

## Closure of pilonidal sinus by the modified off-midline method in the Kurdistan Region, Iraq

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### Abstract

**Background and objective:** Sacrococcygeal pilonidal sinus disease is an inflammation in the natal cleft of the sacrococcygeal region, which develops to abscesses and sinus formation. The incidence of sacrococcygeal pilonidal sinus disease notably increased in the last 50 years, however, there is no accurate data about the frequency of the disease and incidence rate among the Kurdistan region-Iraq population. In this study, we have introduced a simplified off-midline surgical technique without flap reconstruction. The main objective was to find out the rate of postoperative complications, hospitalization time, the recovery time to daily activity and work, and esthetic satisfaction.

**Methods:** This study was conducted in Kurdistan region, Iraq from March 2016 to September 2019 on individuals suffering from sacrococcygeal pilonidal sinus disease. Two hundred ninety-eight individuals from different gender and ages enrolled for operation by modified simple closure of sacrococcygeal pilonidal sinus disease.

**Results:** The median age of the patients was 22.4 years (24.1 male and 20.5 female). 33.9% of our patients were female students ( $P = 0.002$ ). Most of the patients (89.2%) did not have postoperative complications. However, wound infection was detected in 3.0% of patients. Sacrococcygeal pilonidal sinus disease recurred in 5.4% of patients; furthermore, the disease recurred twice in 7 females (2.4%). All the recurrences happened in the patients that had a severe form of sacrococcygeal pilonidal sinus disease.

**Conclusion:** Significant number of our patients were students, and female students for unclear reasons are at risk in our region. The post-surgical complications only occur in patients with a severe form of sacrococcygeal pilonidal sinus disease. In terms of simplicity, hospitalization time, the recovery time to daily activity and work, esthetic satisfaction, and post-surgical complications, our surgery technique was superior to other open wound surgery such as V-Y Advancement flap, and Karydakis flap.

**Keywords:** Modified off-midline; Pilonidal sinus; Sacrococcygeal pilonidal sinus disease; Simple closure; Surgery.

### Introduction

Sacrococcygeal pilonidal sinus disease (SPSD) is an inflammation in the natal cleft of the sacrococcygeal region, which develops to abscesses and sinus formation, which is believed to arise from hair follicle in that region.<sup>1</sup>SPSD disease usually occurs in young adults. The incidence of SPSP notably increased

primarily in Europe and North American in the last 50 years; however, there is no accurate data about the frequency of the disease and incidence rate among the Kurdistan region-Iraq population. The disease is usually asymptomatic, but it can develop into a severe chronic abscess.<sup>2,3</sup> To date, the risk factor of SPSP is the male gender, in which the frequency of the

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disease is twice comparing with female, family history, obesity, occupations that put pressure in that region such as prolonged sitting, excess in body hair, lifestyle, and hygiene.<sup>4,5</sup> SPSD is generally asymptomatic depending on the risk factors; nevertheless, obesity and trauma may cause a symptomatic version of SPSD.<sup>6</sup>

The treatment of SPSD is varied from the surgical approach to the non-surgical. Over the years, many surgical techniques and modifications have been described by surgeons around the world. However, none of them has proven to be the effective treatment of SPSD, and each technique has advantages and disadvantages.<sup>7</sup>

The ideal treatment should be cheap, simple, with minimum hospitalization, less pain, minimal time to recover the patient to daily activity, and minimal complications after the surgery, including recurrence, wound infection, and wound disruption. The treatment strategy must be planned differently according to the patient, severity of SPSD, and size of SPSD because none of all the surgical techniques can provide all of these measures.<sup>2,8</sup> When surgery is the most viable option for treatment, patients will have many worries including the success of the surgery, the recovery and hospitalization time, the shape of the scar and postoperative complications. In this study, we have introduced a simplified off-midline surgical technique without flap reconstruction. The main objective was to find out the rate of post-operational complications, hospitalization time, recovery time to daily activity and work, and esthetic satisfaction.

## Methods

### Study area

This study is conducted in Kurdistan region -Iraq from March 2016 to September 2019 on individuals suffering from SPSD. A total of 298 individuals from different gender and ages enrolled for operation by modified simple closure of SPSD. The patients received a complete explanation regarding

the surgery, including the severity of SPSD, operation time, complications, and time to recover by the study staff. Data about age, gender, body mass index, occupation, and severity of SPSD were collected for all patients before the surgery. All patients completed a written consent regarding the surgery procedure. All the patients with SPSD who accepted the surgery by simple closure of modified off-midline method included in this study. The surgeries were carried out by the same surgical team. According to the declaration of Helsinki - "Every research study involving human subjects must be registered in a publicly accessible database", This research has been registered on the research registry website (Registration ID: researchregistry6133).

### Surgical technique

All operations done under general anesthesia and in prone position. Shaving was performed before the surgery. The surgical site was disinfected with 10% povidone-iodine. Methylene blue was injected into the sinus, and a D-shaped area of skin was marked over the sacrococcygeal pilonidal sinus.

The excision started on the marked D-shaped area to cover all the sinus. The excision extended to the presacral fascia with healthy, soft, and supple wound margins. Electrocautery is used for dissection and hemostasis. After extracting the sinus and cleaning the wound, the wound was closed by multiple deep sutures according to the size of the removed area. The drains have been used in some exceptional cases that have a severe type of SPSD. The sutures were tied in a way to obliterate the dead space and permit the incision just lateral to the midline. The surgical technique and procedure were extracted from the previous study "modified off-midline closure of pilonidal sinus disease" by Aly Saber.<sup>9</sup>

All the patients remained in the hospital as a day surgery case. After discharge, daily dressing started from the second

postoperative day, and the sutures were removed after 14 days from the day of operation. The patients were regularly followed up by the study staff weekly. The SPSS statistical program v22 has been used for analyzing the patient's data such as frequency and percentage. The Pearson's Chi-square test and Fisher's exact test were applicable to compare the variables due to small-sized samples. *P*-values <0.05 (two-tailed) were considered statistically significant.

## Results

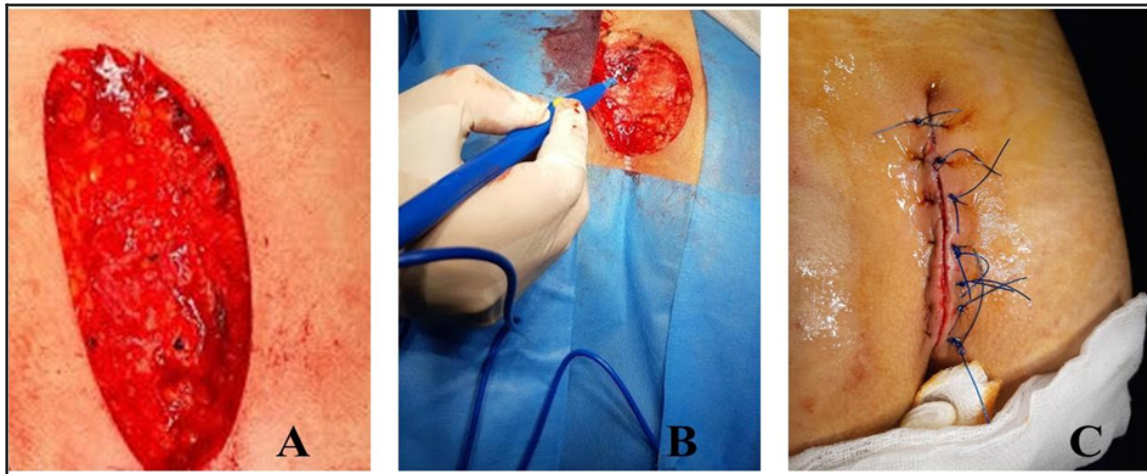
In this study, a total of 298 patients were

In this study, a total of 298 patients were operated on for SPSP using a modified D-shaped method in which 158 (53.0%) were males, and 140 (47.0%) were females (*P* = 0.3247).

Regarding age, the patient's ages varied from 15 to 45 years, divided into three age groups. The median age of the patients was 22.4 years (24.1 years for males and 20.5 years for females). Most of the patients age group were between 15-25 of 222 (74.5%) (*P* = 0.2538). Table 1 shows age distribution by gender.

**Table 1** Age distribution by gender

Age group	Male (%) No. (%)	Female (%) No. (%)	Total (%) No. (%)	<i>P</i> -value
15-25	102(64.6)	120 (85.7)	222 (74.5)	0.253
26-35	46 (29.1)	14 (10.0)	60 (20.1)	< 0.001
36-45	10 (6.3)	6 (4.3)	16 (5.4)	0.454
Total	158 (100.0)	140 (100.0)	298 (100.0)	0.324



**Figure 1** (A) shows complete excision of the sinus in the off-midline area. (B) shows the use of electrocautery. (C) shows primary closure of the wound after the excision of the sinus.

In terms of occupation, 162 (54.4%) patients were students. The female rate was nearly twice of males ( $P$  value = 0.0020). The other 136 patients had other occupations mentioned in Table 2. According to the World Health Organization, a person's body mass index is identified as healthy weight (BMI <25 kg/m<sup>2</sup>), overweight (BMI >25 but <30 kg/m<sup>2</sup>) obese (BMI >30 kg/m<sup>2</sup>).<sup>10</sup> Using these

equations, the majority of our patients were overweight (Table 3) of 157 (52.7%) ( $P$  = 0.0013), 115 (38.6%) had healthy weight, and 26 (8.7%) were obese. Concerning the severity of SPSD shown in Table 4, 190 (63.7%) patients had a severe form of SPSD, 74 (24.8%) had simple SPSD, 28 (9.4%) moderate SPSD and only 6 males had an abscess.

**Table 2** Patients' occupation by gender

Occupation	Male No. (%)	Female No. (%)	Total No. (%)	P-value
Hospital Staff	6 (3.8)	7 (5.0)	13 (4.4)	0.999
General Employee	31 (19.6)	6 (4.3)	37 (12.4)	< 0.001
Student	61 (38.6)	101 (72.1)	162 (54.4)	0.002
Housewife	0 (0.0)	26 (18.6)	26 (8.7)	< 0.001
Military	27 (17.1)	0 (0.0)	27 (9.1)	< 0.001
Worker (daily labor)	33 (20.9)	0 (0.0)	33 (11.0)	< 0.001
Total	158 (100.0)	140 (100.0)	298 (100.0)	0.324

**Table 3** BMI categories by patients' gender.

BMI	Male No. (%)	Female No. (%)	Total	P-value
Healthy <25	47 (15.8)	68 (22.8)	115 (38.6)	0.061
Overweight 25-29	99 (33.2)	58 (19.5)	157 (52.7)	0.001
Obese >30	12 (4.0)	14 (4.7)	26 (8.7)	0.845
Total	158 (100.0)	140 (100.0)	298 (100.0)	0.324

**Table 4** Severity of SPSD by gender

Severity of SPSD	Male No. (%)	Female No. (%)	Total	P-value
Simple	13 (8.2)	61 (43.6)	74 (24.8)	< 0.001
Moderate	14 (8.7)	14 (10.0)	28 (9.4)	1.000
Severe	125 (79.1)	65 (46.4)	190 (63.7)	< 0.001
Abscess	6 (3.8)	0 (0.0%)	6 (2.0)	0.031
Total	158 (100.0)	140 (100.0)	298 (100.0)	0.324

Most patients 266 (89.2%) had no postoperative complications. However, wound infection was detected in 9 (3.0%) patients only and were treated by regular dressing and broad-spectrum antibiotics. SPDS recurred in 16 (5.4%) patients; furthermore, the disease recurred twice in 7 (2.4%) females ( $P = 0.0156$ ), as shown in Table 5. All the recurrences happened in the patients with severe forms of SPDS.

The average time to perform the surgery was 20 minutes for each patient. The sutures were removed after  $14 \pm 2$  days. The time for the patient's recovery to pain-free daily activity was  $16 \pm 2$ , and the time for the patient to return to work was  $20.3 \pm 2$ .

### Discussion

Pilonidal sinus disease (SPSD) is an inflammatory disease that frequently occurs in the midline of the sacrococcygeal region. The cause of the SPDS is not fully described, but it is believed that it arises from hair follicles in that region. It can significantly affect the quality of life, and surgery is the only effective cure. Many surgical techniques and procedures have been suggested and used for treating this condition. However, none of them were ideal techniques, and the patient may experience postoperative complications, including wound infection, hematoma, and recurrence.<sup>1-3</sup> In this study, we have used a simple modified D-Shaped Incision technique for treating SPDS for a total of 298 patients with a high success rate.

Pilonidal sinus disease is known to happen more often in young people, especially among males.<sup>11</sup> Similarly, the majority of our patients were young as the median age was 22.4. the mean age was lower in the affected females (20.5) than males (24.1) which may be due to puberty, which may start earlier in females, as some study suggests puberty and sex hormones may have a role in the occurrence of SPDS.<sup>12</sup> Many studies have shown that the incidence of SPDS is twice higher in males compared with female. In our study, the male: female ratio was 1.1:1. Additionally, the female ratio was even higher in the age group of 15-25. This reveals why in our region the incidence of SPDS is higher among young females compared to the rest of the world with a significant  $P$ -value for unknown reasons and further studies is required.

Most of the patients were students and two factors might trigger the SPDS in young students. A study suggests sitting more than six hours a day increases the risk of SPDS by 4.3-folds, Students in our region spent approximately five hours in the four and half hours. Given an average school, and they would be sitting in the class on Woody chairs for nearly e of two hours of study at home, each student spends six and a half hours sitting.<sup>13</sup> The other factor maybe the level of awareness of the students regarding SPDS and their lifestyle. Surprisingly, female students were the highest number of patients of overall 101(33.9%). This number has never been

**Table 5** Post-operative complications by gender

Postoperative complications	Male No. (%)	Female No. (%)	Total	<i>P</i> -value
No complications	142 (89.9)	124 (88.6)	266 (89.2)	0.297
Recurrence	13 (8.2)	3 (2.1)	16 (5.4)	0.021
Recurrence twice	0 (0.0)	7 (5.0)	7 (2.4)	0.015
Wound infection	3 (1.9)	6 (2.3)	9 (3.0)	0.507
Total	158 (100.0)	140 (100.0)	298 (100.0)	0.324

recorded for an unclear reason, the female students in Kurdistan Region, Iraq are at risk for developing SPSP. We believe that lifestyle and personal hygiene might be involved.

Regarding the body mass index, we noticed that there is no significant association between SPSP and obesity. However, a considerable number of our patients (52.7%) were overweight as a study suggests that obesity alone is not an essential factor and there is no significant correlation between obesity and SPSP.<sup>13</sup>

Concerning the surgical procedure, we have compared our technique of surgery with the surgical techniques often used by surgeons in our region, including open wound surgery, V-Y Advancement Flap, and Karydakias flap in terms of simplicity, hospitalization time, the recovery time to daily activity and work, esthetic satisfaction, and post-surgical complications.

The modified off-midline technique used in this study is patients (52.7%) simple, less time required for pain-free walking and less invasive surgery technique, among other methods for treating SPSP. Nowadays, surgeons agree with the idea of using the most straightforward and less invasive technique, if possible.<sup>9</sup> Although the open wound procedure is simple for complete recovery but wound healing is time consuming. The wound needs dressing and medical care daily, a painful and time-consuming procedure.<sup>14</sup> V-Y Advancement Flap is one of the most complicated surgeries and requires experience and patience; furthermore, the patient may have severe wound pain during recovery time.<sup>15,16</sup> A study suggests that the Karydakias flap is a simple procedure; however, if the sinus is not in the midline area, it would be difficult to proceed with this procedure.<sup>17</sup>

Hospitalization time with our technique is significantly lower than in other techniques. However, the open wound technique not only requires more hospitalization (median 2.4 days) but also requires wound dressing

care regularly. According to a study on V-Y Advancement flap, the patient requires at least three days of hospitalization and a median of 3.6 days in Karydakias flap.<sup>14,18,19</sup>

In our study, the time required for complete recovery and return to work after the surgery was  $20.3 \pm 2$  days. A similar result was observed in another study using the same technique the time required for the patient to return to work, and daily activity was  $25.6 \pm 4$  days.<sup>9</sup> The open wound technique requires much more time to recover and return to work. A study showed that a patient requires  $42.2 \pm 5$  days to return to work after the open wound surgery.<sup>20</sup> The patient's time requirements to get back to work in both V-Y Advancement Flap and Karydakias flap are higher of 3 and 3.53 weeks, respectively.<sup>15,21</sup>

Regarding cosmetic expectations, the problem with flap techniques is cosmetic outcomes that do not meet patients' satisfaction and leave deep scars in uncomfortable areas.<sup>22</sup> In contrast, the modified off-midline technique promises a better cosmetic outcome with high patient satisfaction.

Concerning the post-surgery complications in this study, we encountered wound infection (3.0%), recurrence (5.4%) recurred twice (2.4%) in 7 females. However, abscess and seroma accumulation, hematoma, wound dehiscence, and edema was not observed. The wound infection was higher in females, recurrence was higher in males, and all twice recurrences were in females. All the complications happen in the patients with the severe version of SPSP, the patients with moderate and simple SPSP did not experience any post-surgical complications. The surgery technique used in this study surpassed other surgical techniques used in our region in terms of post-surgical complications. Open wound techniques are more susceptible to wound infection, but the recurrence rate is very low.<sup>20</sup> The wound infection and recurrence

rate of modified off-midline is lower than flab techniques.<sup>9</sup>

### Conclusion

We have observed that the young people have more risk for SPSPD, and significant number of our patients were students. Additionally, in our region the disease is significantly more frequent in female students for unclear reasons. In terms of simplicity, hospitalization time, the recovery time to daily activity and work, esthetic satisfaction, and post-surgical complications, our technique was superior to other standard procedures used in our region including open wound surgery V-Y Advancement flap, and Karydakias flap.

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Not applicable.

### Competing interests

The authors declare that they have no competing interests.

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