



Comparison of Outcomes between Marsupialization and Lay-Open Techniques in the Management of Pilonidal Sinus

Hawar Ali-Ghalib* Shorsh Hama Hussein Ameen** Hussein Ali Hussein***

Abstract

Background and objectives: Different surgical strategies emerged for pilonidal disease, but no ideal one. Thus, this study aimed to compare the outcomes of marsupialization vs laying open techniques in the management of pilonidal sinus.

Methods: This case series study was conducted on 200 consecutive patients with chronic pilonidal sinus who has operated either with excision and marsupialization technique (Group 1, no.=100) or excision and lay-open technique (Group 2, no.=100) in different hospitals at Sulaimaniyah city, Iraq, from January 2012 to January 2022. The patients' socio-demographics, perioperative data, complications and recurrences were collected using a special questionnaire prepared for this study. Also, the patient's data was evaluated after surgery regarding postoperative pain, satisfaction, healing and dressing time, incapacity to work and postoperative complications.

Results: Most patients aged 20-29 years (40.5%), males (71.5%), had working hours for ≥ 6 hours (57%), with no family history of pilonidal disease (86.0%), presented with pain (44.83%), and with hirsutism (41.5%). In total, 39.5% of the patients had severe pain, 38% had moderate, and 22.5% had mild ($p=0.000$). Concerning patient postoperative satisfaction, most patients (32.5%) had good and least had excellent (6.0%) satisfaction ($p=0.000$). Moreover, for the association between the outcomes of both used techniques, a substantial correlation between both groups was found for incapacity for regular daily activity ($p=0.046$), healing time ($p=0.000$), dressing time ($p=0.000$), infection, dehiscence, bleeding and recurrence ($p=0.045$).

Conclusions: Marsupialization was the preferred technique over lay-open regarding postoperative patient satisfaction/severity, healing duration, and dressing time, as it had fewer complications with a recurrence rate.

Keywords: Comparative study, Pilonidal sinus, Postoperative management.

*MBCHB, FRCSI, DLS, Assistant Professor at Department of Surgery, College of Medicine, University of Sulaimani, Sulaimaniyah, Iraq, Email: hawar.ali@univsul.edu.iq

**MBCHB, FIKBMS surgery, Lecturer at Department of Surgery, College of Medicine, University of Sulaimani, Sulaimaniyah, Iraq, Email: shorsh.hussein@univul.edu.iq

***KHCMS Board Trainee, General Surgery Board Trainee, Sulaimani Teaching Hospital, Sulaimaniyah, Iraq, Email: husinks@gmail.com (Corresponding author)



Introduction

Pilonidal sinus (PNS) is a condition that most frequently affects the hair follicles in the sacrococcygeal region of the natal cleft. Males are affected twice more frequently than females, with an incidence of 26 per 100,000 people, and young adults of working age make up the majority of those involved.¹ The male gender, an anatomically deep birth cleft, a positive family history of PNS, increased hair amount in the region, obesity, extended sitting(occupation), trauma, irritation of the coccyx, and inadequate personal hygiene are all known risk factors for PNS.^{2,3} Clinically, PNS is characterized by pain, bleeding, discharge and pits at the sacrococcygeal area. Most often, a sudden episode of sacrococcygeal abscess, which causes excruciating pain and discomfort, marks the beginning of a PNS.^{4,5} Pilonidal sinus study started in 1847 when Dr. Anderson pulled tufts of hair from a wound on a young man's "back" that wasn't healing. Soon after, the damage had healed, and the treatment had been made public. As this wound was infected at the time, open wound care was regarded as the standard treatment. This became a concern during World War II when > 70,000 soldiers were temporarily deactivated owing to open wound treatment for PNS, accruing 47,000 sick days leaves in 1941 alone.⁶ Many treatment modalities were advocated to decrease morbidity with good results. Incision and drainage for acute abscess, wide excision and leaving it open to heal by secondary intention, or wide excision followed by the closure of the resultant wound have all been recommended for PNS.⁷ In addition, the damage can be closed in the middle, or a flap can be used to flatten the buttocks' curve while also relieving stress in the wound. For this reason, various flaps have been employed, including the Karydakias flap, Z-plasty, Limberg flap, and Bascom flap. Although these primary treatments increase the complexity of the surgery and the risk of

tissue loss, they have yet to be proven the best way to treat PNS.^{8,9} In the marsupialization (MP) technique, the skin margins are sutured to the wound base after debridement. This procedure helps to reduce the size of the wound as a whole and avoid early epithelialization. However, there are conflicting results when comparing the MP, primary closure and laying open (LO) techniques on healing time and recurrence.¹⁰ Thus, this study aimed to compare the outcomes between MP and excision with LO.

Patients and methods

This retrospective observational case series study was conducted on 200 patients diagnosed with chronic PNS and operated upon between January 2012 and January 2022 from different Hospitals in Sulaimaniyah City, Iraq. Patients were managed by excision and MP technique (Group 1, no.=100) or excision and LO technique (Group 2, no.=100). The patients were subjected to either group, according to the surgeon's preferences, the surgeon's experience, and the patient's choice, after which details and consequences of each technique were discussed with the patients.

Patients with chronic PNS were included regardless of age, gender, ethnicity and nationality. However, it's worth mentioning that patients were not categorized according to the number of pits, the extent of disease and lateralization; both groups included patients with a different number of pits varying from one pit to multiple pits and mild to severe illness. Patients with abscesses and recurrent PNS were not enrolled in the study.

A special validated questionnaire was prepared for this study to collect the patient's data, including age, gender, occupation, family history of PNS, presented symptoms, and hirsute. Simultaneously, the patient's postoperative pain, satisfaction, healing and dressing time, incapacity to work and overall postoperative complications were reported on the questionnaire. Postoperative pain score





(0-10) was categorized as mild (0-3), moderate (4-7), and severe (8-10).¹¹ The patient was positioned prone for Group 1 patients who underwent MP, and the PNS area was shaved well. After spinal anesthesia using 12-15 mg bupivacaine injection, both sides of the buttock retracted outward by adhesive plaster, and a probe was introduced into the sinus. Then, skin and subcutaneous tissues were opened, excision or debridement of the sinus with all the tributaries was done, all the granulation tissue was removed using a curette, and the skin margins were sutured and sewed to the wound base. Protection against contamination and total immobilization of the area following surgery were mandated for the first 7- 10 days. Patients were urged to sit on a cushion or the side instead of a hard chair. Frequent wound dressing three times daily, early ambulation, long-term hygiene, and hair removal were recommended. Group 2 included those patients who managed by excision and leaving the wound open for secondary intention healing. In this method, patients were positioned the same way as MP and anaesthetized in the same way. Then, the skin, subcutaneous tissue and all the sinuses were excised to the fascia, leaving a larger cavity, and gauze was placed in the hole for daily dressing until the wound healed. The study aimed to compare the outcomes of marsupialization vs laying open techniques in the management of pilonidal sinus. This study was approved by the scientific and ethics committees of the Kurdistan Higher Council for Medical Specialties (KHCMS), Iraq. All methods and procedures were done according to the Declaration of Helsinki. The patients, parents and/or legal guardians filled out a written consent form and were informed in their native language about the purpose of the study. Patients were reassured about confidentiality and privacy. Also, they were allowed to quit at any time without giving a

reasonable declaration. All statistical computation was enhanced using SPSS, version 25. The data were coded, tabulated, and presented in a descriptive form. The inferential data analysis, Chi-Square Test, and independent sample t-test were used to compare between variables. The p-value was set as highly significant ($p \leq 0.001$), significant ($p \leq 0.05$), and non-significant ($p \geq 0.05$).

Results

Most studied patients were 20-29 (40.5%), and only 10% were >39. Most participants (71.5%) were males, and only 27.5% were females. Most patients had working hours for ≥ 6 hours (57%), and only 43% had <5 hours. Regarding the family history of PNS, 86.0% of the patients had no family history, while 13% had a family history. Regarding symptoms, 41.35% of the patients presented with pain, 39.59% had discharge from the wound, 19.6% had cystic swelling, and most patients had >1 sign; regarding association with hirsutism, 41.5% were positive. No significant difference between both studied groups was found, except for age ($p = 0.035$), as shown in Table (1).



Table (1): The sociodemographic association between studied groups.

Variable	Value	Group 1		Group 2		Total		p-value
		No.	%	No.	%	No.	%	
Age (Year)	< 20	20	20.0	26	26.0	46	23.0	0.035*
	20 – 29	37	37.0	44	44.0	81	40.5	
	30 – 39	27	27.0	26	26.0	53	26.5	
	> 39	16	16.0	4	4.0	20	10.0	
Gender	Male	68	68.0	77	75.0	145	72.5	0.18
	Female	32	32.0	23	23.0	55	27.5	
Occupation (Hours)	< 6	40	40.0	46	46.0	86	43.0	0.391
	≥ 6	60	60.0	54	54.0	114	57.0	
Family history	Yes	13	13.0	13	13.0	26	14.0	0.956
	No	87	87.0	85	85.0	172	86.0	
Symptoms	Pain	78	44.83	63	37.72	141	41.35	0.213
	Discharge	61	35.06	74	44.31	135	39.59	
	Cystic swelling	35	20.11	30	17.96	65	19.06	
Hirsute	Yes	62	62.0	55	55.0	117	58.50	0.315
	No	38	38.0	45	45.0	83	41.50	
Total		100	100.0	100	100.0	200	100.0	

*: Significant difference

Regarding postoperative pain, 39.5% had severe pain, 38% had moderate, and 22.5% had mild. However, most of the patients in group 1 had mild pain (42%) and least had

severe pain (21%), while most of the patients in group 2 had severe pain (58%) and least had mild pain (3.0%) ($p < 0.001$), as shown in Table (2).

Table (2): The association between postoperative pain.

Postoperative pain score	Group 1		Group 2		Total		p-value
	No.	%	No.	%	No.	%	
Mild	42	42.0	3	3.0	45	22.5	<0.001**
Moderate	37	37.0	39	39.0	76	38.0	
Severe	21	21.0	58	58.0	79	39.5	
Total	100	100.0	100	100.0	200	100.0	

**Highly significant difference

Concerning the patient's postoperative satisfaction, in Group 1, most patients (31%) had good, followed by very good (26%) and least had bad (9.0%) satisfaction. In contrast,

in Group 2, most patients had fair (36%), followed by good (34%), and least had very good (3%), with no one reporting excellent satisfaction ($p < 0.001$), as shown in Table (3).

Table (3): Patient satisfaction after operation.

Patient satisfaction after an operation	Group 1		Group 2		Total		p-value
	No.	%	No.	%	No.	%	
Bad	9	9.0	27	27.0	36	18.0	<0.001**
Fair	22	22.0	36	36.0	58	29.0	
Good	31	31.0	34	34.0	65	32.5	
Very good	26	26.0	3	3.0	29	14.5	
Excellent	12	12.0	0	0.0	12	6.0	
Total	100	100.0	100	100.0	200	100.0	

** Highly significant difference





Moreover, the mean $\pm$ SD for incapacity for regular daily activity was 9.72 $\pm$ 5.07 in Group 1 and 11.19 $\pm$ 5.27 in Group 2 (1.5 days more) ($p=0.046$). Whereas for the healing time, Group 1 patients reported 3.02 $\pm$ 1.13 weeks, and Group 2 was 7.3 $\pm$ 2.4 ($p<0.001$). Regarding wound dressing times, it was 19.8 $\pm$ 6.85 days for Group 1 and 39.7 $\pm$ 11.14 days for Group 2 ($p<0.001$). Furthermore, Group 1 patients had lower rates of complications concerning infection, dehiscence, bleeding and recurrence(early).

Infection was 14% in Group 2, while only 4% in Group 1. Dehiscence was 6.0% and 3.0% in Groups 2 and 1, respectively. There was more bleeding in Group 2 (13%) than in Group 1 (6.0%). Finally, the recurrence rate was less in Group 1 (2.0%) than in Group 2 (6.0%) ($p=0.045$), as shown in Table (4). Duration of follow-up was 1-7 years, and 2 of the recurrence in group 2 were early recurrences (within the first six months postoperatively).

Table (4): The association between outcomes of operation.

Outcome of operation	Item	Group 1		Group 2		Total		p-value
		No.	%	No.	%	No.	%	
Incapacity for regular daily activity (Day)	< 5	3	3.0	10	10.0	13	6.5	0.002*
	5 – 10	71	71.0	47	47.0	118	59.0	
	> 10	26	26.0	43	43.0	69	34.5	
Mean $\pm$ SD		9.72 $\pm$ 5.07		11.19 $\pm$ 5.27		T = - 2.01 (P= 0.046*)		
Healing time (Week)	< 4	72	72.0	7	7.0	79	39.5	<0.001**
	4 – 5	28	28.0	19	19.0	47	23.5	
	> 5	0	0.0	74	74.0	74	37.0	
Mean $\pm$ SD		3.02 $\pm$ 1.13		7.3 $\pm$ 2.4		T = - 16.131 (P<0.001*)		
Dressing time (Day)	< 20	43	43.0	0	0.0	43	21.5	<0.001**
	20 – 30	53	53.0	27	27.0	80	40.0	
	31 – 40	4	4.0	30	30.0	34	17.0	
	> 40	0	0.0	43	43.0	43	21.5	
Mean $\pm$ SD		19.8 $\pm$ 6.85		39.7 $\pm$ 11.14		T = - 15.214 (P<0.001*)		
Postoperative complication	No complication	85	85.0	61	61.0	146	73.0	0.045*
	Infection	4	4.0	14	14.0	18	9	
	Dehiscence	3	3.0	6	6.0	9	4.5	
	Bleeding	6	5.0	13	13.0	19	9.5	
	Recurrence	2	2.0	6	6.0	8	4	
Total		100	100	100	100	200	100	

*Significant difference, **Highly significant difference

Discussion

Pilonidal sinus is a common disease, especially for young people with no ideal treatment option, despite many surgical procedures with different rates of postoperative complications and recurrence.^{12,13} In our study, most patients were young (40.5%) and males (71.5%). These results agreed with that reported by Onder et al., who showed the mean age of patients with PNS was 26.9 $\pm$ 7.31 and 94% of patients were males and Wickramasekera et al.¹² who reported

male patients to be 68%, but the age range was between 17 and 29 years (66%).¹³ While Adnan et al. reported that the enrolled patients were aged 24-27 years, and the male-to-female ratio was 5:6.¹⁴ On the other hand, Garg et al. found the male gender to be more enrolled (92 out of 111), with the patient's mean age of 22.9 $\pm$ 5.7 years.⁸ These results might be because, in the young population, pilosebaceous glands have more secretion due to sex hormones that might trigger the disease development. Also, PNS occurs in patients who sit more, especially in young patients because of mobile and electronic





games Generally, the type of occupation and long sitting duration directly correlate with PNS development. In the current study, 57% of patients sat for >6 hours daily. This result is close to the Harlak et al. study, which found that 56% of enrolled patients sat for ≥ 6 hours.¹⁵ In contrast, Adnan et al. mentioned that PNS was observed in 49.8% of patients with seated positional occupations ($p < 0.001$).¹⁴ Regarding the family history of PNS and the appearance of the disease, we found that most patients (86%) had no family history, which agreed with other study outcomes.^{14,15} However, Doll et al. reported that a positive PNS family history predisposes a person to an earlier onset of disease.¹⁶ Also, Yildiz et al. mentioned that a family history of PSD significantly affected the incidence of PSD.¹⁷ For the presenting symptoms, most patients in both groups complained of pain, followed by discharge, and then cystic swelling. However, postoperative pain was significantly lower among patients who underwent MP ($p < 0.001$) than LO, which can be explained by the fact that there was more sensitive tissue, dead space and larger wound in the LO technique. In this respect, Garg et al. reported minimal postoperative pain in patients with minimal tissue excision and dead space without requiring any analgesics three days after the procedure. Also, they mentioned that most patients could resume daily work within 3–4 days. Pain is directly proportional to the postoperative wound size and dead space.⁸ Overall, patients in Group 1 were more satisfied than Group 2 ($p < 0.001$), which can be explained by the fact that Group 1 had lower incapacity for regular daily activity and shorter healing and dressing times. These results go with some recent studies stating that those surgical strategies causing more dead spaces are associated with more prolonged recovery and dressing time and less patient satisfaction than those favouring less dead space.¹⁸ Regarding patient

satisfaction in this study, most patients (53%) showed satisfaction (good, very good, and excellent) after surgery, which is lower than reported by Foti et al., who found a satisfaction rate of 95.7% using the visual analogue scale (VAS) and Giarratano et al. who stated the overall satisfaction rate of 97%.^{19,20} Similarly, using patient satisfaction score (PSS). Milone et al. reported that patients enrolled in the minimally invasive treatment (endoscopic) group expressed a significantly higher satisfaction (8.9 ± 1.2) than the conventional treatment group (7.8 ± 0.5) ($p < 0.001$). That is because of the smaller wound size in which the patient had lesser pain earlier return to work Postoperative wound complication was found in 27% of patients, with the highest rate in Group 2 ($p = 0.045$), and the most common complication was bleeding (9.5%). These outcomes are consistent with that found by the Bubenova et al. meta-analysis study, which concluded that patients who underwent excision and MP had fewer postoperative complications than patients who underwent other surgical procedures (excision and primary midline closure, arydakis flap, Dufourmentel flap, and Bascom I procedure).²¹ Similarly, Kartal et al. reported that only 12.5% of patients experienced complications, including hematoma, seroma, infection, and abscess.¹⁸ On the other hand, Basso et al. said postoperative bleeding, followed by hematoma (no.=25/848) and seroma (no.=58/848).²² Moreover, Onder et al. detected wound infection as the most common complication in 26.2% of operated patients.¹² Strong et al. in the UK mentioned that six months after surgery, 13 patients recalled hoping surgery would address pain (no.=3), recurrence (no.=5), wound healing, smell, inconvenience and impaired ability to perform activities of daily living (no.=1 for each).²³ During the period of follow-up (1-7 years), only 2% of patients in Group 1 and %





in Group 2 had a recurrence, which is lower than that reported in a pairwise meta-analysis study by Biet al. on using different surgical procedures (primary closure vs Limberg flap and Limberg flap vs modified Limberg flap) for treatment of PNS. Their study showed significant results between various techniques (RR=5.39, 95% CI 2.84, 10.23; RR=3.7, 95% CI 1.2, 11.45, respectively).²⁴ Similarly, Garg et al. mentioned 3.7% recurrence in the studied patients, 8, while Onder et al. reported a 13.2% recurrence rate in PNS patients.¹² On the other hand, different values for recurrence (0.0-55%) were mentioned in the literature from various studies.²⁵

Conclusions

Marsupialization was superior to LO as it had fewer postoperative complications and recurrence rate.

Limitations of the study

The limitations of this study include a small sample size as PNS is a common disease; a larger sample size may show more accurate results. One surgeon performed surgery in Group 1, and different surgeons performed those in Group 2, so there is a variance in the surgeons' experience, which may affect the outcome.

Acknowledgements

Heartfelt thanks to all the healthcare and physicians of all enrolled Hospitals in Sulaimaniyah, Iraq, as well as to the KHCMS and the participants for their help and support in completing this study.

Conflict of interest:

We declared that there is no conflict of interest.

References

1. McCallum L, King P, Bruce J. Healing by primary closure versus open healing after surgery for pilonidal sinus: systematic review and meta-analysis. *BMJ*. 2008;

336(7649):868–71.

2. Huurman EA, Galema HA, de Raaff C, Toorenvliet B, Smeenk R, Huurman EE. et al. Assessment of surgical strategies for pilonidal sinus disease in the Netherlands. *Cureus*. 2022;14(5): e25050.

3. Oluşumunda EK. Evaluation of etiological risk factors in the development of adult chronic pilonidal disease. *Turk J Colorectal Dis*. 2019;29:75-7.

4. Diéguez I, Costa A, Miró I, March Villalba JA, Del Peral M, Marco Macián A et al. En bloc resection vs. Gips procedure in pilonidal sinus surgery. *Cir Pediatr*. 2022;35(2):75-9.

5. Golet MR, Hinojosa AS, Ruiz YG, Villacampa RE, Broto IG, Rodríguez PB. Pilonidal sinus in adolescence: is there an ideal surgical approach *Cir Pediatr*. 2021;34(3):119-24.

6. Doll D, Stauffer V, Diekmann M, Van Wyk P, Luedi MM. Turkey is leading in the 21st century pilonidal sinus disease research. *Turk J Surg*. 2020;36(3):284–90.

7. Schneider R, Dettmer M, Peters N, Lamdark T, Luedi MM, Adamina M. et al. The current status of surgical pilonidal sinus disease therapy in Germany. *Eur Surg*. 2022;54(2):117-25.

8. Garg P, Yagnik V. Laying open and curettage under local anaesthesia to treat pilonidal sinus: long-term follow-up in 111 consecutively operated patients. *Clin Pract*. 2021;11(2):193-9.

9. Lamdark T, Vuille-dit-Bille RN, Bielicki IN, Guglielmetti LC, Choudhury RA, Peters N. et al. Treatment strategies for pilonidal sinus disease in Switzerland and Austria. *Medicina*. 2020;56(7):341.

10. Humphries AE, Duncan JE. Evaluation and management of pilonidal disease. *Surg Clin*. 2010;90(1):113-124.

11. Milone M, Velotti N, Manigrasso M, Vertaldi S, Di Lauro K, De Simone G. et al. Long-term results of a randomized clinical trial comparing endoscopic versus conventional treatment of pilonidal sinus. *Int*





- J Surg. 2020; 74:81-5.
12. Onder A, Girgin S, Kapan M, Toker M, Arikanoglu Z, Palanci Y. et al. Pilonidal sinus disease: risk factors for postoperative complications and recurrence. *Int Surg.* 2012;97(3):224-9.
 13. Wickramasekera N, Strong E, Shackley P, Callaghan T, Lee M, Hind D. et al. Patient preferences for pilonidal sinus treatments: A discrete choice experiment survey. *Colorectal Dis.* 2023.
 14. Adnan K, Süleyman Ç, Alper P. Evaluation of etiological risk factors in the development of adult chronic pilonidal disease. *Turk J Colorectal Dis.* 2019; 29:75-7.
 15. Harlak A, Menten O, Kilic S, Coskun K, Duman K, Yilmaz F. Sacrococcygeal pilonidal disease: analysis of previously proposed risk factors. *Clinics.* 2010;65(2):125-31.
 16. Doll D, Matevossian E, Wietelmann K, Evers T, Kriner M, Petersen S. Family history of pilonidal sinus predisposes to earlier onset of disease and a 50% long-term recurrence rate. *Dis Colon Rectum.* 2009;52(9):1610-15.
 17. Yildiz T, Elmas B, Yucak A, Turgut HT, Ilce Z. Risk factors for pilonidal sinus disease in teenagers. *Ind J Pediatr.* 2017;84:134-8.
 18. Kartal A, Yalçın M, Kılıncım T, Uzunköy A. Effect of dead space reduction in pilonidal sinus surgery: introduction of a novel technique. *Wounds: A Comp Clin Res Pract.* 2022: WNDS20220215-1.
 19. Foti N, Passannanti D, Libia A, Campanile FC. A minimally invasive approach to pilonidal disease with endoscopic pilonidal sinus treatment (EPSiT): a single-center case series with long-term results. *Tech Coloproctol.* 2021;25(9):1045-54.
 20. Giarratano G, Toscana C, Shalaby M, Buonomo O, Petrella G, Sileri P. Endoscopic pilonidal sinus treatment: long-term results of a prospective series. *JSL.* 2017;21(3).
 21. Bubenova M, Mittlboeck M, Kulinna-Cosentini C, Teleky B, Cosentini E. Pilonidal sinus disease: a 25-year experience and long-term results of different surgical techniques. *Eur Surg.* 2022;54(5):240-8.
 22. Basso L, Pietroletti R, Micarelli A, Bicaj A, Costi U, Crocetti D. et al. The impact of experience on recurrence rates after biopsy punch excision for pilonidal disease. *Colorectal Dis.* 2022;24(8):984-91.
 23. Strong E, Callaghan T, Beal E, Moffatt C, Wickramasekera N, Brown S. et al. Patient decision-making and regret in pilonidal sinus surgery: a mixed-methods study. *Colorectal Dis.* 2021;23(6):1487-98.
 24. Bi S, Sun K, Chen S, Gu J. Surgical procedures in the pilonidal sinus disease: a systematic review and network meta-analysis. *Sci Rep.* 2020;10(1):13720.
 24. Milone M, Basso L, Manigrasso M, Pietroletti R, Bondurri A, La Torre M. et al. Consensus statement of the Italian society of colorectal surgery (SICCR): management and treatment of pilonidal disease. *Tech Coloproctol.* 2021:1-12.

