



Triangle Excision and Advancement Flap in Pilonidal Disease: A Single-Center Prospective Case Series

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ABSTRACT

Aim: Pilonidal disease (PD) is frequently encountered within the community. There are still ongoing debates regarding its treatment in general surgery clinics. Although minimally invasive methods such as phenol, laser ablation, and endoscopic pilonidal sinus treatment are gaining prominence, flap applications remain the preferred option in patients where these methods fail or the disease is widespread. In this study, we describe the clinical outcomes of patients operated on using the triangle excision and advancement flap technique, which allows for the removal of less tissue near the perianal region.

Method: Prospectively collected data were retrospectively analyzed. Age, gender, body mass index (BMI), disease duration, hirsutism score, number of pits, complications, operation time, hospitalization period, and postoperative 3-, 6-, and 9-month follow-up results of the patients were analyzed. The results of the analysis showed that no complications or recurrences were observed in any patient.

Results: A total of 46 patients were included in this study. The mean age of the patients was 23.69 (± 7.06). Of the 46 patients, 41 were men (89.1%), and 5 were women (10.9%). The mean age of the men was 23.3 (± 7.33), and the mean age of the women was 26.6 (± 3.5). In terms of hirsutism score, 34 patients (73%) had a score of 2, and 12 patients (27%) had a score of 3. The mean BMI was 23 (± 2.16). All patients were operated on under spinal anesthesia. The mean operation time was 40 (± 7.55) minutes, and the mean hospitalization time was 1 (± 0) day. In terms of early complications, flap dehiscence was observed in 2 patients. Of these, one was a patient for whom a surgical drain was not placed. No bleeding was detected in any patient, and urinary retention was observed in 3 patients.

Conclusion: We believe that the triangle excision and advancement flap method can be safely employed in PD.

Keywords: Advancement flap, pilonidal disease, triangle excision

Introduction

Pilonidal disease (PD) is a common condition in young people.¹ The pathophysiology of PD remains controversial; however, it is generally accepted that the disease arises due to hair in the gluteal cleft.² Risk factors include white race, male gender, family history, poor hygiene, deep natal cleft, hypertrichosis, obesity, and prolonged sitting.³ Diagnosis is made clinically, and it is usually simple to perform. If an abscess is present in acute form, the patient's main complaint is pain. In chronic form, the clinical presentation may vary depending on the number of pits and sinuses. The cavity communicates with the skin through one or more sinuses. Whether acute or chronic,

there are typically one or more sinus orifices located in the midline, and epithelialized channels open to these orifices.⁴

The clinical presentation of PD can take many different forms. As a result, there are numerous treatment methods available. The critical aspect is identifying and implementing the most appropriate treatment for each patient; there is no ideal standard technique. However, if there is an abscess present, the abscess must be drained. In treatment, the goal is to ensure that the remaining tissues following the complete excision of diseased tissues are well-vascularized, tension-free, and resilient. Additionally, minimizing postoperative pain and dressing requirements, facilitating the patient's prompt return to daily



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activities or work, and preventing recurrence are crucial objectives. When the wound is left open, the recurrence rate is lower, but the need for care is higher.

In this study, the results of the triangle excision and advancement flap we performed in the treatment of PD are presented. The advantage of this method is that less tissue is excised from the area near the anus, which can reduce anal complications.

Materials and Methods

Prospectively collected data were retrospectively analyzed. A total of 46 patients who underwent triangle excision advancement flap between October 2020 and October 2022 were included in this study. Age, gender, disease duration, the modified Ferriman-Gallwey visual scoring for hirsutism (1: mild, 2: moderate, and 3: severe), number of pits, complications, body mass index (BMI), operation time, hospitalization period, and postoperative 3-, 6-, and 9-month follow-up results of the patients were analyzed. All patients had chronic PD without abscess. The surgical methods were explained to the patients, and informed consent was obtained from them after choosing this method. This study was approved by the Ethics Committee of University of Health Sciences Turkey, Haydarpaşa Numune Training and Research Hospital (approval number: HNEAH-KAEK/KK/2024/07, date: 29.01.2024). Informed consent was obtained from all patients for the surgical method to be applied. Procedures were performed in accordance with the Declaration of Helsinki. All patients shaved and bathed 1 day before surgery.

At the time of admission, the patients were classified as follows:⁵

1. Mild disease (1-3 pits, no exudate, and no open wound),
2. Moderate disease (>3-5 pits, rare exudate, and <1 cm open wound),
3. Severe disease (multiple pits, continuous drainage, <1 cm open wound, and chronic wounds due to previous surgery).

Patients with mild to moderate conditions were included in this study. Additionally, the pits and granulomas needed to conform to the inverted triangle shape to be drawn. The excision and flap method was not performed on all the patients with PD. Local minimally invasive procedures, such as phenol, were performed on patients whose pits were on the natal cleft. The exclusion criteria were as follows: patients with American Society of Anesthesiologists (ASA) scores of 3 and higher, BMI ≥ 35 , severe diseases, allergies to anesthetic substances, and contraindications to spinal anesthesia.

The same surgical technique was applied to all patients. The patients were first taken into surgery under spinal anesthesia in the jack-knife position. They were administered first-generation cephalosporin 1 hour prior to treatment. The

gluteal region was fixed to the sides with waterproof tapes, and the area to be operated on was exposed. Figure 1 shows the exposition of the surgical site. Preoperative skin preparation of the surgical area was performed using povidone-iodine. An inverted triangle was drawn to include all of the sinus orifices. A line was drawn extending toward the diseased tissue side, which was equal in length to the upper edge of the triangle (Figure 2). The triangle encompassed all granulomas and orifices, and its lower tip remained outside the midline. The triangle was shifted to the right or left rather than remaining



Figure 1. Pilonidal disease; pits in the intergluteal cleft and sinus in the left lateral

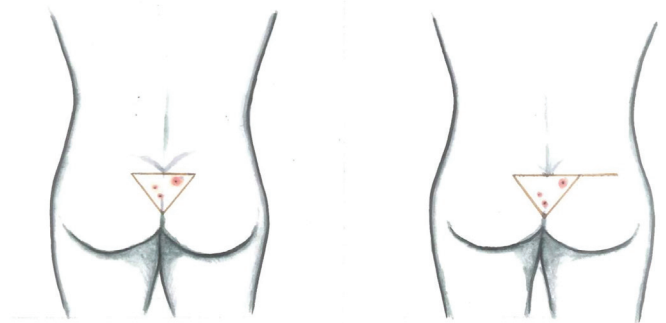


Figure 2. Drawing an inverted triangle shape to include all orifices and extending the upper edge

exactly on the midline. If the site to be flapped was on the right, the lower tip of the triangle was positioned on the right side; if the site was on the left, the lower tip was positioned on the left side. The triangular area where the diseased tissues were located was fully excised down to the post-sacral region (Figure 3). The flap created by extending the upper edge of the triangle was lifted from the base and transposed to the post-sacral region (Figure 4). Any excess tissue formed in the brought area was then excised. After achieving hemostasis, a Hemovac drain was placed in the lodge, and subcutaneous tissues were sutured in two layers with 2-0 polyglactin sutures (Damacryl, GMD Group Medical, Turkey). The skin was closed using 2-0 polypropylene (Polypropylene, MEDICO, China) sutures in a mattress configuration. Care was taken to ensure that the knots were not located on the flap, and a Hemovac drain was placed in the lodge. The postoperative 1st-year follow-up details are shown in Figure 5.

Patients could be mobilized in the postoperative period and were discharged with an analgesic prescription. Antibiotics were not routinely prescribed. Patients were advised to renew the dressing every day for the 1st week in the postoperative period, keep the area clean and hair-free, and avoid heavy work and intense contact sports. Patients were discharged on the first postoperative day and were asked to note the amount of fluid accumulated in the drain.

When the patients returned for postoperative follow-up on the 3rd day, the drain was removed if the fluid amount had decreased to 25 cc. The patients were scheduled for a follow-up on the 7th day and suture removal on the 14th day. They were invited to the outpatient clinic for follow-up appointments in the 3rd, 6th, and 9th months. The primary outcome of the treatment was the low rate of complications, and the secondary outcomes were the low rate of early recurrence and rapid healing process.

Statistical Analysis

Data were reported as percentages and as mean \pm standard deviation. The Social Science Statistical Package 29 (SPSS Inc., Chicago, IL, USA) was used to analyze all data.

Results

A total of 46 patients were included in this study. The mean age of the patients was 23.69 (\pm 7.06). Among them, 41 were men (89.1%), and 5 were women (10.9%). The mean age was 23.3 for the men and 26.6 for the women. According to the Modified Ferriman-Gallwey visual scoring for hirsutism, 34 patients (73%) had a score of 2, and 12 patients (27%) had a score of 3, and none of the patients had previously undergone PD surgery. All patients were primary cases.

The mean BMI was 23, the mean operation time was 40 minutes, and the mean hospitalization time was 1 day. In terms of early complications, flap dehiscence was observed

in 2 patients, and 1 of these patients did not have a drain inserted. The other 2 patients healed with additional sutures and pressure dressings. There was no bleeding, hematoma, flap necrosis, infection, or need for flap reconstruction in any

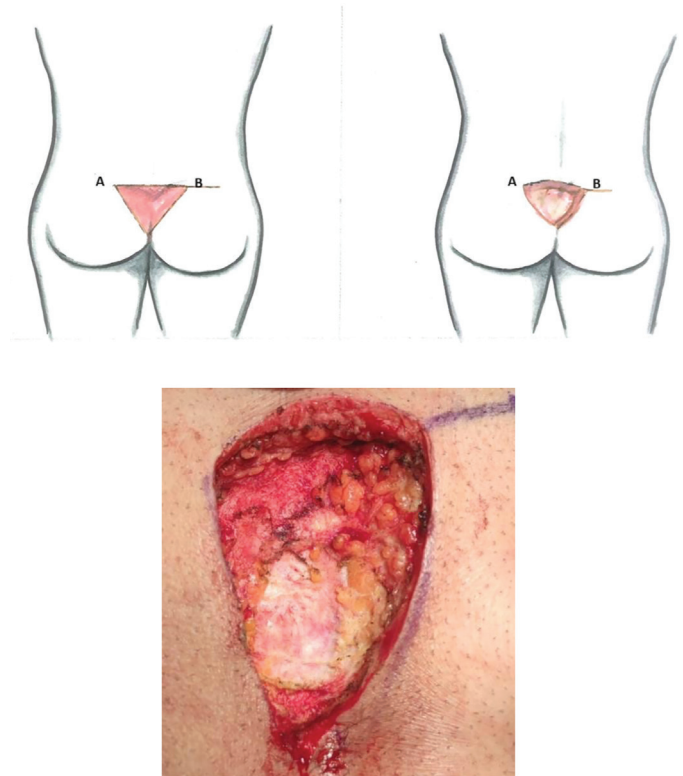


Figure 3. Excision up to the post-sacral region

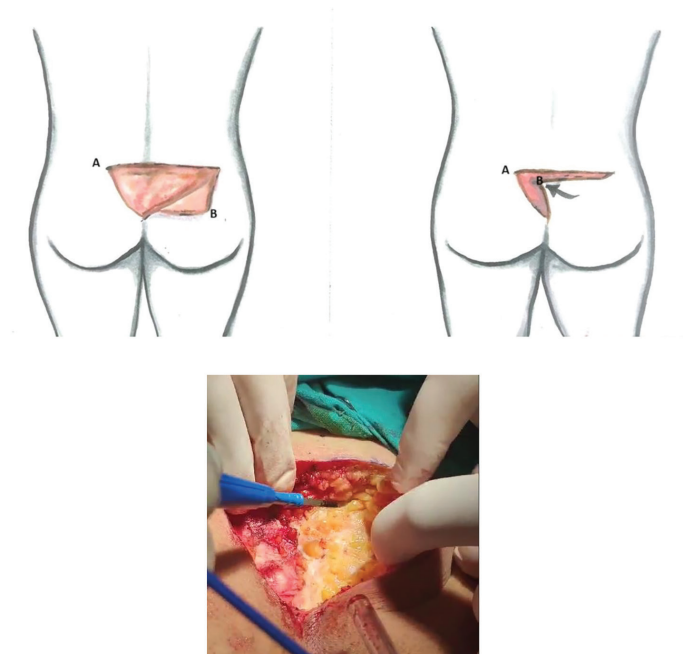


Figure 4. Lifting the flap from the base and the transposition of the flap. "B" is transposing to point "A"

of the patients. All patients were operated on under spinal anesthesia. Urinary retention was observed in 3 patients, and recurrence was not observed in any patient. Demographic data and the surgical outcomes are shown in Table 1.



Figure 5. Postoperative year 1

Table 1. Demographic data and our surgical results

Gender, n (%)	
Male	41 (89.1%)
Female	5 (10.9%)
Age, mean \pm SD	23.69 (\pm 8.9) years
Body mass index, mean \pm SD	23 (\pm 8.3) kg/m ²
Had previous PD surgery	0
Anesthesia, n (%)	
General	0 (0%)
Spinal	46 (100%)
Operation time, mean \pm SD	40 (\pm 7.9) minutes
Postoperative complications	
Infection, n (%)	0
Necrosis, n (%)	0
Complete wound opening, n (%)	0
Seroma, n (%)	0
Hematoma, n (%)	0
Recurrence, n (%)	0
Follow-up time, median (min.-max.)	6 (3-9) months

SD: Standard deviation, PD: Pilonidal disease, Min: Minimum, Max: Maximum

Discussion

PD treatment should be determined according to the characteristics of each patient. Leaving the wound open until granulation tissue forms, partially closing the wound with sutures, and performing secondary closure of the open wound with a skin graft are methods associated with low recurrence rates. However, these methods usually require long-term treatment, and their direct and indirect effects are significant. Furthermore, these treatments lead to high costs⁶ and require longer healing times (typically 3-8 weeks). A previous study showed that the mean recovery time of 150 patients who underwent marsupialization was 4 weeks, and the recurrence rate was 6%.⁷ The follow-up period in that study was 4 years, whereas that of the present study was 9 months. In addition, poor scar healing is a disadvantage of these treatment methods.⁸ In the present study, we investigated the triangle excision and flap method in terms of complications and early recurrence.

Wound closure may be more cosmetically acceptable for some patients and is associated with shorter healing and quicker return to daily activities. Wide local excision and primary closure are advocated by some researchers in the treatment of PD; however, with this method, the scar remains in the midline, which is associated with a high incidence of recurrence.⁹ To resolve this problem and reduce the depth of the natal cleft, the Karydakakis technique uses an eccentric elliptical incision for sinus excision. In this method, a flap is moved from the middle side of the wound, and the last suture line is left on both sides of the midline.¹⁰ A portion of the abscess cavity wall opposite the incision is lifted as a flap and used to close the connection between the midline pits and the abscess cavity. Therefore, these techniques have high recurrence rates. In the present study, no bleeding, hematoma, flap necrosis, infection, or need for flap reconstruction was observed in any of the 46 patients.

In patients requiring wide excision, the flap method can be an effective option. Radical excision of the sinus was performed to reshape and flatten the natal cleft to reduce friction, local temperature, humidity, and hair accumulation.

Various flap methods have been used to close the defect following excision. Most flap techniques avoid tension on the wound and midline scar tissue. Although several studies have reported a recurrence rate of 0-3% for excision and flap repair, recurrence rates were 7-42% after conventional primary closure.¹¹ In the meta-analysis conducted by Berthier et al.¹², 17 randomized controlled trials were examined, comparing flap techniques with lay open/direct sutures. It was observed that direct suturing led to a higher recurrence rate, whereas rapid wound healing was observed with flap repair.

The use of rhomboid excision and the Limberg transposition flap in complex PD was described around 40 years ago.¹³ Low

recurrence rates and short hospital stays were reported using this technique.^{14,15} The Limberg flap not only reduces the depth of the natal cleft but also transposes the midline incision scar laterally. However, because all the skin required to resurface the rhomboid defect is removed from a single direction, this technique often causes excessive tension on the suture lines. Moreover, the use of this technique in closing large excisional defects of the sacrococcygeal region is associated with poor scar healing. In the meta-analysis conducted by Gavriilidis and Bota¹⁶, it was observed that the outcomes of Limberg and Karydakakis flaps were approximately the same.

The V-Y advancement flap technique is reliable and effective in closing large pilonidal wounds, but this technique has limitations in terms of the transposition of the resulting vertical scar from the midline.¹⁷ Berkem et al.¹⁸ reported high recurrence rates when the pilonidal sinus was reconstructed using V-Y advancement flaps, and the vertical suture line remained at the midline. In the case of large tissue defects with repeated infection and recurrence, the use of fasciocutaneous and myocutaneous flaps is indicated. These techniques aim to achieve wide excision of all diseased tissue and closure of the resulting defect with well-vascularized tissue that is similar in volume. Additionally, they provide a tension-free suture line. However, these techniques are more complex and require greater surgical expertise, leading to higher rates of morbidity and wound dehiscence, as well as longer hospital stays.¹⁹ All these flap techniques have certain advantages, such as low recurrence and complication rates, short hospital stays, quick return to daily activities, and satisfactory aesthetic results.²⁰ In this study, we aimed to introduce the method of triangular closure of the defect remaining following excision.

As noted above, although various surgical procedures have been reported to date, a definitive treatment method for PD has yet to be established. Although the best method is not clear, closing the midline is no longer recommended.²¹ To create a surgical alternative, we adapted the Mutaf triangular closure technique, first described in the closure of a large meningomyelocele in 2003, to treat PD. This technique can be utilized for defects following pilonidal sinus excision in different regions that are defined by considering the perforators in the sacrococcygeal region. Predictions can be made regarding scar formation following this technique. Our technique manipulates the tissue from two directions during defect closure. This ensures even distribution of tension and reduces the risk of tissue distortion and displacement of adjacent mobile anatomical landmarks. However, in Limberg flap closure, tissues are harvested in a single direction, which can lead to tension along a single line.

Therefore, in large defects, there is an increased risk of complications due to compromised flap circulation.

Additionally, with this method, a smaller area is excised compared with many other flap techniques. Moreover, excising less tissue from the area near the anal region may help prevent complications in this region.⁹ No recurrence or necrosis was observed in any of our patients.

Study Limitations

This study has certain limitations. For example, the limited sample size and short follow-up period may affect the generalizability of the results. Additionally, the lack of objective assessment tools, such as a satisfaction survey or visual analog scale score, may have limited our ability to fully measure the level of improvement and relief that patients subjectively experienced. Furthermore, we did not use any detailed classification other than the mild/moderate/severe disease classification, and we had no strict indication other than the diseased area conforming to the inverted triangle shape. The short follow-up period was the biggest obstacle to our accurate assessment of recurrence. The exclusion of patients with an ASA score of 3 and those with a BMI >35 is another limitation. Being aware of these limitations is important for future studies to be more comprehensive and detailed.

Conclusion

In this study, it was observed that the triangle excision and advancement flap method achieved successful results. The overall satisfaction of the patients and the rapid recovery process support the effectiveness of this method. In addition, the low rate of post-surgical complications and recurrence rates show that this method is a safe and effective option for treating PD. The triangle excision and advancement flap method can be safely utilized in the management of PD. Randomized controlled trials with long-term follow-up periods comparing this method with other flap techniques and open surgical techniques are needed.

Ethics

Ethics Committee Approval: This study was approved by the Ethics Committee of University of Health Sciences Turkey, Haydarpaşa Numune Training and Research Hospital (approval number: HNEAH-KAEK/KK/2024/07, date: 29.01.2024).

Informed Consent: Informed consent was obtained from all patients for the surgical method to be applied.

Authorship Contributions

Surgical and Medical Practices: N.K., A.F.M., M.S.G., U.K., Concept: N.K., U.K., Design: N.K., İ.T., A.F.M., M.S.G., Data Collection or Processing: N.K., Analysis or Interpretation: N.K., İ.T., M.K., G.E., Literature Search: N.K., İ.T., M.K., Writing: N.K., G.E.

Conflict of Interest: No conflict of interest was declared by the authors.

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