

World Journal of Colorectal Surgery

Volume 1, Issue 1

2008

Article 7

Clinical features and surgical management of sacrococcygeal pilonidal sinus: Experience of a peripheral hospital in Saudi Arabia

Dr. Hassan Al Traifi Dr.*
Mujahid Ashraf Dr.‡

Kazi Selim Anwar Dr.†
Wasim Sayeed Malik Dr.**

*Hatat Sudair Hospital, Ministry of Health, Saudi Arabia, altraifi2@hotmail.com

†Hatat Sudair Hospital, MOH, Saudi Arabia, kselim2256@yahoo.com

‡Hatat Sudair Hospital, MOH, Saudi Arabia (Now working in UK), mujahidashrafpk@hotmail.com

**Hatat Sudair Hospital, Ministry of Health, Saudi Arabia, wasimsayeed@gmail.com

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Dr. Hassan Al Traifi Dr., Kazi Selim Anwar Dr., Mujahid Ashraf Dr., and Wasim Sayeed Malik Dr.

Abstract

STRUCTURED ABSTRACT

Objective(s) Observe age-and gender specific occurrence, see if sacrococcygeal pilonidal sinus disease (SPD) remains more among obese patients, and, evaluate its surgical outcome with some modification.

Design: Prospectively designed interventional study

Setting: Department of Surgery, Hotat Sudair Hospital (90-beded secondary care) located 180 km away from Riyadh city.

Subjects: Twenty four male Saudi patients with the complaints of pain and discharge from natal cleft area who had underwent surgery.

Surgical intervention: All patients underwent surgery following either “open” or ”closed” techniques. An elliptical oblique incision away from midline was made- differing from Karydakis technique. Our modification was somewhat similar to Kitchen which was aimed to minimize normal-tissue loss and reduced tension leading to stronger scar.

Main Outcome Measure(s) Mean surgery time, mean wound healing and hospital stay, and recurrence rate, and complication(s).

Results Mean age was 22.2 ± 4.9 years and mean BMI was 28.7 ± 4.46 (83.3% being obese or overweight). Surgery was performed following closed (67%) and open (33%) excisions. Mean surgery time was 33.9 ± 10.1 minutes. Mean wound healing was 20.4 ± 9.51 days differing with surgical techniques ($p < 0.00$) but inversely proportional to surgery-time ($p < 0.00$). Mean hospital stay was 4.89 ± 1.01 days. One recurrence and 5 complications occurred in open excision ($p < 0.03$) when followed up for 10.83 ± 6.76 months.

Conclusion SPD remains common among obese males. Primary closure though seemed promising, open method remains better for extensive, infected/recurrent cases. Eccentric-oblique

incision is an effective modification where midline is more preserved to reduce tension and healthy scar. More studies be conducted to confirm or refute our observation(s).

KEYWORDS: Pilonidal Sinus, Surgery, Saudi Males

Original Article

Clinical features and surgical management of sacrococcygeal pilonidal sinus: Experience of a peripheral hospital in Saudi Arabia

*¹Dr. Hassan Al Traifi, MBBS (Sudan), CABS(Saudi Arabia), FRCSEd, Consultant and Head, Department of Surgery, and, Medical Director

Dr. Mujahid Ashraf, MBBS, FCPS (Pakistan), FRCS (Glas) Specialist Surgeon, Dept. of Surgery

*²Dr. Kazi Selim Anwar, MD (USSR), M. Phil (England), PG Res Dip (Japan) Specialist Microbiologist, Dept. of Microbiology, and, CME Coordinator

Dr. Wasim Syeed Malik, MBBS, M.S (India) Specialist Surgeon, Dept. of Surgery

Dr. Shahejan Chamansab, MBBS, M.S (India) Resident Surgeon, Dept. of Surgery

Hotat Sudair Hospital, Riyadh 11982, Kingdom of Saudi Arabia

For all sorts of correspondences:

*¹HAT: altraifi2@hotmail.com or, *²KSA: kselim2256@yahoo.com

Conflict of interest: None declared.

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SPD remains common among obese males. Primary closure though seemed promising, open method remains better for extensive, infected/recurrent cases. Eccentric-oblique incision is an effective modification where midline is more preserved to reduce tension and healthy scar. More studies be conducted to confirm or refute our observation(s).

Introduction:

Pilonidal sinus disease (PSD) is a complex condition,^[1] generally being benign. Though it is not life threatening, yet it remain troublesome,^[2] disabling nuisance^[3] and embarrassing^[1] disease condition with considerable discomfort^[1,4] and morbidity.^[W1] It may, at times, manifest with serious complications^[6] like infections^[7] leading to fatality^[8] particularly when carcinogenic changes occur, though rarely.^[9]

PSD remains a common problem of sacrococcygeal region^{[3], [9 - 15]} occurring in the cleavage between buttocks (natal cleft), it is often called as primary sacrococcygeal pilonidal disease: SPD^[16]. However, PSD is not restricted to inter-gluteal region alone but may occur in inter-digital space, hand, axilla, peri-umbilical areas,^[10] and sub-ungual region. The origin of PSD remained debating for a century^[12]: during mid'40 it was thought to be congenital, which is now being well recognized as an acquired condition as Paty & Scarf proposed in 1946.^[2]

PSD are reported more frequently from the Western world (Caucasians) than from Asia and Africa^[11] and is common in Turkey,^[4, 10, 16-18] and Egypt.^[19] It is widely prevalent in western countries, like Denmark,^[20] Switzerland,^[21] Italy,^[22-23] Germany,^[24] UK^[1] and in USA.^[25-27] Current report showed that 40000 PSD patients are treated each year in civilian hospitals, in USA which average 5.2 days of in-hospital care.^[27] PSD is also common in several countries of Arabian Peninsula and the gulf like Kuwait,^[2, 5] Jordan^[11] and Saudi Arabia.^[3, 13-15] However, no exact data on PSD and its management is reported from Saudi Arabia until 2001^[13] though few are seen in recent years.

PSD presents either as a draining sinus or as an abscess.^[7] There is an underlying cyst like-structure with associated granulation tissue, fibrosis & frequent tufts of hair.^[28] Karydakis attributed the pathogenesis of PSD in describing hair insertion process into three main factors: the invader (loose hair); the force (causing insertion) and the skin vulnerability (insert hair at the depth of natal cleft). Moreover, this sinus is initiated from a small midline opening lined by stratified squamous epithelium.^[9] Hair maintain an adverse environment within the natal cleft aggravating PSD and that pits presenting into dermis are distended with keratin & debris but not in hair follicules^[29] which led to hypothesis that PNS occurs more in hairy/ hirsute individuals.^[26]

Pilonidal Sinus are commonly observed among young age groups between 19 to 39 years,^[2, 5, 12, 28] males^[13] being reported to suffer more^[12] which Sondenaa K et al^[16] disagreed to, like many others^[25]. Similarly, obesity also remains controversial as a predisposing factor for contracting PSD.^[12, 19, 30, 31]

Management of PSD disease still remain controversial ^[2] and debating ^[12] but surgical intervention ^[2] remains the main mode of treatment. No single approach ^[5] or surgical technique, can be relied upon to minimize with morbidity and preventing recurrence of this benign yet troublesome condition. ^[2] Many surgical procedures that are available for symptomatic PSD are well reviewed by Allen-Mersh ^[32] ranging from simply shaving ^[12] and excision ^[12] to complex flap repairs, ^[12] none of which being perfect alone ^[12] in terms of i) quicker wound healing, ii) non-recurrence outcome and iii) abolition of infection/sepsis ^[2].

We, thus, conducted this prospectively designed interventional study among SPD patients attending the surgery department of this secondary care hospital of Hotat Sudair, in Riyadh region, Saudi Arabia; to study their clinical features, its surgical management and outcome.

Aims and Objectives:

Study the clinical features of sacrococcygeal pilonidal-sinus disease (SPD, its surgical management and outcome

Specific objectives:

1. Study age and gender specific occurrence of SPD disease in this rural population
2. Determine proportion of obese individuals among these SPD patients
3. Evaluate outcome of clinical/surgical management of PNS in terms of: i) total surgery time, ii) total hospital stay, iii) duration of wound healing, iv) recurrence rates, v) complications, and, vi) duration of follow up.

However, socio-demographic findings, like life style, hairiness, personal hygiene, economic status, etc. excerpted from our main data base will be submitted for publication at the J Pub Health at the Royal Inst. Public Health, London, shortly.

Materials and methods:

Set up and organization of the project:

This prospectively designed hospital based interventional study was conducted among 24 patients attending the surgical department of Hotat Sudair Hospital (HSH) from October 2004 through October 2006. HSH is a 90-bedded secondary care peripheral hospital having modern clinical and diagnostic facilities, located 180 km away from Riyadh city.

Enrolment of patients, their inclusion criteria and related ethical considerations:

All patients with the complaints of pain and discharge from the natal cleft area irrespective of age, gender and duration of illness, were enrolled for this study who met the following inclusion criteria:

- Having no other serious disease/illness including haemorrhagic disorders,
- Not having migrated elsewhere during the study period,
- Having had agreed to undergo operation following either 'open' or 'close' methods; and,
- Having had consented for surgical intervention

Ethical considerations were covered by standard pre-operative consent following proper instructions/guidelines from the Ministry of Health, Kingdom of Saudi Arabia (clinical/surgical methods, biological samples/laboratory tests, etc).

Procedures of surgical intervention followed:

(i) Pre-operative measures:

Patients suffering from SPD (Fig.1, 2) were admitted a day prior to elective surgery after a thorough clinical check up, a routine laboratory investigation (complete blood count & blood chemistry) and a plain X-ray chest. On the day of surgery the patients were prepared (including shaving of natal cleft areas) just before starting the operation.

(ii) Operative measures:

With all aseptic precautions SPD cases was operated under general anaesthesia. Patients were put on the operation table in prone position & the natal cleft was mechanically exposed by strapping buttocks apart using adhesive plasters.

The natal area was cleaned twice with povidone-iodine and finally wiped up using 70% ethyl alcohol prior to draping and the incision was mapped. Prior to incision methylene blue was injected using a plastic cannula right into the sinus opening to map the sinus cavity and its extensions, if any, so that the whole sinus & ramifications can be fully

excised without inadvertent contamination of wound by opening the tract as much as possible (Fig. 3).

An eccentric, elliptical & oblique incision from the midline was made and the sinus excised completely along with all its extensions if the sinus was located in-centrally, either side of mid line was chosen (Fig. 4). Care was taken to excise as little fat & sub-cutaneous tissue as possible and the depth of incision was governed by the depth of the sinus itself. Post-operative wound was either left "open" or was "closed" following primary sutures. Wound was left "open" after complete haemostasis in such patients who had: (i) large sinus or (ii) infected sinus or (iii) large extensions or (iv) undergoing repeat surgery, to allow healing by secondary intention.

Wound was packed with povidone-iodine-soaked gauzes (wrapped in paraffin) to serve as lubricants. We injected bupivacaine along the wound edges locally which reduces post operative pain dramatically. Wound packs are removed 48 hours post surgery. The ellipse was based on the side of any secondary opening or indurations. Note to mention that all secondary openings were found to the left side of midline.

In certain cases deemed fit for primary closure, the wound (sinus cavity) was closed primarily in 2 layers: one for tension suture using monofilament polypropylene No.1 and the other for skin closure using No.3/0 after insertion of a vacuum drainage when needed and removed on 3rd to 5th post-operative day depending on the amount of fluid collection.

This surgical procedure (particularly the "incision") was performed following Karydakis method ^[2] basically. However, instead of being simply eccentric as Karydakis proposed, we made an eccentric and oblique incision (Fig. 3, 4) to reduce amount of normal fat & sub-cutaneous tissue removed- which has been the basic criticism of Karydakis original technique. ^[33] Being inspired by Kitchen P ^[33], our modification (oblique incision) that we made was similar following his technique but in a geometrically different incision. Our technique, thus, kept most of the wound away from the mid line with much reduced tension with minimal normal tissue excised leading to healthy strong scar (Fig. 5).

(iii) Post-operative measures and follow-up:

Dressing of 'open' wound was performed every day for the first week and then on every alternate day for the 2nd week and then bi-weekly which were being monitored clinically & bacteriologically until the wound heals. While utmost care was taken for wound healing, all patients were followed from 1.4 to 28 months to monitor post-surgery recurrence and probable complications.

Data collection and anthropometry:

Two trained surgeons/experts (residents) were responsible for data collection assisted by the investigators themselves. Data were collected in 3 following ways:

- (i) a thorough clinical check up employing the standard history sheet &/or surgical protocol,
- (ii) an observational checklist, qualitatively, on post-operative outcomes, and,
- (iii) anthropometric measurements (height & weight) quantitatively, to assess obesity/body mass index following CDC's (USA)34 standard formula of $BMI = \text{Weight (Kg)} / \text{Height (meter)}^2$.] Moreover, obesity or overweight was graded following CDC's obesity assessment scale (under- weight = $BMI < 18.5$, normal = $18.5-24.9$, overweight = $25-29.9$ and obese ≥ 30)].³⁴

Data Analysis:

Manually verified data were checked for logical sequences using FoxPro, which was then subjected to in-depth analysis using SPSS/Win 12.0 employing necessary statistical tools. Chi-square tests of significance were performed for 2x2, or 2x3 contingency tables, as required, between ≥ 2 discrete variables (or re-coded continuous ones). Thus, Pearson's Chi-square test was employed for larger and Fisher's exact test for smaller sets of number/cell to see the differences in proportions. A p-value of < 0.05 (at a CI of 95%) was considered as significant.

Results and Findings:

I. Demographic characteristics

All PNS patients that we studied were Saudi by nationality except 1 (Egyptian). Mean age of these 24 PNS patient was 22.2 ± 4.9 (median being 20, ranging between 15 and 34) years (Table-1). Age was arbitrarily stratified, subjectively into 2 groups (who remain more vulnerable for PNS): group-I being the youngest (15-24 years) and group II belonging to 25-34 years. Thus, of the 17 patients (71% of total 24) in Group-I, 29% (7/17) were teens &/or adolescents and 42% (10/17) were in their early 20s (20-24 years). Among the 29% (7/24) young adults of Group-II: 17% (4/7) belonged to 25-29 years and 12% (3/7) to 29-34 years (Table-1). However, no female patient attended the hospital with the complaints of with PNS disease during our 2 year-long study period.

II. Obesity among the patients:

The mean body weight and height of these patients were 87.85 ± 21.53 (median=90.50) Kg and 1.72 ± 0.94 (Median=1.77) meter, respectively and their calculated BMI was 28.7 ± 4.46 (Median=29.5). Thus, overall, BMI of 83.3% (20/24) patients revealed either obesity or overweight: 50% (12/20, were obese: BMI 30-36) and 33% (8/20, overweight: BMI 25-29), (table-1). Contingency/cross-tabulations revealed that 41% (7/17) of group-I were obese and 35% (6/17) overweight (cumulatively 76%, i.e., 13/17 were obese or overweight) and of 5 of 7 patients belonging to group-II (71%) were obese and 29%(2/7) overweight. However, Chi-square test revealed that obesity (& overweight) among these young Saudi males were universally distributed with their age ($p=0.27$)(Tab-2), showing no difference.

III. Clinical Details of PNS among the study patients

III.1. Clinical symptoms of sacrococcygeal PNS and its duration

While only 2 gave a positive history of PNS patients (8.3%), mean duration of symptoms was 8.46 ± 3.12 months. Overall, chronic discharge remained the main symptom among 92% (22 of 24) patients: while 67% (16/24) had it as only and 25% (6/24) had it along with other symptoms. However, 2 patients (8%) complained of only pain and/or tenderness in natal areas (table-1). Clinical symptom was significantly associated with its duration: 13 of 15 who had longer duration (8-13 months) of symptom (87%) had chronic discharge from sinus, while 67% (6 of 9) having less duration (1-7 months) had pain in natal cleft and/or other symptoms ($p<0.01$). Though duration of symptoms among 17 patients of age group-I did not vary that much (9 among shorter and 8 longer durations), all 7 patients from group-II had it longer ($p<0.01$), (Table-2).

III.2. Findings of surgical interventions and its outcome:

Majority of the patients undergoing surgical interventions were operated following "closed" (67%, 16/24) and the rest 33% (8/24) patients had "open" excision' techniques (table-3). Open or closed method neither differed with patient's age ($p=0.13$), nor with BMI ($p=0.22$) nor with clinical symptoms ($p=0.44$), (table-4).

Mean duration of operation time was 33.9 ± 10.1 min (median=31, range=20-58 min). While surgical procedure in majority (62.5%; 15/24) took relatively longer time (36-58 minutes), 37.5% (9/24) took it less (20-35 minutes), (table-3). Less time was evident in 9 cases, except 1 for 'open excision', while relatively longer time was taken by all 15 cases of closed excision ($p<0.00$), (Tab-4).

Overall, mean duration of wound healing was 20.4 ± 9.51 (median=18.6) days. While early wound healing (10-15 days) was observed in 62.5% (15/24); 37.5% (9/24) had it delayed (16-40 days), (table-3). All the 8 cases with open and 1 for closed method had delayed healing by secondary intention. Early healing was observed in all 15 patients except 1 following 'excision and primary closure' ($p<0.00$), (table-4). Moreover, duration of wound healing was inversely proportional to total operation time: 93.3% (14/15) who had longer operation time had early healing, whereas all 8 cases except 1 taking shorter operation time had delayed healing ($p<0.00$), (tab-2.)

However, hospital stay (mean= 4.89 ± 1.01 days) differed among patients having closed or open techniques: while 14/16 having closed excision stayed at the hospital for shorter duration, 7/8 patients with open techniques had to stay for longer ($p<0.00$), (table-4).

Only 1 recurrence (4.2% of total) was evident (table-2) on 5th post-operative month who had open excision in contrast to none of 16 patients undergoing closed excision ($p<0.03$; if 2 cells having expected count <5 is considered); (Table-4).

Only 5 cases had minor complications in the form of mild bleeding/re-infection (treated conservatively): 4 of all 5 complications ("re-infections") were observed in patients with 'open', while only 1 'closed' case had minor bleeding ($p<0.03$; again if 2 cells having expected count <5 is considered); (Table-4).

While the mean duration of follow up was 10.83 ± 6.76 months, median being 8.7 (range 1.4 to 28.0) months, 54.2% (13/24) patients were followed for 1.4 to 8.9 months; and the rest 11 (45.8%) for 9 to 28 months (table-2). Proportionately more patients (7/8, 87.5%) undergoing open excision technique had longer follow up, while 12 of 16 patients (75%) undergoing 'closed excision' technique had shorter follow up ($p<0.01$; again if 2 cells having expected count <5 is considered); (Table-4).

Discussion:

General considerations of pilonidal sinus disease

Surgical management of sacrococcygeal PSD remains the main mode of treatment although remains debating ^[2, 3, 4, 9, 12, 25] towards minimizing morbidity and preventing recurrence. ^[2] However, primary closure remains the most commonly adopted technique. ^[14] PSD are more common among Caucasians than the Asians/Africans, ^[1] though, no exact data on PNS disease (and its management) is reported from Saudi Arabia until 2001 ^[13] except few, afterwards. We, thus, conducted this 2 year-long prospective study among PSD patients attending surgical department of a peripheral secondary care hospital of Hotat Sudair in Riyadh region of Saudi Arabia.

Alike ours, literature shows that most of the studies conducted on PNS surgery were of prospective in nature, ^[2-3, 5-6, 12-18, 20, 25, 30-31] including some reviews. ^[1, 26-27, 33] Sample size of our study population over a span of 2 years though seems to be relatively small, two published reports from Kuwait, ^[2, 5] and one each from Turkey, ^[10] Italy ^[23] and Denmark. ^[7] remain comparable to ours; and, some studies were carried out even on smaller sample sizes ^[15, 20, 25] than that of ours.

Demographic characteristics of our PSD patients:

Mean age of our study patients (all being Saudi, except 1 Egyptian) was 22.2±4.9 which remain consistent to several world-wide reports. ^[10, 18, 26] Though age of PNS patients have been reported to vary widely (15 to 50 years), ^[2-3, 15-16] most studies reported peak PNS incidence during puberty, ^[1] in their mid-20s, ^[2-3, 5, 10, 14-16, 18, 20, 28] or in 30s. ^[2, 7, 14-16, 20]

While, male predominance was reported at a male-female ratio of 3:1 or 4:1 among adults, it was reverse in children (M:F ratio of 1:4). ^[26] Male-female ratio in PNS incidence from western world was less (1.3:1 to 1.5:1) ^[7, 16, 22-23] including USA. ^[26-27] than of Arabian countries/gulf. Gender difference in PSD exist more widely in Saudi Arabia (male-female = 7.2:113 to 11.5:1); ^[15] while it ranges from 16.5:1 in Kuwait ^[5] and, 12:1^[10] and 17:118 in Turkey. But, another study from Saudi Arabia reported a much wider male-female ratio (M: F=55:1) though their study population were mostly non-Saudi nationalities. ^[12]

However, there was no scope in our study to tally the findings between male and female PSD patients, since all our study-patients were males. Poor representation of females with PNS has been referred elsewhere as ‘tolerable personal medical problems due to

bashfulness.”^[3] But, this may represent rarity in our female patient population, as well. However, John Bascom, one of the pioneers in PNS surgery reported from USA, that male and female represent equally^[25] while a recent update by Miller & Harding from UK, contradicted to it that men suffer from PNS ten times more than females.^[1] On the contrary, Sondenaar et al from Norway^[6] and Gencosmangulur et al from Turkey^[17] disagreed to such gender difference,^[6] which remain similar to a recent review from Australia;^[25] contradicting these said reports- which we do postulate, too.

Obesity among our PSD patients:

To determine if obesity predisposes PSD, the BMI was calculated objectively. Thus, mean BMI of our study population was 28.7 ± 4.46 (median=29.5) which remains comparable with some reports from Turkey.^[18, 30-31] While our findings is similar to Cubukcu A et al (2000)^[30] it was little less than Akinçi et al^[18] and Cubukcu A et al (2001)^[31] and much less than a report from Egypt.^[9]

According to CDC's obesity assessment scale³⁵ as much as 83.3% of our study patients, overall, were either obese or had overweight; 76% of which were teens, adolescents or young adults. However, obesity/overweight was distributed universally with their age ($p=0.27$). These findings remain consistent with several other global reports confirming obesity as one of the predisposing/risk factors^[1] to develop PNS disease,^[26] frequent recurrence,^[30] prolonged surgery,^[19] longer hospital stay,^[19] and higher post-operative complications^[19] particularly who had deeper inter-gluteal grooves.^[30] However, few authors disagreed with the causal relationship of obesity and PSD^[1, 18-19, 26, 30-31] which our findings do not, unless findings of a well designed case-control study refute this association as commented by Mahoud et al from Kuwait^[2] very correctly- which we plan to conduct, soon.

Clinical observations among our PNS patients

Clinically, sacrococcygeal region remains the only site of PNS diseases as we observed- which remains similar to other reports from Saudi Arabia,^[3, 12-15] Kuwait,^[2, 5] Turkey,^[4, 16-18, 30] Jordan^[11] and Egypt;^[19] including from western countries like Denmark,^[20] Switzerland,^[21] Italy,^[22-23] Germany,^[24] UK^[1] and from USA.^[25-27] However, PNS can also occur in other parts of human-body.^[10]

In our study, none but two (8%) had positive history of having PSD in respective families which is reported to be more (38%)^[1] by Miller and Hardy (2003) similar to two other reviews by Ringalhier (2006).^[26] However, Chronic discharge from sinus

which we observed as main symptom in majority (92%) patients was consistent with other recent reports, including one by Akca et al from Turkey (2005).^[16]

We also observed that clinical symptom in our patients was significantly associated with its duration: 13 of 15 longer duration of symptom (87%) had chronic discharge from sinus, while 67% (6 of 9) having less duration had pain in natal cleft &/or other symptoms ($p < 0.01$). Moreover, duration of symptoms (mean = 8.46 ± 3.12 months) in our patients differed significantly with their age groups ($p < 0.02$). Duration of symptoms among our PSD patients was similar to those reported by several investigators^{1, [5, 26]} while others observed it for longer.^[2, 18] Interesting observations were reported from Saudi Arabia: while Abdur Rahman et al reported a mean duration of symptoms in as less as 1-10 months,^[14] which remains fully comparable with our finding. Seleem et al in another study reported it to be much higher (4 to 36 months; mean being 15.4),^[15] which is in no way remains similar to ours. Reasons of such variations may remain several folded: i) level of hygienic practices, ii) variations in proper history-taking and iii) personal tolerability and reliability in disclosing pertinent clinical information and iv) accessibility to health care facilities in respective catchments.

Surgical interventions and its outcome

Majority of our patients 67% underwent surgery following 'closed' while 33% following 'open' excision technique. It is evident from the literature that most studies carried out on PSD-surgery tended to compare between (i) "Open" or "closed/primary closure" techniques (from Saudi,^[3] Turkey,^[17] Denmark,^[20] Switzerland,^[21] Italy^[22] and Germany^[24] and; (ii) between "primary closure" and, "lateral flap approach" with Karydaki's original or modified techniques (from Saudi,^[13-14] Egypt,^[19] Turkey,^[4, 16, 30] and Australia,^[33] including Bascom's personal experience from USA.^[25] However, some studies reported either on: (i) 'lay open' (from Saudi Arabia^[13] or (ii) "primary closure" technique (Miller & Harding, UK^[11]), or (iii) only on Karydak's original or modified techniques (from Kuwait^[2, 5] or Bascom's method (from UK^[9] and USA).^[27]

Type of surgery (open or closed methods) was neither associated with their age ($p = 0.13$) or with BMI ($p = 0.22$) nor with clinical symptom ($p = 0.45$). Mean operation time among our patients was 33.9 ± 10.1 minutes (median = 31, range = 20-55 minutes): 62.5% took "longer time" (20-35 min) and 37.5% took "shorter time" (36-58 min). But total operation time revealed significant difference between 'open' & 'closed' techniques ($p < 0.001$). A study by Magid AGH from Saudi Arabia reportedly spent 20 min (range 15-30 min) for "open technique"^[5] which remains comparable with our finding (mean = 33.9 ± 10.1 min), though it took them^[5] longer (mean = 60 minutes) for "excision & primary closure with gluteal flap,^[5] similar to another study (60.2 ± 7.9 min)^[2].

However, epidemiologically more important is: mean operating time remains higher among obese PNS patients,^[19] like ours.

Mean post operative duration of wound healing in our patients was $=20.4\pm 9.51$ days. However, wound healing (62.5% shorter for 10-15 days and 37.5% longer for 16-40 days) was significantly associated with surgical techniques ($p<0.00$). Duration of wound healing was inversely proportional to total time spent on surgery ($p<0.00$). Magid AGH et al, from Saudi, when compared wound healing between 'open' and 'flap/closed' methods; 18% of the former in contrast to 7% of the later had delayed healing^[5] but Mahmoud AH from Kuwait reported primary healing in 9-11 days (in 97% cases) whereas, for secondary healing it took 20 days (in 3% cases)^[2]. However, in another study by Samar JAM from Saudi Arabia reported that it took 2.4 months to heal the wound for 'lay open' cases^[13] which is much longer than other reports including ours. But, this variation is probably related to the size of the wound and early post-operative infections/complications including other associated diseases.

Hospital stay (mean= 4.89 ± 1.01 , median= 4.79 days) differed among our patients between 'closed' or 'open' techniques ($p<0.00$). However, mean hosp stay was contingent upon some social grounds which may have influenced the optimum hosp stay as considered generally in surgical practices. Patients request for early discharge may have affected duration of hosp stay, as well. Alike others Magid AGH showed a comparison that mean hosp stay for patients with excision & primary closure was 3.7(2-8) days⁵ while it was nearly double 7 (2-17) for open wound method,^[5] Mahmoud AH et al reported a hospital stay of 3.1 ± 0.4 (range 2-4) days for asymmetric eccentric flap method.^[2] However, Samer JAH reported a mean hospital stay of 5.4 days for laying open method.^[13] Thus, our findings on total hospital stay remains consistent with these above reports. However, every surgeon should tend to limit hospital stay within 2 days.

Only one recurrence was observed in our series during the 5th post-operative month having open excision while none of 16 patients had any recurrence with closed excision. Similar recurrence rate was reported from Kuwait on only 1 case of asymmetric eccentric flap^[2] and two cases of excision-flap closure method; while it was 18.4% (9 cases) for open wound technique-^[5] which largely differs from our finding. However, Samer JAH reported it as 3% in patients undergoing surgery following open method.^[13] However, recurrence rate was higher (11%) in excision and primary closure cases against none with Limberg flap procedure^[16] – which remains a few folded higher than our observation.

Similarly, of the five cases of minor complications encountered in our series, four had re-infections and one had post-operative bleeding: all except one occurred in 'open excision' in contrast to none (except in one with minor bleeding) in 'closed incision'

method ($p < 0.001$). However, more complication (18%) was reported in patients with flap closure and open wound (24%) technique^[5] which is higher to our finding and less complication (9.6%) rate in Karydakis method.^[2]

The mean duration of follow up in our series was 10.83 ± 6.76 months. Proportionately more patients undergoing open excision (7/8, 87.5%) had to follow up for longer, on the contrary 75% patients (12/16) with closed excision required shorter follow up period ($p < 0.01$). A report from Turkey followed up their PSD patients at 1 wk and 1 mon after surgery; then at every 3 months for at least 23 mon with a median follow up of 29 (23-28) months for rhomboid excision and 28 (23-36) months for Limberg flap procedure.^[16] Thus this observation on follow up periods by T Akca largely remains similar to that of ours: we followed everyday up to 1 week, then at every alternative days up to 2nd week and then at every week till the wound heals (up to 28 months).^[16] However, the average follow up was performed for 20 (6-40) months in a study from Kuwait,^[5] while Mahmoud AH, again from Kuwait, followed up for 14.3 (6-21) months^[2] which was more than ours. While Theophilus B et al^[12] reported that they followed up their PSD patients 12 for 10th post-operative day in OPD for removing the skin suture, Samar JAH^[13] followed up their patients for 6 (ranging 3-50) months, which was less than ours. This variation may depend on the closure method and on patient's compliance.

Conclusion

sacrococcygeal pilonidal sinus disease (SPD) remain common among young obese Saudi males, in whom atmospheric temperature, dry climate and specific life styles/cultural activities may have played a role.

Primary closure method for SPD-surgery brings successful clinical outcome in terms of quicker healing, less recurrence/re-infection rates and shorter hospital stay, though open method remains the best possible for extensive, infected and/or recurrent disease.

We believe that eccentric and oblique incision, as we performed, remains effective modification of Karydakis procedure where the midline is more preserved to reduce tension with minimal normal tissue excised leading to healthy strong scar with good cosmetic.

Recommendation

Further better designed multi-centre trials should be carried out involving larger sample size and encompassing wider geographical regions to confirm or refute our observation.

List of Reference

1. Miller D, Harding K. Pilonidal Sinus Disease. Published and last updated in Dec 2003. Revision 1.0 (Accessed June 6, 2006 at <http://www.worldwidewounds.com/2003/December/Miller/Pilonidal-sinus.html>.)
2. Mahmoud AH, Mahmoud S, Atef ABS, Khaled, MAM, Maged RI, Thomas T. Assessment of the asymmetric eccentric flap for the management of chronic pilonidal sinus. *KMJ* 2003, 35(4):281-285
3. Chiedozi LC, Al-Rayyes FA, Salem MM, Al-Haddi FH, Al-Bidewi AA. Management of Pilonidal Sinus. *Saudi Med J*, 2002; 23(7):786-8.
4. Ertan T, Koc M, Gocmen E, Aslar AK, Keskek M, Kilic M. Does technique alter quality of life after pilonidal sinus surgery? *Am J Surg* 2005;190 (3): 388-92
5. Magid AGH, Ali MAN, Vinod KG, Ubrahim W, Majid MN, Mohammad NR. Comparative study of closed and open methods in sacrococcygeal pilonidal sinus management – Results of advancement gluteal fascio-cutaneous flap- in Jahra Hospital. *Kuwait Med J* 2002, 34(1):28-32
6. Søndena K, Diab R, Nesvik I, et al. Influence of failure of primary wound healing on subsequent recurrence of pilonidal sinus. Combined prospective study & randomized controlled trial. *Eur J Surg*. 2002; 168 (11): 614-8.
7. Ommer A, Pitt C, Albrecht K, Marla B, Peitgen K, Walz MK. Pilonidal Sinus - Primary Closure also in Case of Abscess? *Zentralbl Chir*. 2004;129 (3):216-9.
8. Velitchklov N; Vezdarova M; Losanoff J; Kjossev K; Katrov E. A fatal case of carcinoma arising from a pilonidal sinus tract. *Ulster Med J*, 2001; 70(1):61-3.
9. Chintapatla S; Safarani N; Kumar S; Haboubi N. Sacrococcygeal pilonidal sinus: historical review, pathological insight and surgical options. *Tech Coloproctol*. 2003; 7(1):3-8
10. Eryilmaz R; Sahin M; Okan I; Alimoglu O; Somay A. Umbilical pilonidal sinus disease: predisposing factors and treatment. *World J Surg*. 2005; 29(9):1158-60.
11. Al-Jaberi TM. Excision and simple primary closure of chronic pilonidal sinus. *Eur J Surg*. 2001; 167 (2): 133-5.

12. Theophilus BB, Fayez T, Bhisso S. Original research. Pilonidal Sinus Disease Excision and Primary Closure. Accessed 22 March 2006 at http://www.bhj.org/journal/2004_4505_jan/html/pilonidal_16.htm.)
13. Samar JA, Zakaria SH, Alaa SAJ, William HI. Management of sacrococcygeal pilonidal sinus disease. Saudi Med J, 2001; 22 (9) : 762-764.
14. Abdulrahman SAM, Mohammed AS, Hamdoun HA. Pilonidal sinus in males: To preserve or to obliterate the natal cleft. Saudi Med J, 2002; 23(7):875-876..... ..
15. Seleem MI and Al-Hashemy AM. Management of pilonidal sinus using fibrin glue: a new concept & preliminary experience. Colorectal disease; 7(4), Jul 2005:313-322(4)
16. Akca T, Colak T, Ustonsy B, Kanik A and Aydin S. Randomized clinical trial comparing primary closure with the Limberg flap in the treatment of primary sacrococcygeal pilonidal disease. Brit J Surgery 2005; 92: 1081-1084.
17. Anonymous. Modified lay-open (incision, curettage, partial lateral wall excision and marsupialization) versus total excision with primary closure in the treatment of chronic sacrococcygeal pilonidal sinus: a prospective, randomized clinical trial with a complete two-year follow-up. Int J Colorectal Dis. 2005; 20(5):415-22.
18. Akinci O.F., Coskun A, Uzunköy A. Simple and effective surgical treatment of pilonidal sinus: asymmetric excision and primary closure using suction drain and sub-cuticular skin closure. Dis Colon Rectum. 2000; 43(5):701-6.
19. Sakr M, El-Hammadi H, Moussa M, Arafa S, Rasheed M. The effect of obesity on the results of Karydakis technique for the management of chronic pilonidal sinus. Int J Colorectal Dis. 2003; 18(1):36-9.
20. Lesalnieks I, Fürst A, Rentsch M, Jauch KW. Primary midline closure after excision of a pilonidal sinus is associated with a high recurrence rate. Chirurg. 2003;74(5):461-8.
21. Perruchoud C; Vuilleumier H; Givel JC. Pilonidal sinus: how to choose between excision and open granulation versus excision and primary closure? Study of a series of 141 patients operated on from 1991 to 1995. Swiss Surg. 2002; 8(6):255-8.
22. Bianco V, Basile C, Tortorella M. Sacrococcygeal pilonidal sinus disease. Treatment by "open" & "closed" technique: personal experience. G Chir. 2003; 24(4):145-7.
23. Blanco G, Giordano M, Torelli I, Surgical treatment of pilonidal sinus with open surgical technique. Minerva Chir. 2003; 58(2):181-7.

24. Baier PK, Baumgartner U, Furtwängler A, Holzinger F, Schöffel U. Therapy of the pilonidal sinus-Primary wound closure or open wound after excision. *Zentralbl Chir.* 2002; 127(4):310-4.
25. Bascom JU, Bascom, T. Failed pilonidal surgery: new paradigm and new operation leading to cures. *Arch Surg* 2002; 137: 1146-1150.
26. Ringelhiem R, Silverberg MA, Johnson-Villanueva NJ. Pilonidal cyst and sinus. Latest Update. Browsed from the internet on June 6, 2006.
27. Bascom, JU. Pilonidal disease: Origin from follicles of hairs and results of follicle removal as treatment. 1980-2006: An update Browsed from the internet on June 6, 2006.
28. Russell TR. Pilonidal Disease. In: *Anorectum, Chap.32, p-693. Current Surgical Diagnosis & Treatment.* 1994. 10th Ed. Lawrance W. Way, MD. Lange Medical Publication.
29. Bascom JU. Pilonidal disease: correcting over treatment and under treatment. *Contemporary Surg*, 1981: 18; 13-28.
30. Cubukçu A, Gönüllü NN, Paksoy M, Alponat A, Kuru M, Ozbay O. Role of obesity on the recurrence of pilonidal sinus disease in patients, who were treated by excision & Limberg flap transposition. *Int Jcolorectal Dis.* 2000; 15(3):173-5.
31. Cubukçu A, Carkman S, Gönüllü NN, Alponat A, Kayaba, IB, Eyübolu E. Lack of evidence that obesity is a cause of pilonidal sinus disease. *Eur J Surg.* 2001; 167(4):297-8.
32. Allen Marsh TG. Pilonidal sinus: finding the right tract for treatment. *Brit J Surg* 1990;77:123-132.
33. Kitchen P. St. Vincent's Hospital, Melbourne. Pilonidal sinus- The modified Karydakis operation, Browsed from the internet on June 6, 2006.
34. Center for Disease Control & Prevention. Dept. of Health & Human Services, CDC & P. 1600 Clifton road, GA 30333, USA. Accessed 22 March 2006 at www.cdc.gov/nccdphp/dnpca/bmi/calc-bmi.htm

List of figure legends:**Figure-1:**

Figure shows pilonidal sinus with a tuft of hair inside.

Figure- 2:

Figure shows pilonidal sinus with excessive hair at sacrococcygeal region.

Figure- 3:

Figure marks incision & Mapping with Methylene blue.

Figure- 4:

Figure shows sinus after the eccentric excision away from the midline.

Figure- 5:

Figure shows wound closure away from the midline.