

Quilting Sutures, Fibrin Sealant, and the Traditional Technique in Preventing Seroma Formation Following Abdominoplasty: Which is the Most Effective Strategy?

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ABSTRACT

A seroma is frequently observed in plastic and reconstructive surgery, leading to considerable morbidity. Excessive seroma accumulation may lead to wound dehiscence and necrosis of the flap if the pressure is passed to the flap. Another problem that could lead to a subsequent deformity is an infection of the fluid accumulation. This study aims to compare the quantity of the fluid gathered in the drains and the period needed for drain removal and compare the rate of complications.

Objectives: Investigation of seroma formation following abdominoplasty using the traditional approach with quilting sutures and fibrin glue.

Patients and Methods: Fifty female patients, 25-55 years old, nonsmokers with an extra fatty apron and a BMI ranging from 25 to 35kg/m², were studied. They Underwent abdominoplasty between October 2018 and March 2020 in Beni-Sewif university hospital. Patients were randomized to one of three therapy groups at random. Abdominoplasty with fibrin sealant was performed on group 1 (n=20). In group 2, quilting sutures were employed between the flap's subcutaneous tissue and the anterior abdominal wall musculoaponeurotic layer at the same time. Group 3 (n=10) received classic abdominoplasty. Closed suction drainage was used on all of them. Seroma was detected by clinical examination at 2, 4, 6, and 8 weeks post-operative.

Results: In terms of age and BMI, the groups were similar. We found that fibrin glue reduced post-abdominoplasty seroma better than others with higher efficacy (*p*-value less than 0.05).

Conclusion: The use of fibrin sealant as an adjuvant in abdominoplasty has a protective effect against the formation of seroma after abdominoplasty. Compared to suction drains or quilting sutures, the amount of postoperative drainage was significantly reduced.

Key Words: Seroma – Quilting sutures – Fibrin sealant – Traditional abdominoplasty.

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INTRODUCTION

In plastic and reconstructive surgery, seroma development is a common post-operative complication that causes significant patient morbidity. In abdominoplasty, the rate of seromas is estimated to be between 10% and 57% [1].

Plastic surgeons recommend using minimal skin flap manipulation, quilting sutures, drains, and compression garments to limit the risk of post-operative seroma during the recovery phase [2,3].

Seroma incidence estimates range from 1% to 57 percent, with a norm of 10% being widely recognized. It is normally a self-limiting occurrence, but it can occasionally produce severe problems [4].

It is proposed that the flap's thickness causes lymphatic hypertrophy and that fluid collects in the dead space following surgery. Additionally, past scars in the abdomen may work as a physical barrier to the lymphatic channels, trapping extracellular fluids and leading to the formation of seroma [5].

In several surgical circumstances, fibrin sealant has been utilized to induce surface adhesion, which has helped reduce the requirement for drainage and the rate of post-operative seroma [6,7].

To prevent seroma formation during abdominoplasty, Baroudi and Ferreira [2] used quilting sutures between the rectus sheath and the skin flap of the abdomen. Other experts who have used this method have reported positive results [8].

By comparing the volume of fluid collected in the drains and the time required for drain removal, this study aimed to assess the three techniques for

preventing seroma formation after abdominoplasty (conventional procedure, fibrin glue, and quilting sutures).

PATIENTS AND METHODS

All patients gave a written informed consent before being included in the trial, and anonymity was guaranteed.

This is a prospective controlled randomized study with three limbs between October 2018 and March 2020. The Outpatient Clinic of Plastic Surgery at Beni-Suef University Hospital referred all patients. A cohort of 50 patients who were planned to undergo abdominoplasty operation, were distributed into three groups. In group 1 (n=20), abdominoplasty was performed with the addition of fibrin sealant in the dead space. In group 2 (n=20), abdominoplasty with quilting sutures between skin abdominal flap and the musculoaponeurotic layer of the abdominal wall was done. In group 3 (n=10), traditional abdominoplasty was done. Closed suction drainage was applied for all patients of the 3 study groups.

All patients in this study were females (100%), aged 25-55 years with a mean of (40±1.05), non-smokers, in good clinical condition, and stated a desire for abdominoplasty. All of them signed the informed consent in writing.

The patients showed Rohrich type IV B deformities [9] (significant skin and fat excess with rectus muscle diastasis), and their BMIs ranged from 25 to 35kg/m² with a mean of (32.7±0.3).

Patients who smoke or have a history of uncontrolled chronic illness like diabetes, liver or kidney disease, known bleeding tendency, or BMI of more than 35 were excluded from the study.

The following information were collected: Age, gender, height, weight, BMI, previous abdominal surgery, the amount of suction fluid in the drains (drainage total), the time needed for drains removal and the occurrence of complications.

All patients received A single dose of preoperative prophylactic antibiotic (3rd generation cephalosporin) 15 to 30 minutes before the start of the procedure. And operated upon under general anesthesia. An electrocautery device was utilized to detach a dermal-fat flap from the anterior abdominal wall's musculoaponeurotic layer. The navel was incised from the skin after making an incision in the suprapubic area and reaching the umbilical zone as previously marked. Through a created supraumbilical midline 10.0cm wide tunnel, the

dermal-fat flap was dissected laterally from the external oblique aponeurosis muscles and superiorly up to the xiphoid process.

The stage is set for myofascial plication at this point. The wide rectus abdominis muscle plication (WRAP) procedure has started. In terms of plication marking, the xiphoid process is the superior point, whereas the pubic symphysis is the inferior point. The next step is tissue demarcation and resection.

The aesthetic appearance depends on the formation of a new umbilicus. A vertical ellipse of skin represents the shape of the expelled umbilicus. The skin and the subcutaneous tissue beneath the surface surrounding the new umbilical site were vertically removed.

Usually, two suction drains (18F) are installed in the created dead space between the musculoaponeurotic layer and the dermofat flap. The drain was inserted and brought out laterally. A 2/0 silk suture is used to secure the drains. And skin closure we used 0/3 monocryl with cutting needle.

In three groups, the surgical procedure was used in the same way. In the first group, the same steps were followed until before the closure of the skin incision. The following steps were added: 3ml of a previously prepared fibrin sealant* was applied to the wound bed with assistance holding each side of the abdominal flap. Compression was performed for five minutes all over the abdominal flap after the flap was pulled down. At the end of the compression period, skin closure was performed (Fig. 1).

Fibrinogen preparation obtained from plasma cryoprecipitate [10], and the preparation of thrombin was done according to Armand J Quick's method. This was collected from healthy donors who tested negative for HIV and Hepatitis B [11].

While in the second group, after myofascial plication, Quilting sutures (Vicryl 0) were put between the abdominal skin flap and the musculoaponeurotic layer. At the highest point of the dissection, the first suture was placed in the midline. In general, no more than three sutures were put above the umbilicus. The distal flap was advanced with extra progressive tension suture after stabilizing the umbilicus. This row of midline sutures were continued in the infraumbilical area with about 2cm apart spacing. To accommodate the degree of undermining, lateral sutures were put with larger spacing and a more random yet symmetric fashion. On average, three to five sutures were situated laterally on each side of the midline (Fig. 2).



Fig. (1): Spraying the fibrin glue.



Fig. (2): Progressive tension suture placement.

One day of resting with their heads raised to 45 degrees and their legs flexed was advised for the patients. Prophylactic anticoagulant was given for obese patients. (B.M.I above 30. On the first post-operative day, the indwelling bladder catheter was removed, the patients were instructed to walk with leaning forward under nursing supervision. Patients were instructed to wear compression garments from day one post operative for three months after surgery.

Post-operatively, fluids collected in the drains were measured every 24h until the drains were removed. Hospital admission for 5 days. The need for a post-operative stay at home was reported in days. Seroma was detected by clinical examination at 2, 4, 6, and 8 weeks post-operatively. The clinical evaluation included a review of seroma symptoms (bulginess, distention, and a feeling of liquid collection) as well as indicators (palpation and percussion of the wave sign).

Ethical consideration:

Approval by the institutional ethical committee was taken.

Statistical analysis:

SPSS 18 (Statistical Package for Scientific Studies) software for Windows was used to examine the data.

The Kolmogorov-Smirnov test of normality and the Levene test for homogeneity of variance was used to examine the data for normalcy. Because the Kolmogorov-Smirnov and Levene tests revealed that some data were not normally distributed (non-parametric data), non-parametric tests were employed to compare them.

For comparing three groups of independent variables, the Kruskal-Wallis test was utilized.

Statistical significance was determined by setting the level of significance for all tests at 5%. (*p* equal 0.05).

A significance level of *p* 0.05 was used. Only considerable variations between groups can be noticed with limited sample sizes in groups.

RESULTS

No deaths, significant problems, complications of anesthesia, or deep venous thrombosis were reported in all patients of the 3 tested groups with significant difference (*p*-value=0.124).

Statistical analysis showed that the age (*H*=0.30) and BMI (*H*=0.21) groups were consistent (Figs. 3,4) with no statistically significant findings between the 3 study groups (Table 1).

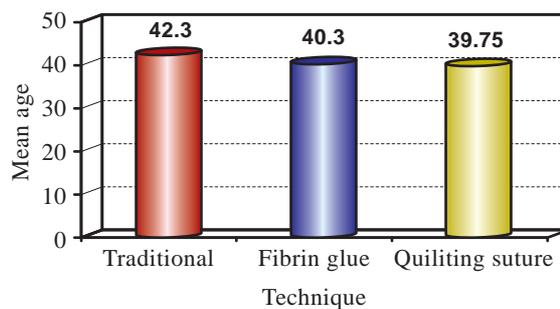


Fig. (3): Groups ages distribution.

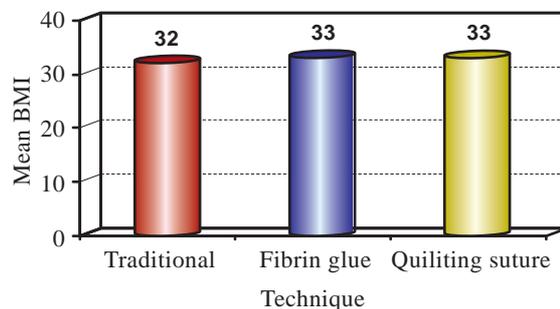


Fig. (4): The distribution of BMI in each of the three study groups.

Table (1): Demographic data of the patients of 3 study groups.

Demographic	Group 1	Group 2	Group 3	<i>p</i> -value
Number of patients	20	20	10	
Age (yr)	40.3±7.3	39.7±7.8	42.3±7	0.679
Mean Body mass index	32.69±2.07	32.9±2.3	32.1±2.8	0.665

Significant differences were found between the 3 study groups regarding reduction in seroma formation and a decrease in drain output (Table 2).

The amount of drain output in fibrin sealant (FS) group (group 1) was significantly lower than in the other 2 studied groups (*p*-value=0.000). However, a non-significant difference was found between the quilting sutures (QS) group (group 2) and traditional group (group 3) (*p*-value=0.06).

Time of drain removal (days) was highly significant between three studied groups (*p*-value <0.01) with the following order: Group 3 > Group 2 > Group 1.

Table (2): Time of drain removal (in days) and the mean amount of drain output in 24 hours (in ml) of the 3 study groups.

Variable	Group 1	Group 2	Group 3	Total	<i>P</i> -value
Time of drain removal	3.95±0.18	5.40±0.15	7.20±0.95	5.1±0.22	0.000*
Amount of drain output in 24 hours	401.7±37	693.5±39	952.5±144	628±42	0.000*

*Kruskal-Wallis test.

DISCUSSION

Seroma post abdominoplasty is one of the most frequently encountered issues. The amount of flap dissection, B.M.I, and the combination of liposuction or other treatments with traditional abdominoplasty surgery are the most important factors that predispose to seroma formation [12].

In 2005, Cruz-Korchin et al., [13] evaluated the potential advantage of utilizing fibrin glue in abdominoplasty operations. Their study revealed that the utilization of a fibrin sealant significantly reduced the time of drainage. Comparing our results to theirs, we found that time of drain removal (days) was similar in FS and traditional groups.

In 2012, Bercial et al., [10] to evaluate the optimal technique for preventing seroma formation, they compared the use of quilting sutures, suction

drains, and fibrin sealant in 43 patients undergoing abdominoplasty. On a postoperative day 15, there was a substantial difference in seroma volume between the three groups seroma volume, fibrin sealant (suction drains, and quilting sutures) (*p*-value 0.05). Seroma volume on post-operative day 30 (*p*-value 0.15) and the percentage difference in seroma volume between post-operative days 15 and 30 (*p*=0.56) showed no significant differences between groups.

The results of their study do not match with our results regarding the effect of fibrin sealant in reduction of incidence of post abdominoplasty seroma. We think that the difference in the conclusion here came from the fact that they did not use suction drain. This indicates the crucial role of the drain with the fibrin sealant to decrease the incidence of post abdominoplasty seroma and to decrease the amount of fluid collection.

Andrades et al., [14] made controlled factorial research that was prospective, randomized, double-blind comparing 4 study groups: Group 1 (control, no drains, and no progressive tension sutures), group 2 (progressive tension sutures alone), group 3 (drains alone), and group 4 (progressive tension sutures and drains). By excluding the groups where no drains were used, there were significantly lower drain output in group 4 (with progressive tension sutures) compared with group 3 (without progressive tension sutures) during the first postoperative week (*p*<0.0001). The results of their study do not match with our results regarding the reduction of the amount of post-operative drainage as no significant differences were found between group 2 (quilting sutures) and group 3 controls (*p*-value =0.06).

Our findings are consistent with other studies which found that fibrin sealant is beneficial to aid hemostasis and reduce seroma production [14, 15, 16]. When compared to the other groups, the fibrin sealant group had less drain output and took less time to remove the drain.

Conversely, seroma amount was extra significant in the quilting suture group than in the other two groups, in contrast with the results other studies [8, 13].

Conclusion:

On the word of our data, the use of fibrin sealant as an adjuvant in abdominoplasty has a protective effect against the formation of seroma after abdominoplasty. Compared to traditional abdominoplasty or abdominoplasty with quilting sutures, the amount

of post-operative drainage was significantly reduced. We recommend use of fibrin sealant together with closed suction drains to minimize seroma formation.

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