

Original Research Article

Prospective randomized study of surgical treatment of pilonidal sinus; primary midline closure after elliptical excision versus rhomboid excision with limberg flap reconstruction versus open excision and healing by secondary intention

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Received: 16 August 2017

Accepted: 28 September 2017

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ABSTRACT

Background: Best surgical treatment of pilonidal sinus is always challenging for a surgeon in term of recurrence. Evaluation of surgical treatment of pilonidal sinus; primary midline closure after elliptical excision versus rhomboid excision with limberg flap reconstruction versus open excision and healing by secondary intention of sacrococcygeal pilonidal disease.

Methods: In this prospective randomized study of 75 patients of sacrococcygeal pilonidal sinus were divided into 3 equal groups through randomly assigning the type of surgery. 25 patients of each group. Group I was operated by primary midline closure after elliptical excision, Group II rhomboid excision with limberg flap reconstruction and Group III open excision and healing by secondary intention.

Results: Data was assessed between three groups in term of operative time, healing time and recurrence over a follow up period of 1 year. Mean operative time in group I (primary midline closure after elliptical excision) was 38.7 ± 5.1 minutes, group II (Rhomboid excision with Limberg flap reconstruction) was 124.2 ± 5.6 minutes, group III (Open excision and healing by secondary intention) was 20.6 ± 5.6 minutes. Mean healing time for group I was 19.0 ± 7.4 days, for group II was 17.0 ± 8.0 days and for group III was 60 ± 9.6 days. Recurrence occurred in 3 patients in group I and nil in group II and III.

Conclusions: Rhomboid excision with limberg flap reconstruction is better choice than primary midline closure after elliptical excision and open excision in terms of healing time and reoccurrence in cases of sacrococcygeal pilonidal sinus.

Keywords: Limberg flap, Primary closure, Pilonidal, Secondary intention

INTRODUCTION

Pilonidal means a ‘nest of hairs’ and sinus is a tract. Sacrococcygeal pilonidal diseases first described by Herbet in 1833 as a hair containing sinus.¹ In 1880 Hodge termed it as ‘Pilonidal’ taken from Latin, means ‘nest of hairs’ indicating disease consisting of hair containing sinus in sacrococcygeal area.² During second

world war the disease was common in jeep drivers, which led to it being known as ‘jeep disease’.

This disease commonly occurs in young, hairy males after puberty, when sex hormone is known to affect pilosebaceous glands and rare after age of 40 years.^{3,4} Males are more affected than female, probably due to hirsute nature.⁵ Disease is more common in Caucasians

than Asians or Africans due to different hair characteristics and growth pattern.⁶ Disease carries high postoperative morbidity and patient discomfort Kary dakis suggested three main factors interacting to produce disease namely hair, force and vulnerability like obesity and family history.^{7,8} Some researchers have proposed that pilonidal sinus may be the result of congenital pilonidal dimple.⁹ Excessive sweating can also contribute to the cause of pilonidal sinus. Moisture can fill a stretched hair follicle, which create a low oxygen environment that promotes the growth of anaerobic bacteria, often found in pilonidal sinus. The presence of bacteria and low oxygen levels hamper wound healing and exacerbate in forming pilonidal sinus.¹⁰

Pilonidal disease is associated with visible pits in the midline of natal clefts, which have microscopic appearance of enlarged hair follicles.¹¹ The enlargement is due to stretching of the follicular openings caused by the weight of buttocks being pulled by gravity.¹¹ Hair acts as a foreign body causing an inflammatory reaction and can lead to prolonged inflammation and lead to chronic pilonidal diseases. Pain in 84% and discharge in 78% are the two most frequent presenting symptoms.¹² Pilonidal sinus disease may present as asymptomatic, acute, chronic or recurrent condition (Miller and Harding, 2009).¹³ Recurrence rate of pilonidal sinus varies depending on treatment, method and length of follow up, but can be up to 5% (Velasco and Dunlap, 2009).¹⁴

Early recurrence is due to failure to identify one or more sinuses at the time of incision and drainage. Later recurrence is usually due to tension in midline cleft and a secondary infection caused by further build up hair or other debris (Ichanzada and Samael, 2007).¹⁵ Repeated infections of the scar or inter gluteal cleft anatomy formation promoting the accumulation of perspiration, friction and tendency for hair to grow into the scar.⁷ Management is variable and guided by the clinical presentation and extensiveness of the disease.^{14,16-18}

Many procedures right from conservative management to various surgical procedures including shaving, incision and drainage, phenol application, cryosurgery, excision with primary closure, excision and open packing, excision with marsupialization, and recently, flap surgeries. None of them is considered as perfect as far recurrence of diseases is concern.¹⁹ The aim of study was to evaluate which procedure is better as far operative time, healing time and recurrence is concern.

METHODS

Study of surgical treatment of pilonidal sinus carried out in 75 patients at Punjab institute of medical sciences, Jalandhar during the period from January 2013 to May 2017. Twenty-five patient each group I treated by primary midline closure after elliptical excision, group II treated by Rhomboid excision and Limberg flap reconstruction where another 25 patients of Group III

were treated by open excision and healing by secondary intention. Nature of surgical procedures was explained to the patients and informed consent was taken from patient's approval from ethical committee for the study was obtained.

Patients with recurrent disease were excluded. Hair of gluteal and sacral region were shaved on the day of surgery in the morning and rectal enema given to patient at night. All the patients were operated under spinal anaesthesia. On prone position buttocks were retracted with adhesive tape for better visualization of operated field. All the three options were explained to the patient and randomly we selected the patients after taking informed consent from patients. Patients were also explained regarding recurrence of fistula in informed consent.

Group I: Primary midline closure after elliptical excision

An alcoholic solution of gentian violet in 3 ml syringe was used to strain the entire tract by injecting into the external opening using the stub of 21 G needle that has been broken about 3-5 mm from the stub. Methylene blue was injected through the external opening of sinus tract. All the tracts were excised in elliptical vertical incision up to pre- sacral fascia. Risk of recurrence or of developing wound infection after surgery is higher than wide excision and healing by secondary intention. The risk of recurrence is reduced by using a wound technique in which line stitches was moved away from between the buttocks. Depending upon the excision four to eight 1.0 propylene (prolene) deep full thickness mattress sutures including pre- sacral fascia and crossing symmetrically through both sides of elliptical incision placed first before tightening proper haemostasis is secured by using minimum cautery. In between 3.0 polypropylene interrupted mattress sutures applied. 1.0 polypropylene suture removed after 10 days and 3.0 sutures after 2 weeks.

Group II: Rhomboid excision and Limberg flap reconstruction

Skin is marked for rhomboid shaped excision. A right sided or left sided Limberg transplantation flap, in incorporating gluteal fascia, was fully mobilized on its inferior edge and transported medially to fill rhomboid defect, (excised area). Subcutaneous tissue and skin were sutured separately without tension using polyglactin and polypropylene interrupted sutures. Stitches were removed on 10th day. In both groups no drains were used and dressings were done on alternate days.

Group III: Open/Wide excision and healing by secondary intention

After injecting methylene blue into sinus tract. Wide excision of an elliptical wedge of skin and subcutaneous tissue down to pre- sacral fascia is designed to remove all

the inflamed tissue along with sinus tract and debris allowing the wound to granulate from its base. The excised dimensions were of sufficient width at both the mouth and base of the wound to allow dressing packing with ease.

Wound is not closed but left open to heal by natural processes (healing by secondary intention). This usually requires several weeks to months of regular dressings until it heals fully. The advantage of this method is that all the inflamed tissue is removed and chance of recurrence is minimum.²⁰ Healing time was defined as complete re-epithelization of the wound.

Recurrence was defined by re-existence of sinus openings in anatomic exploration whether associated with symptoms or not. Recurrence if there was confirmed by sinogram. Operative period was recorded from time of incision to wound closure. Postoperative management included pressure dressings, low residue diet until post-operative day 3, 5, and inspection of dressings on post-operative days 5 and 8. Instructions on discharge included avoidance of prolonged sitting, riding bicycles or scooters until 6 weeks postoperatively to prevent wound disruption, improving local hygiene, and regular

removal of hairs by shaving or depilatory cream. Postoperative mobilization time was defined as the time required for walking comfortably without significant pain or tension. Follow up was done after 2 weeks, 4 weeks and 3, 6 and 12 months for first year after surgery.

RESULTS

75 cases had undergone three different operative procedures. Of the 75 patients 72 (96%) were male. Mean age was 20.2 years. Mean operative time in group I (Primary midline closure after elliptical excision) was 38.7 ± 5.1 minutes, group II (Rhomboid excision with Limberg flap reconstruction) was 124.2 ± 5.6 minutes, group III (Open excision and healing by secondary intention) was 20.6 ± 5.6 minutes. Mean healing time for group I was 19.0 ± 7.4 days, for group II was 17.0 ± 8.0 days and for group III was 60 ± 9.6 days. Recurrence occurred in 3 patients in group I and nil in group II and III. Rhomboid excision with Limberg flap reconstruction is better choice than primary midline closure after elliptical excision and open excision in terms of healing time and reoccurrence in cases of sacrococcygeal pilonidal sinus and it provide a more efficient flattening of the natal cleft without wound tenderness.

Table 1: Age and gender distribution.

Characteristic	Group-1 (N=25)	Group-2 (N=25)	Group-3 (N=25)	p-value
Mean age	20.2	20.2	20.2	N.S
Male	24	23	25	N.S
Female	1	2	0	N.S
Preoperative VAS				N.S

Table 2: On post Hoc Tukey's test ($p < 0.05$).

Variables	Groups	Mean	SD	p- value
Operative time (in minutes)	1 (n=25)	38.7	5.1	<0.05
	2 (n=25)	124.2	5.6	
	3 (n=25)	20.6	5.6	
	Total	61.17	5.8	
Healing time (in days)	1 (n=25)	19.0	7.4	<0.05
	2 (n=25)	17.0	8	
	3 (n=25)	60	9.6	
	Total	32	8.1	

Table 3: Distribution according to recurrence.

Recurrence	Groups		
	Group-1 (N=25)	Group-2 (N=25)	Group-3 (N=25)
Yes	3	0	0
	12%	0%	0%
No	22	25	25
	88%	100%	100%
Total	25	25	25
	100.0%	100.0%	100.0%

DISCUSSION

Number of procedures has been advocated for treatment of sacrococcygeal pilonidal sinus and the fact that no single procedure is superior in all respect. Though surgical treatment of chronic pilonidal sinus by excision of the diseased tissue down to sacrococcygeal fascia is accepted but how to fill the defect is always a matter of debate. There are number of techniques right from simple drainage, curettage and removal of hair to flap techniques. Some pilonidal sinuses can be treated by scrapping away in grown hairs and other debris from sinuses before sealing the area with the special absorbable glue called fibrin glue. Complete excision of the sinus is widely practiced, but controversy remains about what to do with the wound after excision.²¹ Excision and packing, excision and primary closure, marsupialization, and flap techniques are surgical procedures that have been developed for treatment of pilonidal sinus.²² Despite the controversy about the best surgical technique for the treatment of pilonidal sinus, an ideal operation should minimize financial cost, allow patients to return earlier to work, be simple to perform, not require a prolonged hospital stay, inflict minimal pain, and have a low disease recurrence rate.^{23,24}

Open excision and healing by secondary intention technique wound is left open and packed with dressings. It is associated with long hospitalization, frequent dressings, increased post-operative morbidity, loss of work days and poor cosmetic outcome due to wide unacceptable scars.²⁵

Primary closure of the wound is a simple technique but it may have high recurrence rate due to continuing deep natal cleft.²⁶ We had overcome with this problem by properly outlining the tracts by injecting methylene blue before giving incision and secondly by taking 3-4 mattress sutures from deep through sacrococcygeal fascia, which were tightened after securing haemostasis, and then in between sutures were applied. Excision with flap procedure have low recurrence rate but are technically more demanding and are best for recurrent pilonidal sinus.²⁷

Closure of the wound is more cosmetically acceptable for some patients and is associated with a shorter healing time and time off work. However, this potential benefit is offset by the need for bed rest for up to one week in hospital and chances of infection returning are higher than with wide excision.²⁸ When infection intervenes, the wound must be laid open and healing time is longer than if the wound had been treated by secondary intention in the first place. The scar can be sited over the midline or displaced laterally with one-year recurrence rates of 18% and 10% respectively.⁶ Excision and primary closure technique causes restriction of activity because of tissue tension and most of patients complain of wound tenderness after surgery. Bascom has proposed a method to incise, drain and curette a chronic abscess through a

lateral incision combined with excision of any midline pits with a minimal amount of surrounding tissue.²⁹ A section of the wall of the abscess cavity opposite the incision is raised as a flap and used to close the communication between the midline pits and the abscess cavity. This is accomplished by suturing the flap to the underside of the skin bridge formed between the incision and the midline. In a recent study of 218 patients treated with Bascom's procedure as day cases, 6% developed a postoperative abscess requiring drainage and 10% had recurrence requiring further surgery at mean follow up of 12.1 months (range 1-60 months).¹⁹

Healing by secondary intention has the advantage of allowing free drainage of infected material and debris. However, patient need regular dressings and discomfort of packings/dressings until the wound completely heals.³⁰ Wide excision and healing by secondary intention: Wide excision of an elliptical wedge of skin and subcutaneous tissue down to the pre-sacral fascia is designed to remove all the inflamed tissue and debris allowing the wound to granulate from its base. The excised dimensions should be of sufficient width at both the mouth and base of the wound to allow packing with ease. The base itself should be relatively flat and of almost comparable size to the mouth of the wound. A narrow V-shaped wound without a flat base is more difficult to pack and has a tendency to bridging and subsequent infection. The procedure necessitates hospital stay for a few days postoperatively.

The principal advantage is a low recurrence rate but the downside is a lengthy healing time (8-10 weeks) and high direct and indirect costs associated with inpatient care, follow-up wound care and days lost from work.²⁰ Despite this there is a role for wide excision in those with extensive chronic disease and following failed primary closure surgical technique. A modification of the standard excision is 'marsupialization'. The skin edges are not excised, but are sutured to the sides of the wound. The mean healing time in 125 patients who underwent this procedure was shown to be four weeks with a recurrence rate of 6%.³¹

Excision with reconstructive procedures: These procedures are more technically demanding and are probably best performed by a plastic surgeon. Their use is generally restricted to recurrent complex pilonidal disease. The theory behind the majority of procedures is to reshape and flatten the natal cleft to reduce friction, local warmth, and moisture and hair accumulation. Karydakis pioneered a procedure raising a flap to overlap the midline with the scar sited to one side to reduce postoperative hair entry.³² Alternative techniques use a flap of both skin and muscle or a Z-plasty flap to close the defect following excision.²⁸ All these techniques require a week or more of bed rest in hospital.

Recurrence depends upon depth of natal cleft, left over primary residual sinus tracts and a dead space which opens at the gravitational pit of cleft, obesity and

improper hygiene are contributing factors for recurrence. Literature has documented a recurrence rate of 0-3% for Limberg flap against a significantly high recurrence of 7-42% for primary closure.^{26,33-38} Our study also three recurrences in primary closure and nil in case of Limberg flap group and nil in 3rd group where healing was by secondary intention. Our results also support those patients in primary closure group walked freely without significant pain after a relatively longer period than patients treated with flaps because of the tension created by the primary suture technique. The rate of postoperative recurrence was noted in primary closure group rather than other two groups. Some authors still believe that primary closure is better in small defects.

CONCLUSION

Pilonidal disease is a complex condition that causes both discomfort and embarrassment to sufferers. Direct costs to the healthcare system and indirect costs through absence from work are high. Incision and drainage (with curettage) is recommended for treatment of pilonidal abscesses. Wide excision and healing by secondary intention is the recommended treatment of most chronic disease. Shorter hospital stays, earlier healing, shorter time off work, lower rates of recurrence, and lower pain perception are the main advantages of flap techniques relative to open excision and healing by secondary intention. As far recurrence is concerned, chance of recurrence is less in flap treatment and wide excision as compare to primary closure. Finally, we recommend the use of Limberg flap reconstruction because its results were superior to Primary closure technique and wide excision & healing by secondary intention.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Kumar R, Hastir A, Walia RS, Goyal S, Kaur A. Prospective randomized study of surgical treatment of pilonidal sinus; primary midline closure after elliptical excision versus rhomboid excision with limberg flap reconstruction versus open excision and healing by secondary intention. *Int Surg J* 2017;4:3646-51.