A Prospective Study of the Clinical Profile of Pilonidal Sinus Disease at a Tertiary Care Centre in North India - Comparison of Limberg Flap Closure and Z-Plasty in Treatment

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ABSTRACT

BACKGROUND

Sacrococcygeal pilonidal sinus disease is defined as a hair-filled cavity in the subcutaneous fat of the natal cleft (postsacral intergluteal region). This study was done to investigate the prevalence, clinical presentation, body mass index (BMI) as a risk factor; and complications of Limberg flap and Z-plasty, for the reconstruction of defects after excision of sacrococcygeal pilonidal sinus in terms of the incidence of seroma, wound infection, wound dehiscence, flap necrosis, recurrence, duration of hospital stay and time taken for complete wound healing after the procedure.

METHODS

This was a prospective study done on 50 patients from January 2018 to October 2020 at a tertiary care hospital in 15 to 50 years of age group presenting with pilonidal sinus disease.

Statistical analysis was done using SPSS (Statistical Package for Social Sciences) version 15.0 statistical analysis software. Significance was assessed at 5 %.

RESULTS

The mean age of presentation was 25 years with chief complains of swelling, discharge and pain, the mean BMI was 24.39 kg/m^2. Anaerobic infection is more common in the sinus (40 %), and among aerobic organisms, Staphylococcus was the most common organism (19 %). In Limberg flap closure, only one 1 developed wound infection and this same patient had partial wound dehiscence, while in Z-plasty group, 3 developed seroma, 2 wound infections and 2 partial flap ischemia.

CONCLUSIONS

The goals of management of pilonidal sinus diseases include conservative management along with definitive surgical treatment of the disease. Pilonidal abscess is managed by incision and drainage and is followed by definitive treatment, later on. Flap procedures are effective ways to treat the disease, of which Limberg flap is the most reliable flap with minimum complications, lesser hospital stay and faster wound healing.

KEYWORDS

Pilonidal Sinus, Limberg Flap, Z-Plasty

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BACKGROUND

Pilonidal disease includes a pilonidal sinus, pilonidal cyst and pilonidal abscess. Pilonidal sinus disease can affect different areas of the body, but most commonly involves the sacro-coccygeal region of the natal cleft 4 to 5 cm above the anal opening. The most common presentation of pilonidal sinus is a chronic discharging sinus in the sacrococcygeal area in the midline natal cleft. However, extra natal sites, such as finger webs (in hair dressers, barbers, sheep shearers, milkers, dog groomers and people who work in slaughter houses), axilla, perineum, amputation stump, chest wall, umbilicus, ear and supra pubic region may also be involved.[1]

The patient may have a series of openings in the midline or may have secondary lateral openings superior to the midline pit. They mostly present with pain, acute abscess or a chronic discharging sinus. It causes discomfort to the patient and interferes with the education or employment of patients, sometimes for prolonged periods. The origin and the pathogenesis of pilonidal disease is a subject of controversy. It ranges from the age-old congenital theory to the latest, and more accepted hormonal, acquired theory. The occurrence of disease is related to the appearance of hair, for example thick, curly and profuse growth. Various factors include but is not limited to friction in buttock, obesity, local injury, use of tissue papers for cleaning the perineum, and increased duration of sitting and sweating. Other factors implicated are family history, occupation and folliculitis or furuncle over the area. The disease occurs early in females due to the earlier attainment of puberty.[1] The sinus tract is smooth and lined with squamous epithelium. Eventually, the sinus tract leads to a subcutaneous cavity lined by granulation tissue and is filled with nests of hair. The sinus tract openings are actually an extension of the deep cavity.[1] Davage et al.[2] quotes from a personal communication from Dr. K. C. Samuel of the Department of Pathology at Jaipur, India, "Pilonidal sinus is very uncommon in India. Personal cleansing after defecation is by ablution, and toilet paper is never used by the native population."

The diagnosis of this disease is mostly clinical. The patients usually have a waxing and waning course because of the spontaneous drainage from the secondary sinus, which again gets reinfected and a subsequent spontaneous rupture.[1] The sinus usually tracks in the cephalad direction in majority of cases, but in some cases, it may track toward the anus and present as perianal sepsis. Palpation usually reveals a deep induration beneath the skin in the sacral region, with an epithelialized follicle opening. Patients with a chronic discharging sinus without an acute exacerbation, tend to have a recurrent or chronic pilonidal disease. Squamous cell carcinoma after recurrence of pilonidal disease has been described; and when diagnosed, requires an en bloc surgical resection and appropriate oncologic care with local radiation and possibly chemotherapy. Surgical treatment options for this condition include drainage with/without excision, marsupialization, excision with healing by secondary intention, or excision with primary closure. To decreases recurrence rates and chronicity, various other techniques have been described such as Karydaki's flap, Bascom's and modified Bascom's procedure. Transposition flaps, such as Z plasty, V-Y fascio-cutaneous advancement flap, crossed triangular flaps, gluteus maximus musculo-cutaneous flap and rhomboid flap of Limberg, are currently being practiced.[1]

A high incidence of post-operative infections, impaired healing and recurrence, make management of this condition a difficult task. Thus, though the disease is not life threatening, it can cause significant morbidity, considerable time lost from work, which can amount to months, and recurrence. Inspite of a large number of methods of treatment, both non-operative and operative, no single method can be relied upon to cure the condition completely and prevent recurrence. Flap techniques have revolutionized the management of pilonidal disease. Better techniques, lesser incidence of recurrence, lesser morbidity, lesser duration of hospital stay and good patient compatibility, have made such procedures popular and acceptable to patients, with minimal cosmetic disfigurement. Though many flap techniques are practiced, the Limberg's flap is one of the techniques that was found to be efficient in the management of this condition.[1]

Objectives

1. To determine the clinical and demographic profile of pilonidal sinus disease.
2. To compare Limberg flap rotation surgery and closure by Z-plasty, on the basis of outcome, in terms of recurrence upto 6 months of follow up and duration of hospital stay.
3. To compare the above two methods, on the basis of their complications such as wound infection, seroma formation and necrosis of flap.

METHODS

This study was conducted in Department of General Surgery at a tertiary health care hospital in Kanpur, Uttar Pradesh. With proper ethical clearance (IEC No. EC/132/Sept/2020) and informed consent, a prospective study was conducted on 50 patients of symptomatic pilonidal disease from January 2018 to October 2020. Patients were recruited consecutively and divided randomly into two groups of 25 patients each. The sample size is decided according to the past experience of cases of pilonidal sinuses and local guidelines. After proper pre-operative workup and antibiotic prophylaxis, first group (Gp 1) underwent wide excision with Limberg flap reconstruction, and the second group (Gp 2) underwent wide excision with Z-plasty. Authors had a good experience in both surgeries. A working proforma was designed which included demographic data, signs, symptoms, predisposing risk factors, investigations, diagnosis, type of operative technique, operative time, complications (early and late) and outcome.

Surgical Procedure

The patients taken up were operated either under general or spinal anaesthesia. Pre-operative, prophylactic antibiotic

was given, in the form of 1 gm of intravenous ceftriaxone at the time of induction. Patients were placed in prone position and the buttocks strapped apart by adhesive tapes. The operative area was prepared and draped.

In group 1 (Gp-1), a rhomboid area of skin was marked over the sinus involving all midline pits, and lateral extensions if any. The design of the flap was drawn on the skin (Figure 1). Line A-C was drawn. Point C was drawn adjacent to the perineal skin. Point A was placed so that all diseased tissue can be included in the excision. Line B-D transected the mid-point of A-C at right angles, and was 60 % of its length. D-E is a direct continuation of line B-D, and is of equal length to the incision B-A, to which it would be sutured after rotation. E-F is drawn parallel to D-C and of equal length. After rotation, it would be sutured to A-D. The flap consists of skin and fat and is constructed by extending the incision upto the gluteal muscle fascia. The skin is closed after insertion of a drain.[1]

Figure 1. Limberg Flap Reconstruction – Surgical Steps and Outcome

In group 2 (Gp 2), Z-plasty was performed by giving a vertical elliptical incision which was extended down to the post sacral fascia. This was followed by complete removal of all unhealthy tissues with a margin of normal healthy tissue. Two oblique incisions were given by making an angle of 60 degrees with the vertical. (Figure 2)

The drains were removed after when the output was than 30 ml in 24 hours. Patients were discharged from the hospital usually on POD 3-6. Skin sutures were removed on POD 10. Patients were advised to maintain good hygiene. Patients were instructed to come for follow up every fortnightly for 3 months, followed by monthly for at least 6 months. They were advised not to put pressure on the flap for 3 weeks. Patients were evaluated for healing of the wound, oedema, formation of seroma, surgical site infection, flap necrosis, pus culture examination from the discharging sinus, if present, and duration of hospital stay. Operative time was defined as the time between the placements of incision to the last suture applied.

Figure 2. Z-Plasty: Surgical Steps and Outcome

Statistical Analysis

Statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical analysis software. Significance was assessed at 5 % level of significance. Z-test was used to find the significance of study parameters on categorical scale between the two groups. Paired t-test was applied to compare means.

RESULTS

		Number of Patients	Percentage
Gender	Males	42	84%
	Females	8	16%
Age group	20 - 24	21	42%
	25 - 29	12	24%
	30 - 34	9	18%
	35 - 40	8	16%
	Mean age ± SD	25 ± 5.73	-
Occupation	Farmer	13	26%
	Clerk	3	6%
	Driver	4	8%
	Housewife	4	8%
	Shopkeeper	9	18%
	Student	17	34%
Body mass index	18.5 – 24.9 (normal)	32	64%
	25 – 29.9 (overweight)	16	32%
	More than 30 (obese)	2	4%
	Mean +/- SD	24.39 +/- 3.07	
	Range	19.5 – 32.9	

Table 1. Demographic Data (Age, Gender, Occupation, BMI)

		Number of Patients	Percentage
Symptoms	Swelling	36	72%
	Discharge	19	38%
	Pain	44	88%
	Past intervention	39	78%
Examination findings	Swelling	41	82%
	Sinus	50	100%
	Discharge	47	94%
	Abscess	14	28%
	Deep natal cleft	50	100%
Organism cultured	Staphylococcus aureus	9	19%
	Pseudomonas aeroginosa	3	6%
	Escherichia coli	5	11%
	Proteus mirabilis	7	15%
	Bacteroides fragilis	19	40%
	Mixed growth	4	9%
Type of organism	Aerobic organism	24	51%
	Anaerobic organism	19	40%
	Mixed growth	4	9%

Table 2. Clinical Profile and Bacteriology

Parameter	Limberg Flap	Z Plasty	P - Value
Wound infection	1 (4%)	7 (28%)	0.0209
Seroma	0	4 (16%)	0.0366
Partial flap ischemia	1 (4%)	3 (12%)	0.29834
Flap necrosis	0	0	-
Partial wound dehiscence	2 (8%)	9 (36%)	0.0168
Complete wound dehiscence	0	0	-
Duration of hospital stay (days)	5.43 +/- 2.38	6.84 +/- 2.42	0.0432
Time taken for complete healing of wound (days)	14.93 +/- 5.02	22.17 +/- 7.42	0.0002
Recurrence	2 (8%)	3 (12%)	0.6384

Table 3. Comparison of Post-Operative Outcome and Complications between Limberg Flap and Z Plasty

DISCUSSION

Pilonidal Sinus is a disease affecting the younger population, causing significant discomfort and morbidity. Patients seek medical help when complications arise. Early presentation to the surgery out-patient department (OPD) and initiation of treatment reduces distress, absentee from work and economic losses.

Sex Prevalence

In the present study, a total of 54 patients were enrolled; out of which 4 patients lost to follow-up. Out of the total enrolled patients, 84 % patients were males while 16 % were females. Hence, it can be concluded that the disease is more common in males when compared to females with a sex ratio of male : female 5 : 1.

Study conducted by Vernadalis el al.[3] on 111 patients, 92 (82.8 %) of which were men and 19 (17.2 %) were women and they found the ratio of 5 : 1, consistent with our study, while in the study conducted by Hemmat Maghsoudi et al.[4] on 150 patients (131 men and 19 female) found the ratio of 6 : 1.

Age Prevalence

In present study, 42 % of patients were from the age group of 20 - 24 years, 24 % of patients were from age group of 25 - 29 years and there after the incidence of disease decreased. The mean age of presentation was 25 years.

In study conducted by Hemmat Maghsoudi et al.[4] the mean age of presentation was 22.1 years and in the study conducted by Oner Mentes et al.[5] the mean age of presentation was 22.49 years. This depicts better awareness about the disease, early presentation leading to early definitive management at an earlier stage in the western world.

Clinical Presentation

In present study, the most common complaints with which patient came in decreasing order of frequency were pain (88 %), swelling (72 %), and discharge (38%). Study conducted by Oner Mentes et al.[5] they found that 70 % of patients presented with swelling and pain and 20 % of patients came with discharge, while in the study conducted by Sondenaa et al.[6] they found that 79 % patient presented with pain and 75 % patients had chief complain of swelling along with pain.

Body Mass Index as a Risk Factor

In this study, 64 % of patients had normal BMI, while only 32 % of patients were overweight but the average body mass index noted is 24.39 kg/m^2 implicating that obesity is not a significant modifiable risk factor.

In a clinical trial conducted by Cubukçu A, Carkman S et al. containing 419 cases and 213 controls, BMI was reported to be slightly higher amongst cases as compared to control, but the difference was not statistically significant.[7] Another study conducted by Cubukcu, Gönüllü NN et al. stated that obese patients with high BMI have a higher risk of recurrence of pilonidal sinus disease after surgical intervention.[8] In a recent study conducted by Balik O, Balik AA et al. that included 125 patients and 125 controls revealed that sacrococcygeal subcutaneous fatty tissue is thicker in the patient group.[9] Study done by Ali Harlak, Oner Mentes,[5] revealed that obesity is a relatively less important risk factor for pilonidal sinus. They found that 74 % of patients were of normal BMI and only 28 % were overweight.

Investigation

Diagnosis of pilonidal disease is clinical and there are no specific investigations required to confirm the diagnosis. However, in patients presenting with a discharging sinus, a sample was sent for culture & sensitivity, and appropriate antibiotic treatment was given. The most common organisms that were isolated were the anaerobes (40.42 %) followed by *Staphylococcus aureus* (19.14 %) and mixed growth was noted in a few (8 %). S. Chintapatla et al.[10] cultured the discharge of pilonidal sinus and found that anaerobes were most common organism (46 %) cultured.

Management

Maintenance of proper personal hygiene and shaving of the area was advised to all patients. Patients who presented with an abscess underwent an emergency incision and drainage procedure was done with all aseptic precautions and broad spectrum antibiotics post procedure was started. Dressing was done on a daily basis till the inflammation and oedema had subsided and were subjected definitive surgery like wide local excision, Limberg flap closure or Z-plasty subsequently.

Out of the total patients who were decided upon definitive surgery; 50 % of the patients had undergone Limberg flap procedure, 50 % of the patients had undergone Z-plasty procedure.

Complications

Out of 25 patients who had undergone Limberg flap closure (Gp1), only one 1 (4 %) developed wound infection and 2 (8 %) had partial wound dehiscence. While in Z-plasty group (Gp2), 7 (28 %) patients developed wound infection, 4 (16 %) patients had seroma formation and 1 (4 %) had partial flap ischemia. The wound infection was controlled with use of wide spectrum antibiotics.

In the limberg flap group (Gp1), the most common complication was partial wound dehiscence and overall incidence of complications was 16 %, while the other studies done by Katsoulis et al.[11], Akin et al.[12] and Urhan et al.[13] mentions them as 16 %, 15.75 % and 7 % respectively. The rate of wound infection, seroma formation and flap ischemia were found to be 28 %, 16 % and 12 % respectively in current study in the Z-plasty group (Gp2).

While according to the study done by Rao et al.[14] these rates are 7.5 %, 12.5 % and 7.5 % and in the study group of Fazeli et al.[15] the rate of these complications were 9.7 %,13.5 % and 11.5 respectively.

Recurrence Rate

In the Limberg flap group (Gp1), the recurrence rate seen in current study was 8 %. In the study done by Urhan et al. Mentes et al. and Akin et al.[13] it is mentioned as 4.9 %, 1.26 % and 2.91 % respectively.

In the Z-plasty group (Gp2) the recurrence was noted in 12 % cases. In the study done by Behdal & Hosseinpor and Parveen et al.[16] the recurrence rate is mentioned as 3.3 % and 5 % respectively. There was no significant difference between the two groups in terms of recurrence. (P = .6384)

Time Taken for Healing

The time taken for wound healing was lower in patients undergoing Limberg flap procedure. (P = .0002). In patients undergoing Limberg flap procedure, the mean healing time noted in the present study was 14.93 ± 5.02 days, while Katsoulis et al.[10] noted it to be 13.65 days. In patients undergoing the Z-plasty, the healing time was noted as 22.17 ± 7.42 days, while the western studies (Gaber R Asmaa et al.)[17] mentions it as 18 days.

CONCLUSIONS

Pilonidal disease is a disease usually of the natal cleft affecting young adults with mean age of presentation of 25 years and a male to female ratio of 5 : 1. Patients may have asymptomatic pits, or present with a painful discharging sinus (88%) or abscess. It was found to be more common in patients with a high BMI (mean 24.39) and deep natal cleft. Anaerobic infections were the most common (40 %) and among aerobic organisms, Staphylococcus was found to be the most common organism (19 %). There are a wide variety of treatment options, both surgical and non-surgical that are advocated in the management of pilonidal disease, with their own advantages and disadvantages, with respective complications and recurrence rates.[1] Transposition flap procedures are effective methods to treat this disease, of which Limberg flap had better results in terms of lesser complications, faster wound healing, and a lesser duration of hospital stay. However, no difference in recurrence rates was observed between a Limberg Flap and a Z-plasty.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.
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