

Combined Horizontal Split Gluteus Maximus Muscle and Fasciocutaneous Limberg Flaps for Reconstruction of Recurrent Sacrococcygeal Pilonidal Sinus

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Background: Pilonidal sinus is a chronic recurrent medical disease. The exact etiology of the disease is still unknown, but the most accepted theory is an acquired condition characterized by infected sinus in the natal cleft area containing a lifeless hair tuft. Multiple techniques were prescribed for its treatment; however, the ideal method is not yet defined.

Methods: The study population includes 58 male patients who underwent excision of their recurrent pilonidal sinus, and the resulting defects were reconstructed using combined horizontal split gluteus maximus flaps and rhomboid flaps. Outcomes were revised from patient case files and followed up in our outpatient clinic and via questionnaires.

Results: The mean hospital stay was 3 days. The mean time to return to work was 16 days. Partial wound dehiscences occurred in 2 patients. Distal end flap necrosis occurred in 1 patient. There were no flap losses, no recurrences, no infections, no loss of function, and no seromas during a mean follow-up period of 24 months. All patients were satisfied with the results.

Conclusions: This technique has an operative time and hospital stays comparable to those of other techniques. It has minimal and acceptable complication rates and no recurrences. We can conclude that this procedure of combined split gluteus maximus muscle flap and rhomboid flap provides an excellent, effective, easy, and feasible method of choice for reconstructing defects of recurrent pilonidal sinus disease. (*Plast Reconstr Surg Glob Open* 2020;8:e2901; doi: 10.1097/GOX.0000000000002901; Published online 18 December 2020.)

INTRODUCTION

Pilonidal sinus (PNS) is a common recurrent chronic inflammatory disease. It affects about 0.7% of population,¹ and it leads to work intolerance, as it has a very high recurrence rate.² The exact etiology of the disease is still unknown. The most accepted theory postulated that PNS is an acquired condition characterized by infected sinus in the natal cleft area containing a lifeless hair tuft.³ Multiple techniques have been prescribed for treating this condition; however, the ideal method is not yet defined.⁴⁻¹¹

The use of rhomboid flap for reconstruction of PNS was first described by Azab et al in 1984.¹² Since then, many series have been performed to evaluate and compare it with other methods. It shows promising results; however, it still has a considerable incidence of recurrence and complication rates.^{13,14} Even though many modifications (namely lateralization superiorly based, oval head, or perforator rhomboid) have been performed, it still has a considerable incidence of complications and recurrences.¹⁵⁻¹⁷

PNS wound is usually ischemic and present in a contaminated area; so the use of muscle flaps carries a beneficial effect in these situations. Muscle flaps are very good options in reconstruction of such wounds because of their very rich blood supply and ability to obliterate dead spaces. In addition to promoting rapid wound healing, it increases the ability of the wound to resist infections.^{18,19} This study presents a technique of combining 2 independent flaps in 2 layers for reconstruction of recurrent pilonidal sinus.

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PATIENTS AND METHODS

Fifty-eight male patients with recurrent PNS were included in the study. The study started in the Zagazig University, Egypt, plastic surgery department and was completed in Kuwait from March 2016 to July 2019. The mean age was 23 years (range, 18–40 years). From history and revision of previous patient's files, 41 patients (71%) were operated on by excision and primary closure. Ten patients (17%) were operated on by excision and their wounds were left opened for secondary healing. Four patients (7%) were operated on by Karydakis procedure, which is an asymmetric closure technique with a straight edge incision down to the presacral fascia on the one side and a sloping (45 degrees) edge on the other side.²⁰ Three patients (5%) were operated on by Bascom's procedure, which is a closure technique in which asymmetrical elliptical incision is carried out around the midline wound into the subcutaneous fat to wedge out the wound and then a dermal flap is undermined and closed.⁵

Twenty-eight patients (48.2%) had more than 1 operation before admission. All patients were consented for the procedure after it had been approved by the institutional review board. Doppler study was performed preoperatively for all patients to define the perforators of parasacral, superior, and inferior gluteal vessels.

Inclusion criteria include the following:

1. Patients who signed the informed consent;
2. Patients with recurrent pilonidal sinus;
3. PNS without signs infection at the time of surgery.

Exclusion criteria included the following:

1. PNS with signs of infections;
2. Patients who refused to sign the consent;
3. Non recurrent pilonidal sinus.

Surgical Procedure

All patients were operated on under general anesthesia. Patients were placed in a prone jackknife position. During induction, all patients were intravenously administered a prophylactic single dose of 1.5-g cefazoline. Adhesive tapes were used to retract buttocks laterally. Patient's lower back, buttocks, and natal cleft were washed using 10% povidone iodine solution. The affected area (to be removed) was marked in the shape of rhombus, which included all sinus openings. According to the size of the resulting defect, either single or double rhomboid fasciocutaneous flaps were designed (Figs. 1A, 2A). Methylene blue was injected into all visible openings to delineate all sinuses tracts (Fig. 1B). The affected area was then removed completely in block, including all sinus tracts, and confirmed using methylene blue dye. The rhomboid flaps were dissected and raised completely from the underlying gluteus maximus muscle fascia and were hung with sutures. One split gluteus muscle flap (or 2 flaps depending on the defect size) was then raised from lateral to medial, keeping its medial attachment to preserve the perforators (Fig. 1C). After proper hemostasis was performed, the adhesive taps were removed to help achieve a tension-free closure. The muscle flap was turned over upon itself 180 degrees and

sutured over the presacral fascia using 4/0 polyglactin 910 sutures, forming a cushion-like structure over the midline (Fig. 1D). The rhomboid flaps were then mobilized and sutured to close the defect in 2 layers over a negative pressure hemovac drain. The skin was closed using 4/0 polypropylene sutures. Patients were then kept postoperatively in a prone position during their hospital stays. After discharge, they were allowed to change between prone and lateral positions during the first 2 weeks postoperatively; however, sitting position was minimized. During the first postoperative day, only oral fluids were allowed. Drains were removed between the second and fourth postoperative days, and afterward, patients were discharged home.

RESULTS

All 58 patients received the same operative procedure. The mean operative time was 65 minutes (range, 55–78 minutes). Skin sutures were removed after 2 weeks. Each patient's return to work was recorded. The patients were scheduled for follow-up at 1 month, 2 months, 6 months, and yearly thereafter. Sound healing was achieved in 55 flaps without any complications (Figs. 1E, 2B, and 2C). Two patients (3.4%) had partial wound dehiscences, which were managed by local wound care. Another patient (1.7%) developed distal end flap necrosis, which was managed by local debridement and re-suturing. There were no flap losses, no recurrences, no infections, and no seromas during a mean follow-up period of 24 months (range, 7–32 months). The mean time to return to work was 16 days (range, 14–21 days). The mean hospital stay was 3 days (range, 2–4 days). Results of patients satisfactions were as follows: about 94.8% of patients were highly satisfied, while only 5.2% were satisfied. Patient characteristics and patient satisfaction regarding the procedure were summarized in Table 1.

DISCUSSION

PNS disease is a common chronic inflammatory condition affecting young adults. Because of its high rate of recurrence, varieties of techniques have been prescribed.¹⁵ The ideal reconstruction method for PNS should be easy to perform, leads to complete excision of all sinus tracts, completely obliterates or flatten the natal cleft with a well vascularized tissue, provides neat healing, has a very low or no incidence of recurrence, has low complication rate, leads to rapid recovery, and hence less hospital stay and quick resumption of patient's daily activities and return to work.^{6,14,15}

Excision and primary closure have a high rate of recurrence (up to 30%) and wound infections (about 7%) and this because of the resulting midline wound with more pressure and tension.^{15,16} Wide excision and laying the wound open to heal by secondary intention although it has lower incidence of recurrence (10%) than primary closure (30%), it requires a very long healing time with frequent dressings hence longer hospital stays, exhaustion of resources and human powers beside patient discomfort.^{1,8,10,16} Bascom method for treatment of PNS has a high incidence of recurrences ranged between 7.3% and 16%.^{5,21}

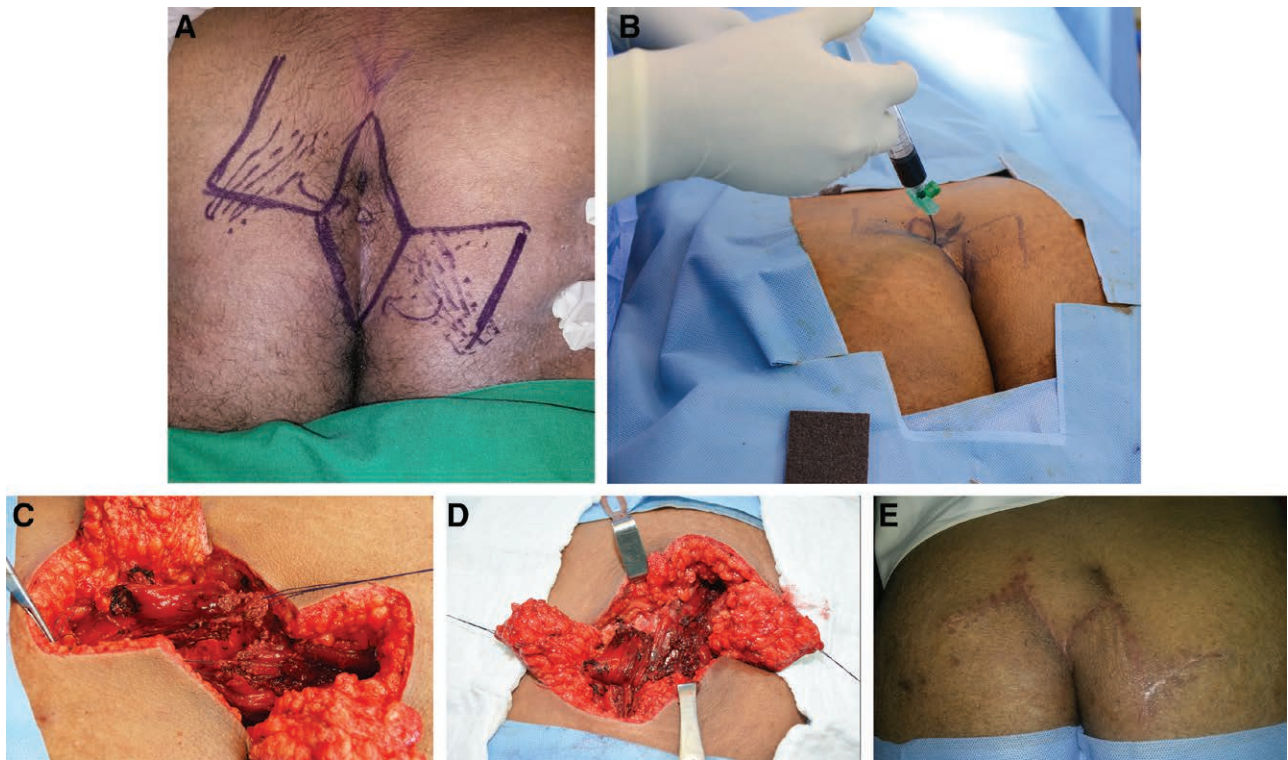


Fig. 1. A, Perforators are detected and marked, and 2 rhomboid flaps are outlined with dotted lines, which mark the underlying muscle flaps. B, Injection of methylene blue into the sinus tracks. C, Intraoperative view after preparation of 2 rhomboids and 2 horizontally split gluteus muscle flaps. D, The partial split muscle flaps turned over 180 degrees and transposed into the defect. E, Postoperative view after 1 year, stable wound without recurrence.



Fig. 2. A, Preoperative design of the rhomboid flap and the rhombus design of excised area, including all sinuses. Marking of perforator sites was identified by Doppler. Split muscle flap marked with dotted lines. B, Postoperative view after few months. C, Late postoperative view (16 months).

Many flap techniques have been prescribed for reconstructing PNS defects (eg, Karydakis, V-Y, Z plasty, rhomboid, perforator flaps, and modified rhomboid). Although each flap has its own pros and cons, all are still having a considerable incidence of recurrences and wound infections. However, still there is no consensus about the proper, ideal method.^{8,11,13–16,20}

After reviewing the literature, it was noticed that all previously mentioned flaps are fasciocutaneous ones, and split gluteus muscle flaps were not addressed before for management of such chronic inflammatory disease.

Of all the currently available fasciocutaneous flaps, the Limberg flap has been considered the most feasible and

preferable surgical technique because it is simple, requires a short hospital stay, allows early patient return to work, leads to easy wound management, and has a very low incidence of complications.^{13,14,16,17} Rhomboid flap, although preferable by most plastic surgeons, still has a considerable rate of recurrences, which ranged from 0.8% to 6%, but its recurrence rate is considered less than that of other flap techniques.^{5,16}

The value of muscle flaps in resurfacing of chronically infected wounds is well established, as it has a very rich blood supply, displays the ability for obliteration of dead space, shows rapid wound healing, and exhibits the ability to resist infections.^{18,19} The only reported trials for use of

Table 1. Patient Demographics, Complications, and Satisfaction

Item	Mean (range)	N (%)
Age (y)	23 (18–40)	
Operative time (min)	65 (55–78)	
Hospital stays (d)	3 (2–4)	
Complications		
Partial wound dehiscence		2 (3.4%)
Distal flap necrosis		1 (1.7%)
Recurrence		0
Follow-up period	24 (7–32)	
Return to work (d)	16 (14–21)	
Patient satisfaction		
Highly satisfied		55 (94.8%)
Satisfied		3 (5.2%)
Dissatisfied and strongly dissatisfied		0

gluteus maximus flap for reconstruction of PNS disease were done by Perez-Gurri et al., when he used it as a rotation myocutaneous flap for a case of multi recurrent pilonidal disease.²² Rosen and Davidson also used Perez's idea, but on 5 patients, they reported no functional sequel with acceptable morbidity.²³ The split gluteus maximus flap as a muscle with split thickness skin graft or as a myocutaneous flap has been reported only for reconstruction of sacral ulcers.^{24,25} Local split gluteal muscle flap has low donor site morbidity; therefore, its use for reconstruction of PNS defect causes no risk, neither on function nor cosmesis. This idea has been explored in previous series but not for reconstruction of sacral pressure ulcers.^{24,26,27}

The aim of this study was to take benefits of both muscle and rhomboid flaps independently. In addition to prescribing this combination and its technical aspects, the study proved its successful and encouraging results in reconstructing recurrent PNS diseases defects.

In this study, we used a split gluteus maximus muscle flap raised from its caudal end and turned up on itself 180 degrees. The muscle flap was then covered by unilateral or bilateral rhomboid fasciocutaneous local flap. In this method the muscle acts as a cushion to fill the gap created by excision of pilonidal sinus. In addition, the muscle resists infections by increasing local area nutrition due to its rich perforators, which form numerous new vascular plexuses.²⁴

The fasciocutaneous flap was used to add more strength to the closure and more padding, which led to elimination of the natal cleft. The rhomboid flap was chosen because it has many advantages in comparison with other fasciocutaneous flaps.^{14–16}

The advantage of this combined flap is that although it consists of 2 different independent flaps, the technique is easy and not time-consuming. The used flaps are local ones, and their dissections required minimal effort.

In this study, the mean operative time was 65 minutes, which is slightly longer than other series that reported 45, 58, and 54 minutes for 1 flap surgery only, not for 2 combined flaps as done in this study,^{15,16,28} while Elkatib and Albasti reported a longer operative time of 80 minutes.²⁹ The mean time return to work was 16 days, which is comparable to that in other series.^{16,30,31} The mean hospital stay in this study was 3 days, which is either comparable to that of some studies^{15–17} or shorter than that of others.^{12,14}

The results of this study revealed no recurrences during a mean follow-up period of 24 months. While 2 patients (3.4%) developed a partial wound dehiscence, 1 (1.7%) developed distal flap necrosis.

In a study on 200 patients operated on by rhomboid flaps, Topgul et al reported 2.5 % recurrence rate, 3% distal flap necrosis, 1.5% seroma, and 1.5% wound infection.¹³ Daphan et al reported 4.8% recurrence rate, 4.1% partial wound dehiscence, and 2% seroma in 147 patients operated by rhomboid flaps.¹⁴

A large study on 238 patients operated upon by modified limberg flap revealed 1.27% recurrence rate and 0.8% wound infection.¹⁵

In this study, 94.8% of patients were highly satisfied and 5.2% were satisfied. Elalfy et al reported that 95% of patients were satisfied and 5% were dissatisfied, while Omar et al reported 14% dissatisfaction rate of rhomboid flap patients.^{10,30}

CONCLUSIONS

This technique has an operative time, length of hospital stay, and work resumption time comparable to those of other techniques, and has minimal and acceptable complication rates. There were no flap losses, no loss of function, and no recurrences. We can conclude that this procedure of combined split gluteus maximus muscle flap and rhomboid flap provides an excellent, effective, easy, and feasible method of choice for reconstructing defects of recurrent PNS disease.

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