

# Modified Off-Midline Closure of Pilonidal Sinus Disease

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## Abstract

**Background:** Numerous surgical procedures have been described for pilonidal sinus disease, but treatment failure and disease recurrence are frequent. Conventional off-midline flap closures have relatively favorable surgical outcomes, but relatively unfavorable cosmetic outcomes. **Aim:** The author reported outcomes of a new simplified off-midline technique for closure of the defect after complete excision of the sinus tracts. **Patients and Methods:** Two hundred patients of both sexes were enrolled for modified D-shaped excisions were used to include all sinuses and their ramifications, with a simplified procedure to close the defect. **Results:** The overall wound infection rate was 12%, (12.2% for males and 11.1% for females). Wound disruption was necessitating laying the whole wound open and management as open technique. The overall wound disruption rate was 6%, (6.1% for males and 5.5% for females) and the overall recurrence rate was 7%. **Conclusion:** Our simplified off-midline closure without flap appeared to be comparable to conventional off-midline closure with flap, in terms of wound infection, wound dehiscence, and recurrence. Advantages of the simplified procedure include potentially reduced surgery complexity, reduced surgery time, and improved cosmetic outcome.

**Keywords:** Modified, off-midline closure, pilonidal sinus

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## Introduction

Sacroccygeal pilonidal sinus disease is a common and usually a minor disease. Although wide excision has been a common practice, there are more simple alternatives, and its treatment remains controversial.<sup>[1]</sup> Numerous surgical procedures have been described, but treatment failure and disease recurrence are frequent, leading to considerable morbidity in these, otherwise healthy patients.<sup>[2]</sup> The multiplicity of procedures testifies to the lack of an optimal treatment method.<sup>[3]</sup> The optimal surgical treatment option should be simple, inexpensive, and associated with low hospitalization periods and recurrence rates. None of the existing surgical options can meet all of these criteria.<sup>[4]</sup> Total excision of the

involved sinus tract to the post sacral fascia is the most frequently applied surgical option but the ideal type of reconstruction is disputed.<sup>[2-4]</sup> The defect formed on the excised area might be primarily closed, partially closed as is the case in marsupialization, left open for secondary healing, or reconstructed by differing flap techniques.<sup>[4,5]</sup> Published literatures comparing the use of flap as off-midline procedure *versus* primary midline suture techniques found that primary closure would be as effective as the flap reconstruction.<sup>[6,7]</sup> Midline excision techniques are associated with high morbidity and recurrence due to wound's placement in the natal cleft.<sup>[7]</sup> Conventional off-midline flap closures are associated with fewer serious complications, but they have less acceptable esthetic outcomes.<sup>[8,9]</sup> In the present study, the author reported a novel simplified off-midline technique for closure of the defect after complete excision of the sinus tracts without flap reconstruction.

## Patients and Methods

All patients completed written informed consent and received an explanation of the operative procedure from the study staff. The study procedures were approved by

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the institutional ethics committee of Port-Fouad General Hospital, represented by the hospital's general director.

A total of two hundreds patients of both sexes with primary, non-recurrent, sacrococcygeal pilonidal sinus disease were enrolled for this prospective study from January 2002 to December 2008 regarding our modified simple closure of sacrococcygeal pilonidal sinus disease. All procedures were performed at Port-Fouad general hospital, Port-Said, Egypt by a single surgical team consisting of a consultant colorectal surgeon assisted by a general surgeon. The surgical team treated 1-2 patients with pilonidal sinus disease per week in both private and public health sectors i.e., over 500 patients, in total, during the study period. Patients were excluded from the study when they had a history of drained pilonidal abscess or recurrent disease, or declined the protocol.

### Operative technique

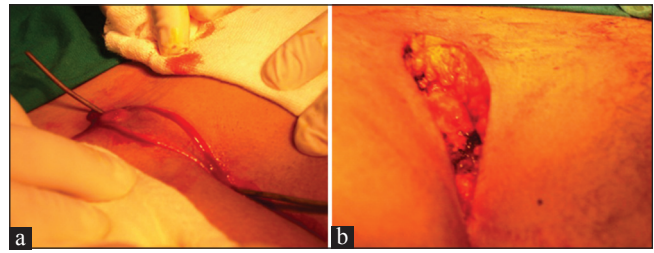
Patients under general anesthesia were placed in a prone, jack-knife position with buttocks widely separated using adhesive tapes, and methylene blue was injected into the sinuses. Modified D-shaped excisions were used [Figure 1a] to include all sinuses and their ramifications to the presacral fascia and surrounding unhealthy tissues to achieve healthy, soft and supple wound margins [Figure 1b]. Dissection and hemostasis were achieved by electrocautery. A suction drain was placed under the flap and was delivered through a separate stab incision. The wound was closed using four or five deeply running sutures obliterating the dead space [Figure 2]. The sutures were tied in a way to obliterate the dead space and permit the incision just lateral to the midline, while two sutures were left long enough to be tied over a cigar-like dressing to promote further obliteration of the dead space [Figure 3a and b]. All patients were initially admitted as day-surgery cases. The drain was removed after 48 hours and the two dressing sutures tying the dressing were cut short at the fourth day to exchange the dressing. Outpatient clinic follow-up occurred two weeks, one month, and three months after surgery, and after six months when necessary thereafter.

### End points

The primary endpoints of the study were early failure, defined as wound disruption within 10 days of surgery and recurrence of the disease, defined as a clinically detectable sinus. Secondary endpoints were wound infection, time-off from work and painless walking and sitting time.

### Results

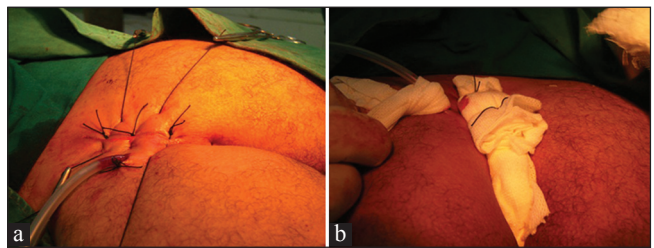
In the present study, there were 164 (82%) male and 36 (18%) female patients with age range from 15-33 years



**Figure 1:** (a) An operative photograph showing planning of off-midline incision (b) An operative photograph showing complete excision of the sinus tracks with good hemostasis



**Figure 2:** An operative photograph showing planning of wound closure with the deeply running sutures *in situ*



**Figure 3:** (a) An operative photograph showing complete wound closure with two sutures long enough to be tied over the dressing (b) An operative photograph showing final step with dressing being tied tightly in place

and male: Female ratio was 4:1. A large majority of patients was between the ages of 15 and 25, and the incidence or decreased thereafter [Table 1].

Regarding the body mass index (BMI), patients were classified as obese (BMI >30 kg/m<sup>2</sup>), overweight (BMI >25 but <30 kg/m<sup>2</sup>) and healthy weight (BMI <25 kg/m<sup>2</sup>).<sup>[10]</sup> By these definitions, 64 patients were obese (52 males and 12 females), 100 were overweight (80 males and 20 females) and 36 patients were of healthy weight (32 males and 4 females). The average BMI for both sexes was 29.3 (SD 2.8, range 22.0-31.0) kg/m<sup>2</sup>.

Wound infection was observed in 24 patients (20 males, 4 females) necessitating daily dressing with injection antibiotics. The overall wound infection rate was 12%, (12.2% for males and 11.1% for females). Wound disruption was observed in 12 patients (10 males, 2 females) necessitating open-wound management. The overall wound disruption rate was 6%, (6.1% males, 5.5% females). Disease recurrence was noticed in 14 patients (10 males, 4 females). The overall recurrence rate was 7%, (6.1% males, 11.1% females) [Tables 2 and 3].

The time required for pain-free walking after surgery was  $20.5 \pm 3.6$  days and the time required to achieve pain-free sitting on the toilet was  $24 \pm 3.89$  days. The time-off from work, defined as the number of days between the day of surgery and the first day a patient returned to work.<sup>[11]</sup> All patients were admitted as day-surgery cases; 174 cases (87%) ultimately conformed to the day-case surgery protocol with mean hospital stay  $1.125 \pm 0.34$  days. The time-off from work was  $25.6 \pm 4.23$ .

## Discussion

After more than half a century, the best surgery for sacrococcygeal pilonidal sinus disease is still a subject of debate, and methods ranging from extensive excisions with complicated reconstructive procedures

to limited debridement are being recommended with equal enthusiasm.<sup>[11-14]</sup> The main problems with the primary closure technique appear to be high-recurrence rate and high-infection rate.<sup>[4]</sup> On the other hand, patients generally complain about open-packing or marsupialization methods because of painful wound management and dressing changes. In spite of the recently accepted superiority of the flap reconstructions to the non-flap techniques, morbidity related to infection and recurrence has not been eliminated.<sup>[7]</sup>

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.<sup>[15]</sup> However, there is no surgical procedure satisfies these requirements<sup>[16]</sup> as various operative methods utilized in the treatment of pilonidal disease are associated with a number of advantages and disadvantages.<sup>[4]</sup> Postoperative complication rates of unroofing and marsupialization are low, but require long wound care. In addition, there were high complication rates in the primary closure and Limberg flap groups. So, the best option is to explain the advantages and disadvantages of the available surgical methods and respect the patient's decision.<sup>[4,6,7]</sup>

Methods of simple primary closure can be broadly categorized as midline closure and off- midline techniques.<sup>[9]</sup> Karydakos was the first to advocate off-midline asymmetric closure of pilonidal wounds to decrease recurrence by avoiding placing a wound in the midline at the depth of the natal cleft. His off-midline procedure also flattens the cleft, reducing hair accumulation and mechanical irritation.<sup>[17]</sup> A clear benefit was shown in favor of off-midline rather than midline wound closure so that, the closure of pilonidal sinuses is the desired surgical option, off-midline closure is now the standard strategy.<sup>[18]</sup>

Regarding the postoperative complications in the primary closure techniques, the wound infection was reported as (17.2%), and wound dehiscence as (13.8%) with no hematoma formation, whereas those in the flap repair, the wound infection was (4.5%), hematoma was (6.8%), and wound dehiscence was (4.5%).<sup>[4]</sup> According to other series with simple closure technique, it was stated that wound dehiscence was 7.7% and recurrence rate was 5%.<sup>[19]</sup> Another study reported the postoperative complication rate in flap construction as wound infection 20%, wound dehiscence 10% and recurrence 10%.<sup>[14]</sup>

Our data came in concordance with those studies regarding the wound infection, wound dehiscence and recurrence with the simplest and less invasive technique.

**Table 1: Patients with sex and subgroup distributions**

Age group	Male	Female	Total
15-25	112	25	137
26-30	38	8	46
31-33	14	3	17
Total	164	36	200

**Table 2: Postoperative complications**

Patients	Wound infection (%)	Wound disruption (%)	Recurrence (%)
	Male	20 (12.2)	13 (6.1)
Female	4 (11.1)	3 (5.5)	4 (11.1)
Total	24 (12)	16 (6)	14 (7)

**Table 3: Postoperative complications regarding the BMI**

BMI	Wound infection		Wound disruption		Recurrence	
	N = 24		N = 16		N = 14	
	Male	Female	Male	Female	Male	Female
>30 kg/m <sup>2</sup>	10	2	8	2	6	2
>25-29.9 kg/m <sup>2</sup>	8	2	5	1	4	2
<25 kg/m <sup>2</sup>	2	0	0	0	0	0
Total	20	4	13	3	10	4

It is now generally agreed that minimally invasive surgery should be used to treat pilonidal disease, whenever possible.<sup>[9]</sup> Ghnam and his colleagues agreed the same opinion of less invasive surgery that pilonidal sinus could be treated with limited excision and primary closure when they performed excision and primary midline closure.<sup>[20]</sup>

The incidence of the wound infection, wound dehiscence and recurrence is directly proportional with value of BMI.<sup>[9,21]</sup> Two recent studies showed that among patients with recurrent pilonidal sinus, majority had BMI  $\geq 30$  and 25 to 30 kg/m<sup>2</sup>. The patients with BMI  $\leq 25$  kg/m<sup>2</sup> had no recurrence of disease.<sup>[22,23]</sup> Our data supported these results, where most of our patients with wound dehiscence or recurrence were of BMI  $\geq 30$  and BMI of 25 to 30 kg/m<sup>2</sup>.

The results favoring flap closure in the treatment of sacrococcygeal pilonidal sinus are low recurrence rates, shorter hospital stay, and time off from work but the disadvantages related to unfavorable cosmetic appearance and body image are troubling.<sup>[7]</sup> The limitations of flap techniques are noteworthy: The unfavorable cosmetic appearance; the surgical length and hospitalization. The flap surgery takes longer than primary closure, requiring an additional attempt of reconstruction, which is the most complex step of the surgical treatment.<sup>[6,7]</sup>

Important goals in the surgical treatment of sacrococcygeal pilonidal sinus disease include minimized hospital stays, minimized time to return to work and daily activities, and esthetic satisfaction;<sup>[15]</sup> No single technique currently optimizes all of these criteria. For example, patients generally complain about open packing and marsupialization methods because of prolonged and painful wound management and dressing changes. Primary closure techniques are more acceptable in those regards, but have the disadvantage of generally higher recurrence and infection rates.<sup>[4]</sup>

Flap closure has important advantages and disadvantages relative to primary closure: Considerations that favor flap closure include lower recurrence rates, shortened hospital stays, and less time-off from work. For example, a recent study compared excision with primary closure to Limberg flap in terms of time required for pain-free walking; pain-free sitting on the toilet after surgery; and return to work.<sup>[24]</sup> The Limberg flap technique proved superior.<sup>[15,24]</sup> Importantly, however, flap surgery takes longer than primary closure because it requires additional reconstruction; the most complex aspect of the surgery.<sup>[6,7]</sup> Flap surgery may also result in an unfavorable cosmetic appearance and body image dissatisfaction.<sup>[7]</sup> The simplified off-midline closure technique described in the present study may offer a

favorable alternative to the flap closure: Like flap closure, the simplified procedure was associated with less time required for pain-free walking, pain-free sitting on the toilet and time off from work than has been reported with other techniques.<sup>[5,7,9,15,24]</sup> Postoperative esthetic satisfaction has been reported to be higher in patients with simplified closures, an advantage that appears to be due to the simplified technique itself, rather than due to differences in rates of wound infection or recurrence.<sup>[13]</sup> Avoiding flap reconstruction, the most involved aspect of the surgery can also reduce surgery time and complexity.<sup>[7]</sup> The cosmetic result was better in patients with simple closure and the flap construction turned out worst while neither wound infection nor recurrence had any influence on the cosmetic result.<sup>[14]</sup> This means that the technique itself is responsible for the patient satisfaction of his body image after surgery.

## Conclusion

For simple non-recurrent pilonidal sinus, less invasive surgery with limited excision and primary closure could be enough. Simple off-midline technique advocates asymmetric closure of the wound leading to decrease both wound infection and recurrence by avoiding placing a wound in the midline at the depth of the natal cleft. The present study represented data comparable with the more aggressive used excision methods regarding the wound infection, wound dehiscence and recurrence.

For simple non-recurrent pilonidal sinus disease, our simplification of off-midline limited excision with primary closure may provide a favorable alternative to conventional off-midline excisions, which involve flap closure. Our simplified procedure resembled conventional off-midline techniques in terms of favorable wound infection, wound dehiscence and recurrence rates, whereas advantages of our simplified procedure include potentially reduced surgery complexity, reduced surgery time, and improved cosmetic outcome.

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