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Original Research Article

Limberg flap procedure for sacrococcygeal pilonidal sinus: a prospective study

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ABSTRACT

Background: Sacrococcygeal pilonidal sinus is a common and morbid disease associated with high recurrence rate after surgery. Many conventional surgical procedures have been described for its management with their merits and demerits. The present study aims to evaluate the efficacy and complications of Limberg flap reconstruction surgery.
Methods: 32 consecutive patients underwent Limberg flap reconstruction between January 2015 to November 2016 and were evaluated for various parameters.
Results: All patients successfully underwent surgery, with very minimal postoperative pain, average hospital stay for 5 days, returned to work after 19 days, with 2 patients having seroma, 1 having flap necrosis, 1 developed wound infection and no recurrences so far. Patients with complications were managed conservatively.
Conclusions: Limberg flap for reconstruction of the defect after excision of recurrent sacrococcygeal pilonidal sinus is an effective and reliable technique, easily performed, with high patient satisfaction, associated with complete cure and low incidence of post-operative complications.

Keywords: Limberg flap, Pilonidal sinus, Sacrococcygeal

INTRODUCTION

Chronic pilonidal sinus is common disease and is usually found in the midline of the sacrococcygeal region of young hirsute men. It is an acquired condition with high morbidity and patient discomfort. The name pilonidal is taken from Latin meaning "nest of hairs." The estimated incidence is 26 per 1, 00,000 population.[1,2] It generally presents as a cyst, abscess or sinus tracts with or without discharge.[3] Men affected more often than women, rare both before puberty and after the age of 40 years.[4]

The aetiology of the pilonidal sinus is a matter of debate. Initially congenital origin was suggested that it was secondary to a remnant of an epithelial lined tract from post coccygeal epidermal cell rests or vestigial scent cells. Now the view widely shifted toward acquired theory[5] and is based on the observations that congenital tracts do not contain hair and are lined by cuboidal epithelium. Karydakis proposed three main factors causing the disease, namely high quantity of hair, extreme force, and vulnerability to infection.[6] The presence of hair in the gluteal cleft seems to play a significant role in the pathogenesis of this disease. A deep natal cleft is a favourable environment for sweating, maceration, bacterial contamination and penetration of hairs. Other risk factors include obesity, local trauma or irritation, sedentary life style, family history, poor hygiene and excessive hairiness.

It is widely accepted that a pilonidal sinus results from the penetration of shed hair shafts through the skin, which

ultimately leads to an acute or chronically infected site, and the disease can be treated effectively by appropriate surgery.[7] However, extensive disease with numerous pilonidal openings, branching tracts, and overt symptoms may require wide excision of the diseased region.

Diagnosis is generally clinical and patient may present with a chronic inflammation or a sinus with persistent discharge or acutely there may be an abscess or multiple subcutaneous tracts.

Although pilonidal sinus can be treated using several defined conservative and surgical methods, recurrence rates remain high.[8] Complete removal of the pilonidal sinus or sinuses and appropriate reconstruction can lead to successful recovery.[9]

Various techniques for management of sacrococcygeal pilonidal sinus have been described which ranges from, clipping of hairs with good hygiene of the area, wide excision of the area and packing, excision and primary closure, marsupialization and flap techniques like Limberg flap,[10] modified Limberg transposition flap,[11] elliptical rotation flap[12] and rotation advancement fasciocutaneous flap.[13]

Among different surgical modalities for treatment of sacrococcygeal pilonidal sinus, flap reconstruction techniques eradicate the aetiology of the disease by flattening the inter gluteal sulcus with much less hairy fasciocutaneous flaps and less perspiration.[14] Among them, the most commonly used is the rhomboid excision with the Limberg flap. With this technique of flattening the natal cleft, a tension-free repair is made using a wide, well-vascularized flap. It is reported as one of the best treatment methods, with a 0-16 % of surgical area-related complication and a recurrence rate of 0-5 %.[15]

This article evaluates the use of Limberg flap, which is based on the superior gluteal and sacral perforators for reconstruction of the sacrococcygeal region after excision of pilonidal sinus.

METHODS

Thirty-two consecutive patients who underwent pilonidal sinus surgery between January 2015 and November 2017 were included in this study. The mean duration of symptoms was 3.5 years. All patients were subjected to complete history taking and routine clinical, local examination and laboratory investigations. Written consent was obtained from all patients after explanation of the procedure and expected results of the flap in this area. Data of the patients were collected from the forms, which were created preoperatively and used for postoperative follow up period, for each patient. The patients having other local pathologies like eczematous, fungal or other deforming pathologies were excluded from the study. All the patients underwent Limberg flap reconstruction as the surgical procedure. All the patients were male. The median ages of patients were 21 years. 7 patients (23%) had previous history of abscess drainage due to pilonidal sinus. The main outcome of this study was to evaluate the surgical procedure with respect to the surgical area related complications and recurrence rates.

Surgical procedure

The natal cleft was shaved the day before surgery. Cefazolin 1 gram and Metronidazole 500 mg were administered intravenously prophylactically before placing incision. All operations were performed under spinal anaesthesia. Patients were placed in prone position and the buttocks strapped apart by adhesive tapes.

Using a sterile skin-marking pen a rhomboid area of skin was marked over pilonidal sinus involving all midline pits and lateral extension if any. The flap design was mapped on the skin (Figure 1). The long axis of the rhomboid in midline was marked as A-C, C being adjacent to perianal skin, A placed so that all diseased tissues can be included in the excision. The line B-D transected the midpoint of A-C at right angles and is 60 % of its length. D-E was a direct continuation of the line B-D and was of equal length to the incision B-A, to which it was sutured after rotation. E-F was parallel to D-C and of equal length. After rotation, it was sutured to A-D.[16]

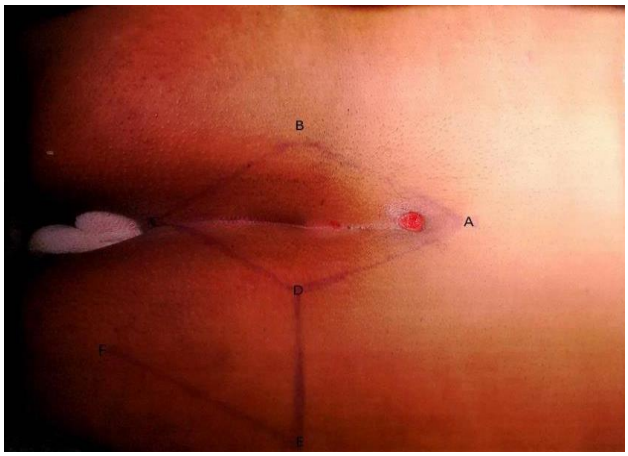

Figure 1: Marking with letters.

A rhombic-shaped excision of the sinus-bearing skin and subcutaneous tissue up to the pre-sacral fascia was done by electrocautery (Figure 2) (Figure 3). Then elevation of perforator-based Limberg flap (Figure 4) (based on the superior gluteal and sacral perforators according to the study done by Koshimaetal on a cadaver dissection)[17] in the same manner and the level of dissection was pre muscular fascia, good haemostasis was achieved and the adhesive tapes which retracted the buttocks were released to allow suturing of the flap without tension A right or left sided fasciocutaneous Limberg transposition flap, incorporating the gluteal fascia, was fully mobilized on

its inferior edge and transposed medially to fulfil the Limberg defect (Figure 5).

Figure 2: Placing skin incision.

Figure 3: Excision of pilonidal sinus complex till deep fascia.

Figure 4: Raising of inferior Limberg flap.

Figure 5: Rotation of flap over defect.

The defect thus created was closed in linear fashion (Figure 6). Interrupted Vicryl 2-0 sutures to include fascia and fat were placed over a vacuum drain, and then finally the skin was closed with skin stapler.18The operation produces a tension-free flap of unscarred skin in the midline (Figure 6). Antibiotics were given for 7 days initially intravenously, then orally, suction drain removed after 2 days, staples removed around 10th day. The patient was advised not to put pressure on the flap for 3 weeks. All the patients were evaluated for flap healing, seroma formation, oedema, flap necrosis, surgical site infection, pain and length of hospital stay. The objective grading of pain was done by visual analogue scale. The patients were followed at 1 and 6 months after surgery.

Figure 6: Final outcome after suturing.

RESULTS

A total of 32 patients came with pilonidal sinus, from January 2015 to November 2016, underwent Limberg flap surgery under spinal anaesthesia. The mean operative time was 50 minutes (range-30 to 80 minutes).

Table 1: Rate of complications.

Complications	Number	Percentage
Seroma	2	6.2%
Wound infection	1	3.1%
Flap necrosis	1	3.1%

All patients were followed up initially at 2-week interval, then at 1 month and again at six months. Four patients (12.5%) developed complications two (6.2%) had seroma formation, 1 (3.1%) had flap necrosis and the other 1 (3.1%) had superficial surgical site infection.

It took nearly 8 days for seroma to resolve and three weeks for the surgical site infection to subside. The patient with flap necrosis underwent multiple debridement and dressings and took 8 weeks to heal by secondary intention. The pain score range was in the range of 2-8 with a mean score of 4.5. The average length of stay in hospital was 5 days (range-2 to 14 days). All other patients wound healed primarily with minimal scarring and less postoperative pain, with no recurrence till now. None of the patients needed readmission due to pilonidal sinus. The mean time to return to work was 19.6 days (range -10 to 30 days).

DISCUSSION

Sacrococcygeal pilonidal sinus disease is notorious for prolonged morbidity and recurrence and the ideal treatment should ensure low pain, short hospitalization period, low risk of complications, rapid return to normal activities, better cosmesis, and should have a low recurrence rate.

There has been increased realisation of the importance that the midline natal cleft should be avoided for suture placement as it is the site for recurrence. To minimise the recurrence, the emphasis should not only be on flattening the natal cleft but also of achieving an off-midline closure of the resultant defect in order to minimize wound-related complications and recurrence.[19-21]

Flap reconstructions having a midline lower edge or suture line on intergluteal sulcus are more likely to increase recurrence rates, wound dehiscence and wound infection risk. Limberg flap reconstruction achieves an off-midline closure and ensures flattening of the natal cleft.

Reconstruction of the defect with Limberg flap has many advantages as it is easy to perform and design, and it flattens the natal cleft with large vascularized pedicle, sutured without tension. This in turn maintains good hygiene, reducing the friction, preventing maceration, and avoiding scar in the midline. This flap procedure is found better than simple excision and closure, marsupialization, other flap procedures such as Bescom and Karydakis.[22-25]

There are many previous studies on this subject among which, Katsoulis had 25 patients, with 16 of them having complications with no recurrences and Aslam had 110 patients, with 5 of them having complications and 1 recurrence (19)5.[26,27] Mentes and Urhan were other studies.[28,29] Several series with the rhomboid or rhombic flap technique, including more than 50 cases, have reported recurrence rates of1% to7%.[30] In our series we had a total of 32 patients among which 4 patients had complications like seroma formation (2), wound infection (1) and flap necrosis (1) which were managed subsequently. The mean pain score was 4.5 and there were fewer needs of additional analgesics apart from the standard protocol. None of the patients reported recurrence.

Iesalnieks studied the long-term results after excision of a pilonidal sinus and primary midline closure compared with the open surgical procedure in 73 patients.[31] There was a high recurrence rate (42%) after excision of pilonidal sinus and primary midline closure. Present study shows no recurrence with this procedure. In present study, the flap is inferiorly based with more anatomical and better cosmetic appearance. In 2008, El-Khatiband Al-Basti reported a series of 8 cases of pilonidal sinus reconstructed by bilobed perforator-based flap, the mean operative time was 90 minutes so it is time consuming with a long scar.[32] In the study, we performed inferiorly based flap, the mean operative time was 50 min with complete cure of the disease and very low incidence of post-operative complications when compared with the previous studies.

CONCLUSION

Limberg flap for reconstruction of the defect after excision of recurrent sacrococcygeal pilonidal sinus is an effective and reliable technique, easily performed, subjectively high patient satisfaction, associated with complete cure and low incidence of post-operative complications.

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