Traditional abdominoplasty versus dual-plane abdominoplasty in abdominal contouring

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Objectives The study aims to evaluate the effect of Scarpa's fascia preservation on the results and complications of abdominoplasty through a prospective randomized comparative study between the dual-plane and traditional abdominoplasty.

Patients and methods The current study included 40 cases with redundant and/or bulged abdomen seeking abdominoplasty. Their ages ranged between 25 and 50 years, and BMI ranged from 25 to 35. BMI above 35, previous abdominal surgery, any associated hernias, postbariatric surgery, smokers, and comorbid diseases such as diabetes, chronic obstructive airway disease, and autoimmune, liver, and renal diseases were excluded.

Results With Scarpa's fascia preservation, the mean total drain output in the dual plane (175.5±35.9 ml) was much lesser than the classic abdominoplasty (479.5±177.27 ml); moreover, drains were removed earlier with Scarpa's fascia preservation (2.9±0.31 days) in comparison with classical abdominoplasty (5.5±1.92 days). All patients passed without seroma formation in Scarpa's fascia preservation in group B; however, full-thickness infraumbilical necrosis in zone I occurred in a single case (5%) and hypertrophic scar in two (10%) cases. In classic abdominoplasty (group A), seroma was detected in a single case (5%), umbilical stenosis in a single case (5%), a single case (5%) presented with full-thickness infraumbilical necrosis in zone I, and a single case (5%) developed hypertrophic scar.

Conclusion Preservation of Scarpa's fascia during dual-plane abdominoplasty reduces patient recovery in the form of reducing total drain output, time for drain removal, and hospital stays in comparison with traditional abdominoplasty. Its disadvantages include longer operative time and incompatibility when mesh reinforcement of the abdominal wall is needed.

Sci J Al-Azhar Med Fac, Girls 2019 3:358–364

The Scientific Journal of Al-Azhar Medical Faculty, Girls
2019 3:358–364

Keywords: abdominoplasty, classic abdominoplasty, Scarpa&apos, s fascia preservation

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Received 19 October 2018 **Accepted** 1 January 2019

Introduction

As indicated in Cosmetic Surgery National Data Bank of the American Society for Aesthetic Plastic Surgery, 180 717 abdominoplasty procedures were performed in the United States in 2015, making abdominoplasty the third most common esthetic surgical procedure after liposuction and breast augmentation [1].

As seroma is still the most frequent complication following an abdominoplasty procedure, with a reported incidence from 5 to 50 percent [2]. The pathogenesis of postabdominoplasty seroma is not completely understood and is probably multifactorial [3,4]. The mechanisms involved in seroma formation include dissection, detachment, and shearing of fasciocutaneous flaps with consequent damage of lymphatic architecture, which seem to be the key etiologic factors [5].

Multiple surgical strategies have been described to lower the complication rates, especially that were related to wound complication and seroma formation, such as placement of a drainage catheter, selective undermining, internal fixation sutures, avoidance of use of electrocautery, pressures dressing, and the use of fibrin glue [6]. Preservation of the Scarpa's fascia has been suggested as a way to lower the complication rate associated with conventional abdominoplasty [7,8].

Patients and methods

A total of 40 cases seeking abdominoplasty were admitted to the Plastic Surgery Department, Al Zahraa University Hospital during the period between January 2017 and July 2018. Their ages ranged between 25 and 50 years and BMI ranged from 25 to 35.

Cases under the study were classified randomly into two groups:

Figure 1

Infraumbilical full dissection at the level of rectus sheath, midline splitting of the lower abdominal flap, and umbilical sparing.

(1) Group A: it included 20 cases where traditional abdominoplasty was used in abdominal contouring.
(2) Group B: it included 20 cases where dual-plane abdominoplasty with preservation of the Scarpa's fascia was used.

All cases were subjected to the following:

(1) Preoperative full history taking, general and local examination, routine investigations, and written informed consent.
(2) Preoperative marking and medical photography were done.

Operative technique

Operative procedures were done under general anesthesia with endotracheal intubation and muscle relaxant.

Group A

Traditional abdominoplasty steps and dissection over the anterior abdominal musculature were applied till xiphisternum. Umbilicus was preserved with good vascular pedicle. Anterior abdominal wall plication from the xiphoid to the umbilicus and from the umbilicus to the pubis using bilobed 0 polypropylene continuous sutures was done. The new umbilical site was located and marked in Mercedes shape on the mid-abdomen or slightly below. The excess skin was assessed and excised. Two suction drains were placed through a separate stab incision. The wound was then closed in two layers. Compressive garment was then used after application of the closed dressing (Figs 1–3).

Figure 2

Rectus muscle plication from xiphisternum to the pubis.

Figure 3

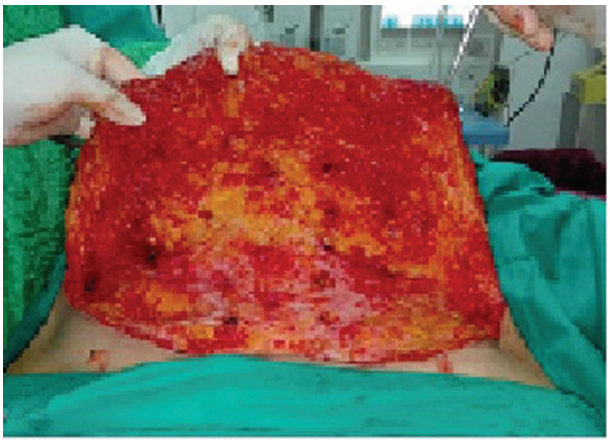
Final wound closure.

Group B

Following the individually marked incision line, a sharp incision was done in the suprapubic region; dissection occurs through the subcutaneous tissue using low-current electrocautery and extends to the level of Scarpa's fascia. Dissection was continued cephalically in the supra-Scarpa's fascial plane till the level of the umbilicus.

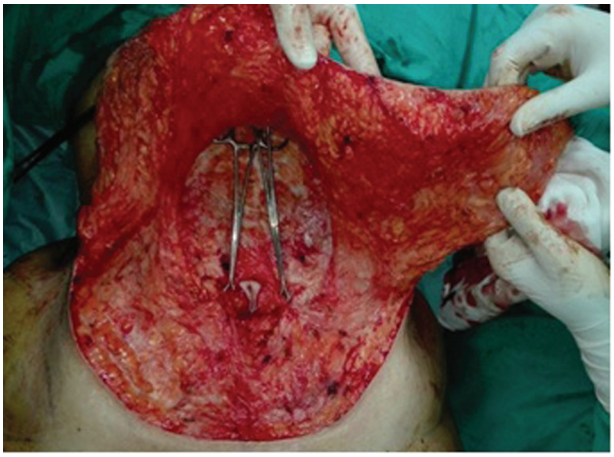
The umbilicus was preserved with good vascular pedicle. Dissection in the supraumbilical region was continued centrally toward the xiphisternum in the

Figure 4



Infraumbilical complete dissection in supra-Scarpa's plane.

Figure 5



Supraumbilical dissection to the level of xiphisternum in supramuscular plane.

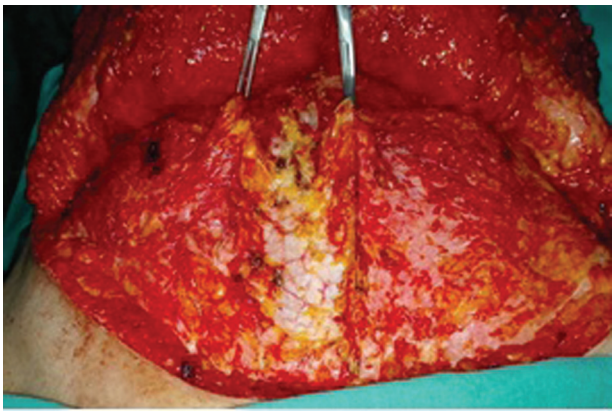
midline and costal margin laterally at the level of anterior abdominal musculature (Figs 4 and 5).

The rectus sheath was plicated from the xiphoid to the umbilicus. Plication of the infraumbilical rectus sheath was carried out after incision and removal of a small central strip of Scarpa's fascia along with the underlying deep fat using the electrocautery to expose the muscular fascia plane (Fig. 6). After infraumbilical plication of the rectus sheath, both edges of the Scarpa's fascia were approximated, and sutures were placed through continuous 2/0 vicryl sutures (Fig. 7). The same operative steps were continued as in group A.

Postoperative care and follow-up

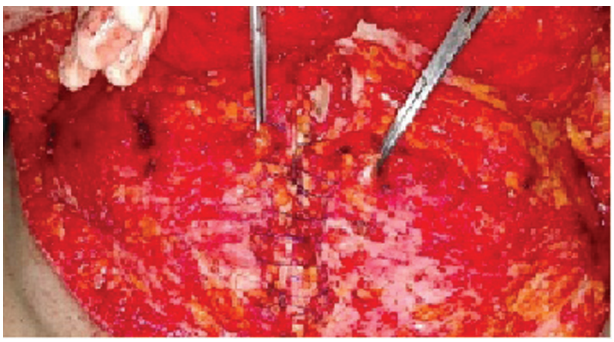
Routine postoperative care was done included parenteral antibiotic therapy, as well as anti-inflammatory, analgesics, and wound dressing. The drains were observed daily and removed once less than 30 ml/day output. Compression abdominal binders were used for at least 1 month after surgery. All cases were followed up weekly for the first month and monthly for the next 6 months.

Figure 6



Removal of the central strip of the Scarpa's fascia.

Figure 7



Plication of the infraumbilical portion of rectus sheath.

Table 1 Postoperative descriptive data of group A

	Minimum	Maximum	Mean±SD
Total volume of drains output (ml)	230	980	479.5 ±177.27
Time for drains removal (days)	3	7	5.5±1.92
Hospital stays (days)	3	7	5.5±1.92
Excised tissues (g)	2500	4000	3070 ±576.8

Results

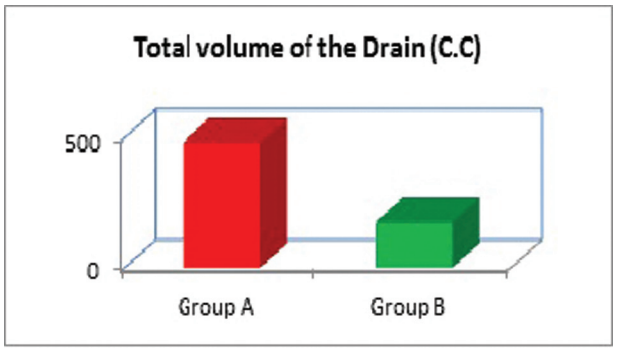
Postoperative descriptive data of both groups regarding total volume of drain output, time needed for drain removal, hospital stays, and weight of excised tissues are summarized in Tables 1 and 2.

There was a statistically significant increase in the operation time in group B (3–3.5 h) in comparison with group A (2.5–3 h).

Table 2 Postoperative descriptive data of group B

	Minimum	Maximum	Mean±SD
Total volume of drains output (ml)	100	230	175.5 ±35.9
Time for drains removal (days)	2	3	2.90±0.31
Hospital stays (days)	2	3	2.90±0.31
Excised tissues (g)	2000	3000	2385 ±258.07

Figure 8



Bar chart between group A and group B according to the mean total drain output.

There was a statistically significant increase in the mean total drain output (479.5±177.27 ml) (Fig. 8) and time for drain removal (5.5±1.92 days) in group A as compared with group B (175.5±35.9 ml and 2.9 ±0.31 days, respectively) (Fig. 9).

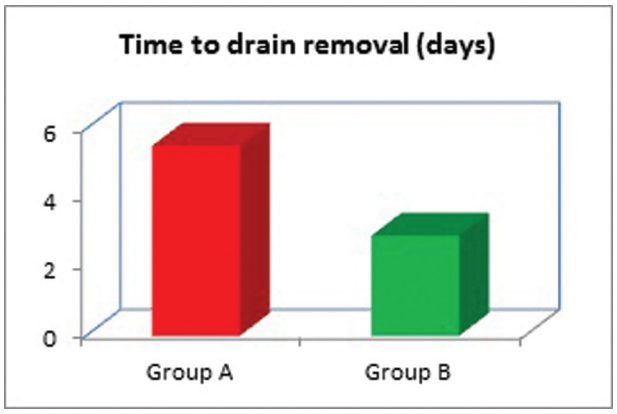
The results of both groups showed no statistically significant difference regarding the total complications (Table 3) and esthetic outcome (Fig. 10).

All patients passed without seroma formation in Scarpa's fascia preservation in group B; however, full-thickness infraumbilical necrosis in zone I occurred in a single case (5%) (Fig. 11) and hypertrophic scar in two (10%) cases. In classic abdominoplasty (group A), seroma was detected in a single case (5%), umbilical stenosis in a single case (5%) (Fig. 12), a single case (5%) presented with full-thickness infraumbilical necrosis in zone I, and single case (5%) developed hypertrophic scar.

Discussion

Although abdominoplasty techniques were introduced in the 1960s, they have undergone a continuous process of evolution to provide better and safer results as well as lowering the complication rate [9]. Seroma is the most common complication after abdominoplasty, occurring

Figure 9



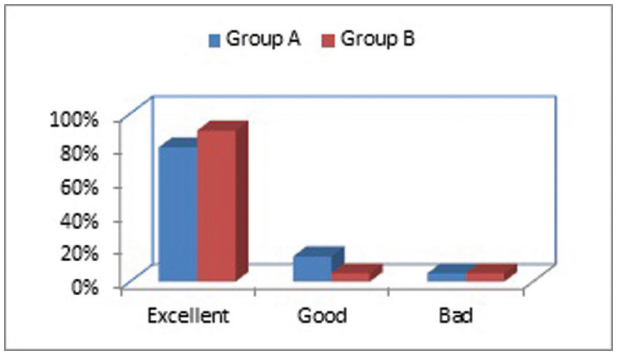
Bar chart between group A and group B according to time to drain removal.

Table 3 Comparison between group A and group B according to complications

Complications	Group A [*n* (%)]	Group B [*n* (%)]	χ^2 test	
			χ^2	*P* value
Hematoma	0 (0)	0 (0)	0.000	1.000
Seroma	1 (5)	0 (0)	0.526	0.468
Wound dehiscence	0 (0)	0 (0)	0.000	1.000
Infection	0 (0)	0 (0)	0.000	1.000
Umbilical complications	1 (5)	0 (0)	0.526	0.468
DVT	0 (0)	0 (0)	0.000	1.000
Necrosis of the edge skin abdominal flap	1 (5)	1 (5)	0.000	1.000
Hypertrophic scar	1 (5)	2 (10)	0.526	0.468

DVT, deep venous thrombosis.

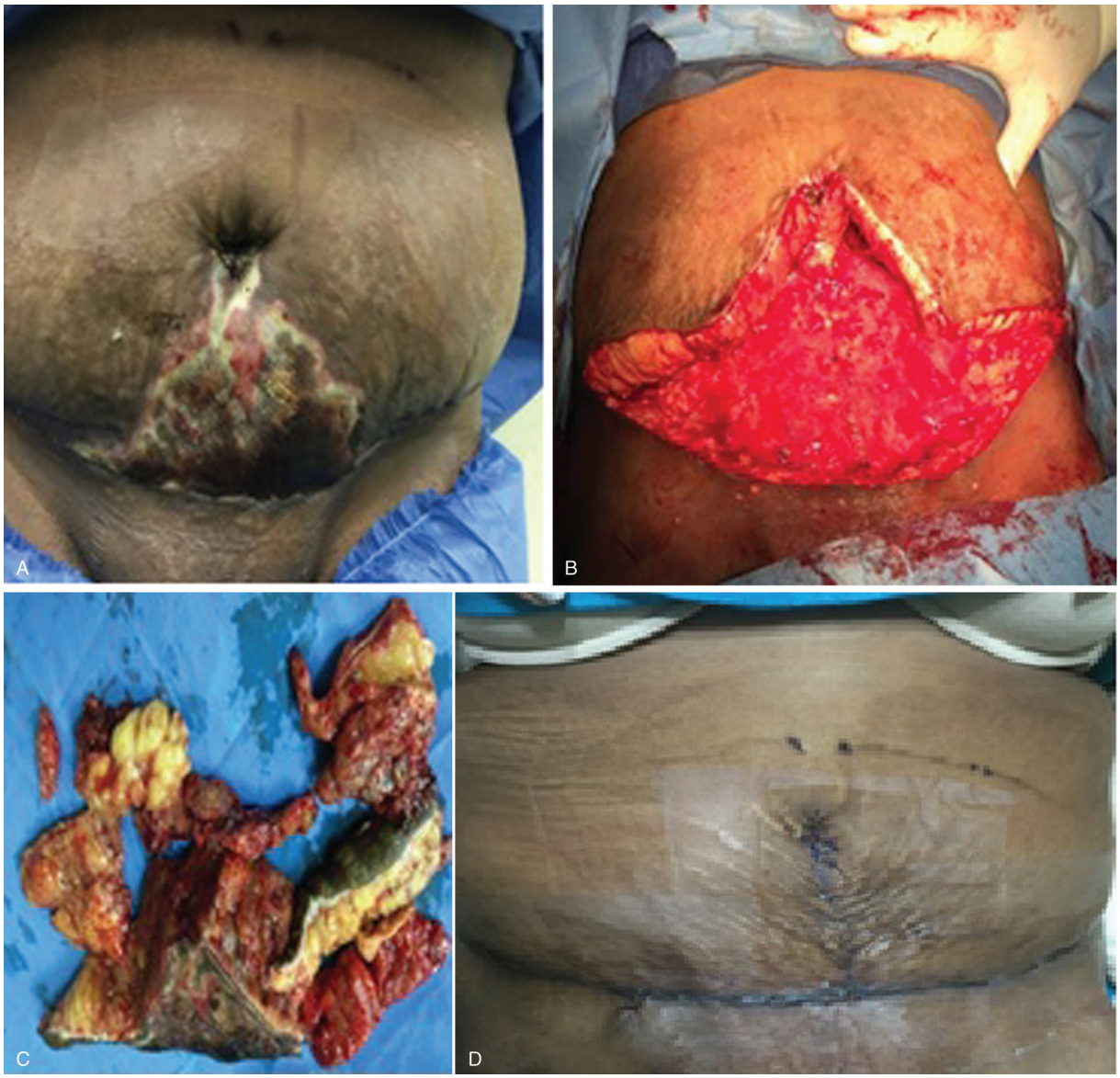
Figure 10



Bar chart between group A and group B according to esthetic outcome.

in ~5–30% of patients [10–12]. Various techniques have been suggested to control this complication [13]. Dual-plane abdominoplasty with preservation of Scarpa's fascia has been suggested as a way to lower the complication rate associated with classical abdominoplasty [14].

Figure 11



(a) A 34-year-old female patient with BMI of 32 presented with postoperative congestion and necrosis of the distal part of zone I in the abdominal flap, which were developed 3 days postoperatively. (b) After complete surgical debridement. (c) The excised tissue. (d) After 2 weeks with complete healing.

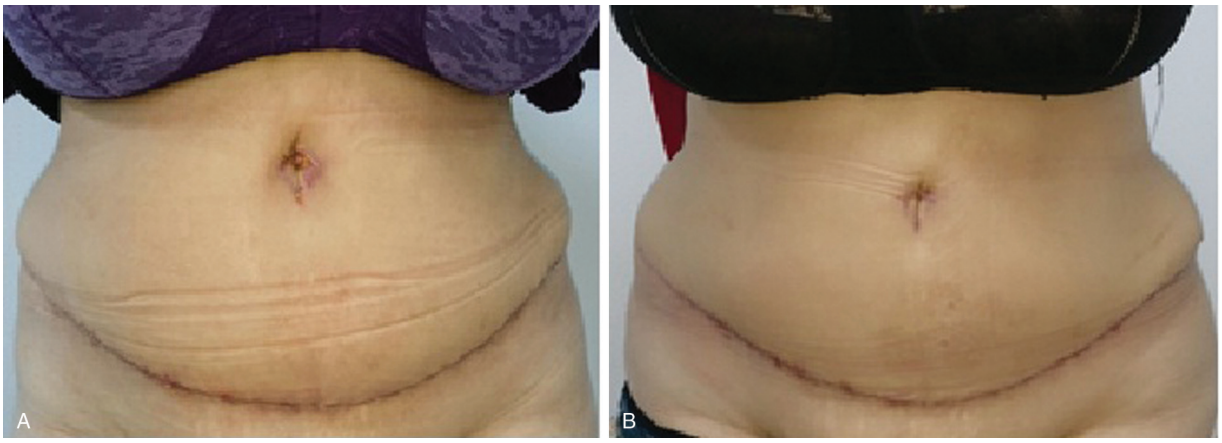
In our study, preservation of Scarpa's fascia had reduced the total amount of drain output by ~50% and reduced the time needed for drain removal and hospital stay to 2.9 days, as shown in Table 4.

These results agree with Shahin and colleagues, who performed a comparative study between classic abdominoplasty and Scarpa's fascia preservation (38 patients, 18 of them with Scarpa's fascia preservation) and demonstrated that the mean total drain output in Scarpa's fascia preservation group was 171.5 ml, which was much lesser than classic abdominoplasty (702 ml). Moreover, drains were removed earlier at the third postoperative day with Scarpa's fascia preservation as compared with 6 days in patients of classic abdominoplasty [14].

This was also in agreement with Costa-Ferreira and colleagues who introduced a randomized clinical study of efficacy and safety of Scarpa's fascia preservation during abdominoplasty showing that Scarpa's fascia preservation group had a highly significant reduction of 65.5% on the total drain output and 3 days on the time to drain removal [15].

According to our results, a single case (5%) of seroma had been detected in group A (classic abdominoplasty) and no seroma in group B (dual-plane

Figure 12



(a) A 43-year-old patient, with BMI 35, developed partial umbilical necrosis in the first postoperative week. (b) After 2 weeks of daily dressing with local antibiotic cream ended by umbilical stenosis.

Table 4 Comparison between group A and group B regarding total volume of drains output, time for drain removal, hospital stays, and excised tissue

	Group A		Group B	
	Mean	SD	Mean	SD
Total volume of drains output	479.5	177.27	175.5	35.9
Time for drains removal (days)	5.5	1.92	2.9	0.31
Hospital stays (days)	5.5	1.92	2.9	0.31
Excised tissues (g)	3070	576.8	2385	258.07

abdominoplasty). Our results is lower than the results of Shahin *et al.* [14]. They reported that seroma was detected in three (15%) patients who underwent classic abdominoplasty, whereas all patients with preservation of Scarpa's fascia (18 patients) passed without seroma.

Our results also agree with Ardehali and Francesca, who studied the effect of abdominoplasty modifications in incidence of seroma. They reported six cases developed seroma of 228 (2.63%) patients who underwent Scarpa's fascia preservation, whereas 15 experienced seroma of 224 (6.69%) patients in traditional abdominoplasty group [1].Costa-Ferreira *et al.* [15] revealed that the Scarpa's fascia preservation group had a highly significant reduction (86.7%) in their randomized clinical study of efficacy and safety of Scarpa's fascia preservation during abdominoplasty of the seroma rate, which is also in agreement with our current study.

Both groups showed no statistically significant difference regarding the total complications and esthetic outcome in our study. These results agree with Abdullah *et al.* [16], who performed a comparative study including 20 patients (10 cases underwent traditional abdominoplasty and 10 patients underwent Scarpa's fascia preservation abdominoplasty). They revealed no statistically difference between the two groups regarding total complications and esthetic outcome.

Our results also agree with Neaman *et al.* [3], who in their retrospective study on abdominoplasty included the analysis of 1008 patients subjected to a full abdominoplasty by six different surgeons. Considering the randomized controlled trial, there is no significantly difference between group A and group B (Scarpa's fascia) according to total complications. Although there was a trend for higher incidence of complications in group A, namely, blood transfusion, hematoma, bleeding, and infection, preserving Scarpa's fascia in group B reduced hematoma/bleeding by 80% and infection by 83.3%.

In our work, patients with low BMI are better candidates for the preservation of Scarpa's fascia during abdominoplasty, as there is no infraumbilical bulging, which was noticed in cases with high BMI.

Scarpa's fascia preservation on the infraumbilical area better respects the physiology of the abdominal wall, as it also implies the preservation of the deep fatty layer along with its connective tissue, lymphatic vessels, arteries, and veins.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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