

Case Series

Limberg Transposition Flap in Treatment of Sacro-coccygeal Pilonidal Sinus : A series of 14 Cases

Debayan Chowdhury¹, Kalyan Ashis Mukherjee², Krishnapada Rakshit³

Abstract

Background : Sacro-coccygeal pilonidal sinus is a condition most commonly seen among young adult male population. There are several treatment options, mainstay being surgery. Conventional surgical method of simple excision of the sinus with midline primary closure results in high rates of recurrences, so discontinued. Thus, flap reconstruction is preferred.

Materials and Methods : *Study design :* A case series – a prospective, longitudinal, interventional study. *Study period:* March, 2019 to February, 2024 (5 years). *Sample Size :* 14 cases. *Methodology :* Limberg Transposition Flap was done in all 14 cases. They were discharged from the hospital with drain in-situ which was removed on following visits once collection was <10 ml in 24 hours. They were followed up for 6-12 months.

Results : 21.4% (n=3) patients presented with multiple tracts whereas 78.6% (n=11) patients presented with single sinus tract in the sacrococcygeal region. There was no case of Wound Infection or Flap Necrosis. 14.28% (n=2) patients had cut through of sutures. The Mean Postoperative Stay (Mean $\pm$ SD) (Days) was 5.43 ± 0.938 . The Mean Postoperative Day of Drain Removal (Mean $\pm$ SD) (Days) was 19.36 ± 2.170 . The Mean Number of Days to Return to Normal Activity (Mean $\pm$ SD) (Days) was 23.36 ± 2.205 . There were no Recurrences.

Conclusion : Limberg Transposition Flap is an effective surgical procedure to treat patients with pilonidal sinus disease. By this flap, we can escape scarring in the midline. This is cosmetically good and there have been no cases of recurrence in our study.

Key words : Pilonidal Sinus (PNS), Sacrococcygeal Pilonidal Sinus Disease (SC-PSD).

A pilonidal sinus (PNS) is a small passageway beneath the skin that is commonly present in the sacrococcygeal region¹. SC-PSD is an acquired condition usually seen in young adults especially males². Damaged hair follicles and imprisoned hair are thought to be the cause, leading to folliculitis, infection and rupture into the surrounding subcutaneous tissue leading to a painful, persistent condition¹.

The pilonidal disease was once assumed to be a congenital ailment produced by aberrant skin in the gluteal cleft, but it is now thought to be an acquired syndrome caused by hair in the cleft. The hair triggers an inflammatory response, resulting in persistent sinus and tract drainage, as well as secondary

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Received on : 16/07/2024

Accepted on : 02/11/2024

Editor's Comment :

- Limberg transposition Flap is one of the several effective ways to treat complex pilonidal sinuses that are primary and recurrent both. Still it is rarely carried out as a treatment of pilonidal sinus by general surgeons.
- This article will guide surgeons to perform more and more flap reconstruction surgeries for pilonidal sinuses.

infection and abscess formation³. Causes are by local trauma, poor hygiene, extreme hairiness, or the existence of a deep natal cleft. This is a benign condition acquired most likely by males, young age group, overweight, and hirsute individuals, as well as those with a positive family history⁴.

There is a visible external opening or pit in the midline of natal cleft. The expansion is induced by the stretching of the follicular openings caused by gravity pulling on the buttocks. Sweating excessively might also lead to the development of PNS. Moisture can fill a stretched hair follicle, creating a low oxygen environment that encourages anaerobic bacterial growth. Bacterial growth and low oxygen levels impede wound healing and hasten the formation of the PNS⁵.

PNS disease can be asymptomatic, acute, chronic,

How to cite this article : Limberg Transposition Flap in Treatment of Sacro-coccygeal Pilonidal Sinus : A series of 14 Cases. Chowdhury D, Mukherjee KA, Rakshit K. *J Indian Med Assoc* 2025; **123**(10): 59-63.

or recurrent. The common presenting symptoms are pain (84%), discharge (78%) and localized edema⁶. A thorough clinical examination, history taking, and radiological investigations like MRI may be necessary for diagnosis and delineation of the tract⁷.

The main concern for SCC-PSD treatment is the recurrence; the literature review shows that it ranges from 20-40% regardless of the technique used⁸. Many reasons were attributed to recurrence, such as leaving behind some tracts, sutures in midline causing more trauma with repeated infection accumulation of perspiration and friction with tendency of the hair getting incorporated into the wound⁹.

Several surgical options have been explained in literature for treatment of SC-PSD. Limberg rhomboid flap for sacrococcygeal pilonidal sinus was designed by Limberg in 1946, who described a technique for closing a 60° rhombus-shaped defect with a transposition flap¹⁰. This prospective study has been performed to determine effects of the Limberg flap rotation surgery for sacrococcygeal pilonidal sinus, its feasibility to the patients, their compliance, and outcomes such as wound infection, postoperative pain relief, recurrence rates, and return to work.

CASE PRESENTATIONS

Patients presented with pain, swelling or chronic discharging sinus from the intergluteal cleft.

Swelling was due to small localised abscess arising from the sinus itself. Diagnosis of pilonidal sinus was clinical owing to their position in the sacro-coccygeal region.

MATERIALS AND METHODS

Study design : This is a case series – a prospective, longitudinal, interventional study.

Study area : Patients coming to OPD of Ramakrishna Mission Seva Pratishthan Hospital with pilonidal sinus.

Study period : July, 2019 to June, 2024 (5 years).

Sample Size : 14 cases.

Investigation : All patients were pre-operatively assessed with MRI (Magnetic Resonance Imaging) of the sacro-coccygeal region to delineate the tract/ tracts or any foci of abscess.

Procedure Methodology : Under spinal anaesthesia,

the patient was put in prone position with buttocks strapped apart and surgical site exposed. External opening of the sinus noted. With a 20 Fr IV canula, Hydrogen peroxide and methylene blue was injected into the sinus tract (Fig 1).

Probing of the tract done with a metallic probe to identify the distal extent of the sinus tract.

Multiple openings signified multiple sinus tracts which may be separate or interconnected. Each of the tracts were probed to delineate the exact anatomy and the distal extent of the tracts. Extent was determined by palpation of the tip of the probe after full insertion and marking of the overlying skin (Fig 2).

Then, a rhomboid was marked over the skin with a skin-marking pen, taking all the external openings and the distal ends of the tracts within it (cranio-caudal or lateral extents).

The long axis of the rhomboid in the midline (Cranio-caudal) is marked A (above) and C (below). Point A lies beyond the distal extent of the tract. Point C lies in the gluteal cleft adjacent to the perianal skin. This, A-C is the cranio-caudal diagonal of the rhombus. The line B-D transects line A-C at their mid-point at right angles and B-D is 60% of the length of A-C. Point B and D are chosen such that they lie beyond the lateral extents of the tracts. D-E is direct continuation of B-D and is equal in length to A-B. E-F is parallel to A-B and is equal in length to A-D. Just like a rhombus, lines AB=BC=CD=AD=DE=EF (Fig 3).

Principle of the surgery is to excise the rhombus ABCD and to cover the area with DEF rotational flap as shown in the picture. Thus, D-E is sutured to B-A, E-F is sutured to A-D, C-D is sutured to C-B (Fig 4).

Painting of the area with 10% Povidone iodine done,



Fig 1 — Injection of hydrogen peroxide and methylene blue via 20 Fr cannula into the tracts



Fig 2 — Probing of the tracts

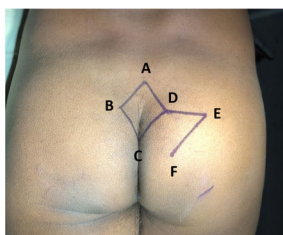


Fig 3 — Mapping of the operative area with superimposed letters

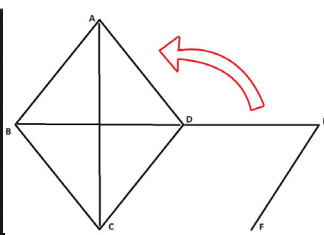


Fig 4 — Demonstration of the rotational flap

and draping of the operative field done. The rhombus ABCD was incised. Skin and subcutaneous fat of the rhombus ABCD with all extensions of the sinus tracts was excised down to the deep fascia and removed. Most of the time, removal had to be done upto the periosteum of the underlying bone (coccyx) (Figs 5&6).

Then, the DEF flap is raised including the skin, subcutaneous fat and the fascia overlying the right gluteus maximus muscle (Figs 7&8).

Then the DEF flap is rotated anticlockwise to cover the midline rhomboidal defect. The defect thus created by the elevation of the DEF flap is closed in linear fashion. Deep absorbable 2-0 polyglactin sutures (vicryl) to appose the fascia and subcutaneous fat were taken over a 16 Fr suction drain (Romovac) (Figs 9&10).

Finally, skin apposed with interrupted mattress sutures with 2-0 monofilament polyamide (Ethilon). By this flap, we can escape scarring in the midline, which prevents recurrences.

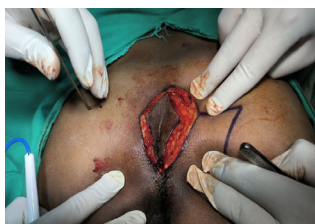


Fig 5 — Incision of the rhombus ABCD and dissection of subcutaneous fat

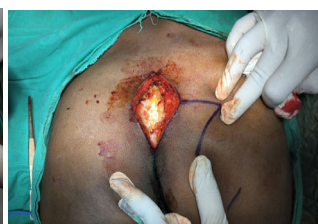


Fig 6 — Removal of rhombus ABCD



Fig 7 — Raising of the DEF flap



Fig 8 — Rotating the DEF flap over the defect



Fig 9 — DEF flap rotated and fixed to cover the rhomboidal defect



Fig 10 — Skin suturing and final outcome

Postoperative Management and Discharge:

The patient was put on IV antibiotic (Amoxicillin-clavulanic acid 1.2gm IV TDS) postoperatively that was changed to oral antibiotics after 3 days (Amoxicillin-clavulanic acid 625mg TDPC). Antibiotic was given for 7 days in total. Appropriate analgesics were given. The patient was advised to avoid putting pressure over the operative area for 3 weeks. Drain output type and amount was noted and was emptied every 24 hours. All the patients were discharged with the suction drain in-situ, with advice to empty the drain regularly and measure the amount with maintenance of a chart. Drains were removed when output was <10ml/day. Alternate stitch was removed after 2 weeks and remaining stitched were removed after another 1 week (ie, at 3 weeks).

Follow-up : Patients were advised to review at 1 week, 2 weeks, 3 weeks, 3, 6, 9, 12, 18 months, after surgery (Fig 11).

Statistical Analysis:

Analysis was done using SPSS software version 25.0. Pearson's Chi-square Test was used to test the significance between the variables of the two groups.

RESULTS

In our study, the Mean Age (Mean $\pm$ SD) (Years) was 28.79 ± 6.339 . The Age distribution ranged from 20 to 41 years.

In our study, there were 14.3% (n=2) Females and 85.7% (n=12) Males.

21.4% (n=3) patients presented with multiple tracts in sacrococcygeal region as evident in MRI whereas 78.6% (n=11) patients presented with single sinus tract in the sacrococcygeal region.

The Mean Operative Time (Mean $\pm$ SD) (Mins) was 56.00 ± 5.684 . Operative Time for Limberg Flap Reconstruction ranged from 49-68 mins.

There was no case of Wound Infection in our study.
There was no case of Flap Necrosis in our study.

14.28% (n=2) patients had cut through of sutures during the period of wound healing, that was managed conservatively. Out of those patients who had cut through of sutures, one had single sinus tract and the other had multiple tracts (Fig 12).

The Mean Postoperative Stay (Mean $\pm$ SD) (Days) was 5.43 ± 0.938 . The post-operative number of days of stay ranged from 4 days to 7 days in the patients.

The Mean Postoperative Day of Drain Removal (Mean $\pm$ SD) (Days) was 19.36 ± 2.170 . The Postoperative Day of Drain Removal ranged from 16 days to 24 days in the patients.

The Mean Wound Healing Time (Mean $\pm$ SD) (Days) was 24.64 ± 3.225 . Wound Healing Time ranged from 21-28 days.

The Mean Number of Days to Return to Normal Activity (Mean $\pm$ SD) (Days) was 23.36 ± 2.205 . The Number of Days to Return to Normal Activity ranged from 21 days to 28 days in the patients.

The patients were followed up for 12 to 18 months in our study. The Mean Follow-up (Mean $\pm$ SD) (Months) was 15.43 ± 3.081 .

There was no case of Recurrence in the follow-up period in our study (Table 1).



Fig 11 — Follow-up at 3 months

Fig 12 — Cut through of suture noted at right angle of the wound

DISCUSSION

Our study comprises of a case series of 14 cases where we performed Limberg Transposition Flap for Sacro-coccygeal Pilonidal Sinus Treatment. Most patients were young with the mean age (Mean $\pm$ SD) being 28.79 ± 6.339 years in our study. The age distribution ranged from 20-41 years. In Jabbar, *et al*¹¹ study the mean age of 27.9 ± 5.96 years with young predominance. The age distribution ranged from 17-41 years.

In a study by Gündoğdu E¹², 80.1%(n=149) were males and 19.9%(n=37) were females. In our study, there were 85.7% (n=12) Males and 14.3% (n=2) Females and There was a prominent male predominance in our study.

In a study by Karaca, *et al*¹³ the Mean Operative time for Limberg Flap Reconstruction 59.64 ± 7.76 mins. In our study, the Mean Operative Time was 56.00 ± 5.684 mins.

Table 1 — Results Summarized

Sl No	Age (Years)	Sex	MRI	Operative Time (Mins)	Wound Infection	Flap Necrosis	Cut through of sutures	Post operative stay (Days)	Drain Removal (POD)	Wound Healing Time (Days)	Return to daily activities (Days)	Follow-up (Months)	Recurrence
1	28	M	Single tract 4cm	54	No	No	No	4	18	21	22	12	No
2	34	M	Single tract 8cm	58	No	No	Yes	5	22	28	28	18	No
3	30	M	Y-shaped tract 7cm in cranio-caudal direction	56	No	No	No	5	19	21	24	12	No
4	20	M	Single tract 6cm	62	No	No	No	6	21	28	23	18	No
5	22	F	Single tract 5 cm with abscess	54	No	No	No	5	17	21	21	12	No
6	24	M	Single tract 3cm	49	No	No	No	6	19	24	22	18	No
7	41	M	Multiple interconnected tracts with 3 external openings-Largest 8cm	68	No	No	Yes	6	24	28	28	18	No
8	39	M	Single tract 6cm	51	No	No	No	5	21	28	24	18	No
9	31	M	Single tract 5cm	55	No	No	No	4	18	21	22	12	No
10	29	M	Multiple interconnected tracts with 2 external openings-largest 6 cm	65	No	No	No	5	20	28	23	18	No
11	21	M	Single tract 4cm	52	No	No	No	7	17	24	23	18	No
12	25	F	Single tract 3cm with abscess	58	No	No	No	6	16	21	21	18	No
13	32	M	Single tract 7cm	52	No	No	No	5	20	28	22	12	No
14	27	M	Single tract 6cm	50	No	No	No	7	19	24	24	12	No

In Chopade, *et al*¹⁴ study, no cases of wound infection were seen in participants who underwent Limberg flap reconstruction surgery. In our study also, there were no cases of wound infection.

In Gündoğdu E¹² study, there were no flap necrosis or ischemia, but one patient had dermal ischemia at the corner where the flap was removed. In our study also there was no case of Flap Necrosis but 2 patients had cut through of sutures during the period of wound healing that was managed conservatively by dressing.

In Karaca, *et al*¹³ study, the Mean Hospital Stay was 2.69 ± 2.32 days while in our study, the Mean Postoperative Stay was 5.43 ± 0.938 days. We preferred dressing after 48 hours of surgery, then regular dressing.

In Arnous, *et al*¹⁵ study, the Mean time of the patients' suction drain removal was 17.5 ± 5.5 days. In our study, the Mean Postoperative Day of Drain Removal was 19.36 ± 2.170 days and the suction drain was only removed once the output was <10 ml in 24 hours.

In Chopade, *et al*¹⁴ study, the mean healing time was 20 ± 2 days for limber flap reconstruction patients. In our study, the Mean Wound Healing Time was 24.64 ± 3.225 days.

In Arnous, *et al*¹⁵ study, the Mean Number of Days to return to work was 20 ± 2.5 days. In our study, the Mean Number of Days to Return to Normal Activity was 23.36 ± 2.205 days.

In our study, patients were followed up for 12 to 18 months. The Mean Follow-up was for 15.43 ± 3.081 months. In Arnous, *et al*¹⁵ study, the mean follow-up was for 16.4 ± 3.7 months.

There was no case of Recurrence in the follow-up period in our study which was similar to Gündoğdu E¹² study.

CONCLUSION

Limberg Transposition Flap is an effective surgical procedure to treat patients with pilonidal sinus disease. By this flap, we can escape scarring in the midline. This is cosmetically good, and there have been no cases of recurrence in our study.

ACKNOWLEDGEMENT

The authors would like to acknowledge the contribution of Dr Kishore Chowdhury, Professor,

Department of General Surgery, Ramakrishna Mission Seva Pratishthan, VIMS for his immense help, constant guidance, patronage and procuring necessary permission for the conduct of this study.

Funding : None

Conflict of Interest : None

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