

Evaluation of Post-Operative Seroma Rate in Abdominoplasty Operations Using Infraumbilical Scarpa's Fascia Preservation Technique

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Abstract

Background: The abdominoplasty procedure is one of the most common aesthetic surgery procedures. If a patient experiences seroma, he or she may need to return to the hospital or clinic for repeated aspiration. Moreover, seroma formation can prolong recovery time and delay the patient's return to normal activities. **Aim:** To assess clinically the rate of post-operative seroma formation in Scarpa's fascia preservation technique versus the traditional technique. **Subjects and Methods:** A randomized controlled clinical trial that included candidates with pendulous abdomen attending the plastic surgery unit, and surgery department at Suez Canal University Hospital from March 2016 to November 2020. The study participants were randomly divided into two groups: the i) study group who underwent Scarpa's fascia preservation technique abdominoplasty (n=20) and ii) the Control group who underwent standard abdominoplasty (n=20). **Results:** About 45% of the patients had more than one history of abdominal surgery where the most common type of surgery was Cesarean section, there was no statically significant difference between the two groups regarding any baseline characteristics and complications (except for infection and the seroma rate), The Scarpa's fascia preservation group had a highly significant reduction of the total drain output, drain removal, and the seroma rate. **Conclusion:** Scarpa's fascia during abdominoplasty decreases the time required for suction drains, the total drain output, and the seroma rate when compared with conventional abdominoplasty.

Keywords: Drain output volume, PITANGUY'S classification

Introduction

The abdominoplasty procedure is one of the most common aesthetic surgery procedures⁽¹⁾. The frequency of seroma following abdominoplasty ranges from 1% to 57%, with a generally accepted rate of 10%. If a patient experiences seroma, he or she may need to return to the hospital or clinic for

repeated aspiration. Moreover, seroma formation can prolong recovery time and delay the patient's return to normal activities⁽²⁾. Mechanisms hypothesized to cause seroma after abdominoplasty include shearing forces between the fascia and abdominal flap, formation of dead space, disruption of vascular and lymphatic channels, and release of inflammatory

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mediators⁽³⁾. Several methods and procedures have been recommended to lessen the risk of postoperative seroma, such as intra-operative liposuction and electrocautery restriction. Following surgery, patients must wear abdominal compression garments, have limited mobility for the first few days after surgery, and endure protracted closed-suction drainage⁽³⁾. However, there is little reliable information to back up most of these strategies. Mladick and Pollock both described progressive tension suturing of Scarpa's fascia to the anterior abdominal wall⁽⁴⁻⁶⁾. To prevent seroma after an abdominoplasty, several writers have suggested using fibrin glue between the abdominal flap and the anterior abdominal wall⁽⁷⁾. Recently, researchers discovered that abdominoplasty is both safe and efficient when Scarpa's fascia is preserved. The sub-fascia Scarpa's is left on the abdominal wall to be examined after an abdominal flap covering the Scarpa's fascia is lifted⁽⁸⁾. As seroma is one of the most common complications of abdominoplasty operations, drains are kept for long time which increase hospital stay, patient suffer, and post-operative complications. In this technique we hope there is a reduction in post-operative seroma formation and then decrease in post-operative comorbidities and improve outcome.

Subjects and Methods

Study design

A randomized controlled clinical study.

Study setting

Plastic Surgery unit, Surgery department, Suez Canal University Hospital, Ismailia from March 2016 to November 2020.

Study population

Patients who presented to hospital clinic complaining of redundant abdomen and

seeking for abdominoplasty, total number 40 cases. Candidates were divided into two groups, each group 20 cases: Group (A) standard abdominoplasty, and group (B) Scarpa's fascia preservation group. The study included candidates between 18 and 60 years old with pendulous abdomen, and body mass index between 18 and 30. Patients with post bariatric and post massive weight loss patients, obesity (BMI > 30), excess fat or candidate desires liposuction were excluded.

Sampling:

Patients presented with pendulous abdomen, satisfying the above criteria were included in the study. After obtaining the consent patients were randomly assigned either to the study (Scarpa's fascia preservation technique) or the control group (Standard treatment).

Data collection tools

1. *Full medical history:* History taken and general examination, history of chronic illness and blood disorders e.g., diabetes, hypertension, coagulopathy, hypoproteinemia.
2. *Careful examination:* Assessment of the umbilicus, need for liposuction, degree of redundancy in abdomen and flanks, presence of inflammation e.g., dermatitis, local skin disease...etc, hernia and degree of divercation, previous scars, weight, height and BMI, waist circumference.
3. *Pre-operative Preparations:* Routine laboratory investigations, chest X-ray, ECG, and pulmonary functions if needed.
4. *Peri-operative Preparations:* Elastic stocking and calf massage was routinely applied from start of anesthesia till full patient recovery.
5. *post-operative care:* Systemic antibiotics, local wound care, analgesic anti-

inflammatory, anti-edematous, patients were instructed to avoid strenuous activity for a full 6 weeks postoperatively, and calf massage and elastic stocking if needed.

6. **Follow-up:** Total and daily volume of drain output, time until drain removal, time until hospital discharge, local and systemic complication. Drains were removed when drain output per day was less than or equal to 30 mL collected over 24 h (on each drain). Regardless of the amount of fluid, the drains were never removed in the first 24 h. The patients were motivated to ambulate on the first postoperative day, and compression garments were used for at least 6 weeks after surgery. Waist circumference was measured in a point midway between iliac crest and costal

margin in mid axillary line. It was measured immediately pre-operative, immediately post-operative, and 3 mos post-operative.

Results

1. Socio-demographic characteristics

Table (1) summarizes the baseline characteristics of the studied sample. Our sample included female patients with pendulous abdomen (mean age of 39.10 ± 8.35 yrs) and mean BMI of 26.23 ± 2.5 kg/m² which is overweight. About 45% of the patients had more than one history of abdominal surgery where the most common type of surgeries was Cesarean section. Finally, we found that there was no statistically significant difference between the two groups regarding any baseline characteristics.

Table 1: Socio-demographic characteristics in both groups.				
Variables	Total (n= 40)	Scarp's fascia preservation group (n= 20)	Standard abdominoplasty group (n= 20)	p-value
Age (Yrs.), mean \pm SD	39.10 \pm 8.357	40.20 \pm 9.70	38.00 \pm 6.84	0.6 ^a
Anthropometrics, mean \pm SD				
Weight	73.40 \pm 7.7	73.01 \pm 7.08	73.80 \pm 8.43	0.84 ^a
Range	(62 – 90)	(64 – 85)	(62 – 90)	
Height	167.40 \pm 5.11	167.20 \pm 4.10	167.60 \pm 6.06	0.88 ^a
Range	(158 – 176)	(160 – 174)	(158 – 176)	
BMI	26.23 \pm 2.5	26.13 \pm 2.01	26.34 \pm 2.94	0.90 ^a
Range	(21 – 29.8)	(23.6 – 29.8)	(21 – 29.5)	
Waist circumference	85.10 \pm 12.56	84.80 \pm 11.66	85.40 \pm 13.70	0.88 ^a
Range	(66 - 103)	(70 – 103)	(66 – 103)	
History of abdominal surgery, n (%)				
Number				
Once	22 (55)	12 (60)	10 (50)	0.5 ^b
More than one	18 (45)	8 (40)	10 (50)	
Type				
Cesarean section	32 (80)	14 (70)	18 (90)	0.24 ^c
Laparoscopic cholecystectomy	12 (30)	8 (40)	4 (20)	0.16 ^b
Hernioplasty	2 (5)	0 (0)	2 (10)	0.49 ^c

^a p-values are based on Mann Whitney U test. Statistical significance at $P < 0.05$

^b p-values are based on Chi-square test. Statistical significance at $P < 0.05$

^c p-values are based on Fisher's Exact test. Statistical significance at $P < 0.05$

2. PITANGUY'S classification

Table (2) shows no difference between the two groups regarding the PITANGUY'S classification ($p=0.53$), where 40% of the patients in the Scarpa's fascia preservation group were classified as Class IV and 50% of the patients in the standard abdominoplasty group were classified as Class III.

3. Total volume of aspirated seroma

As shown in figure (1), the comparison of the total volume of aspirated seroma between the two groups shows that scarp's fascia preservation group (417 ± 166.1 ml) has significantly lower cumulative seroma volume than standard abdominoplasty group (824 ± 301.2) ($p<0.001$).

Table 2: Comparison between the two groups regarding PITANGUY'S classification.

Variables	Total (n=40)	Scarp's fascia preservation group (n=20)	Standard abdominoplasty group (n=20)	p-value
Class III	22 (55)	12 (60)	10 (50)	0.53 ^a
Class IV	18 (45)	8 (40)	10 (50)	

* P values are based on Chi-Square test. Statistical significance at $P < .05$

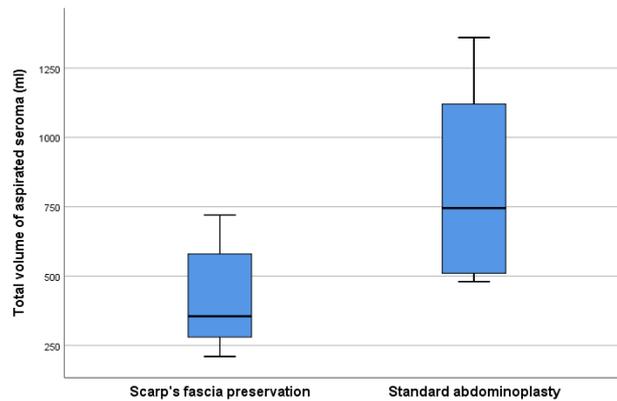


Figure (1): Total volume of aspirated seroma among both study groups

4. Time to drain removal

Table (3) shows that usage of scarp's fascia preservation technique showed 3 days reduction in median days to drain removal compared with the group who did standard abdominoplasty which is statistically significant (median 4, 95% CI (3.27 – 4.73) vs median 7, 95% CI (5.92 – 8.07) ($p = 0.01$).

5. Postoperative hospital stay

Table (4) shows no significant difference between the two groups regarding the postoperative hospital stay ($p=0.24$). Meanwhile, comparison of the time to

return to daily activity between the two groups shows that patients in scarp's fascia preservation group has significantly lower time to return to daily activity than those in the standard abdominoplasty group ($p=0.001$).

6. Waist circumference before and after procedure

Figure (2) shows that both techniques (Scarpa's fascia preservation and Standard abdominoplasty) had elicited significant reduction in the waist circumference after the operation ($p<0.001$).

Table 3: Analysis on time to drain removal in both groups				
Variables	Median (days)	Standard error	95% CI	p-value
Scarp's fascia preservation group	4(2-5)	0.373	(3.27 – 4.73)	<0.001 ^a
Standard abdominoplasty group	7(3-10)	0.548	(5.92 – 8.07)	

^a P-values are based on as log-rank test. Statistical significance at $P < .05$

Table 4: Time to return to daily activity among both groups				
Variables	Total (n=40)	Scarp's fascia preservation group (n=20)	Standard abdominoplasty group (n=20)	p-value
Postoperative hospital stay (days)				
mean \pm SD	1.6 \pm 0.74	1.4 \pm 0.5	1.8 \pm 0.9	0.24 ^a
median (range)	1 (1 – 3)	1 (1 – 2)	1.5 (1 – 3)	
Time to return to daily activity (days)				
mean \pm SD	15.65 \pm 1.55	14.9 \pm 1.1	16.4 \pm 1.6	0.001 ^a
median (range)	15 (14 – 20)	14.5 (14 – 17)	16 (15 – 20)	

* P values are based on as Man-Whitney U test. Statistical significance at $P < .05$

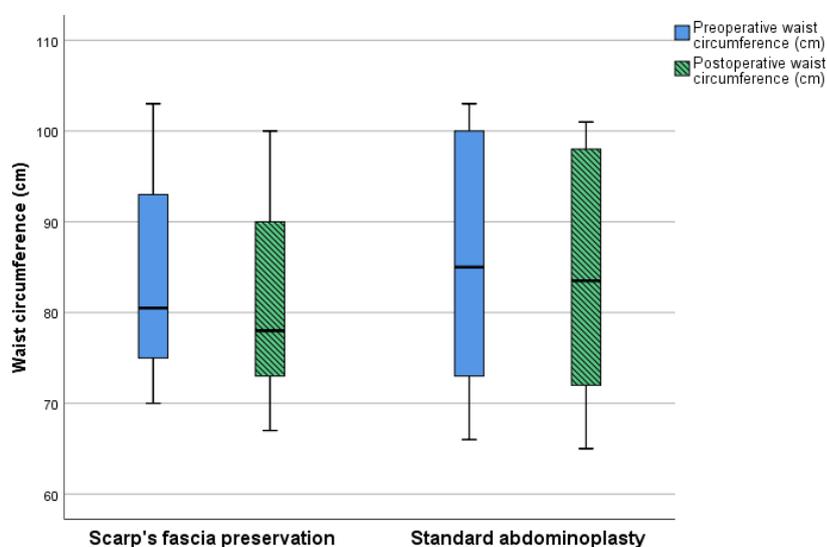


Figure 2: pre-& post-operative waist circumference among both groups

7. Postoperative complications

Table (5) demonstrates that postoperative infections were reported in 6 patients (15%), where two third of them were from Standard abdominoplasty group (4 patients 10%). Moreover, flap disruption took place in 4 patients, where each group had

included two patients. Two patients had developed seroma in the standard abdominoplasty group i.e., persistent seroma secretion after drain removal, mandating frequent aspiration and compression. Hematoma was not reported among the complications.

8. Postoperative complications.

Table (6) illustrates that among all participants, diabetics were found to have significantly higher total seroma volume than non-diabetics ($p < 0.001$). Meanwhile, in standard abdominoplasty group, hypertensive patients had significantly total seroma volume more than those with

normotensive ones. Moreover, smoker patients were found to have higher total seroma volume than non-smokers ($p = 0.022$). Moreover, patients who had history of abdominal surgery more than once were found to have higher total seroma volume than those with only one which is significant in Scarpa's fascia preservation.

Table 5: Comparison of postoperative complications between the two groups

Variables	Total (n=40)	Scarpa's fascia preservation group (n=20)	Standard abdominoplasty group (n=20)	p-value
Infection	6 (15)	2 (10)	4 (20)	0.66 ^a
Hematoma	0 (0)	0 (0)	0 (0)	-
Flap disruption	4 (10)	2 (10)	2 (10)	0.66 ^a
Seroma	2 (5)	0 (0)	2 (10)	-

^a P values are based on Fisher's Exact test. Statistical significance at $P < .05$

Table 6: Relationship of baseline characteristics of participants with total drain output volume.

Variables	N (%)	Scarpa's fascia preservation mean \pm SD	p-value	Standard abdominoplasty mean \pm SD	p-value
Hypertension					
Absent	26 (65)	387.14 \pm 183.28	0.15 ^a	703.33 \pm 320.83	0.012 ^a
Present	14 (35)	486.67 \pm 95.64		1005 \pm 188	
Diabetes					
Absent	28 (72)	325.71 \pm 92.3	<0.001 ^a	648.57 \pm 157.4	<0.001 ^a
Present	12 (30)	630.3 \pm 69.9		1233.3 \pm 107.8	
Smoking					
Absent	32 (80)	441.25 \pm 176.4	0.29 ^a	746.25 \pm 274.5	0.022 ^a
Present	8 (20)	320 \pm 57.74		1135 \pm 259.8	
History of abdominal surgery					
Once	22 (55)	295 \pm 53.51	<0.001 ^a	712 \pm 354	0.052 ^a
> one	18 (45)	600 \pm 81.1		936 \pm 220.56	

^a p-values are based Mann Whitney U test. Statistical significance at $P < 0.05$.

9. Postoperative complications

Table (7) shows that total seroma volume had a positive significant correlation with age, weight, BMI and waist circumference in both Scarpa's fascia preservation group and Standard abdominoplasty group.

10. Patients' baseline characteristics and incidence of post-operative complications among Scarpa's fascia preservation group.

Table (8) shows that postoperative complications in scarpa's fascia preservation group

were statistically significant associated with more age ($p = 0.022$), incidence of diabetes ($p = 0.003$), >1 history of abdominal surgery ($p = 0.014$) and laparoscopic cholecystectomy ($p = 0.014$).

11. Patients' baseline characteristics and incidence of post-operative complications among standard abdominoplasty group.

Table (9) shows that postoperative complications in standard abdominoplasty group were statistically significant associated

with higher age ($p < 0.001$), higher BMI ($p < 0.001$), and incidence of diabetes ($p = 0.003$), wider waist circumference ($p < 0.001$).

Table 7: Correlation between total drain output volume and different clinical variables among each study group				
Variables	Scarp's fascia preservation		Standard abdominoplasty	
	R	p-value	r	p-value
Age	0.855	<0.001 ^a	0.770	<0.001 ^a
Weight	0.685	0.001 ^a	0.693	0.001 ^a
Height	0.372	0.106 ^a	-0.39	0.089 ^a
BMI	0.588	0.006 ^a	0.806	<0.001 ^a
Waist circumference	0.616	0.004 ^a	0.818	<0.001 ^a

^a p-values are based on Spearman's correlation coefficient.

Statistical significance at $P < 0.05$

Table 8: Association of patients' baseline characteristics and incidence of post-operative complications among Scarp's fascia preservation group.			
Variables	Post-operative complications		p-value
	Absent (n=16) N (%)	Present (n=4) N (%)	
Age (years), mean \pm SD	38.1 \pm 8.7	48.5 \pm 9.8	0.022*
Anthropometrics, mean \pm SD			
Weight	72.0 \pm 6.4	77.0 \pm 9.2	0.617
Height	167.25 \pm 4.3	167.0 \pm 3.4	0.892
BMI	25.7 \pm 1.8	27.5 \pm 2.2	0.148
Waist circumference	83.3 \pm 11.2	90.5 \pm 13.2	0.290
Hypertension, n (%)			
Absent	12 (75)	2 (50)	0.549
Present	4 (25)	2 (50)	
Diabetes			
Absent	14 (87.5)	0 (0)	0.003*
Present	2 (12.5)	4 (100)	
Smoking, n (%)			
Absent	12 (75)	4 (100)	0.538
Present	4 (25)	0 (0)	
History of abdo surgery, n (%)			
Number			0.014*
Once	12 (75)	0 (0)	
More than one	4 (25)	4 (100)	
Type			0.267
Cesarean section			
Absent	6 (37.5)	0 (0)	
Present	10 (62.5)	4 (100)	
Laparoscopic cholecystectomy			
Absent	12 (75)	0 (0)	0.014*
Present	4 (25)	4 (100)	

^a P-values are based on Fisher exact test. Statistical significance at $P < 0.05$

^b P-values are based on Man-Whitney test. Statistical significance at $P < 0.05$

Discussion

The study included female patients with pendulous abdomen attending plastic surgery unit, surgery department at Suez Canal University hospital. The study participants were randomly divided into two groups: 1) study group who underwent scarp's fascia preservation technique abdominoplasty (n=20) and 2) Control group who underwent standard abdominoplasty

(n=20). This study aimed at assessing the rate of post-operative seroma formation and the aesthetic outcome in Scarpa's fascia preservation technique in comparison to standard abdominoplasty^(9,10). Our sample included female patients with pendulous abdomen with mean age of 39.10 ± 8.35 years and mean BMI of 26.23 ± 2.5 kg/m² which is overweight. Hypertensive patients formed 35% of the participants while diabetics formed 30%.

Table 9: Association of patients' baseline characteristics and incidence of post-operative complications among standard abdominoplasty group.			
Variables	Post-operative complications		p-value
	Absent (n=14) N (%)	Present (n=6) N (%)	
Age (years), mean \pm SD	38.1 \pm 8.7	48.5 \pm 9.8	<0.001*
Anthropometrics, mean \pm SD			
Weight	72.0 \pm 6.4	77.0 \pm 9.2	0.02*
Height	167.25 \pm 4.3	167.0 \pm 3.4	0.99
BMI	25.7 \pm 1.8	27.5 \pm 2.2	0.003*
Waist circumference	83.3 \pm 11.2	90.5 \pm 13.2	<0.001*
Hypertension, n (%)			
Absent	10 (71.4)	2 (33.3)	0.161
Present	4 (28.6)	4 (66.7)	
Diabetes			
Absent	14 (100)	0 (0)	<0.001*
Present	0 (0)	6 (100)	
Smoking, n (%)			
Absent	12 (85.7)	4 (66.7)	0.549
Present	2 (14.3%)	2 (33.3)	
History of abdo surgery, n (%)			
Number			
Once	8 (57.1)	2 (33.3)	0.186
More than one	6 (42.9)	4 (66.7)	
Type			
Cesarean section			
Absent	2 (14.3)	0 (0)	0.99
Present	12 (85.7)	6 (100)	
Laparoscopic cholecystectomy			
Absent	12 (85.7)	4 (66.7)	0.549
Present	2 (14.3)	2 (33.3)	

* P-values are based on Fisher exact test. Statistical significance at $P < 0.05$

About 45% of the patients had more than one history of abdominal surgery where the most common type of surgeries was Cesarean section. Finally, we found that there was a no statically significant

difference between the two groups regarding any baseline characteristics. Similarly, Costa-Ferreira et al. performed 208 abdominoplasties, including 65 patients who underwent abdominoplasty with

preservation of Scarpa's fascia in infraumbilical region. There was no statistically significant difference between groups with respect to BMI, previous abdominal operations, or comorbid medical conditions⁽⁸⁾. In addition, a study reported that comparison of the total volume of aspirated seroma between the two groups shows that scarpa's fascia preservation group (417 ± 166.1 ml) has significantly lower cumulative seroma volume than standard abdominoplasty group (824 ± 301.2) ($p < 0.001$)⁽¹¹⁾. In the same line, Costa-Ferreira et al. recently published a randomized prospective trial of 160 abdominoplasties looking at Scarpa's fascia preservation and found a highly significant reduction in seroma formation in the Scarpa's fascia preservation group (18.8% v 2.5%)⁽⁸⁾. In the present study, it was found that there is no statistically significant difference between the two groups regarding the postoperative hospital stay ($p = 0.24$). Meanwhile, comparison of the time to return to daily activity between the two groups shows that patients in scarp's fascia preservation group has significantly lower time to return to daily activity than those in the standard abdominoplasty group ($p = 0.001$). Similarly, another study reported⁽¹²⁾ patients in scarp's fascia preservation group had lower hospital stay. Moreover, Costa-Ferreira et al. who also documented similar findings in favor of the Scarpa's fascia preservation group. It was notable preservation of the Scarpa's fascia during abdominoplasty has a beneficial effect on patient recovery, as it reduces the total drain output, time to drain removal, and length of hospital stay. The group with preservation of the Scarpa's fascia had an average reduction of 2.0 days until the time to drain removal and average of 1.9 days of the hospital stay⁽¹⁰⁾. In the present study, showed that Scarp's fascia preservation group had lower median postoperative waist

circumference 78 (67 – 100) cm compared to patients in the standard abdominoplasty group 83.5 (65 – 101). However, this was statistically insignificant ($p = 0.75$). The study also showed that both techniques (Scarp's fascia preservation and Standard abdominoplasty) had elicited significant reduction in the waist circumference after the operation ($p < 0.001$)⁽¹³⁾. Similarly, Scarpa's fascia preservation also resulted in a significantly smaller waist circumference, in line with a previous study that concluded enhanced waistline in abdominoplasty with Scarpa's fascia advancement⁽¹⁴⁾. In the present study, Postoperative infections were reported in 6 patients (15%), where two thirds of them were from Standard abdominoplasty group (4 patients 10%). Moreover, flap disruption took place in 4 patients, where each group had included two patients. Two patients had developed seroma in the standard abdominoplasty group. Hematoma was not reported among the complications. Similarly, Saldanha's study showed an overall reduction of complications when lipoabdominoplasty with Scarpa's fascia preservation was used, namely, seroma (from 60 to 0.4 %) but also epitheliolysis (from 3.8 to 0.2 %), suture dehiscence (from 5.1 to 0.4 %), and necrosis (from 4 to 0.2 %). The previous differences were all statistically significant. This study also demonstrated a nonsignificant reduction of hematoma (from 0.6 to 0.2 %)⁽¹⁵⁾. In addition, our study found a statistically significant difference between Group A and Group B concerning the seroma incidence⁽¹⁶⁾. Group B (Scarpa's fascia preservation) had an 86.7 % reduction of seroma incidence, comparatively to Group A (classical abdominoplasty). It was found that the other complications did not differ significantly between groups, 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 %⁽⁸⁾. The present study showed that postoperative complications in scarp's fascia preservation group were statistically significant associated with more age ($p=0.022$), incidence of diabetes ($p=0.003$), >1 history of abdominal surgery ($p=0.014$) and laparoscopic cholecystectomy ($p=0.014$). Moreover, we found the relationship of complications among participants with total seroma volume. In Scarp's fascia preservation group, patients with postoperative complications were found to have higher total seroma volume than those without complications. However, this was statistically insignificant (infection, $p=0.75$), (flap disruption, $p=0.095$). In addition, this study showed that postoperative complications in standard abdominoplasty group were statistically significant associated with higher age ($p<0.001$), higher BMI ($p=0.003$), wider waist circumference ($p<0.001$), and incidence of diabetes ($p<0.001$). Moreover, in standard abdominoplasty, we found patients with postoperative complications were found to have significantly higher total seroma volume than those without complications, except for seroma (Infection, $p<0.001$), (flap disruption, $p=0.022$)⁽¹⁷⁾. Similarly, among all participants, diabetics were found to have significantly higher total seroma volume than non-diabetics ($p<0.001$). Meanwhile, in standard abdominoplasty group, hypertensive patients had significantly total seroma volume more than those with normotensive ones. Moreover, smoker patients were found to have higher total seroma volume than non-smokers ($p=0.022$). Moreover, patients who had history of abdominal surgery more than once were found to have higher total seroma volume than those with only one which is significant in Scarp's fascia

preservation. Our study has the advantage of being a randomized, double-blinded study. However, we had some limitations. First, the data were collected retrospectively and acquired from only one center, which may produce a selection bias. Second, the sample size of the validation cohort was relatively small.

Conclusion

This randomized, controlled trial study found that Scarpa's fascia during abdominoplasty decreases the time required for suction drain and the total drain output. In conclusion, Abdominoplasty operation with scarpa's fascia preservation has a significantly lower seroma rate. Subsequently the scarpa's fascia preservation decreases the duration required for suction drains and the total drain output.

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