

## Elliptical Rotation Flap for Complicated Pilonidal Sinus

Mohammed J. Al Najjar *FICS, FRCS*, Sajid H.A. Al-Helfy *FICS, CABS*

<sup>1</sup>Dept. of Surgery, Al-Imamain Al-Kadhemain Medical City, <sup>2</sup>Dept. of Surgery, College of Medicine, Al-Nahrain University

### Abstract

<b>Background</b>	Pilonidal sinus is one of the most common sinuses seen in general surgical practice and usually seen in the natal cleft. Postoperative wound complications have always been the main cause of concern followed by the risk of recurrence in the surgical treatment of the pilonidal sinus disease. Various techniques evolved so far mainly aimed at solving these problems. This clinical study conducted to discuss the results of elliptical rotational flap in chronic pilonidal sinus.
<b>Objective</b>	To assess the outcome of patients operated by rotational flap procedure in chronic pilonidal disease in term of healing time, complications and recurrence rate.
<b>Methods</b>	The study was conducted in two different places from December 2007 till April 2011. Eighty two patients with chronic pilonidal sinus were treated by rotation flap. The setting was in two different places, at Nizwa General Hospital, Sultanate of Oman and from Al-Imamain Al-Kadhemain Medical City, Baghdad. Evaluation of operative and post-operative results, complications and recurrence in addition to demographic data.
<b>Results</b>	Out of 82 Patients included in study, 2 cases (2.4%) failed to heal due to partial necrosis of the flap and underwent redo surgery, while 80 patients (97.4%) were cured completely and no further surgery was needed. Eighteen patients (22%) went home in the end of same day and the rest (78%) discharged in second day. Forty six Patients (56%) had dry dressing till suture removed after 8 days, while 20 Patients (24.4%) continued to discharge serosanguinous fluid and spent more than 10 days to heal. Eight Patients (9.8%) developed seroma needed further time to becomes dry and the last 6 Patients (7.3%) developed wound infection and treated by proper antibiotics and surgical drainage in some case.
<b>conclusion</b>	Flap procedures may be promising especially in complex and recurrent pilonidal diseases as it is simple to be done and carry low recurrence rate and relatively shorter hospital stay in comparison to other surgical procedure
<b>Keywords</b>	Chronic pilonidal sinus, elliptical rotation flap.

**List of Abbreviation:** PNS = pilonidal sinus, SSI = surgical site infection

### Introduction

Pilonidal sinus (PNS) was first described by Hodges in 1880, who described the sinus as a characteristic epithelial tract in the skin of the natal cleft, generally contains hair <sup>(1)</sup>, The Latin name pilonidal means literally a nest of hair. Chronic PNS is a common disabling disorder that affects mainly young

adults and the men are affected twice as often as woman <sup>(2)</sup>. It has a high incidence in some countries, particularly in the Middle East and Gulf region owing to differing hair characteristics and growth patterns <sup>(3,4)</sup>.

Today's most widely accepted explanation for the pathogenesis of PNS was suggested by Karydakis <sup>(5)</sup> who attributed the occurrence of PNS to three main factors: the invader (loose hair), the force (causing insertion) and the skin vulnerability (depth of the natal cleft).

Many surgical and non-surgical procedures have been suggested for treatment of PNS; however, in most of cases, an operation is advised. There are various operations adopted to cure this problem. Each one has its own pros and cons. The following is the main surgical procedures in clinical practice and there are many other procedures and modifications.

1. Wide excision and healing by secondary intention. The wound is left open to heal by second intention. This usually means that the wound can take several weeks to heal and requires regular dressing <sup>(6)</sup>.

2. Excision and primary closure (to form an ellipse shape around the sinus), taking out the sinus, and stitching together the two sides of the ellipse. The advantage, if successful, that the wound heals quite quickly, however, the risk of a recurrence, or of developing an infection of the wound after the operation, is higher than the above procedure <sup>(7,8)</sup>.

3. Wide excision of the area containing the sinus and all branches after discolored by blue dye, and to remove all sinus bearing areas, then hemostasis is achieved and the defect is covered by tension free local advancement flap from adjacent healthy region (rotation or limberg flap) which ensure excellent healing result and make an unfertile bed for the recurrence of new sinus in the future <sup>(9,10)</sup>.

The management of chronic PNS, the best method is still controversial. Many surgical and nonsurgical treatment modalities have been suggested, but the ideal and widely accepted treatment has still not yet been established. In this regard, low recurrence rate, shorter hospital stay, less cost, minimal inconvenience and time off work are important considerations <sup>(11,12)</sup>.

This study was carried out to evaluate the usefulness of elliptical rotation flap technique in treatment of chronic PNS in our setup.

## Methods

This is prospective study of 82 patients with complicated PNS, we mean "complicated" by either recurrent or chronic PNS with midline and lateral pits, the setting was in two different

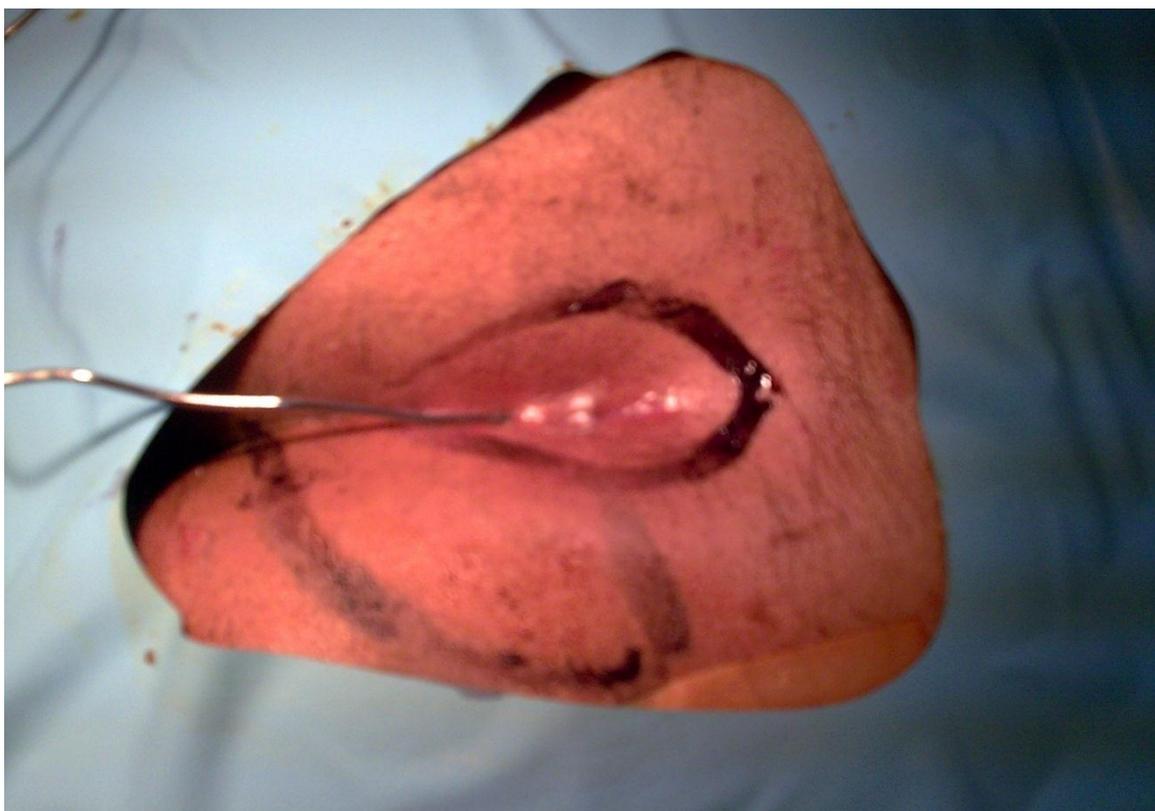
places; one in Nizwa General Hospital Sultanate of Oman, the other in the surgical department of Al-Imamain Al- kadhemain Medical City, Baghdad. The study started in period between Dec 2007 till Nov 2011.

All patients were operated after preliminary investigations and anesthetic fitness. Patients received prophylactic antibiotic in form 500 mg metronidazole and 1 gm third generation cephalosporin, taking in consideration that a colonic microorganisms are the most probable microorganisms than that of skin flora.

The exclusion from this study was for all patients with severely infected sinus or have PNS abscess till the infection cured, in addition simple acute PNS and patients with under 16 year old were also excluded.

Under general or spinal anesthesia, the sinus discolored by methylene blue dye to color all side branches beside the main tract, an asymmetrical elliptical incision was made with wide margin to remove all diseased area deepen to presacral fascia, then we incise nearby skin (local flap reconstruction) in the same size measured by a ruler, including the subcutaneous fat and in the same thickness of the removed tissue, the flap is detached from one side of surrounding tissue deep to gluteal fascia and keep 2 finger breadth in the inferior aspect for nourishment of flap, the flap is transferred to cover the defect and sutured to the deep tissue by 2/0 vicryl suture and to the skin by non absorbable 3/0 nylon (figures 1-4). The flap should be wide enough to completely obliterate the midline natal cleft and to reduce potential risk of flap's corner ischemia Suction drain was used for drainage and removed in the second or third post operative day.

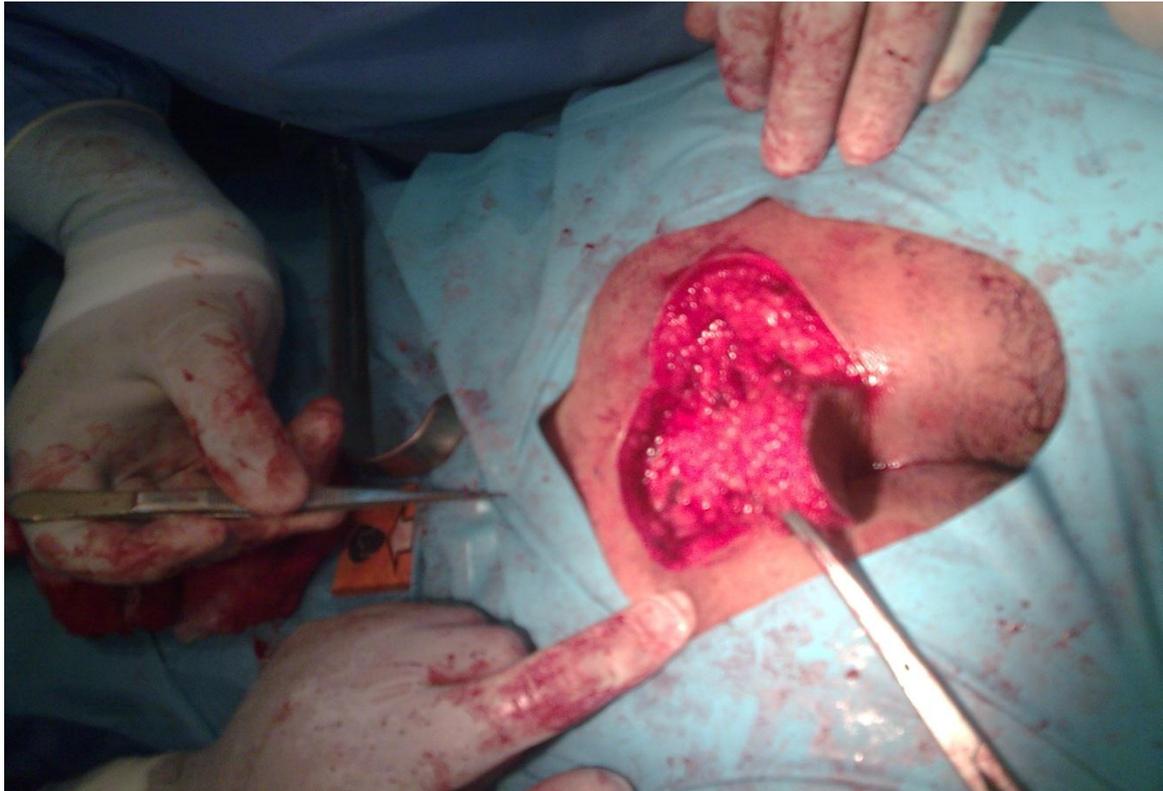
The patients were followed up for an average of about 20 months, the follow up visits were scheduled at 3<sup>rd</sup>, 8<sup>th</sup>, 14<sup>th</sup>, 28<sup>th</sup> post operative day then 4-6 monthly or on need in case of wound complications. The Chi square test was used for statistical analysis, a *P* value < 0.05 was considered significant.



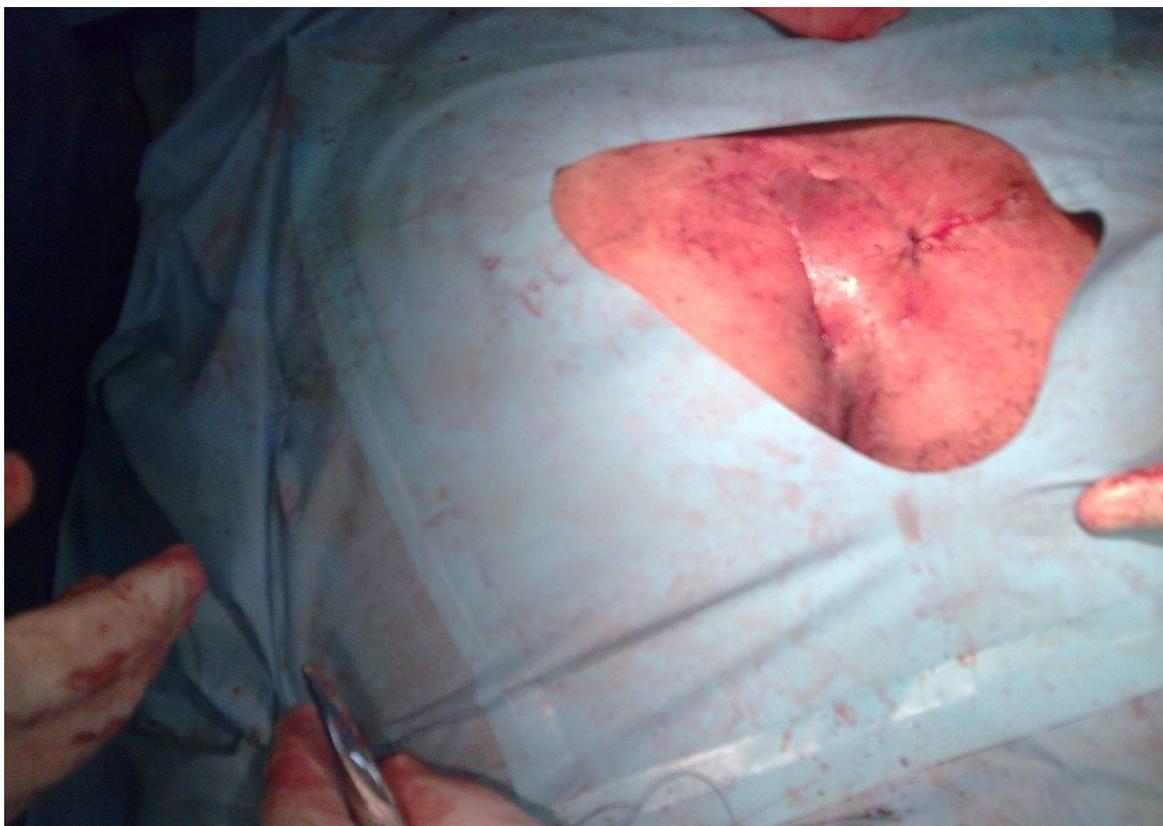
**Fig. 1.** The sinus was probed and the skin was marked by marker, the upper flap for removal and adjacent flap for reconstruction



**Fig. 2.** The sinus bearing area excised and adjacent flap with its sufficient pedicle mobilized to cover the defect



**Fig. 3. After hemostasis the flap ready for rotation and defect closure**



**Fig. 4. The end of the end result of surgery the defect created closed by adjacent flap and the gluteal defect closed by direct suture the edge of the skin**

**Results**

Out of 82 Patients included in this study, there were 56 males (68%) and 26 females (31%). The male: female ratio in Iraqi patients was 16.6:1,

while among Omani patients was 1.4:1, the difference was statistically significant (P<0.0001) (Table1).

**Table 1. Sinus distribution among Iraqi and Omani patients**

Gender	Omani patients		Iraqi patients		Total	
	No	%	No	%	No	%
Male	17	21	59	61	67	82
Female	12	14.6	3	3.4	15	18
Total	29	35.6	53	64.4	82	100
♂:♀ ratio	1.4 : 1		16.6 : 1			

The mean age was 20 years ranging from (16-28 years). Chronic PNS represented in 59 patients (72%) and the other 23 Patients with recurrent PNS (Table 2). In 72 Patients (88%) closed vacuum drains were used and the rest 10

patients (12%) sustained closure without drains. 18 patients (22%) were sent home in the end of same day and the rest 64 Patients (78%) discharged in the second day (Table 2).

**Table 2: miscellaneous characteristics**

Type of sinus	Chronic pilonidal sinus 59 Patients (72%)	Recurrent pilonidal sinus 23 Patients (28%)
Flap viability	Healthy viable (80 Patients)	Partial necrosis (2 Patients)
Need second surgery	No further definite operation.	2 Patients need second surgery.
The Use of Drain	72 Patients closed vacuum drain	10 Patients (12%) no drain used
Hospital stay	18 Patients as day case surgery	64 Patients one night sleep.
Time of return to daily work	8-16 days	
Recurrence rate	3 Patients (3.6%)	
Major Complication	4 Patients (4.8%)	

Regarding healing, 46 patients (56%) had a dry wound and their sutures removed usually in 8-14 days, twenty patients (24.4%) had continuous serosanguinous fluid discharge, needed further few days for healing, 8 patients (9.8%) developed seroma solved by simple drainage procedure, other 6 patients (7.3%) get wound infection that needed culture based antibiotics to complete cure, 2 of them were deep surgical site infection (SSI) dictated readmission for 7 days with surgical drainage and debridement and later secondary wound closure, the last 2 patients failed to heal and needed revisional corrective surgery. Nearly all patients (97.6%) operated

upon had viable flap. The time of recovery and return to daily activity was with a range of 8-16 days and with a mean of 9.4 day (figure 5). The major complications that require admission and surgical procedure occurred only in 4 patients (4.8%), two with major or deep SSI and the other two patients with partial necrosis of flap's corners, while minor complications like superficial or minor SSI and seromas were treated simply and effectively at outpatient clinic in less than 2 weeks period. As seen in table 3, the recurrence rate in our series within the first 18 months of follow up was 3.6% (3 patients).



Fig. 5. The end result of healed flap one month post operatively

Table 3. The outcome and fate of our patients

Outcome of wound		No. (%) of Patients	The fate (end result)
Dry Wound		46 (56)	Healed in usual 10 days
Serosanguinous fluid		20 (24.4)	Become dry in 12-16 days
Seroma		8 (9.8)	Healed with repeated aspiration & dressing in 12-20 days
SSI	Superficial	4 (4.9)	Need just proper antibiotics
	Deep	2 (2.4)	Drainage and antibiotic, cured within 14-21 days
Fail to heal		2 (2.4)	Needed revision flap surgery after 12 weeks

### Discussion

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. Regardless of the surgical technique concerned, standard principles of wound care are essential with repeated depilation of the natal cleft, removal of cut hair and any debris from the wound bed and keeping the wound edges dry and clean using an appropriate dressing<sup>(3,13)</sup>.

In our study, nearly all patients included in this survey were completely cured apart from two of them (2.4%) who needed revision flap surgery to achieve good healing. This failure can be attributable to excessive scarring and ischemia of the vicinity area owing to repeated surgery and active recurrence of sinus (those 2 Patients had 3 times recurrence).

There is great discrepancy in gender distribution in between Iraqi vs. Omani patients" where male: female is 1.4:1 among Omani patients while 16.6:1 for Iraqi patients". This may be due to genetically determined factors related to type

of sacral hair among Omani women and/or may be due to ignorance and lack of medical advice among Iraqi woman.

Most of the patients treated by rotation flap have very little morbidity post surgery, as compared with other surgical methods, which incur prolonged healing time and a high recurrence rate, also it has many advantages. It is easy to perform, to design, and it flattens the natal cleft with large vascularized pedicle, sutured without tension. This in turn maintains good hygiene, reducing the friction, preventing maceration, and avoiding scar in the midline. It is a particularly useful technique for complex sinuses with multiple pits and extended tracts where radical excision leaves a large defect<sup>(14,15)</sup>. The healing with secondary intention would require prolonged supervised wound care. This operation is also suitable for cases where other simpler operations have failed. The use of local flap accelerates healing.

In the present study, the final healing was achieved in most cases (56%) within 10 days, the reminder get cured in a couple of weeks and only few of them 6 Patients (7%) needed 21 days hospital stay, the average mean time for recovery and return to daily activities and work was 9.4 days with a range of 8-16 days, these findings were more or less comparable with many other series<sup>(16-19)</sup> (Table 4), while flap's corner necrosis encountered in 2 patients (2.4%) as mentioned before recalled simple revision operation after 12 weeks to achieve full cure. In our series, recurrence rate 3.6% and major complication rate 4.8% was comparable with other similar studies although hospital stay was short because most of our patients had tolerated the surgery well and they were able to be discharged in next day or at end of same day and the drain removed in next visit (Table 4).

**Table 4. Comparison of current study with some similar studies**

The study	No.	Hospital stay	Time of return to daily work	Complications %	Recurrence %
Jethwani et al <sup>(16)</sup>	67	2-3 days	10-16 days	11.94	1.49
Mentes et al <sup>(18)</sup>	238	2-3 days	4-17 days	2	1.3
Akin et al <sup>(17)</sup>	411	3 days	7-18 days	16	2.9
Mouhammed <sup>(19)</sup>	110	3 days	Within 21 days	5	1
The present study	82	12-36 hours	8-16 days	4.8	8

In comparison with other procedures, in case of excision and lay open method, one study included 150 patients showed an average healing time of 4 weeks and recurrence rate of 8% were recorded<sup>(20)</sup>.

Another study used sinus excision and primary closure, 371 patients, recurrence rate was 12.1% (scar sited midline)<sup>(21)</sup> and 10% of recurrence rate (scar sited laterally)<sup>(22)</sup>. In Iesalnieks and his colleagues (German study) showed a high recurrence rate (42%) after excision of a pilonidal sinus and primary midline closure and (21%) after open procedure<sup>(23)</sup>.

In conclusion, the results of our series support the PNS excision and rotation flap reconstruction

as safe and effective definite treatment of the disease.

The technique can be mastered easily and provides an effective procedure for primary as well as recurrent disease. Few complications associated with it can further be reduced by meticulous skin closure and preventing skin edge inversion, especially at the lower midline.

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### Author contributions

Dr. Al-Najjar did the data collection and analysis and Dr. Al-Helfy did the acquisition and interpretation of data, revising and supervision of manuscript.

### Conflict of Interest

No potential conflict of interest

### Funding

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Correspondence to Dr. Sajid H.A. Al-Helfy

E-mail: [Sajidalhelfy@yahoo.com](mailto:Sajidalhelfy@yahoo.com)

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