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A comparative study of different treatment outcomes in cases of pilonidal disease

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Abstract

Background: Pilonidal sinus (PS) is a common disease of the natal cleft in the sacrococcygeal region with weak hair accumulation occurring in the hair follicles, which can be chronic and undergo acute exacerbation. The incidence of PS is approximately 26/100,000; it is a benign disease that commonly occurs in young men.

Aim: The objective of this study is to have a comparative study of different treatment outcome in case of Pilonidal disease been treated at Pacific Medical College and Hospital, Udaipur from January 2018 to January 2020.

Materials and Methods: A prospective study of Pilonidal disease management was carried in a medical college between Jan 2018 and Jan 2020. A total 90 cases of Pilonidal disease were selected for the study. Information on clinical presentation and management were compared.

Results: The mean time for complete healing of the wound after rhomboid excision and Limberg flap was 20 ± 8 days. The median VAS pain score was significantly lower in the group B ($p < 0.001$). One recurrence occurred in the patient during the follow-up period in group B; group A and C had recurrence of 5 and 3 respectively. When patient satisfaction was compared, the primary closure group received 2.5 ± 0.5 points and B group received 3.3 ± 0.44 ; the patients in the open group received 2.8 ± 0.14 .

Conclusion: We conclude that Rhomboid excision and Limberg flap closure is preferable to simple excision and excision with primary closure in the treatment for sacrococcygeal pilonidal disease.

Keywords: Pilonidal sinus, Limberg flap, laser, karydakia flap

Introduction

Pilonidal sinus (PS) is a common disease of the natal cleft in the sacrococcygeal region with weak hair accumulation occurring in the hair follicles, which can be chronic and undergo acute exacerbation [1, 2]. The incidence of PS is approximately 26/100,000; it is a benign disease that commonly occurs in young men [3, 4].

The diagnosis of pilonidal sinus is by finding a characteristic sinus lined by epithelialized tract present in the natal cleft a short distance from anus and having hairs as its constituents [7]. The pilonidal sinus can be seen at any age but more commonly between the age of 15-40 years. The incidence in males is nearly ten times that in females [2]. The exact etiology of pilonidal sinus is not clear; however there may be role of hormones, friction may be the precipitating factor or the role of bacterial infection in the pathological origin. Male sex predominance, familial predisposition, young people, local trauma or insult, and obesity seem to be associated with the development of pilonidal sinus [3]. Clinically, patients with complex PNS are more common. Low recurrence rate, minimal operation time, convenience, short time off work, and cost are important considerations [4].

Pilonidal disease was first described by Mayo [6] in 1833, who hypothesized that the underlying etiology is incomplete separation of the mesoderm and ectoderm layers during embryogenesis. In 1880, Hodges [7] coined the term *pilonidal sinus*; he postulated that sinus formation was incited by hair. Today, Hodges theory is known as the acquired theory: hair induces a foreign body response in surrounding tissue, leading to sinus formation. Although pilonidal cysts can occur anywhere on the body, they most commonly extend cephalad in the sacrococcygeal and upper gluteal cleft [8, 9]. The presentation of an acute pilonidal cyst is similar to a superficial abscess in other locations; however, a marker to the diagnosis is the presence of cutaneous pits along the midline of the gluteal cleft [10].

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Chronic pilonidal disease varies based on the extent of inflammation and scarring; the underlying cavity communicates with the overlying skin through sinuses and often drains with pressure ^[11].

Pilonidal sinuses are rare before puberty or after 40 years of age ^[12] and occur primarily in hirsute men. The ratio of men to women affected is between 3:1 and 4:1.8, although pilonidal sinuses account for only 15% of anal suppurations, complications arising from pilonidal sinuses are a considerable cause of morbidity, resulting in loss of productivity in otherwise healthy individuals. Complications include chronic nonhealing wounds, as recurrent pilonidal sinuses tend to become colonized with gram-positive and facultative anaerobic bacteria, whereas primary pilonidal cysts more commonly become infected with anaerobic and gram-negative bacteria. Long-standing disease increases the risk of squamous cell carcinoma arising within sinus tracts.

Although pilonidal sinus can be treated using several defined conservative and surgical methods, recurrence rates remain high ^[17]. Complete removal of the pilonidal sinus or sinuses and appropriate reconstruction can lead to successful recovery (18). However, collection of the lifeless hair depends on the anatomy of the intergluteal area, and accompanying risk factors can lead to inadequate surgery and subsequent recurrence.

Histopathologically, the cyst cavity commonly reveals hair, debris, and granulation tissue with surrounding foreign-body giant cells, and because these pilonidal cysts lack an epithelial lining they don't fall in the category of true cysts.

The preferred treatment of pilonidal cysts varies from conservative approach to different surgical methods to the use of laser. In this study we want to compare the outcome of different surgical treatments for pilonidal disease which includes open method, primary closure and flap closure surgical methods.

Aim and Objectives

The objective of this study is to have a comparative study of different treatment outcomes in case of Pilonidal disease being treated at Pacific Medical College and Hospital, Udaipur from January 2018 to January 2020 and study for:

- Comparative study of different surgical procedures adopted
- Duration of surgery and healing time
- Post operative complications
- Recurrence rates of procedures

Review of Literature

Pilonidal disease usually presents in the form of a sinus or recurrent abscess in the presacral region. Although Umbilical Pilonidal sinus and web space pilonidal sinus are also seen. In the differential diagnosis another entity dealing with hairs which is called Dermoid cyst, it has tufts of hairs lying deep inside almost reaching to presacral fascia, with few communicating channels, which gets infected resulting into abscess, rupture and sinus formation. There are different methods of treating Pilonidal disease. To name a few:

Conservative Management Techniques

Phenol Injections: Liquid or crystallized phenol injections have been used for treatment of mild to moderate pilonidal cysts. After removing the debris by curettage, phenol is administered without pressure through the sinus orifice or pits. The phenol remains in the cavity for 1 to 3 minutes before aspiration. Remaining cyst contents are removed through tissue manipulation, and the sinus is washed with saline. Mean healing time is 20 days (range, +/-14 days) ^[13]. There is a failure rate of

30% to 40% with phenol injection, especially with multiple sinuses and suppurative disease ^[11]; however, the success rate improves with limited disease (i.e., no more than 1–3 sinus pits) ^[8].

Simple Incision and Drainage: It has a crucial role in the treatment of acute pilonidal disease to decrease pain and relieve tension. Off-midline incisions have been recommended because the resulting closures fared better against sheer forces applied by the gluteal muscles on the cleft ^[11]. Healing rates vary from 45% to 82% with incision and drainage ^[6]. Primary pilonidal cysts may respond well, particularly if the cavity is abraded; in one series, 79% (58/73) of patients did not have a recurrence at the average follow-up of 60 months ^[14].

Excision and Unroofing: There are two variants techniques for excision and unroofing without primary closure namely: wide and limited. The wide technique consists of an inwardly slanted excision that is deepest in the centre of the cavity. The depth of the incision should spare the fascia and leave as much fatty tissue as possible while still resecting the entire cavity and associated pits ^[11]. Noteworthy disadvantages include prolonged healing time, need for professional wound management, and extended medical observation. The average duration of wound healing in a study of 300 patients was 5.4 weeks (range, +/-1.1 weeks) ^[15], and the recurrence rate has ranged from 5% to 13%. ^[18, 19] Care must be taken to respond to numerous possible complications, including excessive exudation and granulation, super infection, and walling off.

Excision and Primary Closure: In this method the pilonidal sinus is excised with an elliptical excision which includes some of the lateral margin is excised down to the level of the fascia. Adjacent lateral tracts may be excised by expanding the incision. To close the wound, edges are approximated with placement of deep and superficial sutures.

A Cochrane review evaluated 26 studies comparing primary and secondary closure. This large analysis showed no clear benefit for open healing over surgical closure²⁴; however, off-midline closure showed statistically significant benefit over midline closure (mean difference, 5.4 days; 95% CI, 2.3-8.5), and many experts now consider off-midline closure the standard of care in pilonidal sinus management.

Surgical Flap Techniques

For severe or recurrent pilonidal disease, skin flaps are often required. Several flaps have been developed, including advancement; Bascom cleft lift, Karydak, and Limberg/modified Limberg flap. Flaps require a vascular pedicle but allow for closure without tension ^[18]. The cost of a flap procedure is greater than the cost of excision or other conservative therapy ^[17]; however with a lower recurrence rate of pilonidal disease following flap procedures compared to other treatments, patients may save more on treatment over the long-term.

Advancement Flaps: The V-Y advancement flap and Z-plasty are the most commonly used advancement flaps. The V-Y advancement flap creates a full-thickness V-shaped incision down to gluteal fascia that is closed to form a post repair suture line in the shape of a Y ^[10]. Depending on the size of the defect, the flaps may be utilized unilaterally or bilaterally. A defect as large as 8 to 10 cm can be covered unilaterally; however, defects larger than 10 cm commonly require a bilateral flap ^[18]. The V-

Y advancement flap failed to show superiority to primary closure techniques based on complications, recurrence, and patient satisfaction in a large randomized controlled trial [19].

Z-plasty requires excision of diseased tissue with recruitment of lateral flaps incised down to the level of the fascia. The lateral edges are transposed to increase transverse length [18]. No statistically significant difference in infection or recurrence rates was noted between excision alone and excision plus Z-plasty; however, wounds were reported to heal faster in patients receiving excision plus Z-plasty (41 vs. 15 days).

Cleft Lift Closure: In 1987, Bascom [20] introduced the cleft lift closure for recurrent pilonidal disease. This technique aims to reduce or eliminate lateral gluteal forces on the wounds by filling the gluteal cleft. The sinus tracts are excised and a full-thickness skin flap is extended across the cleft and closed off-midline. The previous space of the gluteal cleft is filled up with the adipose tissue. [21,22]

The classic Karydakias flap consists of an oblique elliptical excision of diseased tissue with fixation of the flap base to the sacral fascia. The flap is closed by suturing the edge off-midline. [23] This technique prevents a midline wound and aims to remodel and flatten the natal cleft.

In the modified Karydakias flap, the same excision and closure is performed without tacking the flap to the sacral fascia, aiming to prevent formation of a new vulnerable raphe by flattening the natal cleft. The infection rate was similar to the classic Karydakias flap, and no recurrences were noted during a 20-month follow-up [24].

Limberg Flap: The Limberg flap is derived from a rhomboid flap. In the classic Limberg flap, a midline rhomboid incision to the presacral fascia including the sinus is performed. The flap gains mobility by extending the excision laterally to the fascia of the gluteus maximus muscle. A variant of the original flap includes the modified Limberg flap (Fig.1) which lateralizes the midline sutures and flattens the intergluteal sulcus. Compared to the traditional Limberg approach, the modified Limberg flap was associated with a lower failure rate at both early and late time points and a lower rate of infection (25,26); however, based on the data it is unclear when primary closure should be favoured over a Limberg flap. Several studies show the recurrence rate to be identical; however, hospital stay and pain were reduced in the Limberg flap group compared to primary closure [27, 28].



Fig 1: Limberg Flap

Laser Therapy

Lasers are emerging as primary and adjuvant treatment options

for pilonidal sinuses. Depilation with alexandrite, diode, and Nd:YAG lasers has demonstrated the most consistent evidence [29-33]. The firm texture and quality of the hair is proposed to incite an inflammatory response with sinus formation; therefore, permanent removal of hair by the use of laser shall help prevent the recurrence of disease.

Material and Methods

To carry out this pilot project in the patients being admitted and operated with the Pilonidal disease at PMCH, including patients with recurrence disease. All patients were prospectively evaluated in terms of gender and age, location of sinus pits, postoperative length of hospital stay, postoperative complications (wound dehiscence, infection, hematoma, seroma and cosmetics) and recurrence.

The Ethical Committee of our centre approved the study protocol.

Inclusion criteria

1. Patients willing to give written informed consent.
2. Presence of recurrent pilonidal sinus.
3. Adult (over 14 years of age) undergoing surgery for recurrent pilonidal sinus.
4. International normalizing ratio (INR) of less than 1.5.
5. Prothrombin time (PT) of less than 15 s.
6. Platelet count greater than 50,000 per mm to limit the risk of bleeding.

Exclusion criteria

1. Patients not willing to give informed consent.
2. Age less than 14 years.
3. Patients with bleeding disorders and deranged haematocrit.

The study was conducted at Pacific Medical college and Hospital, Udaipur between year 2018 and 2020, whereby 90 patients with pilonidal sinus in the sacrococcygeal area were seen and included in the study. After obtaining written informed consent, patients were randomly (using table of random numbers) allocated to undergo either excision or primary closure (group A, n=30) or rhomboid excision and the Limberg flap procedure (group B, n=30) and Open method with no closure (group C, n=30). All patients were operated under spinal anaesthesia.

Methylene blue dye was used intraoperatively to stain the sinus so as to delineating the course and extensions of the sinus and thus achieving thorough debridement by excising all stained tissue to prevent recurrence. The debridement was adequate and comparable in all the groups, and further the defect sizes in all the treatment groups were more or less comparable. Suction drain was routinely used in both the closed groups. Patients were given Intravenous antibiotics for first 24 h followed by oral antibiotics for next 7 days. In group A, a vertical elliptical incision was made that was deepened to reach up to the sacrococcygeal fascia and the lesion was excised. After achieving haemostasis, a suction drain was put in and wound was closed back primarily. In group B, a rhomboid-shaped incision was made, with each side equal in length, around the mouth of the sinus. The incision was deepened and the lesion was excised. The rhomboid flap was then rotated from the gluteal fascia to the excised area without tension. Using interrupted sutures, the subcutaneous tissue and the skin were sutured. In group C, incision made, deepened till sacrococcygeal fascia and the lesion excised, haemostasis checked and the wound packed with antiseptic packing.

Length of hospital stay, duration of inability to work, postoperative infection, wound dehiscence, and postoperative recurrence were recorded. Duration of inability to work was defined as the time from the date of surgery to the date on which the patient returned to normal activities, including employment. The patients were regularly followed up for a period of 18

months. All statistical analyses were performed with the Statistical Package (SPSS) version 15.0. The results were expressed as mean value±standard deviation. The chi-square test was applied for comparison between frequencies. The level of significance was set at $P<0.05$.

Table 1: Comparison of procedure outcome

	Group A	Group B	Group C	P value
Operation time (minutes)	35	75	20	<0.001*
Total hospital stay (days)	4	5	3	<0.001*
Wound infection	6	2.2	4	0.024**,a
Dehiscence of wound	9	2	-	0.048**, b
Duration of inability to work (days)	20	9	26	<0.001*
Recurrence	5	0	3	0.026**, c
Complete healing time (days)	24 ± 6	20 ± 8.22	28 ± 4.56	0.015
Pain VAS score	4(3-5)	2(1-3)	5(4-6)	0.001
Painless toilet seating (days)	2(1-3)	1(1-2)	3(2-4)	0.001
Patient satisfaction	2.5 ± 0.5	3.3 ± 0.44	2.8 ± 0.14	0.002

*Mann-Whitney U test

**Chi-square test

Confidence interval: a 0.54–0.97, b 0.51–1.0, and c 0.57–1.0

Table 2: Clinical comparison, operative characteristics and complications between groups.

Variable	Excision with closure	Limberg Flap	Excision only	p-value
Gender (M/F)	22/8	20/10	23/7	0.750
Age (years)	24	22	26	0.26
Location Midline single	21	18	19	0.65
Midline multiple	9	12	11	
Hirsute Nature	20	21	22	0.84
History of Smoking	18	12	10	0.74
Duration of preoperative complaints (months)	35 ± 12	26 ± 10.4	28 ± 4.05	0.06
Obesity Overweight (BMI 25-29.9)	22	18	19	0.55
Obese (BMI 30-39.9)	5	7	4	
Morbidly obese (BMI X 40)	1	3	5	
Follow up (months)	25	32	36	0.650
Fluid collection	6	4	1	0.64
Hematoma	6.2	3.4	6.6	0.003
Recurrence	5	1	3	

Results

Group A consisted of 22 male and 8 female patients with a mean age of 24 (15–40) years, group B comprised 20 male and 10 female patients with a mean age of 22 (14–38) years and group C comprised 23 male and 7 female patients with a mean age of 26 (17–44). There were no significant differences between the groups with respect to age and sex ($P>0.05$). The operating time was longer in group B. Morbidity developed in 15 patients in group A (infection in 6 patients; wound dehiscence in 9 patients) and in 4 patient in group B (infection in 2 patient; wound dehiscence in 2 patients), 4 patients in group C (infection in 4 patient) ($P<0.05$). The median duration of hospital stay was longer in group A and Group C ($P<0.001$). The median duration of inability to work was 20 days in group A and 9 days in group B ($P<0.001$). Recurrence was detected in 5 patients (8.3%) in group A, with time to recurrence between 5 and 12 months. No recurrences were identified in patients in group B.

The three groups did not differ in age or body mass index. Similarly, the three groups did not differ significantly in terms of sinus pit location or the presence of single or multiple pits. Hospitalization time was also significantly higher in the B group than in the other groups. The median duration of incapacity for work was 20 (18–22) days in group A, 9 (7–12) days in the B group and 26 days (24–28) ($p<0.001$). In KF group, eight patients had infection and four had seroma. Total wound

dehiscence and flap necrosis did not occur in any patient. Eleven patients had seroma with negative culture in all studied patients. Wound infection occurred in six patients in the group A, 2.2 in B group and 4 in group C. The mean time for complete healing of the wound after rhomboid excision and Limberg flap was 20±8.22days.

The median VAS pain score was significantly lower in the group B ($p<0.001$). One recurrence occurred in the patient during the follow-up period in group B; group A and C had recurrence of 5 and 3 respectively. When patient satisfaction was compared, the primary closure group received 2.5± 0.5 points and B group received 3.3 ±0.44; the patients in the open group received 2.8 ± 0.14.

Discussion

Pilonidal sinus was first described by Anderson in 1847 and is often seen in the intergluteal region. This chronic disease is characterized by acute exacerbations.

PS usually occurs in healthy young men (Male/Female = 4-5/1), has a negative cosmetic appearance, and can cause loss of work time. Gurer *et al.* [38] reported a mean patient age of 25.5 and a gender balance of 95% males in a series detailing the Karydakias flap procedure. In our series, the mean age was 23, and more than 72% of the patients were male. Several treatment procedures have been described in the literature, ranging from

simple incision and drainage to the use of complex plastic flaps for cleft obliteration. The ideal technique for the treatment of sacrococcygeal PS disease is controversial ^[27]. Medical treatment methods include alcohol, phenol and silver nitrate injection into the cavity.

Surgical treatment methods include curettage after fistulotomy, leaving an open or marsupialized wound after cystectomy, Bascom surgery, primary excision and closure; the Karydakias flap procedure (KF), or sinus excision and skin graft and flap methods, such as Limberg flap rotation (LF). Surgical treatment is often preferred. Ideally, the goals of treatment for this disease should be reliable wound healing with a low risk of recurrence, a short period of hospitalization, minimal inconvenience to the patient, and low morbidity with few wound-management problems and ensure early return to work ^[34].

Muzi *et al.* studied 260 patients with sacrococcygeal pilonidal disease who were assigned randomly to undergo Limberg flap procedure or tension-free primary closure and concluded that there was no clear benefit for surgical management by Limberg flap over primary closure. Limberg flap showed less convalescence and wound infection, while the technique of tension-free primary closure was a day case procedure, less painful, and shorter than Limberg flap ^[27]. Although in the present study the operation time was longer in Limberg flap group, the hospital stay, inability to return to work, wound-related complications, and disease recurrence were significantly less compared to primary closure group and open group. These findings were comparable with the study by Akca *et al.* ^[34]. Akin *et al.* studied the records of 411 patients with pilonidal sinus disease, which underwent rhomboid excision and Limberg flap, and concluded that the Limberg flap procedure is effective and has a low complication rate, short time for returning to normal activity, and short hospitalization ^[35]. Further studies have been undertaken whereby the classical Limberg procedure has been compared with the modified Limberg procedure. The modified procedure has shown better clinical results than in the classical procedure. The recurrence rate and the time to return to work have been statistically higher in the classical group. The maceration and wound infection rates have been statistically higher in the classical procedure than in the modified Limberg procedure ^[36]. As far as the complications are concerned, in the present study wound infection and dehiscence were observed in 6 and 9 cases respectively, in the primary closure group and 2.2 and 2 in the Limberg flap group and 4 cases of infection in open group. Further, one of the patients had a recurrence in the Limberg flap group. Comparable findings were observed in the study by Mahdy ^[37].

Conclusion

Rhomboid excision and Limberg flap closure is preferable to simple excision and excision and primary closure in the treatment for sacrococcygeal pilonidal disease.

Conflict of Interest: None to declare.

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