Innovative Journal of Medical and Health Science
Received 12 June 2020 | Accepted 12 July 2020 | Published Online 15 July 2020

DOI: https://doi.org/10.15520/ijmhs.v10i07.3039
I Jour Med Health Science 10 (07), 1153–1159 (2020)
ISSN (O) 2589-9341 | (P) 2589-9341 IF:1.6

Original Article

Surgical treatment of sacrococcygeal pilonidal sinus with the Limberg transposition flap

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Abstract

Background: Pilonidal sinus disease is a common condition usually affecting young individuals and has been conventionally treated by open excision technique. Rhomboid Limberg is a transposition flap that has been pleaded for treatment of this condition. **Aim:** To study the outcome of Rhomboid excision with Limberg flap closure for the treatment of Sacrococcygeal Pilonidal sinus. **Material and Methods:** The study was conducted prospectively in the department of surgery Skims Medical College Srinagar from March 2014 to February 2019 and total of 55 patients with primary or recurrent pilonidal sinus disease were studied. **Results:** The average operative time was 60 minutes (range 50-80 minutes). Postoperative stay of patients in the hospital was 3-4 days.The complications were seen in total of four patients which included Seroma and mild gaping of the wound in one patient each and dehiscence in two patients. None of the patients had recurrence till date.**Conclusions:** Rhomboid excision with Limberg flap transposition is an effective surgical technique for management of pilonidal sinus.

Keywords: Pilonidal sinus, Limberg flap, rhomboid transposition flap, fasciocutaneous flap

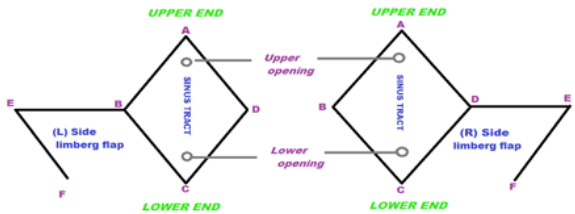
1 | INTRODUCTION

Pilonidal sinus arises from chronic inflammation and pressure involving a hair-bearing region. A tract develops connecting the skin surface with a collection of hairs, cell debris and keratinizing epithelial tissue. Pilonidal sinus disease is a common condition usually affecting young individuals in the age group of 17-38 years. The estimated incidence of the disease has been reported as 26 per 100000 [1,2] and the disease is two times more common in males than in females (1).Although the disease is most frequent in the third decade of life, but this condition may also be seen in the 4th decade [3,4]. The condition was probably first described by Mayo in 1833, and it was believed to have a congenital origin but now the etiology has shifted towards acquired theory [5]. It is now universally believed that the pilonidal sinus is caused by implantation of loose hair into the depth of natal cleft. The other factors which have been found to be associated include excessive sitting with friction and sweating, poor personal hygiene obesity, local trauma and narrowness of the natal cleft [3,4]. The

disease is more common in those with excessive hair and obese individuals because of deeper inter-gluteal grooves [2, 3]. The most common site for pilonidal sinus is the Sacrococcygeal (natal cleft) region. The other rare sites may be the axilla, umbilicus, pubis, intermammarian region, scalp, ear, amputation stumps, interdigital webs of hairdressers, and hands of farmers who deal with sheep [4]. The implantation of hair leads to infection and abscess formation and ultimately to pain and discharging sinus formation.

There is still a controversy regarding the best treatment for pilonidal diseases for many years .An ideal operation should be simple , should have short hospital stay ,should have low recurrence rate and should cause less inconvenience to the patients in terms of minimal pain, minimal wound care and early return to work [5,6]. Currently, there is no treatment which meets all these criteria's. All the surgical procedures have advantages as well as disadvantages. At present the procedures which are being practised include incision and drainage, excision of the sinus and leaving the tract open followed by healing by secondary intention, excision and primary closure and finally excision with reconstructive flap techniques. Simple excisional techniques are associated with high morbidity and recurrence due to the location of the sinus. Recurrence rates of 7–42 percent have been reported following excision and primary closure [7, 8].The rhomboid flap of Limberg is a transposition flap that has been widely advocated for treatment of this condition [9, 10].In 1946, Limberg was first to describe a technique for closing a 60º rhombus shaped defect with a transposition flap [1].Rhomboid excision with Limberg flap closure is an ideal procedure for managing primary and recurrent sacrococcygeal pilonidal sinus and meets all the requirements if performed according to appropriate surgical principles .Studies have shown that Rhomboid excision and Limberg's flap closure can be performed with low complication rate, short hospital stay, short time to return to normal activity and good long-term results [9].

Limberg's procedure : A rhombus is defined as an oblique-angled equilateral parallelogram. In rhomboid all the sides are equal in length, the opposite sides are parallel and the angles meet at 60 degree**.** A rhomboid flap is a transposition flap utilized when the direct closure of fusiform incision is not possible because of the size or shape of a lesion. The technique of skin flap elevation is simple and easy to design. The dissection of elevated flap must be carried past its base and include sufficient fat to prevent an elevated bump when it is transposed. Rhomboid (Limberg) flap, single or multiple can be applied widely and safely with good cosmetic results. It flattens the natal cleft with a wide and well vascularised pedicle that can be sutured without tension. This helps in maintaining local hygiene, avoids hair insertion by reducing the friction between buttocks, reducing humidity, maceration, erosions and scar formation at the natal cleft. After the flap has been sutured viability of the flap has to be monitored to recognize ischemia as early as possible to prevent subsequent flap necrosis and flap failure. Stabbing the flap with a small needle to assess bleeding is one of the most reliable methods of clinical assessment [10].



Pictorial Presentation of Rhomboid –Limberg flap

The objective of the study was to evaluate the outcome of Rhomboid excision with Limberg's flap reconstruction in the management of Sacrococcygeal Pilonidal sinus in terms of complication rates, hospital stay, and time to return to normal activity,

Supplementary information The online version of this article (https://doi.org/10.15520/ijmhs.v10i07.3039) contains supplementary material, which is available to authorized users.

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infection, recurrence and good long-term results.

2 | MATERIAL AND METHODS

The study was conducted prospectively in the department of surgery SKIMS Medical College Srinagar over period of 5 years from March 2014 to February 2019. All the adult patients more than 14 years in age with a primary or recurrent pilonidal sinus disease were included in the study. Patients who had pilonidal abscess were initially managed with incision and drainage and antibiotics followed by a definite treatment. Total number of patients studied was 55, which includes 42 males and 13 females.

Preoperative Assessment; All the patients were subjected to detailed history and clinical examination and all the relevant data was obtained which included age, sex, weight, socioeconomic status and profession, duration of the disease and any past surgical history of pilonidal sinus. Various base line investigations were done in all the patients including CBC, KFT, LFT, X-Ray chest and ECG. Data was entered into the already prepared proforma.

Operative Technique

After initial workup, patients were taken for surgery under regional anesthesia. Patients were placed in prone jack-knife position with buttocks strapped for wide exposure of the area to be operated upon. The area is shaved adequately followed by proper marking of the area to be excised in the form of rhomboid. The area to be excised should include the entire sinus tract. After this flap lines are mapped on the skin either on right side or left side of the pilonidal sinus depending on the choice of surgeon. The area is scrubbed and draped. The rhomboid incision including the sinus and its extensions is made down to the pre-sacral fascia and the entire diseased area is removed enbloc (fig 1 and 2). After that the flap is constructed by extending the incision laterally down to the fascia of gluteus maximus muscle .Flap should be exactly of the same angles and length of the defect made by the excision. Thus a rhombic shaped fascio-cutaneous flap is developed (fig 3). Complete haemostasis is achieved by using electrocautry. The flap is transposed into the rhombic defect created by excision of the diseased area without tension (Fig. 4). Suction drain is placed in the wound cavity, through a separate stab incision. Subcutaneous tissue is approximated with interrupted 2/0 vicryl suture. Skin is closed with interrupted mattress stitches using prolene 3/0.

Postoperative care

Patients were put on intravenous antibiotics for initial three days followed by oral antibiotics for another 7 days. We routinely use third generation cephalosporin in the postoperative period as prophylactic antibiotics. Infusion of paracetamol (1gm) was given during the procedure which was followed by 75 mg of intramuscular diclofenac sodium on need basis for pain control. The postoperative VAS score was noted at postoperative hours 6, 12, 24, 48 and 72 hours and same was recorded in the proforma The suction drain is removed after 72 hrs. Patients were discharged on 4^{th} postoperative day on oral antibiotics and were advised to take analgesics only on need basis. Alternate sutures were removed on 14^{th} day, while as remaining sutures are removed 16^{th} postoperative day.

Follow up

Postoperatively patients were advised to avoid prolonged sitting and any strenuous exercise for a period of 4 weeks. Local hygiene and hair removal either by shaving or by hair removal cream was advised to all the patients. Patients were followed initially every week for one month followed by every two weeks for three months, every three months for a period of one year and every six months thereafter. During follow up various parameters which were observed and recorded include like flap edema, postoperative infection, wound dehiscence, duration of hospital stay, duration of postoperative drain and return to routine work. All this information was recorded in an already designed proforma.

3 | OBSERVATION AND RESULTS

The study was conducted prospectively in the department of surgery Skims Medical College, Bemina Srinagar from March 2014 to June 2019. A total

of 55 patients were included in this study, which included 42 (76%) males and 13(24%) females .The male to female ratio was 2;1. The mean age of the patients in our study was 31.9±13.06 (18-54). The most common complaint of the patients was the discharge from the sinus and was seen in 41(74.54 %) patients followed by swelling in 8(14.54%) patients and abscess formation in 6(11%) patients (Table 1).

In our study 13 patients (23.63%) had tuft of hairs (Fig.2), 9 patients (16.36%) had multiple number of tracts and 11 patients (20%) had multiple external openings, while as 22(40 %) patients had a single external opening (Table 1).

The average operative time was 60 minutes (range 50-80 minutes) (Table 2). Postoperative pain was assessed by visual analogue scale. The pain scores were calculated at 6, 12, 24, 48 and 72 hours postoperatively, and, at first, second, third and fourth week of follow up. . The final visual analog scores in the postoperative period was 2.86 +/- 1.184 (Table 2). The drain was removed after 72 hours.Postoperative stay of patients in the hospital was 3-4 days.The patients returned to normal activity between 21 to 24 days. The complications were seen in total of four patients which included Seroma, in one patient mild gaping of the wound in one patient with dehiscence in two patients (Table 2). None of the patients in our study had recurrence (Table 2).

TABLE 1: Clinical presentation of patients (n=55)

Presenting complaints	No.of patients	Percentage
Discharging sinus	41	74.54
Swelling	8	14.54
Abscess formation	6	11
Local findings		
1) Single external opening	22	40
2)Multiple external openings	11	20
3) Multiple Tracks	9	16.36
4) Tuft of hair in the sinus	13	23.63

TABLE 2: Post operative study parameters of patients (n=55)

Study Parameter	Result
Operative time in minutes	60 (50-80)
Postoperative pain score on VAS (Visual analog score) 1-10	2.86+/-1.184
Duration of drain	72 hours
Hospital stay in hours	72-96
Number of days to return to normal activity	21-24 days
Postoperative complications	04
1. Seroma	1(1.81%)
2. Mild gaping	1(1.81%)
3. Complete wound Dehiscence	2(3.63%)
4. Recurrence	Nil

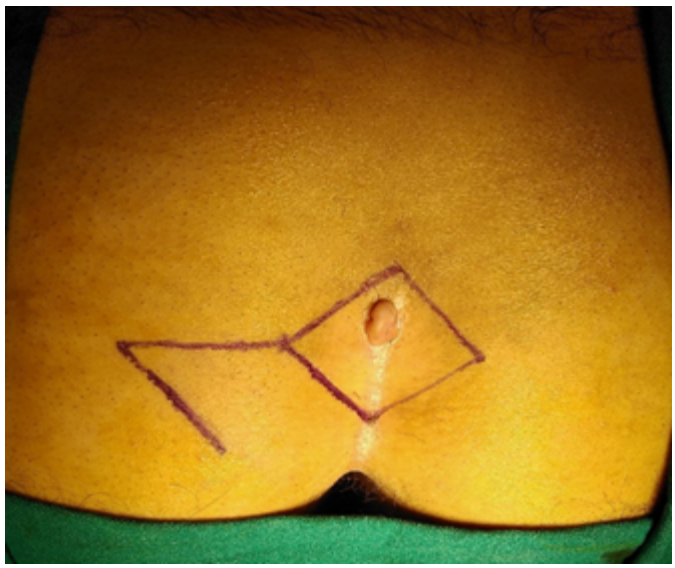

FIGURE. 1: Sacrococcygeal Pilonidal sinus presenting as swelling with a left sided based Limberg flap being marked

4 | DISCUSSION

Pilonidal sinus disease is an acquired condition affecting young adults. Classically it is a blind tract situated in the skin of the natal cleft .It extends into the subcutaneous tissue planes as an infected track.it may or may not possess branching side channels. It may have multiple openings strictly in the midline between the level of sacrococcygeal joints and the tip of the coccyx. Secondary openings are found on either side of the midline .The contents of this track could be hairs, granulation tissue, and epithelial scales and debris. Typically a tuft of hairs projects from its mouth. The discharge from the sinus is often blood stained and may contain foul sebum and hairs.

FIGURE 2: Rhomboid excision of the Pilonidal sinus done, with a tuft of hair in the sinus tract

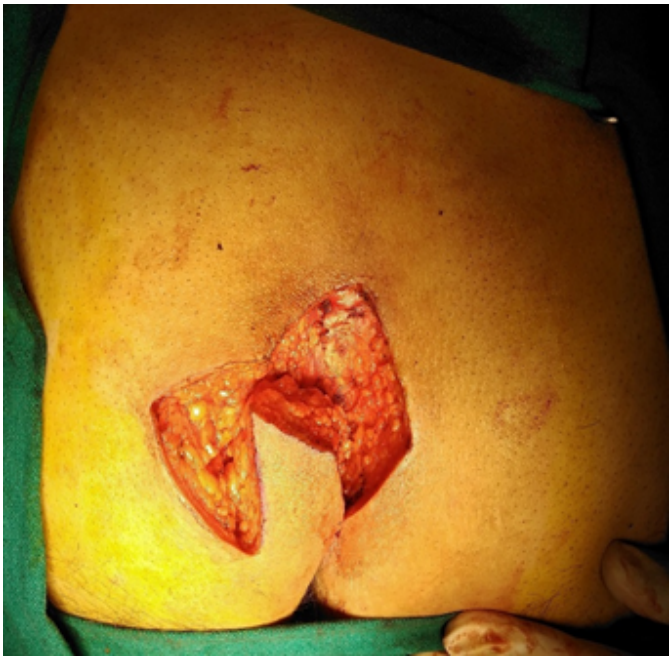

FIGURE 3: Left sided Limberg flap prepared for transposition into the defect

FIGURE 4: Left sided Limberg flap sutured into the defect with drain placed under the flap

The aetiology and pathogenesis of pilonidal sinus is still a matter of debate. Excessive hairiness, poor hygiene and humidity are considered as three important predisposing factors . Increased depth, narrowness of the natal cleft and the friction movements of the buttocks paves the way for loose hair to collect and insert in deep cleft. The hair is perceived as a foreign body which initiates an inflammatory response and can then lead to a pocket of infection leading to abscess or sinus formation [4, 5].

The aim of surgical treatment should be removing of all the sinus tracts as well as the predisposing factors that contribute in the formation of pilonidal sinus. Several studies have been reported recently using Limberg flap with minimal complications.

In our study total number of patients studied was 55, which included 42 (76%) males and 13 (24%) females with a male to female ratio of 2;1. The mean age of the patients in our study was 31.9±13.06 (18-54). In a s study conducted by Faisal et al (11), all the patients were less than 40 years of age except one with a mean age of 23.5 years. In contrast to our results Bukhari et al (12), reported a male to female ratio of 12.3:1, Saleem and Al-Hashimi [13], reported a ratio of 11:1, Whereas Faisal et al(11), reported the ratio of 14.1:1

The most common complaint of the patients in our study was the discharge from the sinus as was seen in 41 (74.54 %) patients followed by swelling in 8(14.54%) patients and abscess formation in 6 (11%) patients. On the other hand in a study conducted by Faisal et al [11], discharging sinuses were reported in 23 patients (76.7%), swelling in 3(10%) patients and pain in 4(13-3%) patients .

In our study 13 patients (23.63%) had tuft of hairs in the track, 9 patients (16.36%) had multiple number of tracts and 11 patients (20%) had multiple external openings, while as 22(40 %) patients had a single external opening. On the other hand in the study conducted by Faisal et al [11], 26 patients (86.7%) had tuft of hairs, 27 patients (90%) had multiple number of tracts and 25 patients (83.3%) had multiple external openings.

In our study the mean operative time was 60 minutes with range of 50-80 minutes. The drain was removed on third postoperative day and the postoperative stay of patients in the hospital was 3-4 days .The sutures were removed between 14^{th} and 16^{th} postoperative day. . The final visual analog scores for pain in the postoperative period was 2.86 +/- 1.184.On the other hand in a study conducted by Jethwani et al [14] ,the range of operative time was 60- 100 minutes, hospital stay was 48-72 hours and the drain was removed between 48-72 hours while as the sutures were removed between 12th and 14th postoperative day . They did not study visual analog scores for pain during their study.In contrast to our results, Milito et al [15] reported a hospital stay of 3.1 ± 0.30 days while as in Faisal et al (11), mean hospital stay was 1.6 days which is shorter than other studies

In our study the complications were seen in total of four patients which included Seroma in one patient (1.81%) mild gaping of the wound in one patient (1.81%) and dehiscence in two patients (3.63%).None of the patients in our study had recurrence till date. In the study conducted by Jethwani et al [14],67 patients with sacrococcygeal pilonidal disease were managed with rhomboid excision with limber flap reconstruction. Superficial necrosis at the tip of flap was seen in four patients while as recurrence was seen in one patient (1-49%). Akin et al (3), performed limberg flap reconstruction on 411 patients and reported recurrence rate of 2.91%.Thus our results were comparable to their results .El-khadrawy (8), operated on 40 patients and reported superficial necrosis at the tip of flap in four patients [7]. Katsoulis et al [9] performed a study with Limberg's flap procedure and they found wound complication rate was 16%.

In 2002, study conducted by Urhan et al [10] in 102 cases, three patients developed seroma (2.9%), two patients (1.96%) had wound dehiscence, and one patient had purulent discharge from the wound . Mentes et al [16] analyzed 353 patients with Limberg flap procedure for pilonidal sinus disease and did not report wound dehiscence and flap necrosis in any patient although they the reported recurrence in 3.2% patients at the end of the follow up period .Eryilmaz et al [17] performed a study in 2003 in which they observed wound complications and recurrence in 6% and 3%, respectively. Milito et al [18] conducted a study on two hundred sixteen patients with excision and rhomboid flap transposition from 1986 to 2004 for pilonidal sinus which showed flap necrosis in 5 patients (2.3%), post-operative infection in 2 patients (0.9%), 4 patients (1.8%) had a seroma, and recurrences occurred in 5 patients (7.4%).In 2006, Lodhi et al [19] in their study used Limberg flap on thirty patients and found wound complications in 3 (10%) patients with no recurrence

Conclusion

Rhomboid excision with Limberg flap reconstruction is a very effective treatment for sacrococcygeal pilonidal disease with low complication rates ,short hospitalisation, early healing, early return to routine to work, patient work, low recurrence rates and good long term results.The surgery is easy to perform, design and learn and is ideal for complex sinuses and recurrent pilonidal disease. The results of our study favour rhomboid excision with limberg flap transposition for the management of pilonidal sinus disease.

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How to cite this article: S.Bari. **Surgical treatment of sacrococcygeal pilonidal sinus with the Limberg transposition flap** . Innovative Journal of Medical and Health Science. 2020;1153−1160. https://doi.org/10.15520/ijmhs.v10i07.3039