The Effectiveness of Platelet-Rich Plasma in Wound Healing of Pilonidal Sinus with Karydakis Procedure

Original Article

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ABSTRACT

Background: Sacrococcygeal pilonidal sinus (SPD) is a common disease affects young individuals, especially men. Management includes non-surgical and surgical methods. PRP therapy is a recent method that shows promise in decreasing recurrence rates and speeding up wound healing. This study evaluates PRP's potential in healing PNS wounds.

Patients and Methods: The study was a prospective study at Helwan University Hospital involved 48 patients with pilonidal sinus disease, comparing primary closure alone (Group A) to primary closure with PRP injections (Group B). Patients were randomized, and PRP was injected during surgery and on postoperative days 7 and 14 with regular follow-ups assessed pain and wound healing.

Results: Patients of PRP injection group showed statistically significantly shorter healing time, lower pain scores, fewer drainage days, and quicker return to work. Complications were similar between groups.

Conclusion: The use of PRP in treatment of SPD clinically reduces healing and recovery time, and lowers economic burden, thus should be routinely offered.

Key Words: Karydakis procedure, pilonidal sinus, platelet-rich.

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INTRODUCTION

A persistent, upsetting suppurative condition of the sacrococcygeal area that results in a persistent cyst or sinus tract is called sacrococcygeal pilonidal disease (SPD). Young adult males are more likely to be affected by this complicated acquired condition, which can lead to considerable morbidity and prolonged disruptions in job or education[1]. It is a widespread disease that was first documented in the literature in (1883)[2], with a frequency of 26/100,000[3].

SPD can be managed with non-surgical techniques like shaving and cryosurgery as well as surgical techniques like flap repair or excision with primary closure. Pit picking and radial laser ablation are combined in the Sinus pilonidalis Minimally Invasive Laser Excision (SMILE) technique, which provides a minimally invasive approach with good aesthetic outcomes. Growth factor-rich platelet-rich plasma (PRP) injection therapy speeds up wound healing and is being studied for its potential to treat pilonidal sinuses[4-9]. The overall goal of this research is to assess PRP therapy's capacity to hasten pilonidal sinus wound healing.

METHODS

For patients with SPD who came to the general surgery department at Helwan University Hospital and were scheduled for sinus excision with primary closure of the wound between January 2024 and July 2024, a prospective randomized controlled clinical study was carried out.

Forty-eight patients of both sexes who were at least 18 years old participated in the study and were split into two groups at random using the closed envelope technique: Twenty-four patients in Group A (control) were scheduled to undergo a complete excision of the pilonidal sinus with the Karydakis procedures of the wound alone, while twenty-four patients in Group B (PRP treated) were scheduled to undergo the same procedure, with the exception that PRP would be injected into the wound both during the procedure and on the seventh and fourteenth days after the procedure. Patients who were anemic, had platelet counts below 150/µL, were taking anticoagulants, had sepsis or local infections, or were hemodynamically unstable

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were not included. Following a clinical examination that included a general examination and a local examination of any sinuses or pits above the anus in the coccygeal region, consenting patients who were willing to participate in our study were asked about their name, age, sex, occupation, marital status, and special habits, as well as any history of current illness and prior surgical procedures.

Routine laboratory work-ups were performed on the participants, including coagulation profiles, complete blood counts, liver and kidney functions, random blood sugar, and electrolyte testing. It is not common practice to obtain imaging studies.

Surgical procedure:

PRP preparation:

Using the double spin method, PRP was prepared. The patient was initially sent to the clinical pathology department of Helwan University, where a venipuncture was performed to obtain 25cc of venous blood. Seven 4ml clean vacutainer tubes filled with sodium citrate 3.8%, an anticoagulant, were used to collect the blood. The citrated blood was separated into red blood cells at the bottom, plasma at the top, and a "buffy coat" in between by centrifuging it for 15 minutes at room temperature at 1700rpm. Each test tube's plasma and buffy coat were aspirated into a syringe, transferred to a different tube, and centrifuged once more for ten minutes at ambient temperature at 3000rpm. Following the second centrifugation, two sections of plasma were obtained: the bottom portion contained platelet-rich plasma (PRP), while the top portion included platelet-poor plasma (PPP). The PPP and PRP were separated by carefully aspirating the PPP.

Techniques of surgery:

The patients with SPD of both groups were firstly prepared for the operation on the preoperative visits.

All patients had the procedure in a prone posture while under anesthesia. Thirty minutes before surgery, a single intravenous dosage of a third-generation cephalosporin (1g) was administered. A good disinfectant was used to clean the skin. Drapes kept the anal area out of the operating field. A paramedian elliptic excision of the sinus-containing region was used to carry out the Karydakis procedures. Following hemostasis, a subcutaneous suction drain was inserted into the wound, and PRP was injected into the subcutaneous layer of the wound before it was mostly closed in layers.

At the outpatient clinic, all patients received routine follow-up care (group (A) patients only received dressings (Figure 1) , while group (B) patients received both dressings and PRP injections). On the seventh and fourteenth days following surgery, PRP was injected into the wound (in the subcutaneous layer, undoubtedly parallel to the skin incision, sparing the skin) (Figure 2). Every patient had their pain score measured (the level of pain was measured using a numerating scale from 1 to 10). Regular dressings were used, and the same surgeons evaluated the wounds' healing in both groups at each visit. When the drainage fell below 30 milliliters per day for two consecutive days, the drain was removed.

Fig. 1: A (Karydakis procedure without PRP injection).

Fig. 2: (Karydakis procedure with PRP injection).

Data analysis:

SPSS v26 (IBM Inc., Armonk, NY, USA) was used to do statistical analysis. The normality of the data distribution was assessed using histograms and the Shapiro-Wilk test. The unpaired student *t*-test was used to analyse quantitative parametric data, which were shown as mean and standard deviation (SD). The Mann-Whitney test was used to analyse quantitative non-parametric data, which were shown as the median and interquartile range (IQR). When applicable, the Chi-square test or Fisher's exact test were used to analyse the qualitative data, which were shown as frequency and percentage. Statistical significance was defined as a two-tailed *P* value <0.05.

RESULTS

Forty-eight patients with SPD who came to our institution throughout the research period had their sinuses removed along with the wound being closed up. Twenty-four patients in Group A (control) underwent a total excision of the pilonidal sinus with primary closure of the wound alone. Twenty-four patients in Group B (PRP treated) underwent the same procedure, but PRP was injected into the wound both during the operation and on the seventh and fourteenth days after the procedure. However, the investigation found that neither the clinico-laboratory factors nor the demographic features of the two study groups differed statistically significantly (Tables 1, 2).

In comparison to group A (control group), group B (PRP-treated group) had substantially decreased healing time, pain score, drainage days, and return to work (*P* values <0.001, 0.002, 0.01, and <0.001, respectively). (Table 3 and Figure 3).

In terms of complications, group B had non-significantly decreased rates of wound infection, delayed wound healing, and recurrence (*P* values of 0.477, 0.489, and 0.303, respectively), whereas delayed wound healing did not differ substantially among the groups under study, Group B (the PRP-treated group) saw a non-significantly lower rate of recurrence than group A (the control group) (*P* value= 0.494) (Figure 4).

Patient's satisfaction was non-significantly different between the studied groups. 41.67% of patients within group B versus 29.17% within group A reported excellent satisfaction (Figure 5).

Table 1: Demographic characteristics ofthe studied groups:

		Group A (*n*= 24)	Group B (*n*= 24)	χ^2	*P* value
Age (years)	Mean± SD	38.08±7.26	35.92 ± 9.55	*T* 0.885	0.381
	Range	24-54	21-51		
Sex	Male	9(37.5%)	13(54.17%)	1.343	0.247
	Female	15(62.5%)	11(45.83%)		
BMI (kg/m^2)	Mean± SD	26.36±4.54	26.22±5.66	*t* 0.093	0.926
	Range	16.36-33.3	17.76-37.8		
Occupation	Student	1(4.17%)	5(20.83%)	3.143	0.208
	Employee	12(50%)	9(37.5%)		
	Manual worker	11(45.83%)	10(41.67%)		
Clinical	Pain	8(33.33%)	9(37.5%)	1.786	0.409
	Discharging sinus	13(54.17%)	9(37.5%)		
	Pain and discharge	3(12.5%)	6(25%)		
Duration of symptoms (months)	Mean±SD	11.13±4.33	10.54±3.71	0.502	0.618
	Range	5-18	6-17		

BMI: Body mass index; *t*: Independent sample *t* test; χ^2: Chi square test.

Table 2: Laboratory investigation ofthe studied groups:

		Group A (*n*= 24)	Group B (*n*= 24)	*t*	*P* value
Hb (g/dl)	Mean± SD	15.18±1.46	15.37±1.79	-0.398	0.692
	Range	12.5-17.7	12–18		
TLC (*10^9/L)	Mean± SD	7.12±2.25	7.49±1.97	-0.614	0.542
	Range	4.1-11	4.4–11		
Platelets (*10^9/L)	Mean± SD	308.46±91.37	302.13±82.54	0.252	0.802
	Range	150-444	159–443		
PT (sec)	Mean± SD	11.96±0.86	12.21±0.78	-1.056	0.296
	Range	11-13	11–13		
PPT (sec)	Mean± SD	30.29±3.47	31.21±3.45	-0.918	0.364
	Range	25-35	25–35		
ALT (U/L)	Mean± SD	33.88±14.41	27.88±13.16	1.506	0.139
	Range	8-55	7–51		

		Group A (*n*= 24)	Group B (*n*= 24)	*t*	*P* value
AST (U/L)	Mean± SD	26.33±10.7	28.71±11.25	-0.749	0.458
	Range	10-48	10–48		
BUN (mg/dl)	Mean± SD	14.75±6.09	16.25±5.41	-0.902	0.372
	Range	6-24	7–24		
Creatinine (mg/dl)	Mean± SD	0.85±0.15	0.76±0.18	1.733	0.090
	Range	0.6-1.1	0.6-1.1		
RBS (mg/dl)	Mean± SD	106.33±13.28	103.79±11.55	0.708	0.483
	Range	87-125	85–124		
Na (mEq/L)	Mean± SD	139.46±3.16	140.17±3.32	-0.757	0.453
	Range	135-144	135–145		
K (mmol/L)	Mean± SD	4.23±0.49	4.32±0.48	-0.627	0.534
	Range	3.5-4.9	3.5–5		

Hb: Hemoglobin; TLC: Total leucocyte count; PT: Prothrombin time; PTT: Partial thromboplastin time; ALT: Alanine transaminase; AST: Aspartate aminotransferase; BUN: Blood urea nitrogen; RBS: Random blood sugar; *t*: Independent sample *t* test.

Table 3: Postoperative outcomes ofthe studied groups:

		Group A (*n*= 24)	Group B (*n*= 24)	*t*	*P* value
Healing time (days)	Mean± SD	25.25±5.32	20.29±2.88	4.016	<0.001*
	Range	18-35	16-25		
Pain score	Mean± SD	5.79±1.77	4.42±1.06	3.267	0.002*
	Range	3-8	3–6		
Drainage days	Mean± SD	6.17±2.58	4.54±1.38	2.718	0.01*
	Range	3–11	3–9		
Return to work (days)	Mean± SD	30.92±5.3	25.71±2.8	4.256	<0.001*
	Range	24-41	22-30		

*: Significant as *P* value <0.05; *t*: Independent sample *t* test.

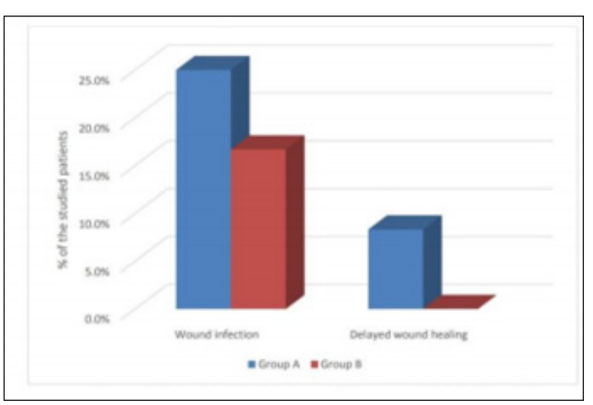

Fig. 3: Wound healing versus delayed wound healing of the studied groups.

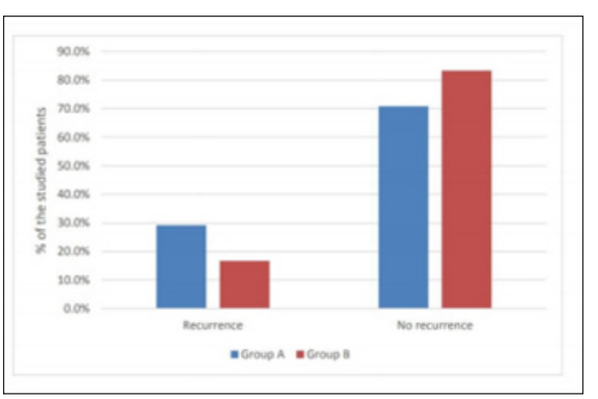

Fig. 4: Recurrence vs no recurrence of the studied groups.

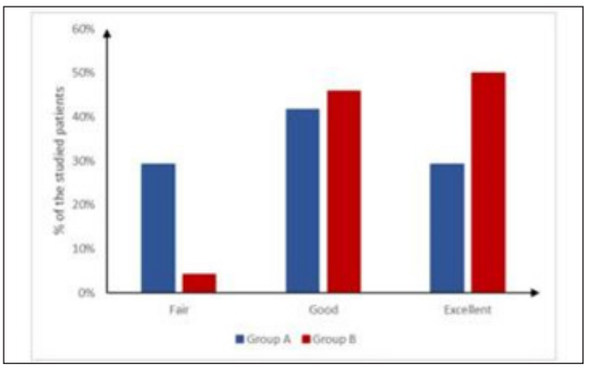

Fig. 5: patients satisfaction of the studied groups.

DISCUSSION

Numerous studies highlight PRP's effectiveness in enhancing wound healing across various surgeries and ulcers. PRP, rich in growth factors and chemokines, promotes proliferation and angiogenesis. Extraction involves autologous blood centrifugation, applying PRP as a gel, solution, or injection[10-12].

According to the results of our study, patients who received PRP had recovery durations that were considerably shorter (16–25 days) than those of the control group (18–35 days), with a *P* value <0.001. This is consistent with Khan *et al*.,[12], who found that PRP patients experienced quicker wound healing. PRP-treated patients showed quicker recovery, particularly on days 15 and 20, according to Gohar *et al*.,[13]. PRP was proven to be more effective than conventional wound dressings by Mostafaei *et al*.,[14] resulting in a speedier recovery and return to normal activities.

In our study, the PRP group's pain ratings were lower (4.42±1.06) than those of the control group (5.79±1.77). PRP-treated patients also reported decreased discomfort, according to Bahar *et al*.,[15] and Gohar *et al*.,[13] Because PRP contains concentrated angiogenic inducers, Mohammadi *et al*.,[16] found that PRP therapy increases angiogenesis and reduces pain and antibiotic usage.

Although no comparison data was provided, the PRP group in our series experienced fewer drainage days (4.54±1.38) than the control group (6.17±2.58). According to Khan *et al*.,[12] and Gohar *et al*.,[13] PRP patients returned to work more quickly in our study (25.71±2.8 days) than the control group (30.92±5.3 days)[13]. There were no appreciable differences in complications like infection and delayed healing across the groups. Although not by much, the PRP group had decreased recurrence rates.

In our study, 41.67% of patients in the PRP group reported good satisfaction, compared to 29.17% in the control group. This indicates that patient satisfaction was greater in the PRP group. Accordingly, Spyridakis *et al*.,[17] discovered that patients receiving PRP had improved quality of life scores.

CONCLUSION

PRP therapy for pilonidal sinus disease reduces healing and recovery time, and lowers economic burden, thus should be routinely offered.

RECOMMENDATIONS

To support our findings and improve the outcome, more extensive research involving a greater number of patients should be conducted. For these reasons, PRP therapy must to be regularly provided in addition to surgical intervention for treating pilonidal sinus wounds.

CONFLICT OF INTERESTS

There is no conflict of interests.

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