Original Research Article

Short-term results of Limberg flap in the management of Pilonidal sinus disease

Shams ul Bari[1*], Syed Waseem Mushtaq[2], Syed Quibtiya Khursheed[3]

[1]Department of Surgery, SKIMS Medical College, Bemina Srinagar, J&K, India
[2]Department of Surgery, SKIMS Medical College, Bemina Srinagar, J&K, India
[3]Department of Surgery, SKIMS Medical College, Bemina Srinagar, J&K, India

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Abstract

Background: Although several treatment options have been used for management of pilonidal sinus disease, no optimal treatment method has been defined as yet due to high complication and recurrence rates. **Aim:** To study the short term results of Rhomboid excision with Limberg flap closure in the management of Pilonidal sinus disease. **Material and Methods:** The study entitled, "Short-term results of Limberg flap in the management of pilonidal sinus disease" was conducted prospectively in the department of surgery Skims Medical College Srinagar for a period of three years from January 2017 to February 2020 and total of 41 patients with primary or recurrent pilonidal sinus disease were studied.
Results: The study included 34 males and 7 females with a male to female ratio of 5;1. The average operative time was 60 minutes. Postoperative stay of patients in the hospital was 4-5 days and the patients returned to their normal activity between 21 and 24 days. The complications were seen in total of three patients which included prolonged drainage in one , Seroma in one and wound dehiscence in one patient. Recurrence was not seen in any of the patients in our study.**Conclusions:** Rhomboid excision with Limberg flap transposition is an ideal and efficient surgical technique for management of pilonidal sinus.

Keywords: Pilonidal sinus, Limberg transposition flap, natal cleft, recurrence.

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Introduction

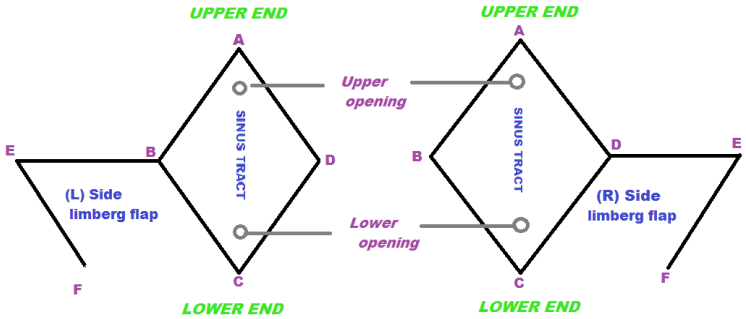
Pilonidal sinus disease is a common disorder affecting young individuals in the age group of 17-38 years. The incidence of the disease has been reported as 26 per 100000 [1] in the literature .The disease is more common in males as compared to females with a male to female ratio of 5;1 . The most common site for pilonidal sinus is the sacrococcygeal region and results from chronic pressure and inflammation in this hair bearing area. It usually presents as an abscess and discharge or a painful sinus tract in the natal cleft. A tract may contain a tuft of hairs, cell debris and keratinizing epithelial tissue [1-3].The disease was first described by Mayo in 1833 and until few decades it was believed to have a congenital origin. However, the recent literature goes in favour of acquired nature of this condition [4]. Although definite etiopathogenesis of the disease is not known , it is universally believed that the pilonidal sinus is caused by implantation of loose hair into the depth of natal cleft due to continuous shearing effect . The implantation of hair leads to infection and abscess formation and ultimately to pain and discharging sinus formation. The other factors which have been found to be associated with pilonidal disease include sedentary lifestyle with friction and excessive sweating, poor personal hygiene, male sex, obesity, local trauma and narrowness of the natal cleft [2, 3]. The disease is more common in individuals, with excessive hair and obese individuals because of deeper inter-gluteal grooves [1, 2]. Besides natal cleft, pilonidal sinus may also be found in other areas such as the axilla, umbilicus, pubis, intermammarian region, scalp, ear, stumps of amputated limbs, interdigital webs of hair dressers, and hands of farmers who deal with sheep [2,3].There is still a controversy as far as the optimal treatment for pilonidal diseases is concerned. An ideal operation should cause minimum discomfort to the patient ,should be simple, with a short hospital stay and early return to routine work. The procedure should have low complication and low recurrence rates [4,5]. The procedures which have been tried include phenol injection, 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. Flap surgeries have been found to be superior to simple excision with primary closure. Following excision and primary closure,recurrence rates of 7–42 percent have been reported [6, 7]. Limberg was first to describe a technique for closing a 60º rhombus shaped defect with a transposition flap in 1946 [1].Rhomboid excision with Limberg flap closure has been widely used as an ideal procedure for managing primary and recurrent sacrococcygeal pilonidal sinus [8,9]. As reported in literature, Rhomboid excision with Limberg flap closure is associated with lower complication rates, shorter hospital stay, early return to normal activity and good long-term results [8, 9].

Technique of the procedure

Rhombus is defined as a quadrilateral figure in which all the sides are equal in length, the opposite sides are parallel but the angles of a rhombus need not be right angles. In rhomboid –Limberg flap procedure, a sinus tract is excised in the form of rhombus. This is followed by preparation of fasciocutaneous flap which is then transferred to the excised area.Rhomboid Limberg flap, a transposition flap is utilized when the primary closure of fusiform incision is not possible without tension and when there is a possible apprehension of wound dehiscence. Limberg flap, single or multiple can be applied widely and safely with good cosmetic results. The technique of elevation of fasciocutaneous flap is simple and easy to design. The dissection of elevated flap must be carried up to the level of sacral fascia and should include sufficient fat to prevent an

**Correspondence*
Dr.Shamsul Bari
Associate Prof. Department of Surgery, SKIMS Medical College, Bemina, Srinagar, J&K, India.
E-mail: shamsulbari@rediffmail.com

elevated bump when it is transposed. It flattens the natal cleft with a wide and well vascularized pedicle that can be sutured without tension. It also helps in maintaining local hygiene and prevents insertion of hair by reducing the friction between buttocks. It also helps in reducing humidity, maceration and scar formation at the natal cleft. After the flap has been sutured, it is crucial to monitor the viability of the flap to recognize ischemia as early as possible thereby preventing subsequent flap necrosis and flap failure. Assessing bleeding by stabbing the flap with a small needle is a very reliable method of clinical assessment [9].



Pictorial Presentation of Rhomboid –Limberg flap

The objective of the study was to evaluate short-term results of Limberg flap in the management of pilonidal sinus disease in terms of various parameters such as complication rates, hospital stay, time to return to normal activity, and recurrence.

Material and Methods

The study was conducted prospectively in the department of surgery SKIMS Medical College Srinagar over period of three years from January 2017 to February 2020. All the adult patients more than 18 years in age with a primary or recurrent pilonidal sinus disease were included in the study. Total number of patients studied was 41, which included 34 males and 7 females.Patients who reported with abscess formation were initially subjected to incision and drainage and antibiotics followed by a definite treatment at an appropriate time.

Preoperative workup

Detailed history,clinical examination and various baseline investigations were carried out in all the patients .All the relevant data such as age , sex, weight ,profession ,socioeconomic status , duration of the disease and any past surgical history of pilonidal sinus was obtained and entered into the already prepared proforma.

Surgical technique

After a proper informed consent, the patients are taken for surgery under spinal anesthesia. Patients are placed in prone jack-knife position with buttocks strapped, thereby allowing wide exposure of the area to be operated upon. Proper marking of the area to be excised is done in the form of rhomboid so as to include the entire sinus tract. After this flap lines of fasciocutaneous flap are marked either on right side or left side of the pilonidal sinus depending on the choice of surgeon. The area is properly scrubbed and draped. Using electrocautry, the rhomboid excision of the sinus and its extensions is carried out down to the pre-sacral fascia and the entire diseased area is removed enbloc (fig 1, 2). After that the rhombic fasciocutaneous flap is constructed by extending the incision laterally down to the fascia of gluteus maximus muscle .Angles and length of the flap should be exactly of the size of the defect created by the excision of the sinus tract to ensure tension free closure . Thus a Limberg flap is prepared which is transposed medially into the rhombic defect created by excision of the diseased area (Fig.3,4). It is important to ensure complete haemostasis at all stages using electrocautry to avoid subsequent collection. Suction drain is placed under the flap and brought out through a separate stab incision. Vicryl suture 2-0 is used to approximate subcutaneous tissue, followed by suturing of the skin with interrupted mattress stitches using prolene 3/0.

Fig 1: Marked Rhombus shaped excision of the Pilonidal sinus, along with a right sided limberg flap

Fig 2: Defect left after complete excision of the pilonidal sinus

Fig 3: Right sidedLimberg flap prepared for transposition into the defect

Fig 4: Right sidedLimberg flap sutured into the defect with drain placed under the flap

Fig 5: Postoperative picture of right sided limberg transposition flap at 12 weeks

Postoperative care

Intravenous antibiotics, usually a third generation cephalosporin were given for initial three days followed by oral antibiotics for another 7 days. During the procedure, intravenous infusion of paracetamol (1gm) was given followed by 500 mg of Paracetamol on need basis for pain control during immediate postoperative period. The postoperative pain score was noted at 6, 12, 24 , 48 and 72 hours after surgery and same was recorded in the proforma. The suction drain was removed once the 24 hour drainage was less than 20 ml which in majority of patients was achieved by 72 to 96 hours after surgery. Patients were discharged on 4th or 5th postoperative day on oral antibiotics and were advised to take analgesics as and when needed and were also advised to keep a record of it. Alternate sutures were removed on 14thday, while as remaining sutures were removed 2 or 3 days later depending on the condition of the wound.

Follow up

Follow up was carried initially every week for one month followed by every two weeks for three months. Further follow up was carried out every three months for a period of one year, followed by every six months for another one year (Fig.5). During follow up various parameters which were observed and recorded included flap edema, postoperative infection, flap necrosis , wound dehiscence, duration of hospital stay, duration of postoperative drain and time taken to return to routine work. All this information was recorded in an already designed proforma .All the patients were advised to avoid prolonged sitting for at least one month and avoid any type of strenuous exercise four at least three months. Local hygiene and hair removal either by shaving or by hair removal cream was advised to all the patients.

Observation and Results

The study was conducted prospectively in the department of surgery Skims Medical College, Bemina Srinagar from February 2017 to February 2020. A total of 41 patients were included in this study, which included 34 (83 %) males and 7 (17%) females .The male to female ratio was 5;1. The mean age of the patients in our study was 31.6±13.02 (18-56). Discharge from the sinus was the most common complaint and was seen in 31(75.60 %) patients followed by swelling in 6(14.63%) patients and abscess formation in 4(9.75%) patients (Table 1). In our study, a single external opening was seen in 29 (70.73%), patients, while as 9 (29.26%), patients had multiple external openings. Out of 41 patients, tuft of hairs projecting from the opening of the tract was seen only in 8 (19.51%), patients Although majority of patients had a single tract, 9 patients (21.95%) had multiple number of tracts (Table 2).

In our study, the average operative time was 60 minutes (range 50-80 minutes) (Table 3). Visual analogue scale was used to assess pain score. 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 pain scores in the postoperative period was 2.84 +/- 1.181 (Table 3). The drain was removed after 72 hours .Postoperative stay of patients in the hospital was 4-5 days .The patients returned to normal activity between 21 to 24 days. The complications were seen in total of four patients which included prolonged drainage in one patient, Seroma in one patient, and wound dehiscence in two patients (Table 4). Recurrence was not seen in any of the patients in our study.

Table 1: Clinical presentation of patients (n=41)

Presenting Complaints	Number of Patients	Percentage
Discharging sinus	31	75.60
Swelling	6	14.63
Abscess formation	4	9.75

Table 2: Distribution of patients according to local findings (n=41)

Local Finding	Number of Patients	Percentage
Tuft of hair in the sinus	8	19.51
Multiple tracks	9	21.95
Multiple external openings	12	29.26
Single external opening with discharge	29	70.73

Table 3:Postoperative study parameters of patients (n=41)

Study Parameter	Result
Operative time in minutes	60 (50-80)
Postoperative pain score on VAS (Visual analog score) 1-10	2.84 +/- 1.181
Duration of drain	72-96 hours
Hospital stay in days	4-5 days
Number of days to return to normal activity	21-24 days

Table 4:Postoperative Complications (n=41)

Complication	Number of patients	Percentage
Prolonged drainage	1	2.43
Seroma	1	2.43
Complete wound dehiscence	1	4.87
Recurrence	Nil	Nil

Discussion

Pilonidal sinus is classically an infected blind tract situated in the subcutaneous tissue planes of the natal cleft .The tract may or may not possess branching side channels and may have a single or multiple openings located strictly in the midline, between the level of sacrococcygeal joints and the tip of the coccyx. Secondary openings, when present are usually found on either side of the midline .The granulation tissue, hairs, epithelial scales and debris are the usual contents of the tract. Typically a tuft of hairs is seen projecting from mouth of tract.The discharge from the sinus is often blood stained and may contain foul sebum and hairs.

There is still a controversy as far as the aetiology and pathogenesis of pilonidal sinus is concerned. Hairy skin, poor hygiene, and moisture are considered as three important predisposing factors. It is universally believed that the pilonidal sinus is caused by implantation of loose hair into the narrow and deep natal cleft due to continuous shearing effect while sitting. The hair initiates an inflammatory response and infection and finally leads to abscess or sinus formation [3, 4]. The objective of surgical intervention for pilonidal sinus should be enbloc removal of the entire sinus tract along with its branches to prevent any recurrence.

In our study a total of 41 patients were recruited , which included 34 (83 %) males and 7 (17%) females .The male to female ratio was 5;1. The mean age of the patients in our study was 31.6±13.02 (18-56). In a study conducted by Faisal et al [10], mean age of patients was 23.5 years and all the patients were less than 40 years of age .They reported a male to female ratio of 14.1:1 [I0], in their study. In contrast to our results, Bukhari, et al [11], reported a male to female ratio of 12.3:1, while as Saleem and Al-Hashimi [12], reported a male to female ratio of 11:1.

Discharge from the sinus was the most common complaint and was seen in 31(75.60 %) patients followed by swelling in 6(14.63%) patients and abscess formation in 4(9.75%) patients. On the other hand in a study conducted by Faisal et al [10], 23 (76.7%) patients had a discharging sinuses, 3 (10%) patients had swelling and 4(13-3%) patients had pain as a presenting complaint .

In our study, out of 41 patients, tuft of hair projecting from the sinus tract was seen only in 8 (19.51%), patients. 9 patients (21.95%) had multiple tracts while as 32 patients had a single tract. A single external opening was seen in 29 (70.73%), patients while as multiple external openings were seen in 9 (29.26 %), patients .On the other hand in the study conducted by Faisal et al [10], tuft of hairs were seen in 86.7% ,multiple number of tracts were seen in 90% patients, while as multiple external openings were seen in 83.3% patients .

In our study the mean operative time was 60 minutes with range of 50-80 minutes. The drain was removed in majority of patients between third and fourth postoperative day except in one patient where drain was removed on 8th postoperative day. The sutures were removed between 14th and 16th postoperative day. The final visual analog scores for pain in the postoperative period was 2.84+/-1.181.In a study conducted by Jethwani et al [13], the range of operative time was reported as 60- 100 minutes and hospital stay was 48-72 hours. In the same study the drain was removed between 48-72 hours while as the sutures were removed between 12th and 14th postoperative day. Visual analog scores for pain was not studied in their study.In contrast to our results, Milito et al [14] reported a hospital stay of 3.1±0.30 days while as in a study conducted by Faisal et al (10), mean hospital stay was 1.6 days which is shorter than other studies.

In our study the complications were seen in four patients which included Seroma in one patient (2.43 %) ,prolonged drainage (2.43%) in one patient and dehiscence in two patients (4.87%).None of the patients in our study had recurrence till date.Akin et al [2], performed limberg flap reconstruction on 411 patients and reported recurrence rate of 2.91%. El-khadrawy [7], reported superficial necrosis at the tip of flap in four patients [6] in his study comprising of 40 patients. Katsoulis et al [8] reported wound complication rate of 16%.In the study conducted by Jethwani et al [13],67 patients with sacrococcygeal pilonidal disease were managed by rhomboid Limberg flap and they reported a superficial necrosis at the tip of flap in four patients and recurrence in one patient (1-49%).

Mentes et al [15] analysed 353 patients with Limberg flap procedure for pilonidal sinus disease and reported recurrence in 3.2% patients at the end of the follow up period. However they did not report wound dehiscence and flap necrosis in any patients. Eryilmaz et al [16] performed a study in 2003 in which they observed wound complications and recurrence in 6% and 3%, respectively. In a study conducted by Milito et al [14] between 1986 and 2004, two hundred and sixteen patients with pilonidal sinus were taken for excision and rhomboid flap transposition. They reported flap necrosis in 5 (2.3%), post-operative infection in 2 (0.9%) , Seroma in 4(1.8%) and recurrences in 5 (7.4%) patients .In 2006, Lodhi et al [17] in their study performed Limberg flap on thirty patients and found wound complications in 3 (10%) patients without any recurrences.

Conclusion; Rhomboid excision with Limberg flap reconstruction is an ideal treatment for management of sacrococcygeal pilonidal disease. The advantages of this procedure are low complication rates, short hospitalisation, quick healing, early return to routine work and low recurrence rates .The surgery is easy to perform, and easy to learn and is considered a treatment of choice for complex sinuses and recurrent pilonidal disease. The results of our study favor rhomboid excision with Limberg flap transposition for the management of pilonidal sinus disease.

References

1. Sondenaa K, Andersen E, Nesvik I, Soreide JA. Patient characteristics and symptoms in chronic pilonidal sinus disease. Int J Colorectal Dis. 1995;10(1):39-42.
2. Solla JA, Rothenberger DA. Chronic pilonidal disease. An assessment of 150 cases. Dis Colon Rectum. 1990; 33(9):758-61.
3. Akin M, Gokbayir H, Kilic K, Topgul K, Ozdemir E, Ferahkose Z. Rhomboid excision andLimberg flap for managing pilonidal sinus: long-term results in 411 patients. Colorectal Dis. 2008; 10(9):945-8.
4. Sabet AM, El Shaer WMH, El Amary MK. Definitive treatment of recurrent pilonidal sinus disease using rhomboid excision and Limberg flap. Egypt J Surg. 2004; 23(4):324-7.
5. Aslam MN, Shoaib S, Choudhry AM. Use of Limberg flap for pilonidal sinus-a viable option. J Ayub Med Coll Abbottabad. 2009;21(4):31
6. El-khadrawy OH. The rhomboid flap for recurrent pilonidal disease. Tanta Med Sci J. 2006;1(4):175-81.
7. Abu Galala KH, Salam IM, Abu Samaan KR, El Ashaal YI, Chandran VP, Sabastian M. Treatment of pilonidal sinus by primary closure with a transposed rhomboid flap compared with deep suturing: a prospective randomised clinical trial. Eur J Surg. 1999;165(5):468-72.
8. Katsoulis IE, Hibberts F, Carapeti EA. Outcome of treatment of primary and recurrent pilonidal sinuses with the Limberg flap. Surgeon. 2006;4(1):7-10, 62.
9. Urhan MK, Kucukel F, Topgul K, Ozer I, Sari S. Rhomboid excision and Limber flap for managing pilonidal sinus: results of 102 cases. Dis Colon Rectum. 2002;45(5):656-9.
10. Faisal S, Khan BA, Mian MA. Rhomboid excision with Limberg Flap a novel treatment for Sacrococcygeal Pilonidal Sinus.P J M H S, 2014;8(3):1.
11. Bukhari AJ BA, Khan AZ, Abid KJ. Treatment of pilonidal sinus. Comparison of primary closure Karydakis technique wide local excision. Annals KEMU. 2003;9:74-6.
12. SeleemMI . Management of pilonidal sinus using fibrin glue: a new concept and preliminary experience. Colorectal disease: the official journal of the Association of Coloproctology of Great Britain and Ireland. 2005;7(4):317-22.
13. JethwaniU, Singh G, Mohil RS, Kandwal V, Chouhan J, Saroha R, Bansal N, Verma R.Limberg flap for pilonidal sinus disease; Our experience. Surgery, 2013
14. Milito GM, Gallinela MM, Crocoli A, Spyrou M, Farinon AM. Modified Limberg's transposition flap for pilonidal sinus. Long term follow up of 216 cases. Annaliitaliani di chirurgia. 2007; 78:227-31.
15. Mentes BB, Leventoglu S, Cihan A, Tatlicioglu E, Akin M, Oguz M. Modified Limberg transposition flap for sacrococcygeal pilonidal sinus. Surg Today. 2004;34(5):419-23
16. Eryilmaz R, Sahin M, Alimoglu O, Dasiran F. Surgical treatment of Sacrococcygeal pilonidal sinus with the Limberg transposition flap. Surgery. 2003; 134(5):745-9.
17. Lodhi FB IS, Shafiq M, Hussain R. Pilonidal sinus; use of Limberg flap in the treatment. Professional Med J. 2006; 29:469-71.

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