

Partial Gluteus Muscle Flap for Treatment of Chronic, Recalcitrant Pilonidal Cyst Disease

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Background: Pilonidal cyst disease is a challenging condition requiring excision and wound management when it is chronic and symptomatic. Primary closure of the excision site can lead to high recurrence rates, necessitating flap-based reconstruction. This article discusses the use of a partial gluteus maximus muscle flap to address recurrent pilonidal disease and reduce its recurrence.

Methods: From 2014 to 2021, 11 patients aged 14–31 with recurrent pilonidal cysts underwent two-stage surgery involving excision and wound debridement by general surgery, followed by plastic surgery for wound closure using the partial gluteus muscle flap.

Results: Eleven patients were included in the study (four women and seven men). The mean age was 23 ± 5.2 , and the average body mass index was $28.59 (\pm 6.7)$. The mean number of previous procedures was 2.25 (range, 2–3). Operative time was 158.7 ± 37 minutes. The average length of stay when both procedures were done in the same admission was 8 ± 6 days (range 3–21 days) and when procedures were done separately, the length of hospital stay after the wound closure using a partial gluteus muscle flap was 3 days, and the range for reliable follow-up was 1.6–7 years postoperatively. In our study cohort of 11 patients, the majority, specifically seven individuals, experienced uneventful healing. However, a subset of patients encountered complications. Three patients developed an infection recurrence: one was treated conservatively, and one required reoperation with resolution of symptoms, and one patient also experienced wound dehiscence, which was closed with a small procedure.

Conclusion: Partial gluteal muscle flap offers a promising approach for treating recalcitrant, difficult-to-treat pilonidal disease in young adults, enhancing wound healing and reducing the risk of recurrence. (*Plast Reconstr Surg Glob Open* 2024; 12:e5887; doi: 10.1097/GOX.0000000000005887; Published online 10 June 2024.)

INTRODUCTION

Pilonidal disease is a chronic inflammatory condition of the skin and subcutaneous tissue occurring most commonly at or near the upper part of the natal or gluteal cleft of the sacrococcygeal area. The incidence of this disease is approximately 26 per 100,000 persons. It affects young men two to four times more often than women with a mean age at presentation of 19 years for women and 21 years for men.^{1–3} Children and adults older than 45 years

may also be affected. Pilonidal disease can be acute or chronic and, in some cases, can be completely asymptomatic.⁴ When symptomatic, patients complain of pain, tenderness, swelling, and erythema in the gluteal cleft with or without drainage from the affected area and with or without pits. Treatment options range from conservative local wound care to surgery depending on the clinical presentation and severity of the disease.^{1–4}

The focus of our article is on recalcitrant difficult-to-treat cases of recurrent disease that have failed previous surgical management. Traditionally, surgical management of severe cases of pilonidal disease requires wide excision of the involved area and wound management. A systematic review conducted in 2010 of 16 trials that included 1666 patients found that the overall recurrence rate of pilonidal disease was 6.9%, with primary wound closure having a significantly higher recurrence rate compared with delayed wound closure (8.7% versus 5.3%, relative risk 1.5, 95% confidence interval 1.08–2.17).⁵ In contrast, a meta-analysis published in 2018 revealed an even higher relapse rate than the one described in the 2010 systematic review, reaching a value of 13.8% and a higher rate

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of recurrence with delayed closure of 17.9% versus 16.8% and 10% for midline and off-midline primary closure, respectively, with a 5-year follow-up.⁶ Multiple surgical options have been described in the literature such as the Rhomboid (Limberg)⁷ and the Kardayakis flap.⁸ Other options are Bascom's cleft-lip procedure,⁹ V-Y advancement flap,¹⁰ and Z-plasty.¹¹ However, there is still no consensus or a gold standard surgical option to treat pilonidal disease. In this case series, we aim to describe the use of a partial gluteus maximus muscle flap as an additional option for the treatment of recalcitrant pilonidal disease when other treatments have not been successful.

MATERIALS AND METHODS

Patient Characteristics

This study was performed in accordance with the ethical standards of the Declaration of Helsinki. Informed consent was waived given the retrospective nature of the study. The electronic medical record system of the hospital was used to collect data from patients with a long history of pilonidal disease who presented to the clinic of a single plastic surgeon for management of their disease from October 2014 to May 2021. The variables assessed were age, sex, body mass index, medical and surgical history, operative times, duration of hospital stay, and post-operative complications including disease recurrence. Inclusion criteria were as follows: (1) chronic infection of a pilonidal cyst lasting longer than 6 months; (2) age older than 14; (3) history of multiple previous surgical treatments and recurrence of infection.

Preoperative Evaluation and Management

A thorough medical and surgical history was taken from all patients, and a physical examination was performed. Additional diagnostics such as laboratory studies and imaging were done depending on the case. Microbial cultures were obtained, and perioperative antibiotics were selected in accordance with the culture findings. The administration of antibiotics persisted for a duration of 48–72 hours following the surgical procedure, depending on the recommendation of the infectious disease specialist.

Surgical Technique

Surgical treatment for recalcitrant cases of pilonidal disease consists of wound debridement through a wide surgical excision of the infected tissue by general surgery or plastic surgery and later wound closure completed by plastic surgery.

In this article, we will describe the wound closure technique using a partial gluteus muscle flap in detail. Wound closure surgery is done under general anesthesia. The patient is placed in the prone position, and the surgical area is prepared and draped. Debridement is repeated to make sure the wound is clean (Fig. 1).

A curvilinear incision is made over the superior aspect of the buttock, usually on the side of the nondominant leg (Fig. 2), and a skin flap is elevated to expose the gluteus maximus muscle underneath (Fig. 3).

Takeaways

Question: How can the use of a partial gluteus muscle flap be used to treat recurrent pilonidal disease and reduce its recurrence?

Findings: From 2014 to 2021, eleven patients with recurrent pilonidal cysts underwent two-stage surgery involving excision and wound debridement by general surgery, followed by wound closure by plastic surgery using the partial gluteus muscle flap. Seven individuals experienced uneventful healing, and four encountered complications. None experienced recurrence.

Meaning: This case series suggests that using a partial gluteus muscle flap is a promising approach for treating recurrent, recalcitrant pilonidal disease in young adults.



Fig. 1. The chronic infected wound after debridement.

Using a Doppler ultrasound, the perforators on the medial superior aspect of the muscle are identified and marked. A perforator at the appropriate location is chosen. Based on this perforator, a partial gluteus maximus muscle flap is designed (Fig. 4 and a closeup in Fig. 5). The flap size is based on the size of the wound. It is usually between 2 cm and 3 cm in width and extends obliquely and laterally. Its length depends on the need to reach the depth of the wound.

The partial muscle flap is elevated off the gluteus intermedius muscle underneath. It is rotated medially to fill the wound. During the dissection, the perforator is protected.

The rotated flap is anchored into the wound securely with sutures (Fig. 6). After achieving hemostasis, the defect on the gluteus maximus donor site is closed with figure-of-eight sutures. A drain is usually placed.

The buttock skin flap is placed back into its location and may be advanced to cover the sacral wound. The wound and the rotated muscle are covered by closing the adjacent skin edges together (Fig. 7).

Postoperative Management

Postoperatively, antibacterial gauze dressings were placed, and care was taken to ensure that blood flow to



Fig. 2. The curvilinear skin incision made over the superior aspect of the buttock, on the side of the nondominant leg.



Fig. 5. The partial gluteus muscle flap rotated medially to fill the wound.



Fig. 3. The elevated skin flap exposing the partial gluteus maximus muscle underneath.

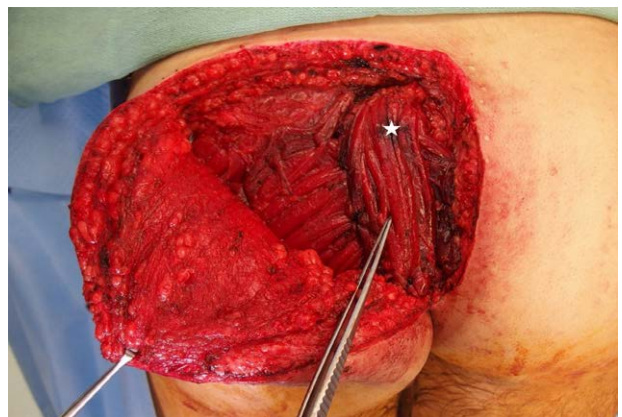


Fig. 6. The partial gluteus muscle flap anchored in place. Star indicating the location perforator artery.



Fig. 4. The elevated partial gluteus muscle flap making up less than one sixth of the total gluteus muscle.



Fig. 7. The closed incision after the wound and the rotated muscle are covered by approximating the adjacent skin together over a drain.

the muscle flap was not interrupted by excessive pressure on the flap. Postoperative management also included pain control using nonsteroidal antiinflammatory drugs and a short course of antibiotics (48–72 hours). Patients were

instructed to sit on a soft pillow on the nondonor site for at least 4 weeks.

Starting on postoperative day 2, dressing changes and wound checks were carried out routinely depending on

the patients' clinical symptoms. The drain was removed when patients started ambulating and when the output was less than or equal to 15 to 20 mL per day.

Postoperative Follow-up

The outcomes of the surgery were recorded, including complications such as infection, wound dehiscence, and disease recurrence. Patients were closely followed up for 2–3 months postoperatively.

RESULTS

A total of 11 patients met the inclusion criteria. Patient characteristics are summarized in Table 1. The cohort consisted of four women and seven men with a long history of complex sacrococcygeal pilonidal sinus disease (mean duration 4.25 ± 1.6 years; range 1–7 years). All patients' surgical history consisted of multiple previous surgical treatments by different surgeons. The mean number of previous procedures was 2.25 (range, 2–3). The mean age was 23 ± 5.2 (range, 14–31), and the average body mass index was 28.59 ± 6.7 kg per m². The average operative time for the wound closure procedure was 158.7 ± 37 minutes, and all were resident-assisted procedures. The average length of stay when both procedures were done in the same admission was 8 ± 6 days (range 3–21 days) and when procedures were done separately, the length of hospital stay after the wound closure using a partial gluteus muscle flap was 3 days. Seven (64%) patients healed uneventfully. The details of the complications encountered are summarized in Table 2. Three patients (27%) developed wound infections, and

one patient (9%) experienced wound dehiscence. It is important to highlight that two of the patients who developed recurrent infections and the patient with wound dehiscence were previously diagnosed with hidradenitis suppurativa. In the two cases of patients with hidradenitis suppurativa and infection, both successfully healed with conservative treatment. However, one of them experienced a recurrence 1 year postsurgery and was again managed with antibiotics. The third patient with infection required reoperation involving debridement and repeat closure of the wound. The patient with wound dehiscence elected to undergo surgical re-closure over waiting and dressing changes to accelerate her recovery. During our efforts to conduct reliable follow-up via phone calls that ranged from 1.6 years to 7 years postoperatively, we encountered difficulties in reaching five of the patients. Nonetheless, six patients denied experiencing any recurrence of the disease when queried.

DISCUSSION

Pilonidal sinus disease, whether primary or recurrent, may be treated surgically depending on its severity. A plethora of surgical options have been described in the literature. They range from a simple fistulotomy and curettage using the Lord–Millar procedure,¹² marsupialization, to a more complex excision and midline versus off-midline closure, all the way to the complex flaps. Other techniques used include radiofrequency sinus excision, the use of fibrin glue, phenolization, and vacuum-assisted closure therapy. Still, the risk of recurrence recorded in all the previously described methods remains high, as high as 30%,¹³ and poses significant morbidity to patients with complex pilonidal sinus disease. Consequently, no single method is currently accepted as a gold standard for the treatment of this complex problem.

The treatment goal for recurrent pilonidal disease is to provide a high rate of cure with a low rate of recurrence.¹⁴ Consequently, the two main procedures that provide the lowest documented rate of recurrence so far are excision with secondary healing of the wound (for less severe disease) or coverage with a local flap (for more severe cases).^{15,16} Randomized controlled trials comparing the use of transposition flaps such as the Limberg or rhomboid flap, Z-plasty, or V-Y flaps, or Karydakis flaps, which are advancement flaps, to the simple excision with secondary healing, have demonstrated lower recurrence rates when flaps were used for wound coverage. A randomized

Table 1. Patient Characteristics, Preoperative Evaluation, and Management

Characteristic	Value
Total no. patients	11
Male	7
Female	4
Duration of symptoms, y	
Mean	4.25 ± 1.6
Range	1-7
Age at surgery, y	
Mean + SD	23 ± 5.2
Range	14-31
BMI, kg/m ²	
Mean + SD	28.59 ± 6.7
Range	18.79-44.9
Smoker	1
Medical history	
Hidradenitis suppurativa	3
Crohn disease	1
Surgical history	
Average no. previous debridements	2.25
Operative time, min	
Mean + SD	158.7 ± 37
Range	121-240
Length of hospital stay, + SD, d	
Both procedures within the same admission (N = 7)	8 ± 6
Only wound closure surgery (N = 4)	3

Table 2. Complications Encountered and Management

Complication	Case No.	History of Hidradenitis Suppurativa?	Required Reoperation?	Recurrence after 1 Year?
Infection	1	Yes	No	No
	2	Yes	No	Yes
	3	No	Yes	No
Wound dehiscence	1	Yes	Yes*	No

*Elective surgical closure over waiting and dressing changes.

study by Keshvari et al¹⁷ involving 321 patients with pilonidal sinus disease found a recurrence rate of 1.2% in the Karydakias flap repair group compared with 7.5% in the group of patients who underwent excision and secondary healing. Similar significant findings were shown in a randomized controlled trial by Jamal et al,¹⁸ where it was found that the use of a Limberg flap had a 4.2% recurrence rate versus 28% with the use of excision and secondary healing in 49 patients.

Flap reconstruction in pilonidal sinus disease management seems to be favored over alternative surgical closures. This is mainly attributed to its superior ability to offer tension-free closure, effective filling of the dead space, and facilitating antibiotic delivery. Moreover, this method promotes faster healing and lessens the need for extensive wound care and pain management, thereby enabling a smoother recovery and earlier return to full functional activity. The advantages and disadvantages of these procedures are detailed in Table 3.

For soft tissue defects, the two main types of flaps at the disposal of surgeons are fasciocutaneous flaps and muscle flaps. Fasciocutaneous flaps are preferable for smaller defects, offering enhanced aesthetic outcomes and reduced donor site morbidity. However, when dealing with recurrent pilonidal disease characterized by deep, larger, and infected defects, muscle flaps emerge as the better choice. They provide essential benefits such as the ability to obliterate dead spaces and providing a robust blood supply. As a result, they promote wound healing and prevent infection, ensuring comprehensive and effective management of the challenging nature of these cases.^{19,20}

Little is understood about the factors predisposing to a recurrence of the disease. Some studies suggest that the anatomy of the gluteal cleft contributes to the recurrence,^{21–23} whereas others stipulate that the friction and shear pressure to local tissues away from the midline lead to the accumulation of detritus that contributes to the development of a recurrent open and draining wound.

In addition, intraoperative and postoperative factors may have a role in recurrence, such as incomplete excision of the infected tissue, poor tissue perfusion due to chronic inflammation and repeat trauma, persistent dead space with wound coverage, inadequate attention to wound care and hair depilation, and poor personal hygiene.^{13,24} Many flaps have been suggested and studied in the literature for the treatment of pilonidal disease.¹⁷ These include the perforator flaps described in the literature by Chaput et al in 2002, where Garrido et al²⁵ found that perforator flaps such as the parasacral artery perforator flap offer a greater advantage over the previously mentioned flaps in terms of vascular reliability and aesthetic outcome. In that study, no recurrence of disease was noted for the five patients who underwent this procedure after 3–15 months. Traditional surgical techniques, such as the Limberg flap, have served as the mainstay for pilonidal disease treatment, whereas recent advancements have introduced promising alternatives. Notably, the keystone flap technique, comprising two V-Y advancement flaps arranged in a keystone shape, has emerged as a potentially superior option for its low wound-complication rates, and simplified surgical procedure, when the flap is designed correctly.^{26,27} Although techniques exist, such as the contralateral Limberg flap, for patients with recurrent pilonidal sinuses who had previously undergone primary treatment with a Limberg flap,²⁸ and reconstruction of the natal cleft using a parasacral perforator-based flap, described in a case series of five patients with recurrent pilonidal sinuses,²⁵ there is currently no single, gold standard surgical approach for the treatment of recurrent and recalcitrant cases of pilonidal disease.

The use of the gluteus maximus musculocutaneous flap has been previously described by Rosen and Davidson,²⁹ who used a variant of the total gluteus maximus rotation flap described by Parkash and Banerjee.³⁰ In this article, the drawback was the use of a large functioning muscle group and an eliminated intergluteal cleft.²⁹ In this article, we discuss the use of only a portion of this large muscle. The partial gluteal muscle flap is based on the superior

Table 3. Advantages and Limitations of Surgical Methods for Treatment of Pilonidal Disease

Surgical Method for Treatment	Advantages	Limitations
Primary midline closure	Technically less challenging Faster healing Cosmetically appealing	High risk of wound dehiscence or suture abscesses High recurrence rate
Primary off-midline closure	Lower recurrence rate Faster healing	Less cosmetically appealing
Excision and healing by secondary intention	Effective for cases with extensive tissue loss or complex sinu-tracts Does not require suturing and allows for natural wound healing	High recurrence rate Long and disabling healing period High cost of care
Flap reconstruction	Lower recurrence rate Reduced dead space Tension-free closure Allows for lateralized scars Faster healing Earlier return to work Reduced burden for lengthy wound care and pain Shorter time to pain-free walking, sitting on the toilet, and pain-free defecation ²⁴	Technically more challenging Risk of donor site morbidity: retractile scar formation in the gluteal region Significant risk of flap necrosis complications due to anatomic variations in vascularity

gluteal perforator arteries perforating the gluteus maximus muscle. It is presented as a viable alternative to the previously described surgical procedures and an option for the management of complex sacral wounds such as the one left after the wide excision of a chronic and recurrent pilonidal infection. The idea is to bring new, vascularized tissue into the previously infected wound to fill the cavity to decrease the rate of infection, allow better healing, and facilitate future antibiotic treatment as needed. In this article, we presented a technique to treat recurrent, recalcitrant cases which have failed previous surgical treatments. The mean number of previous procedures in our cohort was 2.25 (range, 2–3). In terms of donor site morbidity, the patients in our cohort had no activity restrictions following the removal of the partial gluteus muscle, indicating minimal donor site morbidity, limited to a slightly depressed buttock contour, but without any impairment in function.

The technique presented in this article provided a long-term cure for all patients. Clinical presentation of patients with complex pilonidal disease varies, and it can mimic other diseases. Hence, a thorough history and physical examination are necessary to allow for a correct differential diagnosis and an appropriate management plan. For example, hidradenitis suppurativa causes inflamed, painful, and chronic abscesses; as such, it has common characteristics with pilonidal disease (ie, sinus tracts), and a relationship/common etiology has been proposed between the two. Although the relationship is outside the scope of this article, we believe it is important to highlight the fact that the only patient with confirmed recurrence has hidradenitis suppurativa and has had a long hospital stay (12 days) for treatment of postoperative infection despite broad-spectrum antibiotics.^{31–33}

Also, although not constituting a direct cause-and-effect relationship, risk factors associated with pilonidal disease include, but are not limited to, obesity, sedentarism, repetitive trauma or irritation to the gluteal cleft skin, and familial history of pilonidal disease. As mentioned by Doll et al, a positive history of familiar pilonidal disease appearance is associated with its appearance in younger patients, and the incidence of recurrence after surgery was found to be exceeding 50% after 25 years.³⁴ Our cohort's analysis was very much in line with the usual epidemiological standard for the pilonidal disease patient population.

The main complication in pilonidal disease is the propensity for recurrence, which is thought to be more likely associated with a limited type of surgery, and patient comorbidities.²⁸ In our study cohort of 11 patients, the majority, specifically seven individuals, experienced uneventful healing. However, a subset of patients encountered complications. Three patients developed a wound infection, whereas one patient experienced wound dehiscence.

Regarding the patients who developed infections, two individuals successfully achieved healing through conservative management involving antibiotic therapy. However, it is worth noting that one of these patients experienced a recurrence of the infection over a year after their initial

surgery. That patient had hidradenitis suppurativa, and the infection was a recurrence of that disease. Because it was the first recurrence over a year after the surgery, and the infection resolved with conservative treatment, the decision was made to continue close observation. The patient was educated that in case of recurrence of infection, the risk of a subsequent infection would be deemed high enough to warrant a same day wound debridement and closure surgery. At the follow-up of one year and a half later, the patient was still free of disease. On the other hand, the other patient with an infection required reoperation to address the wound by means of debridement and re-closure.

The patient who had wound dehiscence opted for surgical re-closure instead of waiting for secondary healing with dressing changes. This decision was made at the wishes of the patient and aimed to expedite the recovery process for logistics purposes (the patient was a college student abroad and needed to recover before the start of classes).

In our cohort, the mean length of hospital stay for the seven patients who underwent both excision and wound closure procedures is 8 days, ranging between 3 days and 3 weeks. This is explained by the fact that the procedures are normally planned 1 week apart in case the wound is infected and needs to be debrided and cleaned before closure. Throughout this waiting period, patients may leave the hospital premises, provided they adhere to appropriate wound care protocols, or they can stay as inpatients for continuing wound care and antibiotic treatments.

Limitations

The findings of this study must be seen considering some limitations. The small sample size represented one of the biggest limitations we encountered. However, this group of patients represents recurrent disease that has failed previous multiple treatments.

Additionally, this was a retrospective study that collected prospective data. Future prospective studies may be able to gather more granular data, which would further support the use of a partial gluteus muscle flap as a treatment for recurrent, difficult-to-treat chronic pilonidal chronic disease.

CONCLUSIONS

In the literature, there is no consensus on the treatment of complex pilonidal sinus disease. Our case series demonstrates that the use of a partial gluteus muscle flap is a promising solution for recalcitrant and recurrent pilonidal cyst disease.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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