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Case Series

Management of pilonidal sinus in sacrococcygeal region using Limberg transposition flap with acceptable and safer outcome: a case series

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ABSTRACT

Sacrococcygeal pilonidal sinus is a disease that arises from chronic irritation and secondary inflammation of hair follicles located in the sacrococcygeal and natal region, commonly seen among the young male adult population. There are multiple treatment options available ranging from non-medical to surgical procedure. The present study aims to evaluate the efficacy and complications of Limberg flap reconstruction surgery. 8 consecutive patients underwent Limberg flap reconstruction from October 2022 to February 2023 at Midnapore Medical College with a median follow-up duration of 12 months and were evaluated for various parameters. All patients successfully underwent reconstructive surgery, with minimal post- operative pain, average hospital stay for 7 days, returned to work after 3 weeks, with only 1 patient having superficial surgical site infection (SSI), but no flap necrosis, seroma formation, recurrences so far. Overall the Limberg flap technique is an effective and reliable technique having fewer post-operative complications, low recurrence rate, easily performed with patient satisfaction, and is emerging as the standard of care.

Keywords: Limberg flap, Reconstruction, Sacrococcygeal pilonidal sinus, Surgical site infection

INTRODUCTION

Literal meaning of 'Pilonidal Sinus' in Latin means 'Nest of hairs'.[1,2] Sacrococcygeal pilonidal sinus disease (SC-PSD) is a chronic inflammatory disorder, commonly seen in young adult males and hirsute females, defined by an infected sinus in the natal cleft associated with tuft of hairs.[3] Prevalence of pilonidal sinus in Asia is roughly 6.6%.[4] This condition is most frequent in 3rd decade of life.

This disease was first described by Mayo in 1833, who suggested that it has a congenital origin due to persistence of an epithelial lined tract from post-coccygeal epidermal cell rests.[5,6] Pathogenesis of the disease theory has evolved widely over the years from congenital to a definitive acquired etiology.[7] Three primary factors responsible for pilonidal sinus disease are: high quantity of hairs, extreme force and vulnerability to infection.[8] Other important factors contributing to this disease are- deep natal cleft, prolonged sitting (travelling or driving-therefore termed frequently as 'Jeep Driver's disease), obesity, poor local hygiene etc. Continuous friction generated in the depth of natal clefts by the movement of buttocks, drives the broken hair in the subcutaeneous tissue through skin abrasions, thus initiating a foreign body reaction.[9] This is superimposed by secondary infection with abscess formation that may erupt spontaneously forming multiple discharging sinuses.

There are multitude of surgical procedures advocated to eradicate pilonidal disease, which points out to the lack of overall superiority of one surgical technique. Options include laying open of all tracts with or without marsupialization, excision of all tracts with or without primary closure and excision of all tracts with closure by some other means to avoid a midline wound (Limberg procedure, Z-plasty, Karydakis procedure).

Irrespective of procedure, postoperative wound care is important and based on elimination of hair (ingrown, local or other) from the wound.[10]

CASE SERIES

A total of 8 patients of primary pilonidal sinus who underwent Limberg flap technique in the Department of General Surgery at Midnapore Medical College from October 2022 to February 2023 and with a median follow up duration of 12 months were included. The mean age of all the patients was 29 years.

All the patients were diagnosed clinically in the OPD, were subjected to take complete history taking and routine clinical, local examination, laboratory investigations and imaging. Written consent was obtained from all patients after explaining the procedure and its complications. All 8 patients underwent Rhomboid excision with Limberg flap reconstruction as the surgical procedure. Data of the patients were collected via a proforma, follow-up was done at 2 weeks interval, then at 1 month, then at 3 months and again at 6 months. All the patients were evaluated for flap healing, seroma formation, surgical site infection, flap necrosis, pain and length of hospital stay. The objective grading of pain was done by Visual Analogue scale (VAS). Exclusion criteria for the study included patients with local pathologies like eczema and fungal infections, multiple sinus tracts, ischio-rectal abscess, bleeding disorders, uncontrolled systemic diseases, and Immunocompromised patients.

Table 1: Demographic trends/imaging/mean age and postoperative outcome.

S. no.	Age (years)	Sex	MRI	Follow-up	Postoperative stay	Wound infection
1.	30	Male	Single 1.5 cm tract	9 months	5 days	Nil
2.	29	Male	Single 1 cm tract	9 months	4 days	Nil
3.	46	Male	Single large tract of 4 cm	14 months	7 days	Nil
4.	20	Male	0.5 cm single tract	12 months	4 days	Nil
5.	21	Male	Single 1 cm tract	10 months	5 days	Nil
6.	28	Male	Single 2.5 cm tract	12 months	7 days	Nil
7.	19	Female	Single 2.5 cm tract	15 months	12 days	Superficial SSI
8.	39	Female	Single 3 cm tract	15 months	6 days	Nil

Table 2: Post-operative complications after Limberg transposition flap technique (after 1 year follow-up).

S. no.	Post-operative complications	Present/absent
1.	Surgical site infection (SSI)	Superficial SSI present in one patient
2.	Haematoma	Nil
3.	Local recurrence	Nil
4.	Seroma formation	Nil
5.	Flap necrosis/ epidermolysis	Nil
6.	Long time paraesthesia	Nil
7.	Long time pain	Nil

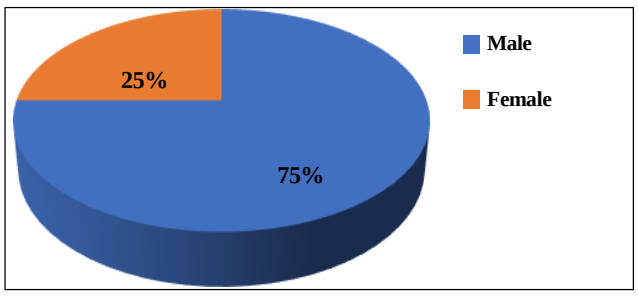

Figure 1: Distribution of study subjects as per sex

The natal cleft was shaved pre-operatively. Injection Coamoxyclav 1.2 gm was administered intravenously prophylactically before placing incision. All surgeries were performed under spinal anaesthesia. Patients were placed in prone Jack-knife position and the buttocks were strapped apart by adhesive tapes. The sacrococcygeal area was washed with 10% povidone iodine solution. The extension of the sinus was determined by methylene-blue injection into the sinus tract.

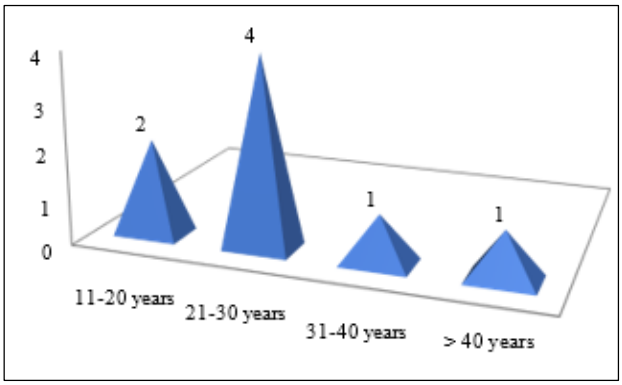

Figure 2: Distribution of study subjects as per age.

Using a sterile skin marking pen, a rhomboid area of skin was marked over pilonidal sinus involving midline pits. The flap design was mapped on the skin in such a way that all diseased tissues were included in the rhomboid. The long axis of the rhomboid in midline was marked as A-C, C being adjacent to perianal skin line. The line B-D transected the mid-point of A-C at right angles and the length of B-D was 60% of length of A-C. D-E was a direct

continuation of line B-D and was of equal length to the incision line B-A, to which it was sutured after flap rotation. E-F was parallel to D-C and of equal length; after rotation E-F was sutured to the incision line A-D. A rhomboid shaped area of the sinus bearing skin and subcutaeneous tissue upto the pre-sacral fascia was excised by electrocautery, followed by elevation of Limberg flap. The level of dissection was upto pre-muscular fascia (with electro-cautery and scissor). Fascia covering gluteus was included in Limberg flap to maintain the vascularity of the flap.

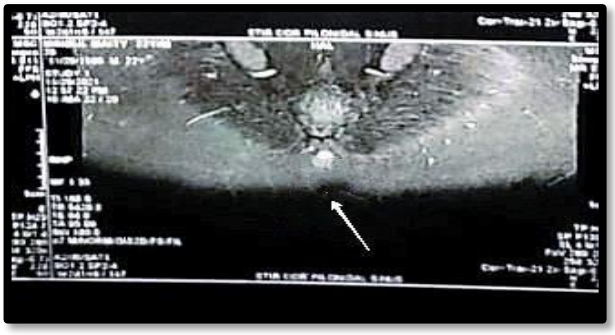

Figure 3: Pre-operative MRI Fistulogram showing pilonidal sinus tract.

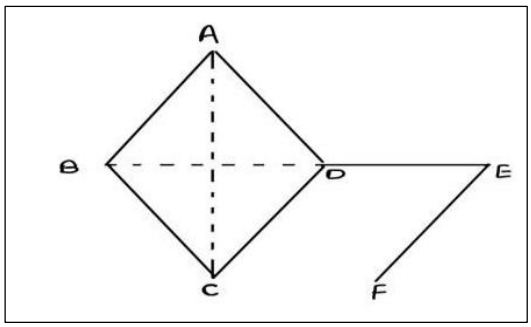

Figure 4: Geometric diagram of Rhomboid flap.

Figure 5: Pre-operative marking of Rhomboid incision line.

Haemostasis was achieved and the adhesive tapes which retracted the buttocks were released before suturing of the flap to keep it tension-free. Interrupted vicryl (2- 0) sutures were placed to include fascia and subcutaeneous fat after placing a vacuum suction drain above the pre-sacral fascia followed by skin closure with Ethylon (2-0) sutures. The average operative time was 1 hour to 1 hour 15 minutes.

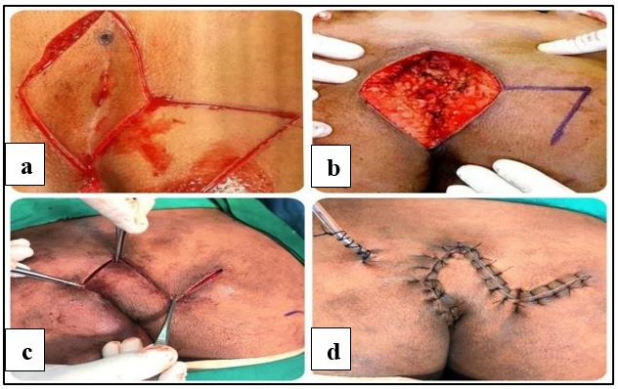

Figure 6: (a) Rhomboid incision given over pre-operative marking, (b) Rhomboid shaped defect after excising diseased area, (c) Limberg fascio-cutaeneous flap mobilized and (d) final outcome after skin suturing.

Figure 7: Post-operative scar after Limberg flap reconstruction in sacrococcygeal pilonidal sinus (after 6 months of surgery).

Antibiotics were given for 3 days initially intravenously, then orally along with analgesics. Suction drain was removed on Post-operative day-7 after the discharge was <25 ml per day and sutures removed on day 10-14 depending on the nature of wound healing. The patients were advised to lie always in prone position and not to put pressure on the flap for 2 weeks. Most of the patients returned to work within 3 weeks.

6 patients were male and 2 were female, the mean age of the patients in this case series was 29 years. Post-operatively all patients made to lie on sides, then made them ambulant after first post-operative day, with drain in-situ. All patients were nursed with dressing at regular interval. Post-operative vascularity checking of the flap was done by- naked eye examination and pin-prick examination near angulation (POD-2 onwards). Amongst

8 patients, only one developed superficial surgical site infection (SSI) with persistent serous discharge; which was treated with basic antibiotics and regular dressing and it took nearly 2 weeks to resolve. Wound of all other patients healed primarily with minimal scarring and less post-operative pain (evaluated with Visual Analogue Scale), with no recurrence till now. Average hospital stay of other patients (excluding patient developed SSI) was 7-8 days. No evidence of flap necrosis, seroma formation etc was found. None needed readmission due to pilonidal sinus operation or its complications and most patients resumed work after 3 weeks.

DISCUSSION

Sacrococcygeal pilonidal sinus disease presents challenges with its prolonged morbidity and recurrence. Effective management strategies should aim at minimizing post-operative pain, reducing hospitalization time, lowering complication risks, enabling a swift return to normal activities, improving cosmetic outcomes, and decreasing recurrence rates.

In 1847, Dr. Anderson introduced the treatment for this condition.[11] Common surgical approaches include incision, drainage, and leaving the wound open during the acute phase, while chronic cases often require excision followed by open healing or primary closure.[12] However, local treatments like chlorhexidine, polyhexanide, iodine, and specialized dressings have not shown optimal results in controlling moisture.[13]

Excisional methods, though effective, often lead to prolonged wound care and recurrent issues, primarily due to the persistence of the natal cleft in the midline, which provides a path for further hair insertion. To address this, various surgical flap techniques have been developed, aiming to modify the natal cleft and shift the scar away from the midline. These techniques include the Karydakis flap, Bascom flap, V-Y advancement flap, and Limberg flap.[14,15]

In 1946, Dr. Alexander Limberg proposed a technique involving a transposition flap to close a 60-degree rhombus-shaped defect. This flap, made of equilateral triangles, flattens the natal cleft with a wide and well-vascularized pedicle that allows for tension-free suturing. Studies have shown that the Limberg flap is superior to primary closure and other flap procedures, offering a safe and reliable solution with low complication and recurrence rates.[16,17]

The Karydakis flap, while effective, often results in a higher recurrence rate compared to the Limberg flap.[18] The Limberg flap, characterized by greater asymmetry, reduces recurrence rates further by leaving a semicircular scar away from the midline. In our study, we emphasized including fascia covering the gluteus in the Limberg flap to enhance vascularity and prevent flap necrosis. Despite a limited sample size, our findings aligned with existing literature. In cases of superficial surgical site infections, we adopted a conservative approach, supported by antibiotics and post-operative drainage.

CONCLUSION

Limberg flap is a technically easy rotational flap which can be undertaken by all general surgeons. The morbidity of delayed wound healing is reduced, with enhanced quality of life due to low recurrence. Added advantages are relatively shorter duration of hospital stay, lower VAS score, higher patient satisfaction. Hence we recommend Limberg flap reconstruction as an effective, safer and reliable surgical technique in the management of sacrococcygeal pilonidal sinus disease.

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