E-ISSN: 2616-3470
P-ISSN: 2616-3462
Impact Factor (RJIF): 5.97
© Surgery Science
www.surgeryscience.com
2026; 10(1): 04-11
Received: 10-11-2025
Accepted: 15-12-2025

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Surgical management in sacrococcygeal pilonidal sinus disease depending on the suggested staging system

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DOI: https://www.doi.org/10.33545/surgery.2026.v10.i1.A.1268

Abstract
Background: Sacrococcygeal pilonidal sinus disease (SPSD) is a common condition affecting predominantly young adults, with varied clinical presentations ranging from asymptomatic sinuses to recurrent disease. Despite numerous surgical options, no universally accepted treatment strategy exists, and recurrence remains a major concern.
Aim: This study aimed to describe a morphology-based staging system for SPSD and to evaluate clinical outcomes of stage-specific surgical management using different operative techniques.
Methods: A prospective cohort analytical study was conducted at Basrah Teaching Hospital between December 2018 and April 2022. Seventy-one patients diagnosed with symptomatic SPSD were enrolled. Patients were staged according to a proposed system (Stage I-IV and recurrent stage) based on the number of midline pits and the presence of lateral extensions. Stage I and IIa disease were managed using pit-picking techniques, while Stage IIb and III disease were treated using the Bascom procedure. Preoperative, operative, and postoperative variables were recorded, including operative details, length of hospital stay, wound healing time, complications, functional recovery, and recurrence.
Results: Stage-adapted surgical management allowed tailored treatment according to disease extent, minimizing tissue excision in early stages and providing adequate drainage and off-midline healing in advanced stages. The approach demonstrated favorable primary healing rates, short hospital stays, rapid return to normal activities, and acceptable complication and recurrence rates.
Conclusion: A morphology-based staging system combined with stage-specific surgical techniques offers a rational and effective approach for managing SPSD. This strategy supports the "less is more" concept, potentially reducing overtreatment, complications, and disease recurrence while improving functional outcomes.

Keywords: Sacrococcygeal pilonidal sinus, pilonidal sinus, proposed staging system, surgical management

Introduction
Sacrococcygeal pilonidal sinus disease (SPSD) is a common disease that mainly affects young adults. It has different forms of presentation; it may be asymptomatic sinus, acute abscess, chronic sinus formation, and recurrent pilonidal disease. Although the sacrococcygeal area is most frequently affected by the disease process, these lesions can occur at other sites, like the umbilicus, axilla, groin etc [1].

The pilonidal disease has a reported incidence of 26 per 100,000 in the US and 48 per 100,000 in Germany. Men are predominantly affected by pilonidal sinus disease (80%) [2]. The higher incidence of pilonidal sinus disease usually occurs in young adults with ages ranging from 15 to 25, and its presentation after the age of 45 years is uncommon. Currently, Pilonidal sinus disease is regarded as an acquired phenomenon [3], with a reported incidence of 26 per 100,000 population [4].

There is a variety of evidence that support the acquired nature of pilonidal sinus disease. [1] The disease usually affects young adults and is not presented at birth, [2] men with excessive hair growth are mainly affected; [3] and some occupations in which prolonged sitting is needed, or frequent driving for a long time, make these people at higher risk to acquire pilonidal disease [1].

According to the congenital theory, it could have developed from caudal remnants of the neural tube, cutaneous inclusions created by sequestrated epithelium components, or dermal tractions generated during embryogenesis [5].

The definite aetiology of pilonidal sinus disease remains not fully understood; although, hormonal changes are thought to be a leading cause in the enlargement of hair follicles with subsequent blockade and closure of the pilosebaceous glands located in the sacrococcygeal area, the development of chronic inflammation (foreign body reaction), later bacterial infection, primary pilonidal sinus development as consequences of these events [6].

Although chronic pilonidal disease frequently occurs, there is no ideal treatment for the disease yet, and this subject remains controversial, with many appreciated procedures being used clinically in the current time [7, 8]. Ideally, the optimal treatment should lead to a high cure rate associated with the lowest recurrence rate to be completed without requiring a prolonged period of hospitalization, the patient should have minimal pain sensation, fewer work-free days, and a rapid return to normal physical activity [9-12].

Though numerous procedures have been described for the management of pilonidal sinuses, such as excisional procedures that include excision with or without primary closure and marsupialization (13), Minimally invasive procedures including pit picking from the midline (Gips, silac) (14) and Using flap surgery to correct tissue removal-induced abnormalities, such as a midline incision (Z-plasty, VY-plasty, Limberg flap, Rhomboid flap) (15). No one of which judging the yardsticks of disability period, complete healing, and recurrence of disease are perfect (16). Prolong disability period and complete healing of these procedures made Karydakis, Bascom, and Lord describe slightly different simple procedures called Off-midline closure procedures resulting in minimal disability, good long-term control, and, rapid return to normal activity (1, 17, 18).

2016, Ai Guner and Arif B. Cekic propose a staging system for the progressive nature of pilonidal sinus disease, by using the morphological extent of the disease, (Stage I-IV) (19).

Aim of the study

Due to the wide range of available strategies of treatments and the lack of accord on the best approach, a single treatment approach applied to all patients included in the trials could be harmful because it may disagree with the "less is more" concept, causing a progression of the previously limited disease to larger lesions. We conducted this study aims to describe the suggested staging system and to assess the results of different treatment approach depending on the specific surgery used for each stage.

Patients and Methods

Study Design

A cohort prospective analytical study was conducted at Basrah Teaching Hospital-surgical Department, from December 2018 to April 2022, on seventy-one patients diagnosed with symptomatic Sacrococcygeal Pilonidal sinus disease (SPSD).

Study population

Sampling

A random sampling technique was used as the sampling technique selection for this study, a recommended method of sampling for such types of research. Steven K. Thompson Formula was used in this study for sample size calculation.

The confidence level (Z) of 95% was selected for this study with an expected value of (1.96); therefore, the confidence interval (margin of error) (D) =0.05, with a probability of a true event (P) assumed to be (50%).

(Sample size = Z^2*P (1-P)/D^2).

Cases: A total of 71 patients were diagnosed with symptomatic Sacrococcygeal pilonidal sinus disease according to the clinical diagnosis based on history and physical examination (including anorectal exam) as follows; intermittent pain, swelling, discharge, and midline pits in the superior gluteal cleft and may be associated with cephalad or lateral tracking sinuses

Exclusion criteria

- SPSD which was identified incidentally and which presented with acute abscesses
- Patients younger than 12 years of age
- Patients who were treated without the use of the suggested algorithm
- Patients with ASA>3
- Immunocompromised patients.

Ethical committee

Agreements of Basrah Health Director and the scientific research ethical committee at the council of Arab Board of Health Specialization on carrying out this study were acquired before the data collection.

Clinical evaluation

Each participant underwent a full clinical evaluation including;

- Weight and height measurement.
- BMI calculation; it was done according to the following formula (kg/m^2).

Data collection

Data were collected using a special data form with written informed consent was obtained from patients after describing the proposed algorithm in detail to all patients. Data regarding patient demographics, duration of symptoms, previous treatments, operative data, length of hospital stay, primary healing rate, functional recovery time, wound healing time, complications, and recurrence for 71 patients were analyzed. (Appendix 2.1)

Proposed staging system

The staging system (Stage I-IV) was defined as follows by using the morphological extent of the disease:

- **Stage I:** Single pit in the midline, no lateral extension
- **Stage II:** >1 pits in the midline, no lateral extension
- **Stage IIa:** 2-3 pits in the midline
- **Stage IIb:** >3 pits in the midline
- **Stage III:** Midline pit/pits plus lateral extension in one direction
- **Stage IV:** Midline pit/pits plus lateral extension in both directions
- **Stage R:** Recurrent SPSD following any type of treatment

Patients with recurrent disease were included in a separate group, Stage-R. Specific surgical technique was used for each stage except for stage R. The technique was decided based on the potential defect size following the excision of the diseased tissue [20].

Surgical techniques

General measures

Preoperative preparation: After a well-designed consent was informed, proper hair removal of the area by an electrical clipper was done 1 hour before the operation. Prophylactic, preoperative (Ceftriaxone) antibiotics were administered to all patients.

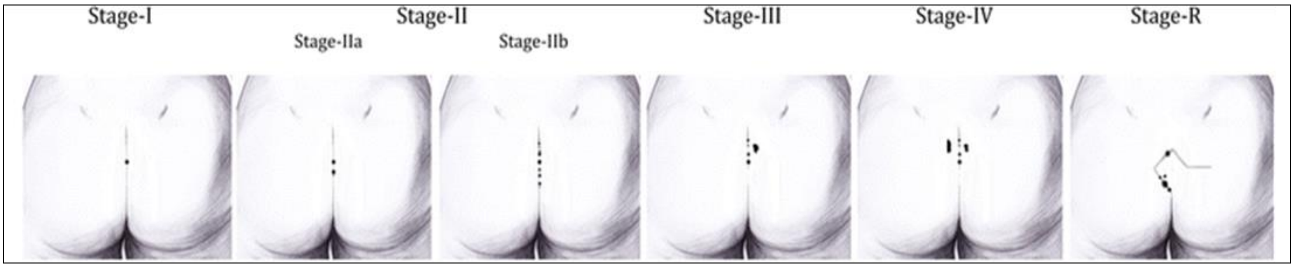

Fig 1: Proposed staging system

Anesthesia: General endotracheal or spinal anesthesia was administered to the patients.

- **Positioning:** on the prone position, patients were lying down on the operative table, with two pillows that had been put below the buttock and chest, and the buttocks were strapped apart by adhesive tapes to identify all pits.
- Cleaning the skin with 10% povidone-iodine solution and drape the area.
- Probing the sinus tract with Methylene blue injection to the sinus tract to stain all the sinus tracts to avoid leaving behind of tract during excision.

Stage I and stage IIa: **(pit picking)**

1. Small elliptical incision of 1-2 cm in length was performed to excise the pits and curate the disease cavity.
2. All infected granulation tissue and hair were removed and curated.
3. After establishing hemostasis, the area of the excised midline pits was approximated by non-absorbable sutures [21].

Stage IIb and stage III: (Bascom procedure)

1. Blade No. 15 was used to excise the pits, and a minimal amount of tissue was removed (the size of a grain of rice).
2. Pits are excised individually as far as feasible, these wounds extend into the disease cavity which was then drained laterally to the most convenient side of the midline by a parallel incision made 2.5 cm lateral to the midline.
3. Granulation tissue, hair, and debris were removed using curate.
4. At that point a fibrous and fatty fold lifted profound to the midline pits, this was accomplished by incising the fibrous boundary of the disease cavity into the fat of the opposite buttock, in this way discharging the midline pits from the post sacral fascia.
5. This flap was sutured to the bridge of skin between the midline pits and the lateral incision,

Subcuticular, non-absorbable suture was used to suture the midline wounds, Haemostasis secured using monopolar diathermy,

Small wick had been left inside the lateral incision and remained open or closed with interrupted non-absorbable sutures over the Redivac drain [22].

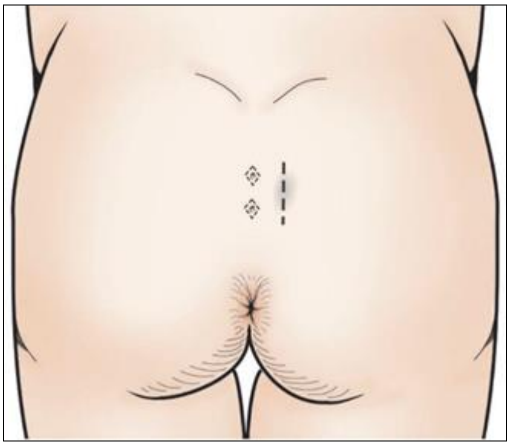

Fig 2: Illustration showing Bascom procedure.

Stage IV: (Rhomboid excision with the Limberg flap technique)

1. A-line AC (C towards the anal region) was drawn covering all midline pits.
2. Another line BD (60% of the length of AC) was drawn at the midpoint of AC at 90 degrees keeping both sides equal in length.
3. All points ABCD were joined to each other. By this method rhombic area is created in which one angle is 60 degrees and another is 120 degrees.
4. D-E is a direct continuation of the line B-D and is of equal length to the incision B -A, to which it will be sutured after rotation.
5. E-F is parallel to D-C and of equal length, after rotation, it will be sutured to A-D.
6. The skin and subcutaneous tissue were incised by deepening along the marked lines down to the deep fascia.
7. Rhomboid area of excised specimen included pilonidal sinus and its all extensions.
8. Then the flap is raised so that it includes skin, subcutaneous fat, and the fascia overlying the gluteus maximus rotated to cover the midline rhomboid defect.
9. Deep absorbable sutures to close the fascia and fat are placed over a Redivac drain, and then finally the skin is closed in interrupted sutures [23].

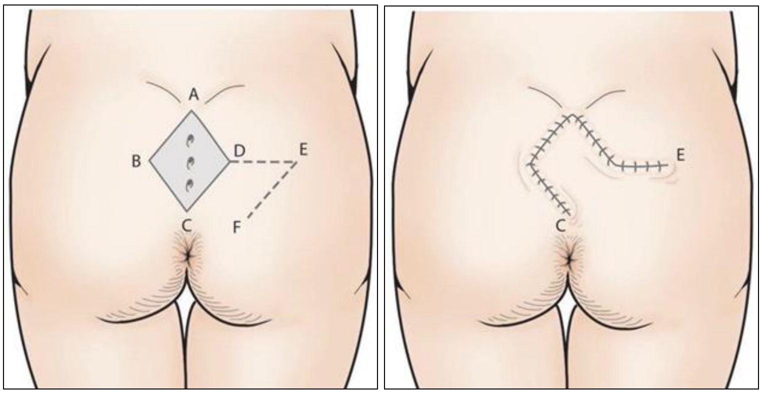

Fig 3: Illustration showing Limberg Rhomboid flap procedure

Stage VI

The technique was decided based on the potential defect size following the excision of the diseased tissue.

Post-Operative Care

1. Oral metronidazole 500 mg/tidy and Cephalosporin 1000 mg/bid for 3 days.
2. Dressing to protect clothing with a mini-pad inside the underwear is useful.

Patients follow-up

All patients were followed postoperatively at 1, 10, 15, 20, 30 days, and every 6 months. Follow-up was done by attaining detailed history by asking the patients when they felt comfortable about starting their daily activities and the interval between surgery and return to daily activities was defined as functional recovery time. Recurrence was used when symptoms of the disease recurred sometime after complete wound healing. The examination was done by a consultant or senior surgeon, and complications were listed as; infection (superficial or deep), collection (seroma or hematoma), or wound dehiscence (partial or complete).

Definitions of variables

- **Duration of symptoms**: the time from the beginning of chief complaint till the time of operation and it was calculated by days.
- **Presence of abscess drainage history**: any drained abscess from the pilonidal sinus.
- **Operative duration**: the time from the incision till skin closure and it was collected by minutes.
- **Drain usage**: any type of drain used in the operation.
- **Drain removal time**: the time from the insertion of drain till the time of removal and it was collected by days.
- **Infection**: any recorded redness, delayed healing, fever, pain, tenderness, warmth, swelling, or any recorded bacterial growth by culture and sensitivity test.
- **Dehiscence:** wound reopens, breakdown, disruption, or separation after it has been stitched back together.
- **Primary healing**: no breakdown of the wound (complication-free healing) at any point along its length and it was calculated by days.
- **Recurrence**: when symptoms and signs of the disease recurred after complete wound healing.
- **Functional recovery time**: The period time after the surgery at which functions and daily activity need to be restored.
- **Wound healing time:** The period time after wound injury (surgery) that is needed to establish complete wound healing.

Statistical analysis: Statistical calculations were done using Statistical Package for the Social Sciences version 25 (SPSS Inc.). In which categorical data were expressed as numbers and percentages, and the differences between the groups were analysed using the Chi-square test (X^2) and Fisher exact test. Adjusted standardized residuals were used to explore which variable consider a contributor to the chi-square results (>3 adjusted standardized residuals). Continuous data expressed as mean±SD and the differences between the groups were analyzed by non-parametric Kruskal-Wallis H test for abnormally distributed data and ANOVA test for normally distributed data. Shapiro-Wilk test was used to test the normality of the data, and outliers were detected using Boxplot methods. A confidence interval of 95% was applied as the dependent interval in statistics and P-values <0.05 were accepted as statistically significant.

Results: Demographical data analysis of the included patients: A total of seventy-one patients with Pilonidal Sacrocoxcygeal sinus were involved in this study, with a mean age of (25.59±5.27) and male predominance (52 (73.2%)) and female (19 (26.8%)) with male: female was 3:1, the body mass index mean was (23.4±3.4). (Table 3.1)

Regarding the difference in the age between the studied groups, it was obvious that the mean age of stage IV (31.00±3.56) was higher compared with the other groups followed by stage III (27.93±4.87), stage R (27.57±5.31), stage II-b (24.31±5.04), stage II-a (24.33±6.59) and lastly stage I (23.31±4.17) respectively. (Table 3.1)

Males are commonly presented with stage II-a (83.3%), and to a lesser extent at stage IV (75.0%), stage III (73.3%), stage II-b (73.07%), stage R (71.4%), and stage I (69.23%) respectively. (Table 3.1)

Females in turn recorded high percentages among stage I (30.7%) and stage R (28.57%) followed by stage II-b (26.93%), stage III (26.7%), stage IV (25.0%), and stage II-a (16.7%) which was rarely recorded. (Table 3.1)

The body mass index was high among stage IV (26.75±2.21), stage I (24.23±2.58), stage III (24.13±4.24), stage II-a (23.17±3.60), while stage R (22.57±2.57) and stage II-b (22.88±2.51) recorded the lowest. (Table 3.1)

Duration of symptoms recorded long duration with stage IV (13.75±2.63) followed by stage R (11.57±2.07), stage III (11.33±2.76), stage II-b (8.27±3.25), and lastly, stage II-a (8.17±2.85) and stage I (5.23±3.16) which was statistically significant (P-value <0.05). (Table 3.1)

Table 1: Demographical data analysis of the included patients.

Variables		Overall (No.71)	Stage I (No.13)	Stage II (No.32)	Stage II-a (No.6)	Stage II-b (No.26)	Stage III (No.15)	Stage IV (No.4)	Stage R (No.7)	P-value
Age (mean±sd) (years)		25.59±5.27	23.31±4.17	24.3±5.5	24.33±6.59	24.31±5.04	27.93±4.87	31.00±3.56	27.57±5.31	0.062⁑
Gender	Male	52 (73.2%)	9 (69.23%)	24 (75.0%)	5 (83.3%)	19 (73.07%)	11 (73.3%)	3 (75.0%)	5 (71.4%)	0.62*
	Female	19 (26.8%)	4 (30.77%)	8 (25.0%)	1 (16.7%)	7 (26.93%)	4 (26.7%)	1 (25.0%)	2 (28.57%)	
Body mass index (mean±sd) (kg/m^2)		23.61 ±3.11	24.23±2.58	22.89±3.2	23.17±3.60	22.88±2.51	24.13±4.24	26.75±2.21	22.57±2.57	0.09⁑
Duration of symptoms (mean±sd) (months)		8.99±3.78	5.23±3.16⸎⸸⁝	8.2±2.9	8.17±2.85	8.27±3.25⸎⁝	11.33±2.76†⸙	13.75±2.63†	11.57±2.07†⸙	<0.005⁑

* Fisher exact test ⁑ One-way ANOVA test † significantly differs from stage I ‡ significantly differs from stage II-A
⸙ significantly differs from stage II-B ⸎ significantly differs from stage III ⸸ significantly differs from stage IV⁝ significantly differs from stage R

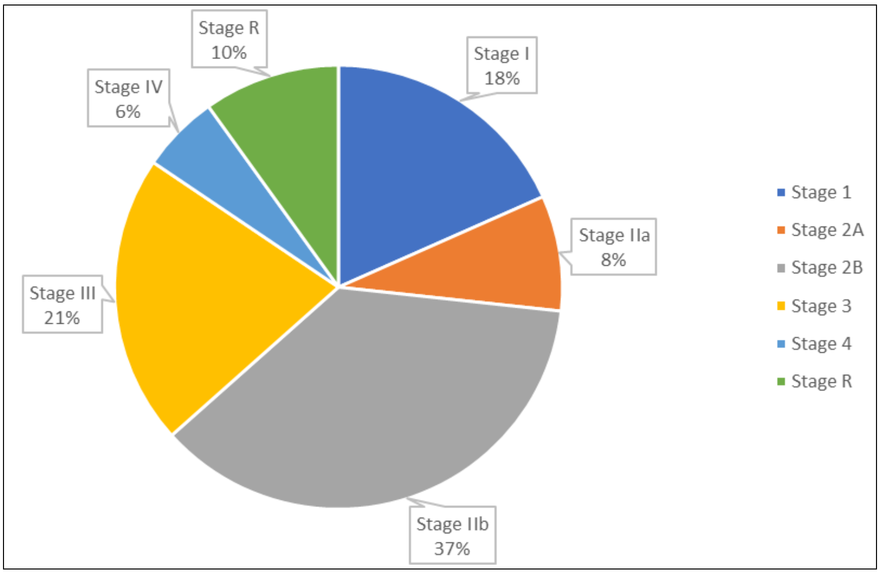

Fig 4: Proposed staging system distribution of the included patients

Clinical and surgical data analysis of the included patients.

Clinical and surgical parameters were recorded significant presence of abscess drainage history was commonly seen among stage IV (75.0%), and stage III (26.66%). While it is rarely seen among stage I (15.38%), stage R (14.28%), stage II-b (7.69%), and stage II-a (0.0%). (Table 3.2).

The operative duration was varied from the longest recorded at stage IV (26.0±1.41), stage R (23.14±3.33), stage III (22.0±2.64), and stage II-b (19.96±2.76), with the shortest recorded at stage II-a (15.17±1.94) and stage I (14.00±1.87) that was recorded significant results (P value0.033). (Table 3.2)

Drains were significantly used frequently among stage IV (100.0%), stage III (33.33%), and stage R (28.57%), while stage II-b (19.23%), stage II-a and stage I were not used at all. (Table 3.2).

Meanwhile, drains were removed with the longest mean days at stage IV (2.75±0.95), and stage R (2.40±0.54), with the shortest, was stage III (2.13±0.64) and stage II-b (1.88±0.64). (Table 3.2).

The Hospital stay was longest among stage IV (2.00±0.00) followed by stage R (1.71±0.48), stage III (1.53±0.51), stage II-b (1.42±0.50), stage II-a (0.83±0.40), and stage I (0.69±0.48) in which significant values were recorded (P value0.004). (Table 3.2).

Table 2: Clinical and surgical data analysis of the included patients

Variables	Overall (No.71)	Stage I (No.13)	Stage II (No.32)	Stage II-a (No.6)	Stage II-b (No.26)	Stage III (No.15)	Stage IV (No.4)	Stage R (No.7)	P-value
Presence of abscess drainage history	12 (16.9%)	2 (15.38%)	2 (6.25%)	0 (0.0%)	2 (7.69%)	4 (26.66%)	3 (75.0%]*	1 (14.28%)	0.033*
Operative duration (minutes) (mean±sd)	19.55±4.29	14.00±1.87 ⸙⸎⸸⁝	17.4±2.3	15.17±1.94⸙⸎⸸⁝	19.96±2.76†‡⸸	22.0±2.64†‡⸸	26.0±1.41†‡⸙⸎	23.14±3.33†‡	0.033⁑
Drain usage	16 (22.53%)	0 (0.0%)*	5 (15.62%)	0 (0.0%)	5 (19.23%)	5 (33.33%)	4 (100.0%)*	2 (28.57%)	<0.001*
Drain removal time (days) (mean±sd)	2.20±0.70	-------	1.88±0.64	--------	1.88±0.64	2.13±0.64	2.75±0.95	2.40±0.54	0.057⁂
Hospital stay (days) (mean±sd)	1.32±0.60	0.69±0.48⸙⸎⸸⁝	1.2±0.3	0.83±0.40⸸	1.42±0.50†	1.53±0.51†	2.00±0.00†‡	1.71±0.48†	0.004⁂

* Fisher exact test ⁑ One-way ANOVA test ⁂ Kruskal Wallis test †significantly differs from stage I
‡ Significantly differs from stage II-A ⸙ significantly differs from stage II-B ⸎ significantly differs from stage III
⸸ significantly differs from stage IV ⁝ significantly differs from stage R

Outcomes analysis of the included patients

The short and long-term complications of the studied patients were observed with the following frequencies: Collection (9.85%), Infection (8.45%), and Dehiscence (4.22%). (Table 3.3).

The collection was seen among stage R (28.57%), stage IV (25.0%), and to a lesser extent mong stage II-b (7.69%), stage III (6.67%), and stage I (7.69%). Infection was highly presented among stage IV (25.0%) and stage R (14.3%) while stage III (6.67%) recorded the lowest rates. Meanwhile, Dehiscence was recorded among stage III (6.7%), stage II-b (3.8%), and stage R (14.3%). (Table 3.3).

Primary healing was recorded (91.5%) among the overall included patients with the higher rates at stage II-a (100.0%) and stage III (93.3%), stage II-b (92.3%) followed by stage I (92.3%), stage IV (75.0%), and stage R (71.4%). (Table 3.3).

The Recurrence rates were (2.81%) which is commonly observed among stage II-a (16.67%) and stage III (6.67%). The Functional recovery time was (12.21±5.43) with the longest observed among stage IV (14.25±7.13) followed by stage R (13.86±3.89), stage II-b (12.27±3.62), and stage III (12.13±3.06), with the shortest among and stage I (10.08±1.49) and stage II-a (11.33±1.63). (Table 3.3).

The wound healing time was longest at stage IV (13.25±7.27), followed by Stage R (12.86±7.38), stage II-b (11.96±4.2), stage III (11.80±4.42), stage II-a (10.50±2.34), and stage I (9.15±2.57). (Table 3.3)

Table 3: Outcomes analysis of the included patients.

Variables	Overall (No.71)	Stage I (No.13)	Stage II (No.32)	Stage II-a (No.6)	Stage II-b (No.26)	Stage III (No.15)	Stage IV (No.4)	Stage R (No.7)	P-value
Infection	6 (8.45%)	1 (7.69%)	2 (6.25%)	0 (0.0%)	2 (7.69%)	1 (6.67%)	1 (25.0%)	1 (14.3%)	0.097*
Collection	7 (9.85%)	1 (7.69%)	2 (6.25%)	0 (0.0%)	2 (7.69%)	1 (6.67%)	1 (25.0%)	2 (28.57%)	0.413*
Dehiscence	3 (4.2%)	0 (0.0%)	1 (3.12%)	0 (0.0%)	1 (3.8%)	1 (6.67%)	0 (0.0%)	1 (14.3%)	0.057*
Primary healing	65 (91.5%)	12 (92.30%)	30 (93.75%)	6 (100.0%)	24 (92.30%)	14 (93.3%)	3 (75.0%)	5 (71.42%)	0.084*
Recurrence	2 (2.81%)	0 (0.0%)	1 (3.12%)	1 (16.67%)	0 (0.0%)	1 (6.67%)	0 (0.0%)	0 (0.0%)	0.237*
Functional recovery time (days) (mean±sd)	12.21±5.43	10.08±1.49	11.23±3.57	11.33±1.63†⸙⸎⸸⁞	12.27±3.62†‡	12.13±3.06†‡	14.25±7.13	13.86±3.89†‡	0.023⁑
Wound healing time (days) (mean±sd)	11.39±4.75	9.15±2.57⸙	10.88±5.36	10.50±2.34	11.96±4.2†	11.80±4.42	13.25±7.27	12.86±7.38	0.004⁑

* Fisher exact test ⁑ One-way ANOVA test †significantly differs from stage I ‡ significantly differs from stage II-A
⸙ significantly differs from stage II-B ⸎ significantly differs from stage III ⸸ significantly differs from stage IV
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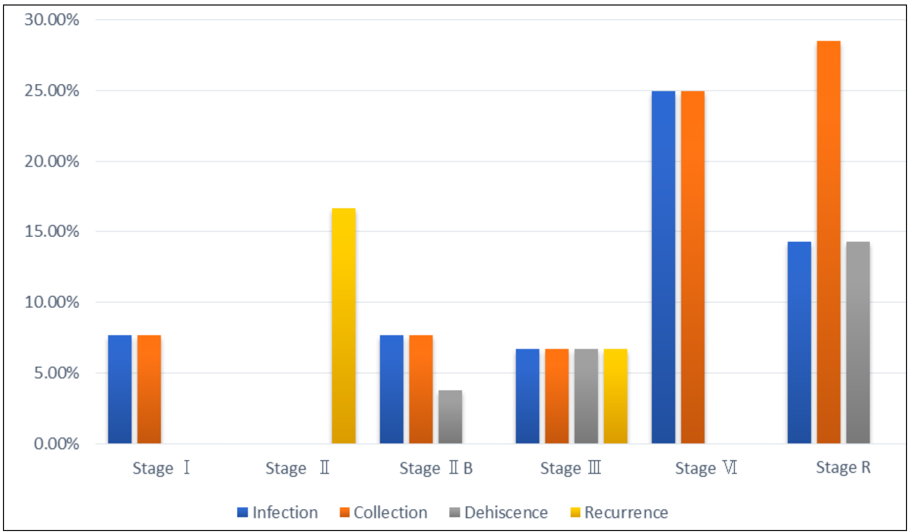

Fig 5: Complications distribution of the included patients

Discussion

Individual patient outcomes after the implementation of a surgical treatment method based on the SPSD stage were analyzed in the current study. SPSD is a progressive disorder, and patients were categorized according to the stage of the disease. Including all stages of the disease, a satisfactory primary healing rate and quicker recovery with minimal complications were achieved, especially for early disease courses where less intervention was undertaken. Despite stage II being the most common presenting type in the current study, only 5.6% of the patients had a severe illness, which was categorized as stage IV. Furthermore, this study discovered a correlation between duration symptoms and SPSD stages.

Despite different surgical techniques being utilized to treat sacrococcygeal pilonidal illness, the best therapeutic technique has yet to be determined. For every surgical technique, various recurrence rates have been observed [24]. Moreover, in the search for the best procedure, recurrence wasn't the only crucial issue to consider. The surgery should also be simple and affordable economically, with minimal complication rates, and the ability for the patient to come back to work or do normal daily activities rapidly [25]. The consequence of surgical treatment on the patient's quality of life is another crucial factor that has provoked growing attention in recent years [26]. As a result, the creation of a SPSD staging system is critical for judgment in the treatment of this condition. The utilization of more targeted treatment options and outcome assessment is made possible by disease staging. Furthermore, it promotes data exchange among researchers, allowing for the comparison of study outcomes, safety, and expense, as well as the possibility of clinical studies being conducted in more targeted patient groups [27].

Although the asymptomatic disease is frequently discovered by chance, the preventative operation is universally thought to be of no benefit, thus it is not included in the staging system [28]. Additionally, an acute abscess can occur at any stage of PSD but does not necessitate the utilization of particular therapeutic methods. As a result, the developed staging approach was confined to primary chronic symptomatic SPSD [29].

In situations of stage I and stage IIA disease, we favor the least invasive approach of "pit-picking," to minimize the complications that result from using pit-picking for more than three midline pits. Furthermore, this method can be done under regional anesthesia in some patients who are not candidates for general anesthesia [30] despite this aspect was not covered in this study.

In this study, the Bascom procedure has become the preferred method for stage IIB/III disease. Conserving this method to those specific stages has decreased the infection, collection, dehiscence, and, Recurrence rates significantly in comparison to the previously published data about the use of this surgical option to all presentations of SPSD [31, 32]. In 2020 Alexander Muacevic and John R Adler conducted retrospective research on 700 individuals who had the Bascom as surgery for all cases of pilonidal sinus cases from 1993 to 2020 whether it was minimal or complicated, this revealed a meantime for wound healing extended to weeks in comparison to 10 and 12 days in stage II-b and III respectively in our study proposed staging system while the percentage of wound separation in Muacevic study was 10.9% which is significantly higher than that reported by surgeries done according to the classification system. The infection rate also was higher, especially with recurrent disease [33].

Rhomboid excision with the Limberg flap technique was preserved in this study for the patients presented with stage IV disease. Those patients have the most complicated course of the disease in comparison with other stages, with the highest reported hospital stay, functional recovery time, and infection rates. Surprisingly, no reported recurrence or wound dehiscence. Previous studies reported that Rhomboid excision reduces the rates of complications when it is used for all patients with PNSD.

The Limberg flap has been compared to other flap techniques in various prior studies. The modified Limberg flap was compared to the Karydakis flap by Mentes *et al.*, [34], Ersoy *et al.*, [35], and Can *et al.*, [36]. They discovered that when compared to the Karydakis flap, the modified Limberg flap has fewer problems and recurrences. We chose the Limberg flap operation for our patients because of these characteristics. We found that this method had fewer postoperative problems, a shorter hospital stay (compared to 10-15 days for other operations), and a lower rate of recurrence [37]. In comparison to a previous study by ozdemir *et al.*, the mean time for hospital stay by Limberg flap procedure was shorter than their meantime for hospital stay which was 4.51±2days.

In this study, the prevalence of abscess drainage history increases with increasing SPSD stage, (6.25%) in stage II and stage IV and (75.0%) respectively. in a retrospective study held in turkey from January 2012 to March 2013, it was found that the complicated advanced form is the most prevalent variety found on hospitalization for SPSD abscess surgery but the prevalence of abscess, in general, was 30% [38], this might be attributed to the lack of the classification system that can accurately count the risk of abscess formation which associated with each disease stage.

In 2016, Yavuz *et al.* made a staging system based on clinical, ultrasonographical, and MRI results. That system divided the SPSD according to the depth into 3 stages. That study found that the length of hospital stay and the time spent not working increased with stage advancement from I to III [39]. Similar findings were observed in this study as the length of the hospital stay was (0.69±0.48) day in stage I and (2.00±0.00) day in stage IV respectively while the time required for functional recovery increased from four to fourteen days with the advancement of the stages, reaching its maximum work-free days at stage IV. Based on these findings, we concluded that staging before beginning SPSD management was critical, both in terms of the treatment's duration and in regards to informing the patient about the postoperative convalescent period.

The limitations of this study were, firstly the effects of comorbidities and the treatment that the patients kept on were not evaluated on the healing process as well as the complication. Secondly, this study was held only in Basra teaching hospital center and by a single investigator which may increase the risk of bias in the real arrangement of the cases between the staging groups.

Conclusions

Sacrococcygeal pilonidal sinus is a common condition in our locality, and it can be present in different stages ranging from a single little skin pit to a large complicated sinus, thus this proposed staging system is considered a significant way to select the proper surgical technique for each stage accordingly, in addition to its advantages in reducing the complications rate associated with the commonly used techniques.

References

1. Lord PH. Anorectal problems: etiology of pilonidal sinus. Diseases of the Colon & Rectum. 1975;18(8):661-664.
2. Guyuron B, Dinner M, *et al.* Excision and grafting in treatment of recurrent pilonidal sinus disease. Surgery, Gynecology & Obstetrics. 1983;156(2):201-204.
3. Lee P, Raniga S, *et al.* Sacrococcygeal pilonidal disease. Colorectal Disease. 2008;10(7):639-650.
4. McCallum IJ, King PM, *et al.* Healing by primary closure versus open healing after surgery for pilonidal sinus: systematic review and meta-analysis. BMJ. 2008;336(7649):868-871.
5. Kanat BH, Sözen S. Disease that should be remembered: sacrococcygeal pilonidal sinus disease and short history. World Journal of Clinical Cases. 2015;3(10):876.
6. Karydakis GE. Easy and successful treatment of pilonidal sinus after explanation of its causative process. Australian and New Zealand Journal of Surgery. 1992;62(5):385-389.
7. Burney RE. Treatment of pilonidal disease by minimal surgical excision under local anesthesia with healing by secondary intention: results in over 500 patients. Surgery. 2018;164(6):1217-1222.
8. Mohamed H, Kadry I, *et al.* Comparison between three therapeutic modalities for non-complicated pilonidal sinus disease. The Surgeon. 2005;3(2):73-77.
9. Majeski J, Stroud J. Sacrococcygeal pilonidal disease. International Surgery. 2011;96(2):144-147.
10. McCallum I, King PM, Bruce J, Ahmed AK. Healing by primary versus secondary intention after surgical treatment for pilonidal sinus. Cochrane Database of Systematic Reviews. 2007;(4).
11. Hameed K, editor. Outcome of surgery for chronic natal cleft pilonidal sinus: a randomized trial of open compared with closed technique. Medical Forum Monthly. 2001.
12. Khawaja HT, Bryan S, Weaver PC. Treatment of natal cleft sinus: a prospective clinical and economic evaluation. British Medical Journal. 1992;304(6837):1282.
13. Ommer A, Berg E, *et al.* S3-Leitlinie: sinus pilonidalis. Coloproctology. 2014;36(4):272-322.
14. Iesalnieks I, Deimel S, *et al.* Pit-picking operation bei Patienten mit Sinus pilonidalis. Der Chirurg. 2015;86(5):482-485.
15. Iesalnieks I, Ommer A. The management of pilonidal sinus. Deutsches Ärzteblatt International. 2019;116(1-2):12.
16. Allen-Mersh T. Pilonidal sinus: finding the right track for treatment. British Journal of Surgery. 1990;77(2):123-132.
17. Karydakis G. New approach to the problem of pilonidal sinus. The Lancet. 1973;302(7843):1414-1415.
18. Bascom J. Pilonidal disease: origin from follicles of hairs and results of follicle removal as treatment. Surgery. 1980;87(5):567-572.

19. Guner A, Cekic AB, *et al.* A proposed staging system for chronic symptomatic pilonidal sinus disease and results in patients treated with stage-based approach. BMC Surgery. 2016;16(1):1-7.
20. Guner A, Cekic AB, *et al.* A proposed staging system for chronic symptomatic pilonidal sinus disease and results in patients treated with stage-based approach. BMC Surgery. 2016;16:18.
21. Iesalnieks I, Deimel S, *et al.* Pit-picking surgery for patients with pilonidal disease: mid-term results and risk factors. Der Chirurg. 2015;86(5):482-485.
22. Immerman SC. The Bascom cleft lift as a solution for all presentations of pilonidal disease. Cureus. 2021;13(2):e13053.
23. Paudyal S, Maharjan S, *et al.* Rhomboid excision and Limberg flap operation for managing pilonidal sinus: our experience at Patan Hospital, Patan Academy of Health Sciences. Journal of Society of Surgeons of Nepal. 2019;22:7-11.
24. Unalp HR, Derici H, Kamer E, Nazli O, Onal MA. Lower recurrence rate for Limberg vs V-Y flap for pilonidal sinus. Diseases of the Colon & Rectum. 2007;50(9):1436-1444.
25. Akinci OF, Coskun A, Uzunköy A. Simple and effective surgical treatment of pilonidal sinus. Diseases of the Colon & Rectum. 2000;43(5):701-706.
26. Karakayali F, Karagulle E, Karabulut Z, Oksuz E, Moray G, Haberal M. Unroofing and marsupialization vs rhomboid excision and Limberg flap in pilonidal disease: a prospective randomized clinical trial. Diseases of the Colon & Rectum. 2009;52(3):496-502.
27. Guner A, Cekic AB, Boz A, Turkyilmaz S, Kucuktulu U. A proposed staging system for chronic symptomatic pilonidal sinus disease and results in patients treated with stage-based approach. BMC Surgery. 2016;16(1):1-7.
28. Doll D, Friederichs J, *et al.* Surgery for asymptomatic pilonidal sinus disease. International Journal of Colorectal Disease. 2008;23(9):839-844.
29. Hussain ZI, Aghahoseini A, Alexander D. Converting emergency pilonidal abscess into an elective procedure. Diseases of the Colon & Rectum. 2012;55(6):640-645.
30. Iesalnieks I, Deimel S, Schlitt HJ. Pit-picking operation bei Patienten mit Sinus pilonidalis. Der Chirurg. 2015;86(5):482-485.
31. Agcaoglu O, Dural AC, Ercetin C, Tezcaner T, Kirnap M, Anuk T. Comparison of cleft lift and Limberg flap techniques for pilonidal sinus surgery. Eastern Journal of Medicine. 2019;24(3):320-324.
32. Tezel E, Bostanci H, *et al.* Cleft lift procedure for sacrococcygeal pilonidal disease. Diseases of the Colon & Rectum. 2009;52:135-139.
33. Immerman SC. The Bascom cleft lift as a solution for all presentations of pilonidal disease. Cureus. 2021;13(2).
34. Mentes BB, Leventoglu S, Cihan A, Tatlicioglu E, Akin M, Oguz M. Modified Limberg transposition flap for sacrococcygeal pilonidal sinus. Surgery Today. 2004;34(5):419-423.
35. Ersoy E, Devay AO, Aktimur R, Doganay B, Özdoğan M, Gündoğdu RH. Comparison of the short-term results after Limberg and Karydakis procedures for pilonidal disease: randomized prospective analysis of 100 patients. Colorectal Disease. 2009;11(7):705-710.
36. Can MF, Sevinc MM, Hancerliogullari O, Yilmaz M, Yagci G. Multicenter prospective randomized trial comparing modified Limberg flap transposition and Karydakis flap reconstruction in patients with sacrococcygeal pilonidal disease. The American Journal of Surgery. 2010;200(3):318-327.
37. Hussain SM, Farees SN, Abbas SJ, Raghavendra SV. Rhomboid excision with modified Limberg flap in the treatment of sacrococcygeal pilonidal disease. Archives of International Surgery. 2015;5(2):74.
38. Kanat BH, Bozan MB, Mehmet F, Yur M, Erol F, Özkan Z, Emir S, Urfalıoğlu A. Comparison of early surgery (unroofing curettage) and elective surgery (Karydakis flap technique) in pilonidal sinus abscess cases. Turkish Journal of Trauma and Emergency Surgery. 2014;20(5):366-370.
39. Yavuz Y, Yıldırım MA, Çakır M, Varman A, Karahan Ö. Classification of pilonidal sinus disease according to physical examination, ultrasonography and magnetic resonance imaging findings. Turkish Journal of Colorectal Disease. 2020;30(4).

How to Cite This Article
Saud JD, Habbash MM, Al-Sabbagh HAN. Surgical management in sacrococcygeal pilonidal sinus disease depending on the suggested staging system. International Journal of Surgery Science 2026;10(1):04-11.

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