

coloproctology 2019 · 41:101–105
<https://doi.org/10.1007/s00053-019-0351-3>

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 Springer Nature 2019



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Out of the midline—cleft lift, advancement and rotation procedures

Pilonidal disease is common and represents a minor condition for the majority of patients. However, in some patients it can result in prolonged pain, sepsis and long periods off work and education. Many treatments have been described for this condition, which clearly demonstrates that no single procedure is completely effective. It therefore follows that failure of primary treatment as well as recurrence of the disease is inevitable to some degree after all treatment modalities [1].

The results of different treatments should be expressed as the rate of failure of the original treatment as well as the rate of recurrence after healing. Some reports do not differentiate between these two outcomes. It can sometimes be difficult to differentiate, as apparent healing may have taken place when in fact there has been a failure. It is nonetheless important that whatever treatment is carried out, the patient be no worse after treatment—whether due to failure or recurrence—than if they had not undergone the treatment in the first place. Unfortunately, this guiding principle in the treatment of this benign non-life-threatening condition is often not adhered to.

Surgeons often treat pilonidal disease using the same technique for all cases. It is known that the severity of the condition varies widely and attempts at classification have been made [2, 3]. A new international classification is in the process of being developed [4]. This concept leads to the conclusion that different severities of pilonidal disease should be treated in different ways. Simple dis-

ease should be treated by surgery best suited to this, such as trephine operation [5], Bascom's pit-picking operation [6] or endoscopic pilonidal sinus treatment (EPSiT) [7]. However, there are circumstances when such operations are either not possible or have been used before and the disease has recurred. The off- or out-of-midline closures are ideally suited to these circumstances. Such situations are extensive disease, recurrence beneath a previously sutured wound and unhealed midline wounds. In other words, when there are no longer simple pits present.

The most distressing of these conditions is when there has been failure of wide excision of pilonidal disease leaving an unhealed midline wound that never heals. These wounds are treated for prolonged periods resulting in time off work, inability to hold down jobs, use of nursing resources and a diminished quality of life. These unhealed midline wounds are usually due to failure of primary treatment, although they can occur spontaneously. After they have been present for several months, they are often perceived as a recurrence by both the surgeon and the patient. These wounds are the *bête noire* of pilonidal surgery.

The midline wide excision, either with primary closure or with secondary healing, has been shown by several authors to have a poorer outcome than a lateral or off-midline closure. Due to the unacceptable incidence of an unhealed midline wound after these procedures, they should be abandoned [8–13].

Out-of- or off-midline closures

These include the following operations:

- Karydakis operation
- Cleft closure/lift
- Limberg flap
- Complex flaps

Karydakis operation

The best-known off-midline closure technique is the Karydakis operation ([14]; **Fig. 1**). Here, a wide excision of the disease is made using an elliptical asym-

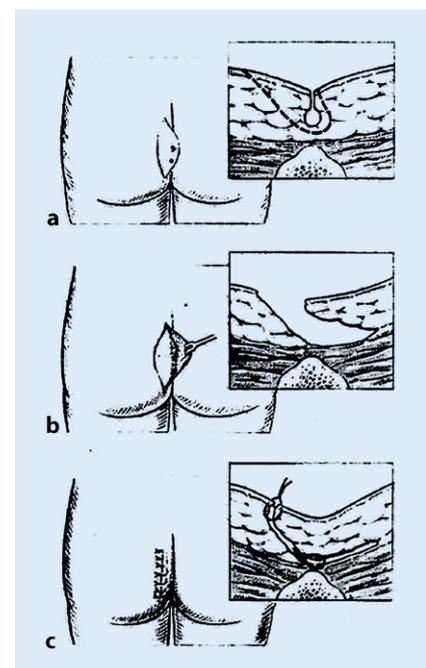


Fig. 1 ▲ Diagrammatic representation of the Karydakis operation. (From [26].) **a** Off midline excision on the left. **b** Mobilisation of the flap from the right. **c** Tension free closure on the left with advancement of the flap from the right

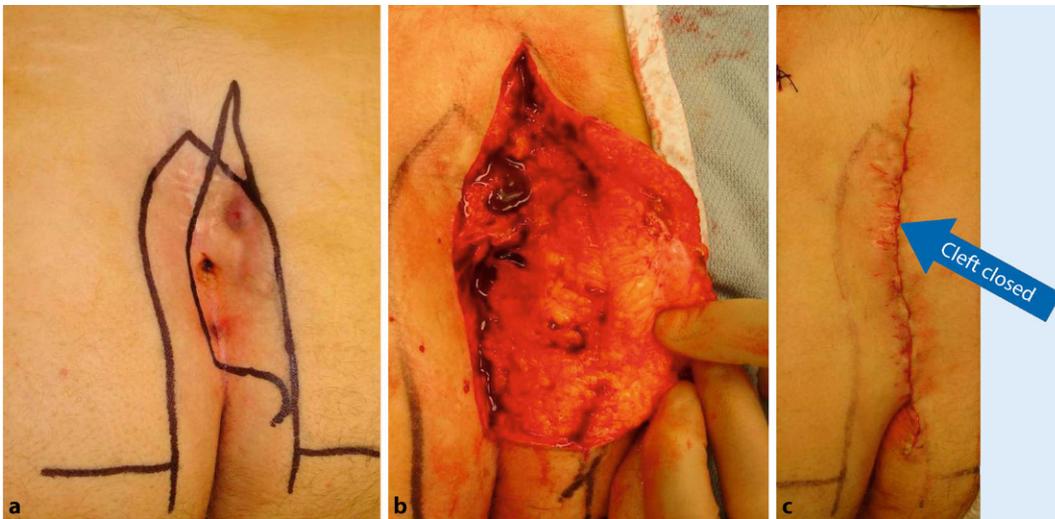


Fig. 2 ◀ Cleft lift operation. (From [43] with permission of Elsevier). (a) Skin markings before surgery (b) Mobilisation of the skin flap on the right before excision (c) Off midline closure after mobilisation of the skin flap from the opposite side



Fig. 3 ▲ Modified Limberg flap. a Excision of the previously marked skin and subcutaneous tissue. Note that the lower pole of excision lies 2 cm lateral to the midline, which creates a scar that is out of the midline at the distal end. b Closure of the Limberg flap. (from [1], Courtesy PD Dr. Sven Petersen)

metric excision down to the deep fascia. The thick flap thus created is sutured to the deep fascia and then closed to one side of the midline. A total of 7471 cases were described by Karydakis, and there has been a 2–20-year long-term follow-up of these patients [15]. Surgery was performed as an inpatient procedure with a hospital stay of between 1 and 3 days with a 1% recurrence rate. Many others have published their results since, with good outcomes [16–23]. The operation has also been performed as a day case [24]. Overall, recurrence rates vary from 0 to 7%. In a thorough meta-analysis of all treatments, Karydakis and cleft lift were found to have the lowest recurrence rates [25].

Some trials comparing the Karydakis operation with Limberg flaps found it to be superior [27–29], with others finding

it worse [30, 31]. Recurrence rates were, however, consistently low [27–29].

Cleft closure/cleft lift

This is a modification of the Karydakis operation described by Bascom ([32, 33]; ■ Fig. 2). Skin on each side of the natal cleft is mobilised as a fairly superficial flap with a small amount of subcutaneous tissue. The abscess cavity is not excised but instead laid open and curetted. All debris and hair is removed. The diseased skin from one side of the natal cleft is removed, the midline fat pads are closed with obliteration of the natal cleft and the skin flap sutured laterally off the midline. This procedure has the advantage that it can be performed as a day case and under local anaesthesia [33]. The cleft lift is particularly suited to treating the unhealed midline wound and results in rapid and

successful healing. In a series of 150 patients, of whom 63% were treated for recurrent disease or an unhealed wound, there was a 96% success rate for healing. No patient had a major breakdown of the wound and only 5% required further surgery for recurrence [33]. Several other authors have published good results with this technique [34–39]. The recurrence rates vary from 0 to 5%, although one small study of 24 patients had a 17% recurrence rate [34]. In meta-analysis the recurrence figures for this technique are the lowest reported and are similar to those of the Karydakis operation [25], compared with which it is considerably less invasive. Cleft closure/cleft lift has been compared in a randomised trial with Bascom's pit-picking procedure for fairly simple disease and has demonstrated its utility even in this setting [40]. In comparison with a Limberg flap, this procedure was found to be better in a randomised trial of 122 patients [41]. It was also found to be superior to wide excision with or without closure [42], such that the authors state that wide midline excision should not be used. It is particularly suited for the treatment of complex disease as well as an unhealed midline wound [33]. Primary wound healing occurs in 60 to 70% of patients, and most can return to work between 1 and 4 weeks after surgery. This and the Karydakis operation have asymmetric off-midline closures and have been demonstrated to be superior to other midline closures, which should now be

abandoned [9, 11–13]. These operations should now be the treatment of choice for more complex disease.

Limberg flap

The Limberg flap and its variant Dufourmental flap are the commonest complex flaps to treat pilonidal disease ([27, 30, 44, 45]; ■ Fig. 3). In randomised trials, the Limberg flap was found to be superior to midline closure [46, 47]. In other studies, it was found to be comparable to the Karydakis operation [48–50] and to asymmetrical elliptical excisions [51, 52]. A systematic review of the Limberg flap supported its equivalence to the Karydakis operation and its superiority over midline closure [44]. Recurrence after the operation is low at 0–4%. A meta-analysis has also reported low recurrence rates [25].

The most obvious disadvantage of a Limberg flap is the cosmetic aspect. It completely obliterates the natal cleft and alters the contour of the buttocks. It scored lower than Karydakis in prospective studies [17, 29, 48].

Complex flaps

Many complex flaps have been used in the treatment of pilonidal disease. The House flap [53] has recently been described for what appears to be simple disease. Z-plasty [54–57], V-Y flaps [58–60], rhomboid flaps [61, 62] and complex plastic surgical techniques such as transverse lumbar artery perforator flap [63] are other techniques that have been used. They have also been compared with each other and with other techniques [47, 55–57]. In addition, modifications of these procedures have been described [61]. By and large, the results are no better than those obtained with the simpler flaps, as was demonstrated in a meta-analysis of treatments for pilonidal disease [25]. The Cochrane Database publications included these flaps with all off-midline closures and concluded that the latter were better than midline closures [10, 12].

Generally, the more complex the procedure the more likely the patient is to require general anaesthesia and inpatient

hospital stay. Postoperative care is also more complex and there is more interruption to the patient's daily living. Undoubtedly, these procedures are also cosmetically disfiguring. Nonetheless, along with the Limberg flap, Karydakis and cleft lift, they have better outcomes than midline closure [47].

Discussion

The aim of pilonidal surgery should be to keep it as simple as possible to effectively treat the disease. Although it has been shown that recurrence after treatment is one of the major determinants for reduced quality of life [64], a simple operation that has low morbidity and a low recurrence rate should be the objective of treatment. For simple disease, the procedures that primarily deal with the pit—such as trephine, Bascom's pit-picking and EPSiT—are the most appropriate operations. They have very low morbidity, seldom make the patient worse and have recurrence rates of approximately 16% 5 years following surgery, which is not low, but acceptable. The cosmetic results are very good as there is no change of contour [65]. For the off-midline closures and flaps, recurrence rates are and should be under 5% at 5 years. Any variation from this makes the morbidity and recovery from such procedures unacceptable.

As there have been many procedures described to treat pilonidal disease, it can safely be assumed that none are entirely satisfactory. They all have their advantages and disadvantages, but it seems inappropriate to treat all pilonidal disease with the same technique—treatment should be tailored to the severity of the disease. This will be facilitated by the use of a classification [4], and surgeons need to be willing to alter their technique to suit the patient.

Complex flaps, including the most commonly performed Limberg flap, have the major disadvantage of completely obliterating the natal cleft and altering the contour of the buttocks. Many patients find this unacceptable and are unwilling to consider this procedure as a first-line treatment. Modern clothing and attention to appearance

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Abstract

Surgery is usually necessary to treat symptomatic pilonidal disease. However, some operations have the propensity to make the patient worse. Uncomplicated disease should therefore be treated by operations that excise the pits rather than excisional surgery. More complex disease, however, cannot be treated by these techniques. It has been shown in many publications that off- or out-of-midline closures have better outcomes than midline closures and wounds. Descriptions and results of these procedures are described. Midline wounds should be abandoned in favour of off-midline closures.

Keywords

Surgical procedures, operative · Recurrence · Wound healing · Surgical flaps · Pilonidal sinus

Raus aus der Mittellinie – mit „cleft lift“, Verschiebe- oder Rotationslappen

Zusammenfassung

Nur mit einem chirurgischen Eingriff kann ein Pilonidalsinus heilen. Einige Eingriffe können den Zustand des Patienten verschlechtern, deshalb sollten einfache Pilonidalsinus mit einfachen Methoden wie „pit picking“ statt chirurgischer Exzision behandelt werden. Kompliziertere Sinus werden hingegen mit einfachen Verfahren nicht ausreichend versorgt. Mittlerweile ist es Allgemeinwissen, dass Verfahren außerhalb der Mittellinie bessere Ergebnisse zeigen als Mittellinienverschlüsse. Gängige Off-Midline-Verfahren werden hier dargestellt. Mittellinienverschlüsse sollten nicht mehr angewandt und stattdessen Off-Midline-Verfahren eingesetzt werden.

Schlüsselwörter

Chirurgische Verfahren, operativ · Rezidiv · Wundheilung · Chirurgische Lappen · Pilonidalsinus

make this an inappropriate choice in the first instance. This aspect of treatment is seldom addressed. When it has been, the Karydakakis operation was found to be cosmetically superior to the Limberg flap [28, 29, 48]. Others have commented that some patients have an issue with the cosmetic appearance after Limberg flap [66], whereas the Karydakakis operation had a cosmetic satisfaction rate of 91% in another study [67]. The cleft lift was described as having an excellent cosmetic result [33], as did a modified primary closure [68]. Studies should include the cosmetic appearance as a measure of success. In the current health care environment, patients should be offered a choice of comparable procedures based also on the cosmetic results.

Conclusion

Off-midline closure has clearly been shown to be superior to midline closure and the latter should be abandoned. It is therefore disappointing that this is still widely performed. Many have suggested that off-midline closures need to be promoted [69–71].

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Compliance with ethical guidelines

Conflict of interest A. Senapati declares that she has no competing interests.

This article does not contain any studies with human participants or animals performed by any of the authors.

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