

## Comparison Between Primary Closure and Open Technique for the Surgical Treatment of Pilonidal Sinus

Muhammad Javed Shakir, Ahmed Sohail, Muhammad Zubair, Sajid Aziz and Yasser Bilal

**Objective:** To compare the two different surgical techniques for the treatment of pilonidal sinus- primary closure and open technique in respect of hospital stay, duration of healing time and rate of recurrence.

**Material and Methods:** This prospective randomized study was conducted in the Department of Surgery, Fatima Memorial Hospital, Lahore from January 2003 to December 2008. A total number of 42 cases of chronic pilonidal sinus, all belonging to Pakistani nationality were identified and divided in two groups randomly. Patients in Group A were treated by excision and primary midline closure of the defect while in Group B the wounds were left open after excision to be healed by granulation. Four patients were lost at follow up. The remaining 38 cases, 32 males and 6 females, were finally analyzed. Mean follow up period was 2.5 years .

**Results:** The mean hospital stay was 5.5 days in group A while 8.2 in group B ( $p=0.025$ ). The mean healing time was much shorter in group A than group B which is statistically significant ( $p=0.001$ ). Complications in both groups were comparable.

**Conclusion:** Excision with primary closure of the defect has less morbidity and is a cost effective way of treating chronic pilonidal sinus.

**Key Words:** Pilonidal sinus, primary closure, open technique

### Introduction

The term "pilonidal" is of Greek derivation and means "nest of hair". In its more usual form this disease consists of a sinus or fistula situated a short distance behind the anus and generally containing hair. Other rare sites for this condition are umbilicus, axilla, clitoris, inter-digital webs of hands and feet. Most pilonidal sinuses resolve without treatment by the age of 40 years irrespective of the method of treatment (Clothier et al, 1984).<sup>1</sup>

Because of the uncertainty as to its etiology and the considerable difficulties often encountered in its treatment, a formidable and controversial literature has arisen in connection with pilonidal sinus.

Pilonidal sinus is the disease in which definite cure is usually achieved. For the surgical treatment of pilonidal sinus different methods are described such as:

- i. To lay open after excision of sinus
- ii. Marsupialization
- iii. Primary closure of wound after excision of the track with healthy tissue around
- iv. Closure by different plastic techniques like Z-plasty Karidakis, thiersch grafting etc. All techniques have their own advantages and disadvantages so no consensus has emerged. However, the ideal treatment of pilonidal sinus

should provide a high chance of cure with minimum complication and low recurrence rate and should have a minimum hospital stay with early return to work.

In this prospective study two different surgical techniques for the treatment of pilonidal sinus primary closure and open technique were compared in respect of hospital stay, duration of healing time and rate of recurrence.

### Historical Background

Pilonidal sinus was recognized in 1833 when Mayo reported a young woman with a hair containing sinus in the sacrococcygeal region. It was described by Anderson<sup>2</sup> in 1847 in a paper entitled "Hair extracted from an ulcer". Hodges<sup>3</sup> in 1854 coined for it the expressive term pilonidal sinus and proposed a theory of congenital origin. The early embryological studies by Mallory<sup>4</sup> and others as well as more recent autopsy findings of subcutaneous squamous epithelium lined spaces in subcutaneous tissue removed from the region of the sacrum and coccyx have led some to conclude that a congenital origin is the primary and essential anatomical factor in the development of this clinical and pathological entity.

Since Patey and Scharff<sup>5</sup> reopened the debate of pathogenesis in 1946, the evidence has weighed

heavily in favor of an acquired nature for all but the rare case of sacrococcygeal pilonidal disease. These investigators believed that the friction produced by the natal cleft was probably responsible for producing the sinus. Brearly in 1955 postulated that hair become clustered in a drill like form that enters the skin, and that with shedding the hair are drawn further into the sinus, thus increasing its depth. He referred to the first stage as a punctured sinus and the second stage as a suction sinus.

The theory that pilonidal sinus is acquired was given further support by the reports of Franckowaik and Jackman<sup>6</sup> (1962) who analyzed 354 patients with pilonidal disease seen at Mayo Clinic from 1950-1975. In their opinion 90% of cases were acquired and only 10% satisfied the criteria for a congenital origin. They also mentioned the similarity of most of cases of pilonidal disease to the acquired pilonidal sinuses in the inter-digital webs of barber's hand and to a similar condition developing in the umbilicus of people who did not bath often.

Indeed, pilonidal sinuses containing wool grass, animal hair, and hair of a colour different from that of the patient have also been reported.<sup>7,8</sup> So common was pilonidal sinus among jeep riders in the second World War that it became known as a "jeep bottom". Casberg (1949)<sup>7</sup> reported 78,924 admissions to army hospitals from 1941 to 1945 for pilonidal disease.

Sacrococcygeal pilonidal disease afflicts young adults after puberty.<sup>3,25</sup> In a population study of Minnesota college students, pilonidal sinus was noted at routine physical examination in 365 (1.1%) of 31497 males and 24 (0.11%) of 21367 females,<sup>4</sup> but proportionately more females undergo treatment and so the ratio of patients treated is closer roughly 4:1.4.

## Patients and Methods

This study was conducted in the Department of Surgery, Fatima Memorial Hospital, Lahore from January 2003 to December 2008. A total number of 42 cases of chronic pilonidal sinus, all belonging to Pakistani nationality were identified and treated surgically. Four patients were lost at follow up. The remaining 38 cases, 32 males and 6 females, were finally analyzed.

Mean follow up period was 2.5 years (range one year to five and half years). All patients with chronic pilonidal sinus having one or two openings in natal cleft at sacrococcygeal region presented to department of surgery for treatment were included in the study. Patients having more than two sinuses

or having the evidence of recent infection (acute abscess formation) were excluded from the study. Similarly patients with recurrent disease, or having some specific local disease like tuberculosis, malignancy or who were diabetics were excluded.

## Management Protocol

Once the patient presented to the hospital, relevant history was obtained and complete physical examination was performed to ascertain the diagnosis and to assess the general condition of the patient and recorded. Routine investigations were carried out. All the patients were admitted a day before surgery and were randomly divided into two groups - group A and group B.

On the preoperative visit before scheduled surgery, all the patients were reassured and explained about the anaesthetic and surgical management. Patients belonging to group A were treated by surgical excision and primary closure of the defect and the patients belonging to group B were treated by excision of pilonidal sinus and the wounds were allowed to granulate from the bottom (open technique).

All patients were operated under general anaesthesia in Jackknife position. The natal cleft area was shaved. Both surgical techniques adopted by us are discussed here.

### Closed Technique (group A)

In this technique a limited area of skin (1-1.5cm) around the sinus/es was incised down to sacral fascia and the whole eclipse of mass was removed. Careful search was made for secondary tracts and, if found were excised subcutaneously with one cm healthy margin of fat. Haemostasis was secured carefully with diathermy.

The adjacent flaps of skin were undermined over the sacral fascia and brought together. A closed series of deep sutures of polypropylene (prolene) No.1 were inserted on a large 1/2 circle needle. These were passed at the interval of about 2.5cm from one another and about 2cm from the skin edge. Each stitch emerged in the wound at the junction of fat with fascia on the back of coccyx and sacrum. It then took a bit of the fascia roughly in the midline and was passed in the reverse direction from fat to skin through the opposite side wall as shown in (figure 1).

The ends of deep sutures were clipped with forceps and left untied, while actual skin edges and immediate subcutaneous fat were united by a close series of vertical mattress sutures of silk No. 2/0, tied

as they were inserted after placing a suction drain in (Radivac system). When the skin wound had been completely closed, a thick roll of gauze was applied and deep sutures were tied firmly over it thus approximating the sides of the wound to one and other and to the back of sacrum and coccyx.

Further gauze pieces and cotton wool were then placed over the anchored dressing and kept in position by several transverse strips of elastic strapping. After recovering from anaesthesia, patients were shifted to ward. Proper analgesia, therapeutic antibiotics and fluids were given. Drain was removed on 2nd day and deep sutures were removed on the 4th postoperative day. Wound was examined for early complications and patients were discharged usually on the next day. Patients were asked to follow in out patient clinic. Remaining sutures were removed on the 10th day and patients followed for at least one year at regular intervals of 3 months for the evaluation of late complications.

### Open Technique (group B)

In this technique after excision of the sinus at the natal cleft along with healthy tissue around down to sacrum securing the haemostasis, the cavity was packed with pyodine soaked gauze. This pack was removed after 48 hours of surgery and the patients were treated with daily sitz bath followed by dressing for a few days in the ward and then in the out patient clinic with weekly review by the treating surgeon till complete healing of the wound. Patients were asked for follow up at 3 months' interval for the evaluation of late complications.

Postoperatively wounds were examined regularly and different complications were recorded. The wounds were said to be infected if there were signs of acute inflammation along with the presence of pus positive for bacteria on cultures. Wound dehiscence was defined as if there was gaping of skin edges of one cm in length and more than one cm in depth. Occurrence of infection in these gaping wounds was identified by culture.

Complete healing was defined as when there was no pain, tenderness, swelling or redness and there was no raw area at operation site. After complete healing of wound patients were followed up at 3 months interval for the evaluation of recurrence at least for one year. Recurrence of the disease was labeled when there was a non healing sinus with or without discharge of pus.

Results of study were analyzed statistically. Student t test was applied for the evaluation of age, sex, hospital say and duration of wound healing. The rate of complications was analyzed by Fischer's exact test.

## Results

Each group consisted of 21 patients. Four patients were excluded, three from group A and one patient from group B from the study due to lack of follow up. Eighteen patients from group A and 20 patients from group B were finally analyzed statistically.

Maximum number of patients were in their third decade of life (**Table-1**).

The sex distribution was 32 (84.2%) male and 6 (15.50%) female patients (**Table-2**). This study showed that pilonidal sinus was more common in male patients.

The mean hospital stay was 5.5 days (SD  $\pm 2.25$ ), ranging from 3-11 days for the group A and 8.2 days (SD  $\pm 4.83$ ), ranging from 4-19 days for the group B (**Table-3**). The p value is 0.025 which is statistically significant.

The mean healing time was 22.49 days (SD  $\pm 9.4$ ) in group A while 52.15 days (SD  $\pm 19.6$ ) in group B (**Table-4**). The p value is less than 0.001 which is highly significant.

Complications after these two different surgical procedures are presented in (**Table-5**).

Early postoperative complications were infection in two patients (11.1%) in group A and four patients (20%) in group B. In group A aseptic partial gaping of wound after removal of stitches in 2 patients was done and none in group B. All cases were managed conservatively.

There were 2 (11.11%) cases of recurrence after complete healing in group A which developed after 5 and 7 months and was treated by open technique while recurrence was reported in 3 (15%) cases belonging to group B and were excised again and left open to heal by granulation.

## Discussion

When considering how to treat sacrococcygeal pilonidal sinus disease it is important to remember that the condition is merely a particular form of foreign body granuloma. The acute pilonidal abscess contains pus under pressure with signs of acute inflammation and the chronic sinus is a blind tract lined with granulation tissue containing shed hair but no hair follicles. The secondary tract which connects the deep part of the primary tract to the sinus opening lying to one or other side of the midline has the appearance of any ordinary fistula.

Because of considerable difficulties often encountered in its treatment, a formidable and controversial literature has arisen in connection with pilonidal sinus. For the surgical treatment of pilonidal sinus, different methods are described, each having its

**Table-1:** Age of the studied cases

Age (Years)	Group A n=18 No. %	Group B n=20 No. %	Total n=38 No. %
15-20	05 (27.7)	04 (20)	09 (23.86)
21-30	11 (61.3)	13 (65)	24 (63.16)
31-40	01 (5.5)	03 (15)	04 (10.53)
> 40	01(5.5)	-	01 (2.63)

**Table-2:** Sex of the studied cases

Sex	Group A n=18 No. %	Group B n=20 No. %	Total n=38 No. %
Male	16 (88.88)	16 (80)	32 (84.2)
Female	02 (11.11)	04 (20)	06 (15.8)

**Table-3:** Duration of hospital stay

Groups	Range (Days)	Mean (Days)	SD
A	3-11	5.5	±2.25
B	4-19	8.2	±4.38

p value = 0.025

**Table-4:** Duration of complete healing of wounds.

Groups	Range (Days)	Mean (Days)	SD
A	14-49	22.94	±9.44
B	28-98	52.15	±9.06

p value = 0.001

**Table-5:** Complications seen after closed (group A) and open technique (group B).

Complications	Group A n=18 no. %	Group B n=20 no. %
Infection	2 (11.11%)	4 (20%)
Partial gaping	2 (11.11%)	-
Recurrence	2 (11.11%)	03 (15%)

own advantages and disadvantages therefore, the ideal treatment is controversial.

All surgical techniques involve excision. Thereafter the treatment policies differ whether to keep the wound open for secondary healing by granulation or close it primarily. All these variations have come up to minimize the problems associated with the open techniques such as prolonged hospitalization and clinic attendance for dressings, complications such as sepsis, large scars, pouch formation, delayed wound healing and risk of recurrence resulting in high financial costs both for the hospital (treatment)

and the patient (period off work).<sup>9, 10, 11</sup> Therefore excision and primary suturing of the wound, obviates the need for prolonged treatment in the hospital or outpatient attendance, reduces the period of recovery and leave from work. Thirty eight patients surgically treated for pilonidal sinus were analyzed, 18 in group A (primary closure) and 20 in group B. Patients in group A were managed by excision and primary closure of the defect and wounds of the patients in group B were left open and allowed to heal by granulation from the bottom.

In this study the maximum number of patients (63.16%) with pilonidal sinus presented for the treatment were in the 3rd decade of life in both groups.<sup>12,13</sup> The male preponderance in this study is corresponding to the other studies carried out in west<sup>9,10</sup> as well as to the local studies.<sup>14</sup> The mean hospital stay for group A was 5.5 days (range 3-11 days) while for the group B it was 8.2 days (range 4-19 days) similar to the different other authors.<sup>14,17</sup>

Infection is the main early complication of surgery of the pilonidal sinus. We encountered deep infection in 11.11% of cases in group A and 20% in group B. One patient in group A developed signs of inflammation but no discharge was noted. The infection rate in other studies has been reported from 1.8%<sup>15</sup> to 30%<sup>10</sup> for open technique and 3.6%<sup>15</sup> to 13%<sup>10</sup> after closed technique. Deep infection was documented by the presence of discharge which was positive for bacteria on culture. *Staphylococcus aureus* was cultured from all the infected wounds. Anaerobic cultures were not performed. Open wounds were treated by irrigation and aseptic dressings. After infection in patients with primarily closed wounds, the wounds were opened and managed by regular irrigation of the wound with normal saline and daily aseptic dressings. The therapeutic antibiotics were given according to culture and sensitivity. The infection of the wounds in group A patients was the cause of delayed healing. Infection rate following excision of pilonidal sinus with primary closure of different studies are comparable with the present study.<sup>16,17</sup> Amir et al noted 19% infection rate after open technique<sup>14</sup> for the treatment of pilonidal sinus in the study of 63 patients which is nearly equal to the present study in which the infection rate is 15%.

Two cases in group A developed wound breakdown after removal of stitches, one at the upper end and other in the middle of the suture line but without the evidence of infection. These cases were managed conservatively. Poor compliance to the post operative dressing schedules, unsatisfactory personal hygiene and irregular follow up have contributed to the higher incidence of sepsis and gaping in both groups, especially in the group A. Excised tissue enblock with the sinus tract was sent for histopathology. Majority of the tracts were opened peroperatively and hair were extracted by the surgeon because of which hair were detected in very few cases on macroscopic examination. Microscopically all the tracts were lined by granulation tissue in its whole extent except near the opening at skin where stratified squamous epithelium was found and chronic inflammatory cell infiltration along with plasma cells was detected. None of the patient was suffering from any other local specific disease like tuberculosis or having any evidence of malignant change. The healing time was less than 21 days in 72.22% of the patients in group A and non in group B which is very significant. The wound of just over one fourth of the patients in group A took more than 21 days time for complete healing. Only in one patient (5.5%) the healing time was more than 42 days, whereas in group B the healing was not

complete in any patient in less than 21 days. 40% of the patients recovered completely within 22-42 days and 45%, of patients in 43-63 days and 15% of the patients healed in more than 63 days. The mean healing time was 22.94 days in group A while 52.15 days in group B which is highly significant. These results are similar to the results of other studies.<sup>9,14,16</sup>

Keeping in view the healing time, the patients in group A got the benefit of early healing of wound so early return to their work, cost effectivity, avoiding many follow-up visits to hospital.<sup>11,18,19,25</sup>

Recurrence of the disease occurred in 2 patients (11.11%) in group A and 3 (15%) in group B. Recurrence rate quoted by different authors after excision and primary closure of the pilonidal sinus is ranging from 2% to 32%. Results of this study fall in the same range.<sup>14,16,17,20</sup>

Following open technique, recurrence rate of different studies is depicted in ranging from 2.93% to 19%. Recurrence rate of this study falls in the same range.<sup>14,17,21</sup> Comparing the two groups regarding recurrence rate p value is >0.05 which is not significant. The sample size of the study was small for the evaluation of rate of complications which may have different results if large sample is available and with the longer follow up. Various modifications of the techniques of closure of the excised wound have been designed to reduce the risk of recurrence associated with simple closure such as reducing the depth of the inter gluteal furrow and taking the wound away from the midline for suturing. Bascom's cleft operation<sup>22</sup> produces a lateral wound and Z-plasty and V-Y fascio-cutaneous flaps shallow the natal cleft. They require expertise and have produced inconsistent results.<sup>23</sup>

The Karydakis procedure addresses both these factors. It is said to be easier to learn and has been reported to have low recurrence (1-4%).<sup>23,24</sup> In our cases, recurrence has been a problem; 11.1% in close and 15% after open technique as well as early postoperative morbidity due to complications such as sepsis, wound breakdown and resultant delayed wound healing seem to be the major problems. Simple primary suturing of the sinus wound after excision may be as effective as other modern techniques provided meticulous technique of excision and closure is adopted under antibiotic cover along with careful haemostasis, effective deep drainage, suturing of the deep layers and proper coaptation of skin margins. Thereafter, dedicated postoperative care in the form of restricted early mobilization, avoiding sitting on the wound in the

first few days and regular follow-up to monitor healing of the wound and hygiene of the area and gradual transition to normalized routine of daily life are essential for sound healing without undue morbidity and recurrence. Poor postoperative care and non-compliance by the patient can jeopardize any refined surgical technique of closure of the sinus.

## Conclusion

The rate of complications like wound infection and recurrence is comparable in both the groups but there is short hospital stay, early wound healing and short duration of work incapacity in group A patients. Therefore, it is concluded that the better

method for the treatment of pilonidal sinus is excision with primary closure of the defect. So it is suggested that the treatment of pilonidal sinus should be individualized but preference must be given to closure of the wound after excision, wherever feasible, coupled with strict compliance to post-operative care and regular follow up to achieve cost affective early healing with minimum morbidity and less recurrence.

*Department of Surgery*  
*Fatima Memorial Hospital, Lahore*  
**theesculapio@hotmail.com**  
**www.sims.edu.pk/esculapio.html**

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