Disease"¹³, sacrococcygeal pilonidal sinus disease should be taken seriously. Treatment varies greatly and is often less than satisfactory with the quite high rate of recurrence after surgery. Recurrence requires repeated courses of treatment, with the additional cost of hospital stay, frequent and time consuming wound

care and outpatient management.

The aim of this study was to compare the excision and primary closure technique with modified Limberg flap technique in terms of operation time, hospital stay, analgesic requirement and chances of recurrence and to find out a better treatment option.

MATERIALS AND METHODS

This Quasi experimental study was conducted at Surgical Unit-I of Allied Hospital Faisalabad, for a total duration of 16 months from April 2011 to July 2012, including 4 months of follow up period. A total 60 patients were included in the study, and were divided in two groups. Group 1 patients underwent excision with primary closure, while Group 2 patients; rhomboid excision with modified limberg flap repair. It was done by Purposive sampling. The study was approval by hospital ethical committee.

All the patients, whether male or female, above 12 years of age presenting through OPD with either primary or recurrent sacrococcygeal pilonidal sinus disease diagnosed on history and clinical examination were included in the study. However, patients with congenital sacrococcygeal pits/cysts and vertebral column deformities and those with pilonidal abscess were excluded from the study.

All the patients were either assigned Group 1 or Group 2 by using random numbers table. Regarding the ethical issues, patients in either group were told about their disease, the nature of that particular procedure going on, its advantages, and expected complications and a written informed consent was obtained. No investigation was required except for Hb% and RBS in all, and ECG in a few cases. All patients were operated under spinal anaesthesia. After shaving off the operative field, buttocks were strapped apart, followed by marking for the incision (according to the procedure 1 or 2) with indelible pen. The operative field was cleaned with povidone-iodine solution followed by a single dose of prophylactic I/V antibiotic (Ceftriaxone 1 Gm) just before making the incision.

In Group 1, an elliptical area incorporating all the sinuses was excised up to presacral fascia. The resulting defect, after securing haemostasis was

closed primarily, in multiple layers with vicryl 2/0 over a redivec drain. Skin stitches applied with prolene 2/0.

In Group B, after observing the same protocol as described above, marking for incision was done, as shown in the fig.

The lesion was excised with a rhomboid shaped incision *abcd* with each side equal in length. After extension of line *cb* and axis *db*, line *be* was created equidistantly between lines *bc'* and *bd'*, with a length equal to the sides of the rhomboid excision. Line *ef* was drawn parallel to the *ac* axis, and was also of same length. Depth of rhomboid excision was extended upto the gluteal fascia at lines *be* and *ef*. Hemostasis secured. The rhomboid flap *cbef* was then rotated from the gluteal fascia to the excised area *abcd* without tension. Subcutaneous stitches applied with vicryl 2/0 in multiple layers over a redivec drain and

Fig 1. Drawing and rotating a modified limberg flap:

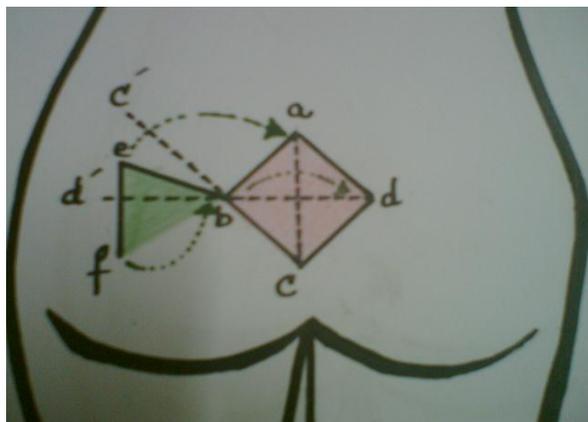


Fig 2. Demonstrating the modified limberg flap:



skin was closed in interrupted stitches with prolene 2/0. Post operatively, all the patients received I/V antibiotic (ceftriaxone 1Gm x BD) for three days, followed by oral antibiotic (Augmentin 1Gm x BD) for next three days. The set protocol regarding the administration of analgesia was as below: Injection Diclofenac sodium 75 mg I/M x BD for first two days, followed by Tab. Dicloran 50mg x BD. In a few cases where pain could not be controlled whether with I/M or oral analgesia, an additional I/V analgesia (Toradol) was administered. Patients were discharged once mobilized fully, with follow up instructions and advice regarding personal hygiene and weekly shaving up off the area to avoid any future recurrences. Stitches were removed on 10th post op day in all patients. Follow up was weekly initially during first month then monthly for three consecutive months to see any recurrence in both groups.

Fig 3. modified limberg flap, after removal of the stitches:



Two measurable variables of the study were, duration of operation (in minutes) and hospital stay (in days). So their Mean, Standard deviation and Standard error of difference were determined in both groups, and there relationship was examined by t-test and t value was determined. p-value <0.05 was taken significant statistically. For other two variables, i.e, analgesic requirement and recurrence, proportion along with Standard error of difference for proportion was determined. Chi-square test applied.

RESULTS

In a period of 16 months, 60 patients of sacrococcygeal pilonidal sinus disease were selected for the study. 30 patients underwent Excision with primary closure and 30 were done with modified limberg flap repair after excision. The number of patients was equal in both groups. 28 males (93.3%) and 2 females (6.7%) underwent excision and primary closure, while 29 males (96.7%) and 1 female (3.3%) were done with modified limberg flap repair. The patients with Excision and primary closure had a mean age of 28.73 ± 7.4 years, while those of excision and modified limberg flap repair were having a mean age of 26.10 ± 7.8 years. All operations were performed by a single consultant surgeon. The mean operating time was 32.57 ± 8.5 minutes in excision and primary closure, and 48.57 ± 8.4 minutes for excision with modified limberg flap repair. There was a statistically significant difference in operating time in both groups (Table 1). The No. of patients requiring I/V analgesics in first group were 10 (33.3%), while for the modified limberg flap group, the patient No. was 12 (40.0%). Post op hospital stay was 4.17 ± 1.0 days in Excision with primary closure, and 5.90 ± 1.6 days in modified limberg flap group. (Table 2). Recurrence occurred in 7 patients (11.7%). Out of them, six (20%) were present in first group, and only 1 (3.3%) in modified limberg flap group. ($p < 0.05$) (Graph 1).

Graph 1. Recurrence rate in both groups:

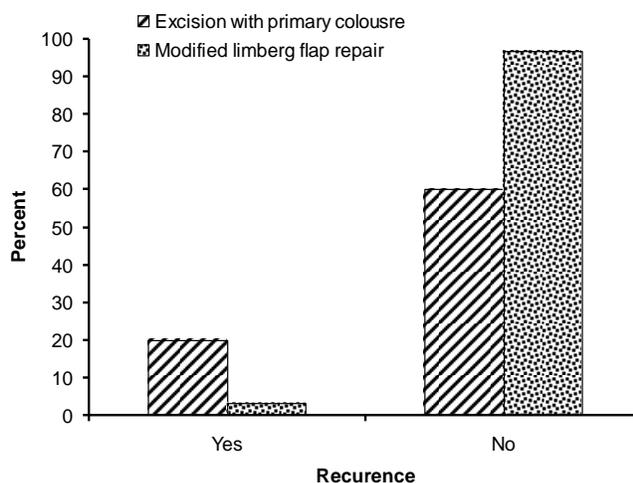


Table 1. Operation Time Groups Statistics:

Groups	Mean	Std. Deviation	Standard Error mean
1	32.5667	8.49212	1.55044
2	48.5667	8.40231	1.53405

t-value= -7.336

p-value= 0.000

Table 2. Hospital Stay Group Statistics:

Groups	Mean	Std. Deviation	Standard Error Mean
1	4.1667	1.01992	0.18621
2	5.9000	1.60495	0.29302

t-value= -4.993

p-value= 0.000

Table 3. Post op injection Requirement:

Groups	No. of Patients
1	10 (33.3%)
2	12 (40.0%)

Chi-square value= 0.287

p-value=0.592

Table 4. Recurrence:

Groups	No. of recurrences
1	6 (20%)
2	1 (3.3%)

Chi-square value= 4.043

p-value=0.044

DISCUSSION

Duration of operation in excision with primary closure group was 32.5667 ± 8.49212 , this is comparable with the results of Muzi et al and Alam et al, in which median operative time was 30 minutes¹⁴ and 34 minutes¹⁵ respectively.

modified limberg flap group was found to have longer duration of operation with a mean operating time of 48.5667 ± 8.40231 as compared to excision and primary closure group. Akca et al have shown similar results¹².

The No. of patients requiring I/V analgesia (Toradol) for pain relief, in addition to routine analgesic administration, was 10 (33.3%) in group 1 and 12 (40.0%) in group 2.

Regarding post op pain in excision and primary closure, different studies have shown contradicting results. Akca et al have shown that primary closure group is associated with increased post op pain as compared to the other group ($p < 0.001$)¹², while according to Muzi et al, excision and primary closure is associated with

less post op pain¹⁴. VAS was 1 with a range of 1-3. However, Misiokos et al have found post op pain to be minimal in modified limberg flap repair as well¹⁶.

Hospital stay was 4.1667 ± 1.01992 days in first group. Khanzada, and Khan both have shown comparable results^{17,18}. However according to studies by Al-Salamah et al, and Muzi et al, hospital stay after excision and primary closure is shorter^{7,14}.

In our study, we came to know that modified limberg flap is associated with comparatively longer hospital stay with a mean of 5.9000 ± 1.60495 days, while Eryilmas et al, Akin et al, Topgul et al, Menten et al have given varying results with still shorter hospital stay^{19,20,21,22}.

Thus in our study, hospital stay was longer in modified limberg flap group than in First group, but a randomized controlled trial by Akca et al, conducted a few years back comparing primary closure with the Limberg flap in the treatment of primary sacrococcygeal pilonidal sinus disease has shown that duration of hospital stay was shorter¹² in group 2 than in group1($p < 0.001$).

We followed all the case for a period of 4 months to see any recurrences. The high recurrence rate in group 1 has been observed by Cihan et al and Khan aswell, showing recurrence rates of 17.9% and 16.6% respectively^{11,18}. Al-Salamah et al, Iesalniaks et al, Alam et al, Dalenback et al, Muzi et al, Khanzada, and Tocchi et al, have shown varying recurrence rates^{7,8,16,23,14,17,24}, from 0 to 42%. On the other hand, recurrence rate in modified limberg flap group was quite low, 3.33%, and the fact is supported by Duphan et al, Eryilmas et al, Akin et al, Topgul et al, and Menten et al^{3,19,20,21,22}, but the majority of such studies by Cihan et al, Akca et al, and Misiakos et al, have declared a recurrence rate of 0% after varying degrees of follow-up periods^{11,12,16}.

Tension and risk of accumulating hair in midline clefts were considered the main problem in connection with Excision and primary closure. Failure to identify small secondary sinus at the time of primary operation, secondary infection caused by residual hair and debris, further complicated by inadequate wound care and insufficient attention to depilation, could be responsible factors for recurrence¹⁷.

CONCLUSION

Excision and primary closure technique is a safe and better choice for uncomplicated sinuses, in terms of simplicity of the procedure, easy learning, shorter hospital stay, lesser time off work and fewer post op visits. modified limberg flap repair demands experienced surgeons, involves sophistication alongwith accuracy and more gentle tissue handling, it takes a longer operation time and requires longer post op hospital stays, but its the best treatment option for complicated and recurrent sacrococcygeal pilonidal sinus disease . It allows wider excision of the involved skin with the benefits of primary wound cover, causes less discomfort to the patient, allows early mobilization, needs fewer dressings and is associated with minimal chances of recurrences. Patient education regarding personal hygiene and repeated depilation of the natal cleft is imperative to prevent any recurrences in future.

REFERENCES

1. Basterzi Y, Canbaz H, Aksoy A, Sar A, Turkmenoglu MO, Caglkulekci M. Reconstruction of extensive pilonidal sinus defects with the use of S-GAP flaps. *Ann plast surg* 2008; 61: 197-200.
2. Holmebakk T, Nesbakken A. Surgery for pilonidal disease. *Scand J Surg* 2005; 94:43-6.
3. Duphan C, Tekelioglu MH, Sayilgan C. Limberg flap repair for pilonidal sinus disease. *Dis Colon Rectum* 2004; 47: 233-7.
4. Ogunbiyi OA. Cysts, ulcers and sinuses. In: Russell RCG, Williams NS, Bulstrode CJK, editors. *Bailey & Love's short practice of surgery*. 24 ed. London: Arnold, 2004: 207-11.
5. Kareem TS. Surgical treatment of chronic sacrococcygeal pilonidal sinus. Open method versus primary closure. *Saudi Med J* 2006; 27: 1534-7.
6. McCallum IJ, King PM, Bruce J. Healing by primary closure versus open healing after surgery for pilonidal sinus: systematic review and metaanalysis. *BMJ* 2008; 336: 868-71.
7. Al-Salamah SM, Hussain MI, Mirza SM. Excision with or without primary closure for pilonidal sinus disease. *J Pak Med Assoc* 2007; 57: 388-91.

8. Iesalnieks I, Furst A, Rentsch M, Jauch KW. Primary midline closure after excision of a pilonidal sinus is associated with a high recurrence rate. *Chirurg* 2003; 74: 461-8.
9. Katsoulis IE, Hibberts F, Carapeti EA. Outcome of treatment of primary and recurrent pilonidal sinuses with the Limberg flap. *Surgeon* 2006; 4: 7-10, 62.
10. Surgery of the anus and perineum. In: Farquharson M, Moran B. *Farquharson's text book of operative general surgery*. 9th ed. London: Hodder Arnold, 2005: 435-58.
11. Cihan A, Menten BB, Tatlicioglu E, Ozmen S, Leventoglu S, Ucan BH. Modified Limberg flap reconstruction compares favourably with primary repair for pilonidal sinus surgery. *ANZ J Surg* 2004; 74: 238-42.
12. Akca T, Colak T, Ustunsoy B, Kanik A, Aydin S. Randomized clinical trial comparing primary closure with the Limberg flap in the treatment of primary sacrococcygeal pilonidal disease. *Br J Surg* 2005; 92: 1081-4.
13. Buie LA. *Jeep Disease*. *South Med J* 1944; 37:103-9.
14. Muzi MG, Milito G, Nigro C, Cadeddu F, Farinon AM. A modification of primary closure for the treatment of pilonidal disease in day care setting. *Colorectal Dis* 2009; 11: 84-8.
15. Alam SN, Azfarruddin, Rahman RM. Excision with primary closure of pilonidal sinus. *Pak surgeons* 2006; 22: 7.
16. Misiakos EP, Troupis T, Hatzikokolis S, Macheras A, Liakakos T, Patapis P. Limberg flap reconstruction for the treatment of pilonidal sinus disease. *Chirurgia(Bucur)* 2006; 101: 513-7.
17. Khanzada TW, Samad A. Recurrence after excision and primary closure of pilonidal sinus. *Pak J Med Sci* 2007; 23: 375-9.
18. Khan A. Prognostic factors of pilonidal sinus. *J Med Sci* 2006; 14: 40-3.
19. Eryilmaz R, Sahin M, Alimoglu O, Dasiran F. Surgical treatment of sacrococcygeal pilonidal sinus with the Limberg transposition flap. *Surgery* 2003; 134: 745-9.
20. Akin M, Gokbayir H, Kilic K, Topgul K, Ozdemir E, Ferahkose Z. Rhomboid excision and Limberg flap for managing pilonidal sinus; long term results of 411 patients. *Colorectal Dis* 2008; 10: 945-8.
21. Topgul K, Ozdemir E, Kilic K, Gokbayir H, Ferahkose Z. Long term results of Limberg flap procedure for treatment of pilonidal sinus; a report of 200 cases. *Dis Colon Rectum* 2003; 46: 1545-8.
22. Menten BB, Leventoglu S, Cihan A, Tatlicioglu E, Akin M, Oguz M. Modified Limberg transposition flap for sacrococcygeal pilonidal sinus. *Surg Today* 2004; 34: 419-23.
23. Dalenback J, Magnusson O, Wedel N, Rimback G. Prospective follow up after ambulatory plain midline excision of pilonidal sinus and primary closure under local anaesthesia- efficient, sufficient, and persistent. *Colorectal Dis* 2004; 6: 488-93.
24. Tocchi A, Mazzoni G, Banoni M, Fornasari V, Miccini M, Drumo A. Outcome of chronic pilonidal disease treatment after ambulatory plain midline excision and primary suture. *Am J Surg* 2008; 196: 28-33.

AUTHORS

- **Dr. Durr-I-Chaman**
Senior Registrar, Surgical Unit-I
Allied Hospital, Faisalabad
- **Dr. Muhammad Akram**
Assistant Professor, Surgical Unit-I
PMC/Allied Hospital, Faisalabad
- **Dr. Faisal Bilal Lodhi**
Associate Professor, Surgical Unit-I
PMC/Allied Hospital, Faisalabad
- **Dr. Abid Rashid**
Prof. of surgery, Independent Medical
College, Faisalabad
- **Dr. Sumaira Kanwal**
Assistant Professor, Surgical Unit-I
PMC/Allied Hospital, Faisalabad
- **Dr. Haseeb Ahmed Khan**
Medical officer, Nawaz Sharif Social
Security Hospital, Lahore

Submitted for Publication: 23-05-2014

Accepted for Publication: 03-06-2014
After minor revisions