

Efficiency of the new modified inverted Y cleft lift advancement flap in primary and recurrent sacrococcygeal pilonidal sinus disease with low-lying tracts near the anus

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Received: 22 December 2023

Revised: 1 January 2024

Accepted: 1 January 2024

Published: 22 March 2024

The Egyptian Journal of Surgery 2024, 43:548–554

Propose

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

Patients and methods

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

Results

The average age was 27.4 years (range, 16–52 years); 29 (72.5%) patients were male and 11 (27.5%) were female. The mean operating time was 25 min (range, 22–45 min) and the mean length of hospital stay was 0.8 days (range, 0.4–2 days). Primary healing occurred in 35 (87.5%) patients. Complete healing for complicated wounds (five patients) was achieved in an average of 21 (14–60) days. Two (5%) patients developed a superficial wound infection, four (10%) patients experienced a seroma, and five (12.5%) had partial dehiscence (some complications observed in the same patient). There was no case of deep infection, hematoma 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 cases with pits located very close to the anus, associated with low complication and recurrence rates.

What does this paper add to the literature?

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

Keywords:

Pilonidal sinus, recurrent pilonidal sinus, sacrococcygeal region, surgical flaps

Egyptian J Surgery 43:548–554

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1110-1121

Introduction

Hodges published the first description of the pilonidal sinus in 1880 [1]. A distinctive epithelial track that was seen in the skin of the natal cleft – a small area directly below the anus and often containing hair – was used to diagnose pilonidal sinus.

The primary factor contributing to the advancement of pilonidal illness may be the structure of the natal (or the intragluteal) cleft. Weight pushing at tightly closed skin and walking are examples of mechanical forces. Microbiological variables are also important given the substantial number of bacteria present in natal clefts. Similar to the axilla and groin, it is an intertriginous

zone that provides a favorable environment for the growth of germs. Furthermore, a rich supply of bacteria that seems to be in charge of the development of pilonidal illness may be found in the anus, which is situated at the bottom of the natal cleft. A foreign body response develops over time, leading to the creation of sinuses and abscesses. Overweight, rashes, stress, and a sedentary lifestyle are the main risk factors linked to pilonidal sinus [2,3].

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Recurrence rates are still high even though there are several specific conventional and surgical methods for managing pilonidal sinus [4]. A successful recovery may result in complete removal of the pilonidal sinus or sinuses and suitable reconstruction [5]. However, the structure of the intergluteal zone is necessary for the assembly of the immobile hair, and other risk factors may result in insufficient surgery and a recurrence later on [4–6].

Many flap-based treatments for long-term pilonidal illness have been suggested [7–11]. The idea behind flap-based reconstruction is to use a rich, healthy blood supply to cover the resulting defect naturally and without strain. Despite the recently demonstrated benefit of flap reestablishments over nonflap surgeries, infection and recurrence-related problems were still encountered [12,13].

None of these methods was able to fully flatten the natal cleft, which is regarded to be one of the primary reasons for wound separation and recurrence. This pressure was particularly high in the lower region of the midline [7]. The inferior midline, which is close to the anal area and most inclined to invert, is where postoperative complications including nonhealing, infection, and/or recurrence typically occur [10–12].

Techniques that flatten the intergluteal sulcus depth and move the suture line away from the midline seem to be beneficial in this regard. It was discovered in two systematic assessments, involving 10 090 and 2949 participants, respectively, that off-midline closure had lower recurrence rates when compared with midline closure [14,15]. Recurrent Pilonidal Sinus Disease (PSD) can be effectively managed using the cleft lift procedure, as identified by Bascom. Unlike other full-thickness flaps that only closed with the skin flap following removal, Bascom's first results revealed no recurrence following the cleft lift procedure [9].

By raising the skin on each side, the cleft lift surgery flattens the birth cleft and cures the chronic condition. It is an outpatient procedure. Closing the incision off the midline is one of the main ideas of this strategy. This strategy aligns with a recent meta-analysis [2] that compared various methods for managing persistent pilonidal illness. According to the results of this meta-analysis, the best closed wound strategy for pilonidal illness is asymmetrical/tension-free wound closing strategy; meanwhile, open radical broad excision and primary midline mass closure should be avoided.

This manuscript describes our approach to performing a modified cleft lift procedure for pilonidal disease in patients with a difficult situation where the lower pits of the sinus are very close to the anus. This was accomplished using an advancement flap technique with off-midline primary wound closure.

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, either new cases or recurrent disease, between September 2018 and September 2020 were included in the assessment. Written informed consent was obtained from each patient with the ability to withdraw from the clinical study at any time without any penalties.

We then prospectively reviewed the results of 40 consecutive patients who underwent a modified inverted Y cleft lift advancement flap procedure for the treatment of PSD near the anus. All operations were performed by a single surgeon. Age, sex, BMI, primary and recurrent disease using Tezel classification [16] (as shown in Table 1), duration of symptoms (pain, abscess history, and chronic purulent discharge), and length of hospitalization were recorded. Patients were assessed in terms of operative duration, postoperative complications (including infection, flap edema, wound dehiscence, seroma formation, flap necrosis, and maceration), recurrence rate, return-to-work time, and patients' cosmetic satisfaction. During this clinical study, we follow complete transparency, quality assurance, and data sharing, and reporting of results.

Surgical technique and postoperative care.

Every patient receives standard spinal anesthesia. Following an intravenous cefazolin injection before surgery as the sinus near the anus, the patient was placed in prone position and the skin around the midgluteal cleft was shaved. The point of contact was indicated with ink and the buttocks were squeezed together. The natal cleft was then made

Table 1 Tezel classification for pilonidal disease

Tezel type	Definition
I	Asymptomatic disease
II	Acute abscess
III	Symptomatic disease limited to the navicular area
IV	Extensive disease
V	Recurrent disease

visible by the buttocks being freed and pulled back using an adhesive tape. Using a 10% povidone-iodine solution, the skin was prepped. The location for starting incision is initially determined by analyzing midline pits and their sideway delays. The uppermost portion of the incision was made on the extralong side, 1–2 cm laterally to the midline, and it extended vertically for 1–2 mm beyond the midline pits.

With its lesser end 2 cm from the midline, the lower side was formed in a V shape starting from the midline. Next, the skin on this side of the birth cleft was removed by elevating it. To allow the major closure of the deficiency away from the tension-free midline, the skin on the opposite side with a 0.5 cm thickness of subcutaneous tissue undermined the necessary space. The sinus tissue and its outgrowth are excised (Fig. 1).

Healthy fatty tissue, sacrococcygeal fascia, or the fibrotic tissue around the sinus was not excised. At the lower end of the flap, if we try to move the skin with low-lying pilonidal pits, there will be tension over the lower end. In this modification, we close the lower end

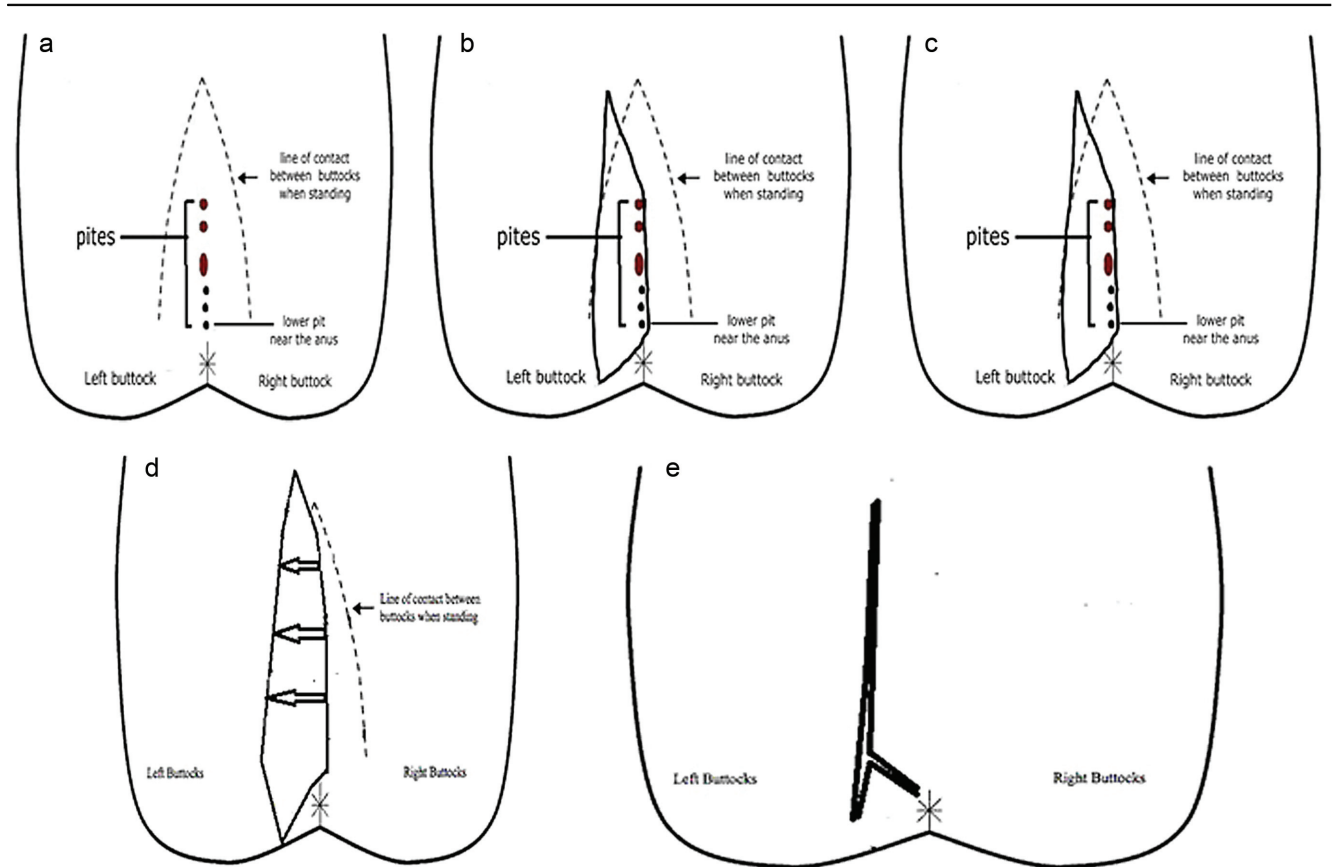
at T with the vertical limb directed toward the anus to allow no tension on the flap (Fig. 1).

Following the establishment of hemostasis, two layers of Polyglactin (2–0) sutures were used to approximate the excised sinus region, subcutaneous tissues, and the area under the flap. Two layers are present: one layer closes the dead space by combining the deep fat, and another layer reaches the nonmobilized side by transferring the 0.5 cm thick flap. After using absorbable poliglecaprone (3–0) to seal the incision subcuticularly, a few interrupted mattress poliglecaprone (3–0) buttress sutures were also introduced (Fig. 2). In every instance, a closed suction drain (14 F) is used. When the drainage dropped to less than 20 ml/day, the drains were withdrawn, and the patient was released that same day with instructions to use povidone-iodine dressings for the next 2 days.

Follow-up

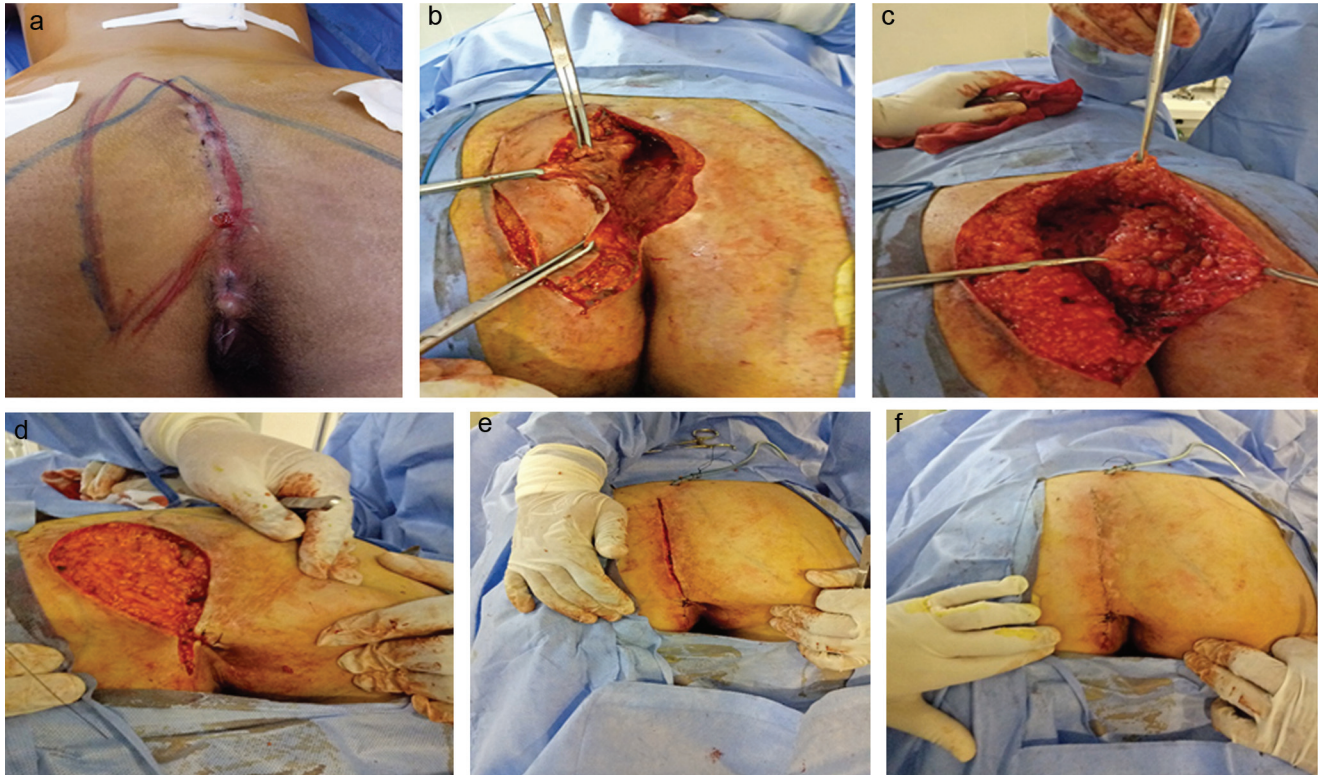
Follow-up appointments were scheduled every 6 months, as well as after 3, 10, 30, and 90 days. Any

Figure 1



Drawing of removal of sinus and inverted Y modified cleft lift closure. (a) Pilonidal sinus present near the anus. (b) Drawing the flap with lateral end over the cleft and medial end near the midline. (c) Moving the flap from medial to lateral until no tension over a flap thickness of 0.5 mm. (d) Flap thickness of 0.5 mm and moving it ensuring no tension over it. (e) Forming the inverted Y closure to avoid tension over the flap in the area near the anus.

Figure 2



Removal of sinus and inverted Y modified cleft lift closure. (a) Drawing of the pilonidal sinus present near the anus flap. (b) Removal of the sinus with area of normal skin with a flap thickness of 0.5 mm except in the area of the sinus. (c) Dissection and mobilization of the flap with a flap thickness of 0.5 mm and closure of the deep layer. (d) Approximation with the formation of inverted Y flap with the lower end near the anus. (e) Closure of the subcutaneous tissue and flap approximation. (f) Closure of the skin by the subcuticular suture.

complications at the surgical site were recorded, and patients who took a while to heal were regularly monitored until full recovery was attained (Fig. 3). Primary healing is the full healing of the wound at any point along its length without any complications. The 'functional recovery time' is the period of time following surgery before returning to regular daily activities. The word 'recurrence' refers to the healing

of the entire wound following the return of the ailment.

Statistical analysis

Data acquired from the follow-up forms were entered into the Statistical Package for the Social Sciences (SPSS Inc., Chicago, Illinois, USA), version 16.0. Complete descriptive statistics was used for the nominal variables and the data was presented as mean, frequency, and percentage values. An analysis of patients with and without surgical-site complications was carried out using Pearson's χ^2 test. A *P* value of less than 0.05 is recognized as statistically significant.

Figure 3



Wound closed after the modified inverted Y cleft lift. (a) Wound after 3 weeks. (b) Wound after 4 weeks.

Results

The basic demographic and clinical data of the studied patient group (Table 2) showed that 29 (72.5%) patients were male and 11 (27.5%) patients were female. The mean age was 27.4 ± 8.12 years. The mean BMI was $23.8 \pm 4.21 \text{ kg/m}^2$, and the mean duration of symptoms was 19 ± 22.6 month.

Eleven (27.5%) cases of the patients had previously undergone drainage of an acute abscess. In 12 (30%) cases, the condition was recurrent and they had

Table 2 Patient characterization

	n (%)
Sex	
Male	29 (72.5)
Female	11 (27.5)
Age (years)	
Range	16–52
Mean±SD	27.4±8.12
Symptom duration (months)	
Range	3–125
Mean±SD	19.0±22.6
BMI (kg/m ²)	
Range	17.2–31.5
Mean±SD	23.8±4.21
Tezel type	
Type III	28 (70.0)
Type IV	12 (30.0)

undergone one to four previous operations. Most of the patients were classed as Tezel type III in 28 (70%) patients and Tezel type IV in 12 (30%) patients.

The mean operating time was 25±6.82 min (range, 22–45 min). The mean interval to removal of the drain was 4.2±1.82 days (range, 3–7 days), and the mean length of hospital stay was 0.8±0.23 days (range, 0.4–2 days). Primary healing occurred in 35 (87.5%) patients. Complete healing for complicated wounds (five patients) achieved in an average of 21 days (14–60) days. Two (5%) patients developed a superficial wound infection, four (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 3).

There was no case of deep infection, hematoma formation, or complete dehiscence. When patients with and without complications were compared, the

former had a significantly higher BMI (28.0 vs. 22.6) and a significantly longer operating time (36 vs. 25 min). The mean time for functional recovery was 12.4 days (range, 7–38 days) and no recurrence was found within 48.5 months (range, 21–57 months). The postoperative pain scores and satisfaction scores are shown in Table 4.

The final satisfaction score after 30 days (Table 5) shows a significant correlation with age; younger individuals had excellent results compared with older individuals, and also the long duration of symptoms showed a significant effect on the final satisfaction score, with short periods showing more excellent results. Individuals with low BMI showed excellent

Table 3 Incidence of complications in the studied patient group

Complication	n (%)
Seroma resolved with syringe aspiration	5 (12.5)
Wound infection	6 (15)
Mild, resolved with antibiotics	3 (7.5)
Severe, leading to gapping of the wound	3 (7.5)

Table 4 Comparison between 1 day and 10 days postoperative pain and satisfaction

	VAS score		t test/P value
	Day 1	Day 10	
Range	0–65	0–30	
Mean±SD	14.31±17.8	4.86±6.85	0.013*
	Satisfaction score		χ ² P value
	10th day	30th day	
Excellent	17 (42.5)	24 (60)	3.510.043*
Very good	18 (45)	13 (32.5)	
Good	3 (7.5)	3 (7.5)	
Fair	2 (5)	0	
Poor	0	0	

VAS, visual analog scale. *Significant difference.

Table 5 Relation between 30 day satisfaction score and basic demographic and clinical data

	Excellent (N=24)	Very good (N=13)	Good (N=3)	P value
Sex				
Male	18 (75.0)	9 (69.2)	2 (66.7)	0.321
Female	6 (25.0)	4 (53.8)	1 (33.3)	
Age (years)				
Range	16–40	19–50	22–52	0.021*
Mean±SD	22.8±7.22	25.3±8.01	36.3±5.88	
Symptom duration (months)				
Range	3–46	12–62	12–125	0.033*
Mean±SD	12.3±10.89	16.3±13.6	26.8±21.2	
BMI (kg/m ²)				
Range	17.2–25.9	19.2–28.9	22.5–31.5	0.022*
Mean±SD	21.6±6.85	22.2±5.95	26.2±7.98	
Tezel type				
Type III	22 (91.7)	6 (46.2)	0	0.016*
Type IV	2 (8.3)	7 (53.8)	3 (100.0)	

*Significant difference.

results compared with obese patients. Finally, Tezel type III showed better results compared with type IV.

Discussion

The termination of the hair insert and subsequent neutralization of the causative device is the primary goal in PSD treatment. Due to various inherited or acquired characteristics, the typical depth of the natal cleft is the goal point of hair due to automatic reasons and is also highly susceptible to hair insertion [3–9].

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

The primary healing of the defect under tension also suggests the presence of ischemia around the edges of the lesion. Even years after the operation, many still complain of discomfort, especially when sitting [17]. Faster healing [18–20] and quicker rates of return to work [19] are demonstrated for primary closure. However, in contrast to healing by secondary intention, they were linked to increased rates of recurrence [21,22].

Many flap-based options were put up [15,21–26] for the treatment of chronic pilonidal illness. The idea behind flap-based reconstruction is to use a rich, healthy blood supply to cover the resulting defect naturally and without strain. ‘Off-midline closure should be the standard treatment,’ according to a Cochrane review’s findings [23]. Numerous research on the cleft lift procedure [2,18] show excellent results in terms of initial healing rate, recurrence rate, and morbidity rate. The infection and wound-dehiscence rates in a research by Tezel *et al.* [15] using the traditional cleft lift approach were 13.2 and 14.5%, respectively. Comparable rates of 7.1% and 11.4% were reported by Abdelrezeq *et al.* [26].

In two systemic reviews carried out on 10 090 and 2949 patients [14,15], it was found that off-midline close

had lower recurrence rates when compared with midline closure [14], while off-midline closure was concluded as the top select for excising and suturing the sinus as it was associated with short hospital stays and the lowest recurrence rate [15]. Besides, off-midline closure had a lower infection rate (6.3%) when compared with the midline closure (10.4%) [15]. In the studies with follow-ups lasting for more than a year, off-midline closure had a lower recurrence rate (1.4 found %) than midline closure (10.3%) [14,15], which was similar to our results.

In this study, we applied a novel modification to the lower end of the flap for reconstruction, which allows off-midline closure with a higher suture line, lower tissue tension, and avoids tension near the anus in patients with pilonidal sinus pits reaching very low near the anus with cleft lift. Lower inferior pole wound difficulties are caused by adequate off-midline closure. In our series, we did not encounter any maceration or inferior pole wound problems other than a superficial infection in the limp formed close to the anus.

Conclusion

In conclusion, the results of this series provided evidence that the new modification to cleft lift flap reconstruction is an effective operative procedure for primary and recurrent pilonidal sinus with pits very close to the anus, associated with low morbidity and recurrence. Further clinical studies, including case cohort or randomized studies on a larger patient population with a 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.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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