Efficiency of New modified inverted Y Cleft lift advancement flap in primary and recurrent sacrococcygeal pilonidal sinus disease with low laying tracts near the anus

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Abstract

Propose:

The aim of this study was to assess the efficiency of the new modified inverted Y cleft lift procedure, utilizing an advancement flap technique with off-midline primary wound closure in patients with lower pits of the sinus near to the anus.

Methods:

This clinical study was conducted from September 2018 to September 2020. Forty patients with sacrococcygeal pilonidal sinus disease with lower pits near the anus new cases or recurrent. All patients offered the new modified inverted Y cleft lift advancement flap patients followed up for 48.5 (range, 21–57) months. Patients evaluated in terms of operation time, postoperative complications, recurrence rate, return-to-work time, and cosmetic satisfaction.

Results:

The average age was 27.4 (range, 16–52) years, 29 patient (72.5%) were male and 11 (27.5%) were female. The mean operating time was 25 (range, 22–45) min. and the mean length of hospital stay was 0.8 (range, 0.4–2) days. Primary healing occurred in 35 (87.5%) patients. Complete healing for complicated wounds (5 patients) achieved in an average of 21 (14–60) days. Two (5%) patients developed a superficial wound infection, 4 (10%) a seroma and five (12.5%) a partial dehiscence (some complications observed in the same patient). There was no case of deep infection, haematoma formation or complete dehiscence.

Conclusion:

This series proved that the new modification inverted Y cleft lift flap reconstruction is an effective operative procedure for primary and recurrent pilonidal sinus with pits very near to the anus, associated with low complication and recurrence rates.

What does this paper add to the literature?

This paper, discuss a new modification to modified cleft lift procedure named inverted Y flap, achieving off-midline primary wound closure in patient with difficult situation with lower pits of the sinus is very near to the anus, for pilonidal disease either primary or recurrent.

Introduction

The first description of pilonidal sinus (PS) was done by Hodges in 1880[1]. The PS was diagnosed by the detection of a distinguishing epithelial track situated in the skin of the natal cleft, a little space behindhand the anus and usually holding hair.
The anatomy of the natal (or intra-gluteal) cleft is possibly the main reason leading to the progress of pilonidal disease. The mixture of mechanical aspects (weight pulling at tightly fixed skin, driving force of natal cleft indication with walking) and microbiologic factors as the natal cleft also contains a significant amount of bacteria. It is an intertriginous zone, like to the axilla and groin, which delivers a productive zone for bacterial development. In addition, the anus located at the bottom of the natal cleft, provides a rich source of bacteria that appears to be responsible for the development of pilonidal disease. Over time, foreign body reaction occurs, causing abscess and sinus formation. The most risk factors associated with PS was overweight, local irritation, trauma, and a sedentary lifestyle [2, 3].

Though pilonidal sinus can be managed using numerous definite conventional and surgical approaches, recurrence rates remain high [4]. Whole subtraction of the pilonidal sinus or sinuses and appropriate rebuilding can cause fruitful recovery [5]. Nevertheless, assembly of the unmoving hair be contingent on the anatomy of the intergluteal zone, and supplementary risk causes can lead to inadequate surgery and subsequent recurrence [4–6].

Lot of flap-based options for the treatment of chronic pilonidal disease were proposed [7–11]. The theory behind flap-based reconstruction is to cover the resultant defect with healthy, rich blood supply without tension. In spite of the newly established advantage of the flap re-establishments to the non-flap procedures, complications associated to infection and recurrence has not been totally reduced [12, 13].

None of these techniques able to flatten completely the natal cleft to lower the pressure on the midline, especially in the lower part, which thought to be one of the main causes of the wound separation and recurrence [7]. The post-operative complication such as non-healing, infection, and/or recurrence frequently happen on the inferior midline, which is near to the anal region and most motivated to invert [10–12].

In this respect, techniques that flatten the depth of intergluteal sulcus and bring the suture line away from the midline appear to be advantageous. Two studies as a systemic reviews which carried out on 10,090 and 2,949 subjects [14, 15], it was exposed that off-midline close had lesser recurrence rates when matched with midline closure. The cleft lift technique labeled by Bascom is an effective technique for the management of recurrent PSD. In distinction to other full-thickness flaps, Bascom's first outcomes did not expose any recurrence after the cleft lift process, in which the imperfection closed only with the skin flap after the removal [9].

The cleft lift procedure is an outpatient operation that eliminates the chronic disease and flattens the natal cleft by elevating the skin on either side. A key concept of this approach is closure of the incision off the midline. This approach is in keeping with a recent meta-analysis comparing different techniques for management of chronic pilonidal disease [2]. This meta-analysis concluded that when performing a closed wound approach for pilonidal disease, that asymmetrical/tension-free main closing is the finest choice and that open radical wide excision and primary midline mass closure avoided.
In this paper, we present our method of performing modified cleft lift procedure, utilizing an advancement flap technique with off-midline primary wound closure in patient with difficult situation with lower pits of the sinus is very near to the anus, for pilonidal disease which include the perioperative administration and operative procedure.

**Patients and Methods**

After approval by the local ethics committee, either patients who presented to the Colorectal Surgery Clinic of Alexandria University Hospital with the diagnosis of pilonidal sinus with lower pits near the anus new cases or recurrent disease between September 2018 and September 2020 was included in the assessment. Written informed consent obtained from each patient.

We then prospectively reviewed the results of 40 consecutive patients who underwent modified inverted Y cleft lift advancement flap procedure for treatment of PSD near the anus. All operations were performed by single surgeon. Age, gender, body mass index (BMI), primary and recurrent disease using Tezel classification [16] (as shown in table I), duration of the symptoms (pain, abscess history, and chronic purulent discharge), and length of hospitalization were recorded. Patients assessed in rapport of operative duration, incidence of complications postoperative (including infection, flap edema, wound dehiscence, seroma formation, flap necrosis, and maceration), recurrence rate, return-to-work time, and patients cosmetic satisfaction.

*Surgical Technique and Postoperative Care.*

Spinal anaesthesia routinely used in all patients. After a preoperative injection of intravenous cefazolin, the patient placed in the prone position and the midgluteal cleft and the adjacent skin tissues shaved. The buttocks pressed together and the line of contact was marked with ink. The buttocks then released and retracted by adhesive tape to expose the natal cleft. The skin was prepared with 10% povidoneiodine solution. First, midline pits and their sideways delays assessed to regulate the greatest location for the opening. The upper end of the incision made 1–2 cm sideways to the midline on the additional exaggerated side and this continual vertically over a space of 1–2 mm from the midline pits.

The lower side was shaped from the midline in a V-shape with its lesser end 2 cm away from midline. The skin on this side of the natal cleft was then elevated and excised. The skin on the opposite side with 0.5 cm thickness of SC tissue undermined to the space essential for allowing main closure of the deficiency away from the midline deprived of tension. Sinus tissue and its extensions excised (Fig. 1).

Healthy fatty tissue, sacrococcygeal fascia or the fibrotic tissue around the sinus not excised. At the lower end of the flap if we try to move the skin with low laying pilonidal pits there will be tension over the lower end. In this modification we close the lower end at T with the vertical limb directed towards the anus to allow no tension on the flap (Fig. 1).
After establishing haemostasis, the area of the excised sinus and then the subcutaneous tissues and the area under the flap approximated by polyglactin (2–0) sutures in two layers one layer taking the deep fat together to close the dead space and another layer taking the 0.5 cm thickness flap to the other non-mobilized side. The incision was then closed subcuticularly by absorbable polyglecaprone (3–0), after which a few interrupted mattress polyglecaprone (3–0) buttress sutures were also inserted (Fig. 2). Closed suction drain (14F) used in all cases. The drains removed when the drainage decreased to < 20 ml/day and the patient discharged on the same day, instructed to apply povidone-iodine dressings on the next two days.

Follow up

Follow-up visits made at 3, 10, 30 and 90 days and every 6 months afterward. Any surgical-site morbidity documented, and patients with long healing frequently reviewed until complete healing achieved (Fig. 3). Primary healing defined by complete complication-free healing of the wound at any point along its length. The interval between surgery and return to normal daily activity described as the ‘functional recovery time’. The term ‘recurrence’ used when the illness recurred resulting whole wound healing.

Statistical analysis

Data acquired from the follow-up forms entered into the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 16.0. Complete descriptive statistics used for all the nominal variables and the data presented as mean, frequency and percentage values. An analysis of patients with and without surgical-site complications carried out using Pearson's v² test. A value of P < 0.05 recognized as statistically significant.

Results

The basic demographic and clinical data of the studied patients group (Table II) showed that 29 patients (72.5%) were male and 11 patients (27.5%) were female. The mean age was 27.4 ± 8.12 years. The mean body mass index was 23.8 ± 4.21 kg/m² and the mean duration of symptoms was 19 ± 22.6 month.

Eleven cases (27.5%) of the patients had previously undergone drainage of an acute abscess. In 12 cases (30%), the condition was recurrent and they had undergone one to four previous operations. Most of the patients were classed as Tezel type III in 28 patients (70%) and Tezel type IV in 12 patients (30%).

The mean operating time was 25 ± 6.82 (range, 22– 45) min. The mean interval to removal of the drain was 4.2 ± 1.82 (range, 3–7) days and the mean length of hospital stay was 0.8 ± 0.23 (range, 0.4 – 2) days. Primary healing occurred in 35 (87.5%) patients. Complete healing for complicated wounds (5 patients) achieved in an average of 21 (14–60) days. Two (5%) patients developed a superficial wound infection, 4 (10%) a seroma and five (12.5%) a partial dehiscence mainly in the limb near the anus (some complications observed in the same patient) (Table III)
There was no case of deep infection, haematoma formation or complete dehiscence. When patients with and without complications were compared, the former had a significantly higher body mass index (28.0 vs 22.6) and a significantly longer operating time (36 min vs 25 min). The mean time for functional recovery was 12.4 (range, 7–38) days and no recurrence found within 48.5 (range, 21–57) months. The postoperative pain scores and satisfaction scores shown in (Table IV).

The final satisfaction score after 30 days (Table V) show a significant relation with age, the young age had an excellent results more than the old age, and also the long duration of symptoms showed a significant effect on the final satisfaction score, the short period show more excellent results. The low body mass index showed an excellent results more than the obese patients. Finally Tezel type III show an excellent results more than type IV.

Table I. Tezel classification for pilonidal disease.

<table>
<thead>
<tr>
<th>Tezel type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Asymptomatic disease</td>
</tr>
<tr>
<td>II</td>
<td>Acute abscess</td>
</tr>
<tr>
<td>III</td>
<td>Symptomatic disease limited to the navicular area</td>
</tr>
<tr>
<td>IV</td>
<td>Extensive disease</td>
</tr>
<tr>
<td>V</td>
<td>Recurrent disease</td>
</tr>
</tbody>
</table>

Table II. Patient characterization.
Table III. Incidence of complication in the studied patients group.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seroma resolved with syringe aspiration</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Wound infection</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Mild resolved with antibiotics</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Sever lead to gapping of the wound</td>
<td>3</td>
<td>7.5</td>
</tr>
</tbody>
</table>
### Table V. Relation between 30 day satisfaction score and basic demographic and clinical data.

<table>
<thead>
<tr>
<th>VAS score</th>
<th>t-test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Day 10</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0–65</td>
<td>0–30</td>
</tr>
<tr>
<td>Mean ± S.D.</td>
<td>14.31 ± 17.8</td>
<td>4.86 ± 6.85</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Satisfaction score</th>
<th>10th day</th>
<th>30th day</th>
<th>X²</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>17 (42.5)</td>
<td>24 (60)</td>
<td>3.51</td>
<td>0.043*</td>
</tr>
<tr>
<td>Very good</td>
<td>18 (45)</td>
<td>13 (32.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>3 (7.5)</td>
<td>3 (7.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>2 (5)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VAS, visual analogue scale.
<table>
<thead>
<tr>
<th></th>
<th>Excellent “n = 24”</th>
<th>Very good “n = 13”</th>
<th>Good “n = 3”</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18 (75.0%)</td>
<td>9 (69.2%)</td>
<td>2 (66.7%)</td>
<td>0.321</td>
</tr>
<tr>
<td>Female</td>
<td>6 (25.0%)</td>
<td>4 (53.8%)</td>
<td>1 (33.3%)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>16–40</td>
<td>19–50</td>
<td>22–52</td>
<td>0.021*</td>
</tr>
<tr>
<td>Mean ± S.D.</td>
<td>22.8 ± 7.22</td>
<td>25.3 ± 8.01</td>
<td>36.3 ± 5.88</td>
<td></td>
</tr>
<tr>
<td>Symptom duration (months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>3–46</td>
<td>12–62</td>
<td>12–125</td>
<td>0.033*</td>
</tr>
<tr>
<td>Mean ± S.D.</td>
<td>12.3 ± 10.89</td>
<td>16.3 ± 13.6</td>
<td>26.8 ± 21.2</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>17.2–25.9</td>
<td>19.2–28.9</td>
<td>22.5–31.5</td>
<td>0.022*</td>
</tr>
<tr>
<td>Mean ± S.D.</td>
<td>21.6 ± 6.85</td>
<td>22.2 ± 5.95</td>
<td>26.2 ± 7.98</td>
<td></td>
</tr>
<tr>
<td>Tezel type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type III</td>
<td>22 (91.7%)</td>
<td>6 (46.2%)</td>
<td>0 (0.0%)</td>
<td>0.016*</td>
</tr>
<tr>
<td>Type IV</td>
<td>2 (8.3%)</td>
<td>7 (53.8%)</td>
<td>3 (100.0%)</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

The essential aim in management of PSD is the ending of hair insert, thus neutralizing the causal device. The usual depth of the natal cleft is the goal point of hair for automatic reasons and is also very vulnerable to hair insert due to a number of inherited or acquired features [3–9].

The recurrence of PSD remains the most serious problem in treatment. The recurrence rates differ according to the management of select. In the simplest approach, incision and curettage, this rate reported to be between 1% and 20%. The rate of recurrence reported to be 2–5% if sinus excision done and the wound left open for secondary healing. This technique has single of the lowermost recurrence rates amongst the treatment methods but used identically infrequently nowadays because the wound healing time, which lasts 8–28 weeks, is very long. In the case of marsupialization, the healing time reduced to 5–6 weeks by bringing the open wound to the fibrotic tissue. Recurrence rates of primer closure after excision reported at between 11% and 29% [14, 15].

Principal closure of the defect under tension too indications to ischemia at the wound ends. Patients complain of tension, particularly on sitting, even years after the surgery [17]. For primary closure, faster
healing [18–20] and more rapid return to work rates shown [19]. On the other hand, they were associated with higher recurrence rates when compared to healing by secondary intention [21, 22].

Lot of flap-based choices for the management of chronic pilonidal disease were proposed [15, 21–26]. The theory behind flap-based reconstruction is to cover the resultant defect with healthy, rich blood supply without tension. A Cochrane study concluded that “off-midline closure should be the standard treatment” [23]. Several studies about cleft lift technique [2, 18] indicate high levels of success, with a high primary healing rate, low recurrence and a low rate of morbidity. In a study by Tezel et al [25] who used the classic cleft lift technique, the infection rate was 13.2% and the wound-dehiscence rate was 14.5%. Abdelrezeq et al [26] reported similar rates of 7.1% and 11.4%.

In two studies as a systemic reviews, carried out on 10,090 and 2,949 subjects [14, 15], it was exposed that off-midline close had minor recurrence rates when compared with midline closure in the former [14] while off-midline closure was concluded as the top select if the sinus was to be excised and sutured and was associated with short hospital stay and the lowest recurrence rate in the latter study [15]. Besides, off-midline closure had lower infection rate (6.3%) when compared with midline closure (10.4%) [15]. In the studies with follow-up lasting more than a year, off-midline closure had a lower recurrence rate (1.4%) than midline closure (10.3%) [14, 15] which was similar to our results.

In the present study, in order to perform off midline closure in patients with pilonidal sinus pits reaching very low near the anus with cleft lift, we applied a novel modification to the lower end of the flap for reconstruction, which enables off-midline closure with higher suture line and lower tissue tension and avoid tension near the anus. The sufficient off-midline closure results in lower wound problems in the inferior pole, and in our series, we did not meet any maceration and wound problem in the inferior pole except superficial infection in the limb created near the anus.

**Conclusion**

In conclusion, the results of this series provided evidence the new modification to cleft lift flap reconstruction is an effective operative procedure for primary and recurrent pilonidal sinus with pits very near to the anus, associated with low morbidity and recurrence. Further clinical studies, including case cohort or randomized studies on a larger patient population with longer follow-up, are needed to prove the efficacy of this technique in the surgical treatment of pilonidal sinus disease with pits near the anus.

**Declarations**

**Conflict of Interest**

There is no conflict of interest

**Statements and Declarations**
There is no financial or non-financial interests, study approval was taken by the local ethical committee for research in the faculty of Medicine, University of Alexandria, Egypt, no conflict of interest, and all patients signed informed consent.

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Authors contributions

Walid ElShazly, Mohamed Abdelhalim, and Ahmed Moaz share by writing the main manuscript, Ahmed Radwan share by photos management and follow up of cases and all Authors review the manuscript

References


Figures
Figure 1

drawing of removal of sinus and Inverted Y modified cleft left closure
Figure 2

removal of sinus and Inverted Y modified cleft left closure
Figure 3

wound closed after modified inverted Y cleft left