

The Cleft Lift procedure for pilonidal disease renamed as a rotation and advancement flap procedure (RAF): Insights and technical tips for a successful outcome

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ABSTRACT

Introduction: The Cleft Lift procedure originally named by Bascom is a derivative of the Karydakias flap procedure for pilonidal sinus disease. The terminology and variations of the name have long confused surgeons and have limited its wide adoption.

Technique: This technical paper deconstructs the confusing terminology, suggests simple steps for success, and proposes a more descriptive name for the asymmetric flap procedure which has the lowest reported recurrences for all surgical options for pilonidal disease.

Results: The author has successfully performed the Cleft Lift procedure for pilonidal disease since 2000. In the last consecutive 757 patients treated over 12 years, only 6 patients have required a second operation. This cohort included 287 patients referred with recurrent disease or open wounds from prior pilonidal surgery. A new naming scheme is proposed that more accurately describes the operation. The proposed name is the pilonidal RAF procedure for rotation (around the anus) and advancement (across the natal cleft midline) flap.

Conclusions: The pilonidal RAF procedure is highly successful in treating pilonidal sinus disease with a very low need for additional surgery even in complex recurrent disease.

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Introduction

Symptomatic pilonidal sinus disease (PSD) rarely resolves in patients under the age of 40 years without operative intervention. The condition is bothersome at best, and severely debilitating and socially isolating at worst. In some cases, the patients miss work or school, are unable to participate in sports, and refrain from much social activity due to discomfort, drainage and in some cases, a malodorous discharge. In addition, the condition can be painful and require repeated trips to the emergency room or clinic for drainage procedures. PSD often flares at inconvenient times, such as on long car rides or during airplane travel. PSD and the care of patients with it can be emotionally draining for patients, family members, and surgeons as patients may return for multiple postoperative appointments with non-healing surgical wounds or recurrent disease.

Surgical approaches and outcomes for PSD are highly variable and outcomes are closely correlated with the type of procedure performed and perhaps with the experience of the surgeon.¹ The recurrence rate following many traditional operations is > 30% (as high as 67.9% at 240 months for primary midline closure).² Many patients

who have poor outcomes seek care with new surgeons, so surgeons may underestimate their own operative failures.³ Many surgeons feel that removing the infected skin and subcutaneous fat in the natal cleft midline with a generous margin is required to cure pilonidal disease, as many still believe that PSD is caused by a cyst or that the incomplete removal of infected tissue leads to operative failure. The diseased tissue, however, will recover after the nidus of infection is removed as PSD is just an infection. A clear understanding that there is no true cyst, just fibrous tissue surrounding infected tissue should lead to less extensive resection and tissue loss (Fig. 1).

A deep natal cleft is associated with PSD and should be considered the cause of the condition.⁴ When a large amount of tissue is removed, as in traditional pilonidal surgery, and the incision is closed in the midline, the cleft remains deep, a dead space is often created, and this leads to recurrent infection or unhealed wounds. If the wound is left open, it remains at the bottom of a deep cleft and resists healing in the moist, fetid, anaerobic environment. A radical excision is completely unnecessary and harmful as it can make the problem worse and more challenging to remedy as it may lead to a large chronically unhealed wound (Fig. 2). PSD is a skin infection, a benign disorder. It should not be treated aggressively with wide local excision as if it were a malignant condition. Extensive excision of primary disease with significant tissue loss can lead to an open, draining sacrococcygeal wound that requires intensive wound care and dressing

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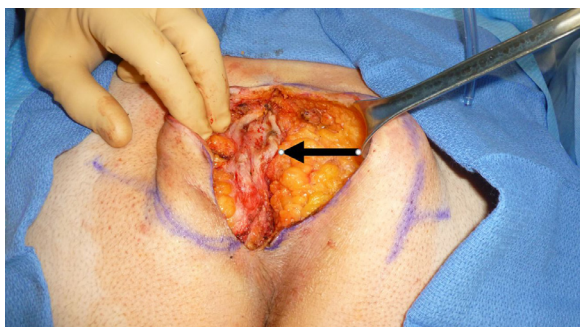


Fig. 1. Looks like a cyst but it's the fibrous wall of chronic abscess cavity (arrow).



Fig. 2. Non-healing of pilonidal wound 1 year following wide local excision.

changes or negative pressure wound therapy for many months without guarantee for resolution as some patients require re-operative surgery with the risk of additional failure.

In the 1980s, Dr. John Bascom introduced a new surgical technique for successfully treating pilonidal disease. Initially coined “the Cleft Closure”, it was a derivative of the Karydakakis flap.⁵ But unlike the Karydakakis flap, in which a thick block of tissue is removed before a flap is rotated and advanced into the resulting defect, the Bascom procedure entailed the advancement of a thin flap of skin with a few millimeters thickness of subcutaneous fat for wound closure. The Bascom procedure limited the tissue excision mostly to skin. The procedure was renamed the Cleft Lift Procedure in a subsequent 2002 article by Drs. John and Thomas Bascom.⁶ The success of this procedure relies on the creation of a stable base of subcutaneous tissue for the flap of skin to adhere to in the newly created shallow cleft, the avoidance of excessive tissue excision, and the complete elimination of dead space. Encouraged by the initial results of the Bascom procedure, I adopted this technique into my clinical practice. Over the last 2 decades, I have operated on a large cohort of patients and obtained excellent results.

The Cleft Lift Procedure has consistently yielded the lowest recurrence rate of any operation for pilonidal disease.² Nonetheless, it has not been widely adopted as the “gold standard” technique for treating pilonidal disease. Having communicated over the years with many surgeons who perform surgery for PSD, the poor adoption of this technique is due to a number of factors. First, the successful conduct of the procedure requires a particular experience in order to tackle complex cases of PSD such as patients with external openings close to the anus, in those with very deep clefts, or in the presence of large chronic abscesses or significant soft tissue loss from prior excisions. Second, this flap procedure isn't clearly in any surgical specialty's purview (further explained below). Finally, the Cleft Lift Procedure seems to have an identity crisis and surgeons seem confused by the procedure and the name.

In this article, I propose to rename the procedure in a descriptive manner so that surgeons understand the mechanics of the procedure. I suggest renaming the Cleft Lift Procedure as the Pilonidal RAF Procedure, for rotation (around the anus) and advancement flap (across the natal cleft midline). Based on more than 20 years' experience with the procedure, I believe the RAF should be considered the initial approach to treating pilonidal disease. I have found that the operation is reliable, reproducible, and recovery is rapid with most patients returning to school, work, or sports in about a week. The principles of the RAF are: 1) to shallow the deep natal cleft, 2) to obliterate all dead space under the surface, and 3) to place the incision off to one side of the now shallow cleft so it is in the open air for optimal healing. It is reasonable to apply this procedure to most but the simplest of chronic or recurrent pilonidal disease, as most other techniques have higher failure or recurrence rates and can entail longer and more complicated postoperative recoveries. The advantage of the RAF flap being thin is that other than an island of skin, no additional tissue is removed, minimizing any potential dead space. The subcutaneous abscess is scrubbed free of hair and debris, the fibrous wall is crosshatched so that it can be infolded on itself to eliminate all dead space. This is done even if the abscess extends down to the periosteum of the sacrum. When other flaps fail, they often do so because of a failure to eliminate all dead space and when they fail, they are more difficult to correct. In the rare event when the RAF fails, there is typically ample soft tissue to successfully remedy the failure as little tissue is removed at the initial operation.

Most surgeons have been slow to adopt asymmetric flap procedures such as the RAF, unaware of the published recommendations of the last 10 years.² Most pilonidal operations in the US and globally are performed by general or colon and rectal surgeons. The RAF is considered a reconstructive flap procedure. Many surgeons from these two specialties don't have much experience with rotation and advancement flaps. Further complicating this issue is that plastic and reconstructive surgeons operate infrequently around the posterior anus.

The pilonidal RAF technique

Careful planning and meticulous conduct of the operative technique are of utmost importance for a successful outcome. The RAF Procedure can be broken down into the following nodal points:

Preoperative marking

In the preoperative holding area, the patient is asked to stand without tensing his/her buttock cheeks with legs shoulder width apart. The line where the buttock cheeks touch is marked with an indelible pen [Figure 3].



Fig. 3. Preoperative marking of the patient's buttock cheeks where they touch in the relaxed position. This indicates the lateral borders and apex of the natal cleft.

Intraoperative planning

Each patient's disease needs to be carefully evaluated and the operative plan mapped out once positioning has taken place in the operating room. Under either spinal or general anesthesia, the patient is placed in the prone position and sedated in the case of spinal anesthesia. Patients receive a dose of intravenous antibiotics upon induction of anesthesia with gram positive and anerobic bacterial organisms' coverage. The lower back, buttocks, and natal cleft/perianal tissues are closely clipped, and the buttock cheeks are taped apart to expose the entire natal cleft down to the anus. Now the disease can be best evaluated with attention given to midline wounds or pits, sinus openings, or induration suggesting underlying chronic abscess cavities.

It is important to note that the length of incision cannot be small. The incision needs to begin 1 to 2 centimeters (cm) above the top of the cleft and attempts should be made to minimize the depth of the necessary residual cleft close to the anus in order to prevent recurrence and ensure a gentle transition of skin down to the anus, preventing divots or tissue overhangs.

The skin of the less scarred or diseased side of the natal cleft is preserved and used as a rotation and advancement flap. On the opposite side of the natal cleft, an asymmetric island of skin is marked with an indelible marker as the island of skin intended to be removed. The cephalad apex of that island comes to a gentle point 1 to 2 cm above the natal cleft (to avoid a divot when closed) in the midline or 1 to 2 cm off to the side of the excision. This apex is strategically placed to best excise the majority of the scarred or affected skin. The middle of the skin island is a flattened ellipse with the flattened portion just across the midline to include all of the pits or wounds. The line crosses the midline at a right angle and swings towards the anus. The line is brought up laterally just wide of the line of skin contact on the side of the cleft where the line began, to join the cephalad apex. The anal aspect of the skin island narrows to point at the right or left posterolateral aspect of the anus. Just before the incision swings towards the anus it is indented a bit towards the midline. I call this the "inflection point" or "waist". This is the portion of the wound that will have the most tension and care should be taken to avoid an overly aggressive excision here (Fig. 4).

I often prefer to excise the sinus openings for cosmetic and healing reasons (they often take a month or more to fully epithelialize). However, if such openings are very cephalad or lateral, they can be left in place and curetted and used as the eventual drain exit site.

On occasions, when the lowest natal cleft wound extends to within 1 cm of the anus, I leave a small portion of the wound in place and rotates it to one side as the flap is rotated around the anus. This strategy avoids aggressive skin excision close to the anus and is often successful, as wounds that remain but are just off the midline usually heal.

Incise, mobilize, excise

Using a knife or electrocautery on a clean pure cutting mode (ACE by Megadyne™ is my preference), the medial aspect of the flap and island of skin to be removed is incised along the entire length of the cleft. The flap is elevated off one side of the cleft with the assistant placing vertical traction on the skin edge. The flap is thin, approximately 3 millimeters (mm) and is made a bit thicker around the anus to avoid devascularizing the perianal skin. Mobilization continues out past the line of skin contact marked on the flap side, several centimeters cephalad to the wound, and halfway around the anus (Fig. 5). In order to flatten and rotate the perianal skin, a portion of the fibers of the subcutaneous external sphincter muscle are detached from the skin with care taken not to divide this closer than 5 mm to the skin to again avoid devascularizing the skin in the area. Occasionally, the anococcygeal ligament is divided but this doesn't provide as much

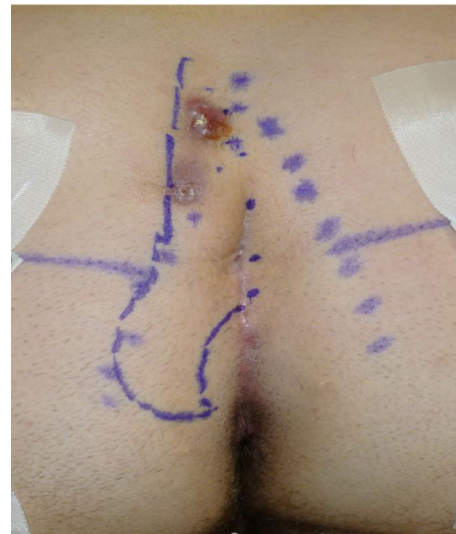


Fig. 4. Intraoperative planning in a patient with long-standing pilonidal sinus with a large chronic abscess on the left. The dashed line is where the buttocks touch when standing. There are 2 sinus openings to the left and dilated pits in the midline. The asymmetric island of skin marked on the left will be excised after the coverage flap has been mobilized and the natal cleft recontoured to be shallower.

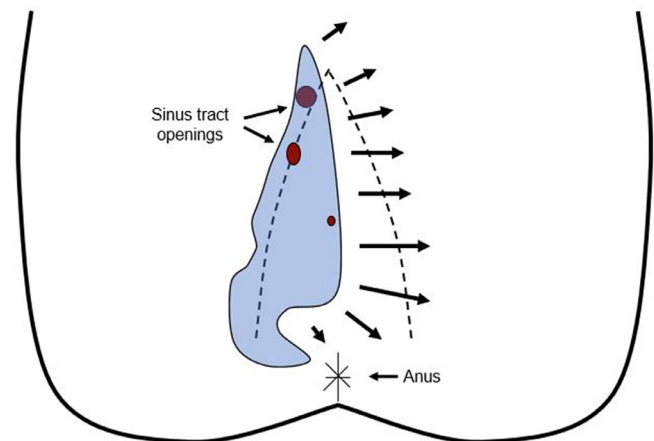


Fig. 5. The arrows indicate the extent of flap mobilization.

rotation or flattening of the perianal skin. The goal is to keep the incision as lateral as feasible so that it is out of the residual cleft and exposed to air so it will heal. Even if the incision can't be lateralized significantly, just moving it off the midline slightly is usually sufficient to allow proper healing. Be aware that the gluteus muscles will pull the incision towards the midline after anesthesia wears off so often the incision ends up closer to the midline than it appears when the patient is relaxed in the operating room, so plan for this.

Next, the island of skin to be removed is mobilized sparing as much of the subcutaneous fat as possible. The buttock cheeks which have been placed on traction are untaped so that the surgeon can adequately gauge the proper extent of the skin excision. The flap now can be gently draped over the skin to be removed with the surgical assistant gently pushing the buttock cheeks together and the lateral extent of the excision is adjusted. The island of skin is now detached laterally with a scalpel blade or electrocautery, and the extent of the abscess and sinus tract is now fully appreciated (Fig. 6). The abscess and sinus tracts are fully unroofed and cleansed after excising the skin island with the pits and sinus openings (Fig. 7). Deep tissue excision is strictly avoided so that dead space is not created. Often the sacrococcygeal fascia is exposed and represents the deep portion of the abscess cavity wall. A curette can be used but



Fig. 6. Thin flap on the right has been mobilized. The skin island on the left has been elevated (not yet removed) to reveal the abscess cavity and the extent of the flap mobilization.



Fig. 7. Skin island has been excised from the left and abscess debris has been scrubbed and its fibrous wall preserved.

often the roughness of a cotton gauze is most useful in removing the viscous material and hair. Only if there is hair inspissated in the abscess cavity wall is the inner-most layer of this fibrous tissue removed. No special dye is required to find the tracts as all are connected to the main abscess cavity and they typically connect to the most caudad wound or pit. In my opinion, it is a mistake to excise the abscess tissue with a clean margin. After all, we all have experience with interventional radiologists successfully draining and resolving intraabdominal or pelvic abscesses with the simple placement of an external drainage catheter. In such situations, the fibrous abscess cavity wall is left in place and the patient recovers. The same concept should apply to patients with PSD.

Preparation of the wound bed

The abscess cavity wall (which in very chronic abscesses can be over a centimeter in thickness) is cross-hatched down to more pliable tissue with care being taken not to narrow the base of the cubes of tissue and devascularize them (Fig. 8). The purpose of this maneuver is to release the scarred fibrotic tissue in order to collapse the abscess wall and fill in the cleft to create a flat bed for the flap to adhere to and eliminate any potential dead space. I irrigate the wound but the necessity of this is debatable. Next, the abscess cavity wall is in-folded on itself and rearranged so it can't reform. The fibroadipose tissue of both buttock cheeks is serially sewn together in multiple layers with absorbable monofilament suture material to pad the sacrum and make the natal cleft shallower. I prefer using a larger needle for the deeper layers to grab more tissue. Needle size and suture gauge is a personal preference. During this process, meticulous care should be taken to eliminate all dead space



Fig. 8. Abscess cavity wall crosshatched to permit the cavity to be rearranged so that the cavity won't reform.

and to flatten to majority of the cleft while placing tissue over the exposed sacrum to pad it (Fig. 9).

Place drain, inset flap, and close

Now the wound is almost ready to be closed (Fig. 10). I always place a passive drain to minimize the risk of an infected seroma. The majority of complex PSD cases are chronically infected. A single thin silastic vessel loop is placed through a small cruciate incision made 1 cm from the cephalad point of the flap, around 2 cm from the incision's edge. If there is a sinus opening present on the side of the flap, it can be curetted, and the edges excised and used as the drain hole. The drain is brought out through the incision at its inflection point (waist) just as it makes the curve to point towards the anus approximately 2 to 3 cm from its anal end. While a closed suction catheter has been used it often clogged. I abandoned such practice over 10 years ago and I feel that the use of a passive drain is more effective.

The superficial layers of the wound are closed with many interrupted absorbable monofilament sutures. The skin is closed with a continuous running barbed absorbable suture (Fig. 11). I do not recommend external retention sutures. One-inch adhesive strips are applied. The passive drain is tied in an overlapping manner to itself with silk sutures (Fig. 12).

Postoperative care

All patients are discharged on the day of surgery with follow-up on postoperative day 1 in the office. Patients are required to have a caregiver accompany them home and to the office so that the



Fig. 9. Flattening of the cleft: the abscess cavity wall and adjacent adipose tissue of the cleft has been serially sewn together to eliminate all dead space, pad the sacrum, and form a flat flap bed for support and adherence.

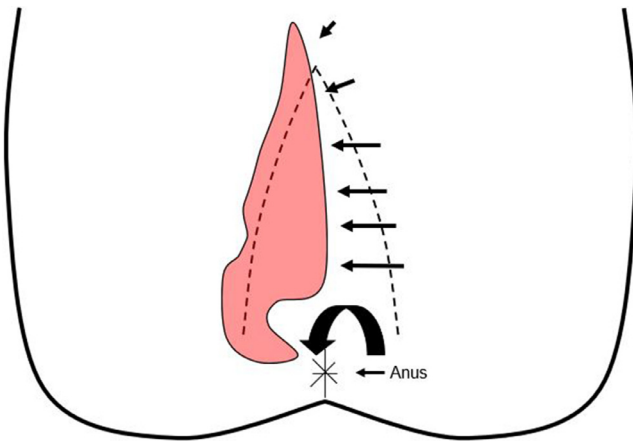


Fig. 10. The island of skin on the left has been excised (red area). The arrows demonstrate the direction of flap rotation (around the anus) and advancement (across the midline of the natal cleft).



Fig. 11. Wound closed off to one side. Traction tape has been removed from buttocks, so this is a relaxed view demonstrating that the incision is fully exposed to the air.



Fig. 12. Final Postoperative view with surgical tapes and drain tied.

caregiver can care for the drain, which involves the caregiver rolling a cylinder of gauze three times a day up the flap with the patient prone on a firm surface to help evacuate fluid under the flap. The caregiver gently probes the cruciate incision at drain exit site with a cotton swab during each rolling session for the first few days to prevent that

hole from closing prematurely. Patients may sit immediately and shower the day following surgery.

Patients are prescribed antibiotics with gram positive and anaerobic bacterial organisms' coverage for two weeks, a low dose narcotic, and a non-steroidal anti-inflammatory medication (NSAID). Most patients have minimal postoperative discomfort and actually experience numbness on the flap side of the incision for 6 to 8 weeks. Additional postoperative visits are scheduled around the 8th postoperative day (for drain removal). For patients who live far away from my office, the caretaker is provided with instructions of how to remove the drain. As long as there are no wound issues, patients are permitted to return to sports at this time with the caveat that they do not participate in contact sports, perform deep squats, fall on the incision, or submerge in water. One month postoperatively the patient returns for a wound check (Fig. 13). A return to all activities is permitted following that visit as long as no concerns about healing. Follow-up occurs at 1 month, 6 months, and on the anniversary of surgery and yearly thereafter. Patients are encouraged to follow-up in person, but most follow-up is self-reported by HIPAA-compliant email, phone, or text message.

While I do not have data to support my use of the passive drain or for providing 2 weeks of post-operative antibiotics, this approach has worked well for my patients. I am hesitant to change this approach. I have not seen any adverse effects of such postoperative care practice (such as drain complications or clostridium difficile colitis).

Results

My short and long-term results have been formally presented at 2 national meetings and hopefully will be published in the scientific literature in the future.^{7,8} An initial review was conducted of 757 consecutive patients who underwent the RAF over a 12-year period (including 287 patients (37.9%) with at least one prior operation). During a mean follow-up of 33.4 months, only 6 patients required a second operation. Six weeks after surgery, 90% of the patients were fully active. At 3 months 100% of patients were back to full activity. Overall, 5- and 10-year recurrence rates (RR) were 1.5% and 2.7%. The 6 failures noted in my study occurred in the subgroup of 287 patients with prior failed surgery by other surgeons. These patients with prior surgery were more likely to experience a recurrence. The 5- and 10-year RR in this group with complex disease were 3.7% and 6.3% versus 0% and 0% for those with no prior surgery ($p=0.0038$).⁷

Why the Pilonidal RAF works? In my own experience with this operation, I believe that the success encountered in the majority of patients is due to the following factors:

- It creates a shallower natal cleft which is aerated and stays dry
- Skin is excised to prevent wrinkles in the new shallow cleft and deep soft tissue removal is strictly avoided to prevent the creation of dead space

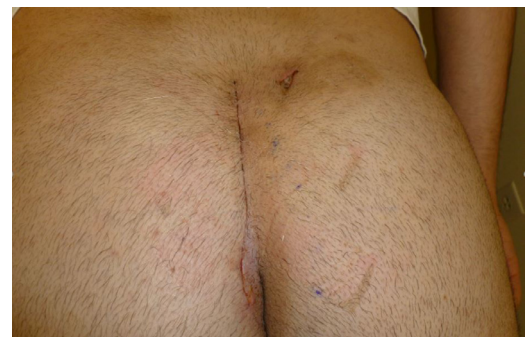


Fig. 13. Postoperative result at 1 month.

- Existing dead space is obliterated by in-folding the abscess cavity wall and fibroadipose tissue which aides in padding the sacrum
- Tension free wound closure is off to one side, so the incision is exposed to air to promote healing and the incision is away from the vulnerable midline natal cleft skin
- A shallow passive drain (my preference as closed suction drains can clog) is placed to facilitate seroma evacuation from under the flap and is typically kept for around 1 week

Conclusions

PSD continues to be inconsistently treated and suboptimal results with significant morbidity are common. In my personal experience, the Cleft Lift Procedure, which may be more accurately described as the Pilonidal RAF Procedure is highly successful in treating PSD. In my opinion, the RAF Procedure should be considered the first line surgical therapy for all forms of pilonidal disease requiring surgery. Attention to the technical details of this operation is of paramount importance to achieve a high success rate.

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