

Incidence of Haematoma in Post Bariatric Abdominoplasty Cases

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Abstract

Objective: This study aims at assessing the incidence of haematoma formation in abdominoplasty cases who had previous bariatric surgery and in those who did not have bariatric surgery before. **Patients and Methods:** This is a 4 years retrospective study involving patients who underwent abdominoplasty surgery between the period of July 2015 and June 2019. The incidence of haematoma formation was assessed in relation to history of previous bariatric surgery in these patients. **Results:** 164 patients met the inclusion criteria of the study; 46 of them were males and 118 were females. The mean age of the patients included in the study was 38.6 (21 - 60 years). The mean BMI was 27 kg/m² (21.4 - 34.7 Kg/m²). The mean hospital stay was 6.6 days (4 - 19 days). 107 patients had history of previous bariatric surgery performed and 57 had not. 21 patients developed haematoma (12.8%). 16 of the patients who had haematoma had previous bariatric surgery done (15% of post bariatric surgery cases) while 5 patients developed haematoma with no history of previous bariatric surgery (8.8%). Sixteen male patients out of the 46 male patients in the study developed postoperative haematoma (34.8% of the male patients) while only 5 of the 118 female patients developed postoperative haematoma (4.2% of the female patients) which shows a significant difference in haematoma formation when comparing males to females in general ($p < 0.001$). A same significant difference in haematoma formation was found in males who had previous bariatric surgery (13.1%) compared to females who had the same procedure done before (1.9%) ($p < 0.001$). Out of the 46 male patients included in the study, 16 patients developed haematoma, 14 patients of them had previous bariatric surgery (30.4% of the male patients) while the other 2 patients had no bariatric surgery done before (4.4% of the male patients) indicating that males who had previous bariatric surgery had the highest chance of developing haematoma ($p < 0.05$). The difference in the incidence of post

abdominoplasty haematoma was not much significant in female patients who had history of previous bariatric surgery (1.7%) and who did not have it (2.5%) ($p = 0.650$). Out of the 77 patients who underwent abdominoplasty combined with liposuction, plication of the recti muscles or both, only 2 patients developed haematoma. No statistical significance was found in comparing those who underwent these procedures combined with abdominoplasty surgery and those who did not ($p = 0.294$). **Conclusion:** Our study shows that the incidence of post abdominoplasty haematoma formation is significantly higher in male patients who had bariatric surgery before when compared to those who had not ($p < 0.05$). The incidence was higher in males when compared to females ($p < 0.001$) indicating that males with previous history of bariatric surgery have the highest chance of developing haematoma formation. Combining liposuction of the lower flanks, plication of the recti muscles or both to the abdominoplasty procedure did not result significantly in an increased risk of haematoma formation.

Keywords

Haematoma, Abdominoplasty Surgery, Postbariatric Surgery, Liposuction, Plication Recti Muscles

1. Introduction

There has been a marked increase in the number of morbidly obese patients undergoing bariatric surgery. [1] With the progress and advancement of these types of surgeries over years, the lives of many patients improved. [2] Still, these surgeries have their own drawbacks. [3] One of the late drawbacks is the excessive redundancy of the skin of different parts of the body and mostly the abdomen. [4] Abdominoplasty is one of the most common procedures requested by these patients. This study discusses the incidence of haematoma formation in postbariatric abdominoplasty cases and compares it with its incidence in those who underwent abdominoplasty without having history of previous bariatric surgery.

2. Patients and Methods

This is a 4 years retrospective study conducted on patients who underwent abdominoplasty procedures in the Plastic Surgery Department at Zayed Military Hospital, Abu Dhabi, UAE from the beginning of July 2015 till the end of June 2019.

The aim of the study is to review the incidence of hematoma formation in abdominoplasty patients who had previous bariatric surgery and in those who did not have bariatric surgery before.

2.1. Patient Selection Criteria

As a protocol in our department, all the patients who have history of bariatric

surgery have to wait for at least 1 year before embarking on abdominoplasty operation and their weight have to be stable for at least the last 3 months before the surgery.

The patients who underwent full abdominoplasty procedure during the selected period were included in the study. Those who underwent dermatolipectomy, in the form of excision of the redundant skin below the umbilicus level without dissection above the umbilicus, or those who had preexisting haematological diseases were excluded from the study.

The medical records of each patient were reviewed to identify characteristics such as age, sex, body mass index (in kilograms per square meter) and previous history of bariatric surgery. The minimum follow up period was determined to be 30 days postoperatively for the assessment of development of postoperative haematoma.

2.2. Operative Technique

The surgical marking is done starting at a midline point 7 cm cephalic to the vulvar commissure in females or the root of the penis in males. From this point, the marking extends laterally in a concave line on each side as much as required for removal of the sagging skin. The skin is incised and the wound is deepened using the monopolar diathermy till the fascia superficialis and the anterior rectus sheath preserving the overlying thin lymphatic tissue layer. The superficial inferior epigastric vessels should be cauterized or even ligated if they are enlarged as frequently seen in post bariatric cases. The dissection is continued in a cephalic direction to the umbilicus. The umbilical stalk is usually found to be elongated. It is preserved and dissected circumferentially around from the elevated abdominal flap. From this level, the dissection is continued in the midline region to the xiphisternum in the cephalic direction.

If there is excessive fat accumulation at the lower part of the flank region, liposuction of that area is done. In cases where there is muscular diastasis, repair of the recti muscles is done in 2 layers using permanent sutures. Excision of the lower part of the skin flap is done. Haemostasis is ensured. The umbilicus is extruded through the overlying skin and sutured with half horizontal mattress non absorbable sutures to its new location about 9 - 11 cm from the incision line. The Scarpa's fascia is repaired with 2/0 inverted absorbable sutures. The skin is sutured in two layers using 3/0 absorbable inverted interrupted dermal sutures and continuous subcuticular sutures. The wound drained with two negative pressure drains; one kept at the epigastric region and the other one at the lower part of the wound. Dressing is applied with overlying compressive garment.

2.3. Postoperative Care

The patient is kept in the bed in the modified Fowler's position postoperatively and mobilization is started on the first postoperative day. Subcutaneous low molecular weight heparin 40 mg is started 6 hours postoperatively and continued once daily for about 5 days. Antithrombotic pneumatic compression stock-

ings are started in the operation theatre and continued till discharge. The drains are kept on negative pressure and removed when the drainage is less than 20 ml of fluid in 24 hours for each drain. The patient is usually discharged by the fifth postoperative day. The umbilical sutures are removed after 2 weeks. The patient continues to wear the abdominal pressure garment after the abdominoplasty surgery for a period of one month. If plication of the recti muscles is done during the abdominoplasty procedure, the duration of the pressure garment is extended to 3 months postoperatively (**Figure 1**).

2.4. Statistical Analysis

The data collected was stored in a simple manner for comparison. Descriptive and frequency statistics were performed to understand the population. Then, a series of statistic tests were conducted Using SSPS to determine if an association between bariatric and gender to hematoma incidence was evident. Fischer's exact test was used for independent variables. Finally, the alpha was set at $\alpha = 0.05$.

3. Results

During the period from the beginning of July 2015 till the end of June 2019, 175 patients underwent abdominoplasty surgery. Eleven patients were excluded from the study; nine of them had dermatolipectomy, one patient had mostly scar revision after previous abdominoplasty procedure and one patient had haematological disorder of Klinefilter syndrome. (**Table 1**) Accordingly, only 164 patients met the inclusion criteria; 46 of them were males and 118 were females.

The mean age of the patients included in the study was 38.6 (21 - 60 years). The mean BMI was 27 kg/m² (21.4 - 34.7 Kg/m²). The mean hospital stay was 6.6 days (4 - 19 days). The patient who stayed for 19 days had haematoma with complications.

Out of the 164 patients included in the study who underwent abdominoplasty, 107 patients had history of previous bariatric procedures performed and 57 had not. The 107 patients who had previous bariatric procedures were in the form of gastric sleeve operation (94 patients), gastric bypass procedure (8 patients), gastric balloon (3 patients) and gastric bandage and gastric stapling (one patient each) (**Table 2**).

21 patients out of 164 patients in the study developed haematoma (12.8%). Those were 16 males and 5 females.

16 of the patients who had haematoma (14 males and 2 females) had previous bariatric surgery done (16 out of 107 patients with history of bariatric surgery with incidence of 15%). The other 5 patients who developed haematoma (2 males and 3 females) had no history of bariatric surgery (5 out of 57 patients with no history of bariatric surgery with incidence of 8.8%).

9 of the patients who developed postoperative haematoma had to undergo exploration and evacuation of the haematoma surgically (5.5% of the total number of abdominoplasty patients) while the other 12 patients who developed

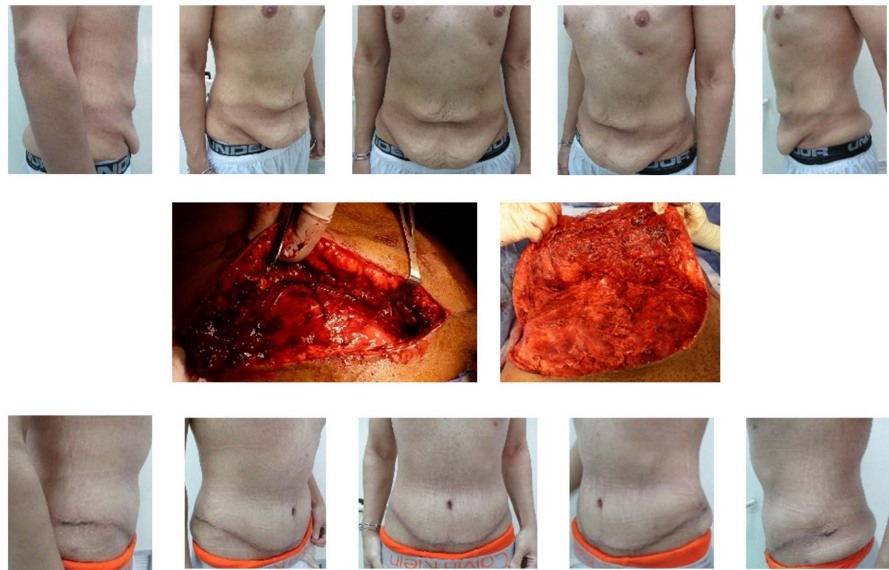


Figure 1. Pre and Postoperative views of case of postbariatric abdominoplasty who had haematoma evacuation surgically.

Table 1. Exclusion criteria in the study.

Cause of Exclusion	Number
Dermatolipectomy	9
Scar revision post abdominoplasty	1
Haematological disorder	1

Table 2. Types of bariatric procedures, their numbers and percentages.

Type of Bariatric Procedure	No. of patients	Percentage
Gastric Sleeve	94	88.68%
Gastric Bypass	8	06.61%
Gastric Balloon	3	02.83%
Gastric Band	1	00.94%
Gastric Stapling	1	00.94%
Total	107	100%

haematoma were managed by repeated aspirations of small amount of blood in the out-patient department (7.3% of the total number of abdominoplasty patients).

Eight of the nine patients who required surgical haematoma evacuation had previous bariatric surgery history (88.9% of the surgically evacuated haematomas). They were all male patients. The remaining patient who required surgical haematoma evacuation was a female patient who had not undergone bariatric surgery before (11.1% of the surgically evacuated haematomas).

Seventy seven patients underwent abdominoplasty combined with liposuc-

tion, plication of the recti muscles or both. 35 of them had previous bariatric surgery (3 males and 32 females) while the remaining 42 patients did not have previous bariatric surgery (1 male and 41 females).

Only one male patient of the postbariatric group who had abdominoplasty combined with liposuction developed haematoma while one female patient developed haematoma following abdominoplasty combined with liposuction and plication of the recti muscles but she did not have history of bariatric surgery before. No statistical significance was found in comparing those who underwent these procedures combined with abdominoplasty surgery to those who did not ($p = 0.294$) (**Table 3**).

The incidence of haematoma was higher among male patients when compared to female patients in our study ($p < 0.001$). Sixteen male patients out of the 46 male patients included in the study developed post abdominoplasty surgery haematoma (34.8% of the male patients). The incidence was much less in the 118 female patients included in the study in whom only 5 patients developed post-operative haematoma (4.2% of the female patients).

The incidence of haematoma among the males was higher in those who underwent previous bariatric surgery (14 patients with incidence of 30.4% of the 46 male patients) compared to those who had no bariatric surgery before (4.4% of the 46 male patients) and was statistically significant indicating that males who had previous bariatric surgery had the highest chance of developing haematoma. The incidence of hematoma among males who underwent previous bariatric surgery was significant compared to females who had a history of bariatric surgery ($p < 0.001$). The difference in the incidence of post abdominoplasty haematoma was not much significant in female patient who had history of previous bariatric surgery (1.7%) and who did not have it (2.5%) ($p = 0.650$) (**Table 4**).

4. Discussion

Obesity is defined as excess body weight for height. The World Health Organization defines obesity as having a body mass index (BMI) of 30.0 kg/m² or higher. [5] It is further subdivided into class 1 (BMI of 30.0 - 34.9 kg/m²), class 2 (BMI of 35.0 - 39.9 kg/m²) and class 3 (BMI of 40.0 kg/m² or higher) categories. In general, bariatric surgery is an option for adults with a minimum BMI of 40 kg/m² or a BMI of 35 kg/m² or greater coupled with a serious obesity-related health problem. Bariatric surgeries can be classified as restrictive, malabsorptive, or a combination of both. [6] In the year 2018, 252,000 bariatric procedures were performed in the US. The gastric sleeve was the most popular surgery, followed by gastric bypass with continuation of reduction of the gastric band procedure when compared to the previous year. [7] This is matching with our study cases in which the patients who had gastric sleeve operation constituted the majority of our postbariatric abdominoplasty cases (88.68%). This was followed by the gastric bypass surgery cases (6.61%) while other procedures as gastric balloon, band and stapling constituted the rest of the cases (4.71%).

Table 3. Variables among Post Bariatric (PB) and Non Post Bariatric (NPB) patients in the study.

Variable	Post Bariatric (PB) 107 (65.2%)			Non Post Bariatric (NPB) 57 (34.8%)			Total 164 (100%)
	No. of Pt.	% from PB	% from Total	No. of Pt.	% from NPB	% from Total	No. & %
Males	40	37.4%	25%	6	10.5%	3.7%	46 (28%)
Females	67	62.6%	41.5%	51	89.5%	30.5%	118 (72%)
Haema.	16	15%	9.8%	5	8.8%	3%	21 (12.8%)
Haem. in Males	14	13.1%	8.6%	2	3.5%	1.2%	16 (9.8%)
Haem. in Females	2	1.9%	1.2%	3	5.3%	1.8%	5 (3%)
No Haem.	91	85%	55.5%	52	91.2%	31.7%	143 (87.2%)
Haema. operated	8	7.8%	4.9%	1	1.8%	0.6%	9 (5.5%)
Haema. operated M.	8	7.8%	4.9%	0	0%	0%	8 (4.9%)
Haema. operated F.	0	0%	0%	1	1.8%	0.6%	1 (0.6%)
Haema. aspirated	8	7.5%	4.9%	4	7%	2.4%	12 (7.3%)
Haema. aspirated M	6	5.6%	3.7%	2	3.55%	1.2%	8 (4.9%)
Haema. aspirated F	2	1.9%	1.2%	2	3.55%	1.2%	4 (2.4%)
Abd. With C.P. in M.	3	2.8%	1.8%	1	1.8%	0.6%	4 (2.4%)
Abd. With C.P. in F.	32	29.9%	19.5%	41	71.9%	25%	73 (44.5%)
Haem. Abd. C.P. M.	1	0.9%	0.6%	0	0%	0%	1 (0.6%)
Haem. Abd. C.P. F.	0	0%	0%	1	1.8%	0.6%	1(0.6%)

Pt.: Patient; M.: Male; F.: Female; Haem.: Haematoma; Abd.: Abdominoplasty; C.P.: Combined Procedure (Plication of Rectus abdominus muscles/Liposuction); PB: Post Bariatric; NPB: Non Post Bariatric.

Table 4. Incidence of haematoma in abdominoplasty patients in relation to gender.

Variable	Males (46 Patients)		Females (118 Patients)	
	Number	Percentage	Number	Percentage
Haematoma	16	34.8%	5	4.2%
Haematoma in Post Bariatric Pt.	14	30.4%	2	1.7%
Haematoma in Non Post Bariatric Pt.	2	4.4%	3	2.5%

There is a direct relationship between the increase of the body mass index and the increase of complications after abdominoplasty surgery. On their analysis of 511 cases, Michaels *et al.*; found that there is significantly increase in abdominoplasty complications with increasing body mass index at the time of body contouring surgery. [8] Obese patients (BMI > 30 kg/m²) presenting for abdominoplasty surgery have an increased total, major, and minor complication rates as compared with non obese patients (BMI < 30 kg/m²) [9] [10] Taking this into consideration, it was decided in the last 3 years of our 4 years study to perform abdominoplasty for patients who have BMI of maximum 28 kg/m² and not more than that. This kept the mean BMI of the patients presenting for abdominoplasty

in our study at 27 kg/m².

Haematoma is one of the most common complications of abdominoplasty surgery. [11] Patients presenting for abdominoplasty surgery who have history of previous bariatric surgery carry a higher risk of haematoma formation compared to those who had no bariatric surgery before. Many studies tried to explain the cause for that. Baptista *et al.*; did a comparative histological study between the white adipose tissue composition of ex-obese patients and control patients with regard to blood vessels and resident mesenchymal stem cells (MSC). They found that there is a higher number of adipose tissue blood vessels in ex-obese patients and related that to the excessive bleeding observed during their plastic surgery. [12] Deficiency of vitamin K with other malabsorption deficiencies in post bariatric cases can be another cause. [13] Other studies disagreed with this hypothesis and related the increased incidence of haematoma in these patients to the longer operative time and to the larger size of the surgical specimen removed in comparison to that in cosmetic abdominoplasty [14].

In our study, 21 patients out of the 164 patients developed haematoma with incidence of 12.8%. 16 of these patients had previous bariatric surgery done (16 out of 107 patients with history of bariatric surgery with incidence of 15%). The other 5 patients who developed haematoma had no history of bariatric surgery (5 out of 57 patients with no history of bariatric surgery with incidence of 8.8%). This shows the higher incidence of haematoma in postbariatric abdominoplasty cases compared to cosmetic abdominoplasty cases. Our result is matching with Grignaffini *et al.*; who had incidence of haematoma in postbariatric abdominoplasty cases of 12% [15].

Nine of the patients in our study who developed haematoma required surgical evacuation. Eight of them had previous bariatric surgery history (7.8% of postbariatric abdominoplasty cases) and the remaining haematoma case had not undergone bariatric surgery before (1.8% of the cosmetic abdominoplasty cases). This was matching with Naeman *et al.*; study done on 1008 cosmetic abdominoplasty cases and had incidence of haematoma formation which required evacuation of 2.6% [16].

Uchelen *et al.* found that the complications of abdominoplasty surgery were higher in male patients compared to female patients [17]. Dutot *et al.*; reported on their retrospective study on 1128 female abdominoplasty patients an incidence of haematoma of 5.7% [18]. The incidence of haematoma among females in our study was 4.2% (5 patients of 118 female patients in the study) while among the males was 34.8% (16 haematoma cases out of 46 male patients in the study). This shows the marked difference in the incidence of haematoma between both genders which may be related to hormonal factors, to smoking issues with higher prevalence in male patients or to other causes. However, further studies are indicated to specifically delineate this difference.

Out of the 107 abdominoplasty patients in our study who had previous bariatric surgery, 16 patients developed haematoma. Fourteen of them were males (13.1%) while the other two were females (1.9%). This is nearly matching with

Chong *et al.*; results with incidence of 14.6% in males and 3% in females in postbariatric abdominoplasty cases [19].

Four male patients in our study had abdominoplasty combined with liposuction of the flank areas while 73 female patients underwent abdominoplasty combined with liposuction, plication of the recti muscles or both. Only two patients developed haematoma; one male and one female. This did not show significant increase in haematoma formation when these procedures are combined with abdominoplasty ($p = 0.294$). Other studies also confirmed the safety of combining liposuction with abdominoplasty in postbariatric cases [20].

5. Conclusion

Our study shows that there is an increase in the incidence of haematoma in postbariatric abdominoplasty cases when compared to those who had no previous bariatric surgery done. This was statistically significant in male patients. The incidence of haematoma in males was statistically much higher than in females. Combining liposuction of the lower flanks or plication of the recti muscles to the abdominoplasty procedure did not result significantly in an increased risk of haematoma formation.

Limitation of the Study

The number of patients was limited to 164 patients. A higher scale of cases can provide more accurate results. Further studies may be required to explain the higher incidence of haematoma formation in males compared to female patients in postbariatric abdominoplasty cases.

Compliance with Ethical Standards

This study was approved by Abu Dhabi Region Ethics and Research Committee, Zayed Military Hospital Abu Dhabi, Reference No. 2020.23.

Surgical consent was obtained from all the patients before surgery. Consents for photography and publication were also signed.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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