Risk Factors for Hematoma Development Post Reduction Mammaplasty: Novel Associations and Implications

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Abstract

Objectives: The aim of this retrospective study was to analyze various preoperative and intraoperative factors that may contribute to the development of wound hematoma after reduction mammaplasty. This will help us to estimate a prospective patient's individualized risk based on selected identifiable factors, facilitating patient selection and preoperative counseling.

Methods: Sixty six patients, who underwent Wise-pattern, Inferior pedicle reduction mammaplasty over a 10- year period (1999-2008) performed by a single surgeon were studied. The following factors were addressed: age, medical history, medications, smoking habits, Body Mass Index (BMI), phase of menstrual cycle, mass of resection, prophylactic heparin, operation time, intraoperative blood loss, preoperative and postoperative Hemoglobin (Hb) and Hematocrit (Hct) levels, various blood pressure measurements and hematoma formation. The operative time was divided into two periods and in our experience, hemostasis was achieved in the second period.

Results: In our series, six patients developed a postoperative wound hematoma; only two patients required operative evacuation (3%). Body Mass Index (BMI), mass of resection and subcutaneous prophylactic heparin significantly affected the likelihood of wound hematoma (P values: 0.018, 0.002 and 0.031, respectively). Smoking, age, medical illnesses and phase of menstrual cycle had no statistical significance on the development of wound hematoma. Logistic regression analysis showed that the peak systolic blood pressure during the period of hemostasis was significantly lower in patients who developed hematoma (P=0.019).

Conclusions: Our data indicate that there was a significant correlation between post-operative hematoma and Body Mass Index (BMI), mass of resection, prophylactic heparin and intraoperative hypotention during the period of hemostasis.

Keywords: Intraoperative Hypotension, Reduction Mammaplasty, Wound Hematoma.

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Introduction

The first reduction mammaplasty, by breast amputation, was performed in 1561 by Hanns Schaller to an otherwise healthy woman for functional reasons, [1] and today it is a routine procedure for which several techniques have been described, [2] which has been practiced since the 1970s. [3] An overall complication rate of 10-30% has been reported, [4] and even as high as 43-52% in some recent reports. [5-7]

Wound hematoma constitutes 0.3-2% of all complications. [8, 9] Other complications of these procedures include fat necrosis, bleeding, infection, skin necrosis, wound dehiscence, scar hypertrophy, nipple and areola complex problems (sensitivity loss, shape change, retraction, protrusion, malposition, necrosis, loss of erectility). Therefore, it is important to identify the factors that put a prospective patient at risk for complications.

A number of classic studies are frequently quoted in the plastic surgery literature addressing these factors; such as obesity, [7, 20, 21, 33, 34] resected mass, [7, 22, 23, 33, 34] age, [20, 24] Smoking habits, [35] past medical history [5, 22, 24] and drug history. [5, 22, 24] This study revealed divergent results regarding the impact of these factors on postoperative complications after the mammaplasy reduction. There are other factors that we believe have influence on the incidence of postoperative wound hematoma, and were not addressed widely in the literature; such as intraoperative hypotension, use of prophylactic heparin and the phase of the menstrual cycle of the patient. The aim of our research was to further study all the possible factors that may be implicated in the development of wound hematoma after the mammoplasty reduction. This will help us to estimate a prospective patient's individualized risk based on selected identifiable factors, facilitating patient selection and preoperative counseling.

Patients and Methods

In this retrospective study, we reviewed the charts of sixty six patients who underwent Wise-pattern, inferior-pedicle reduction mammaplasty by a single surgeon over a 10- year period from Sep 1999 to Sep 2008, in the plastic surgery unit at Jordan University Hospital. Three patients underwent unilateral reduction and sixty three patients underwent bilateral reduction. Any patient who had coagulation disturbances or on medications that influence coagulation, or had any contraindication for hypertensive anesthesia (uncontrolled hypertension, severe anemia, hepatic insufficiency, renal insufficiency, cerebrovascular disease, peripheral vascular disease and coronary insufficiency) was excluded from the study.

Preoperative, intraoperative and postoperative data were collected on each patient. The data recorded included the age of the patient, medical history, medications, smoking habits, BMI, prophylactic heparin, phase of menstrual cycle, operation time, mass of resection, intraoperative blood loss, preoperative and postoperative Hb and Hct levels, various Blood Pressure (BP) measurements and postoperative hematoma formation. All patients were given three doses of prophylactic intravenous antibiotic (1gm Ceforuxime), and prophylactic subcutaneous low molecular weight heparin (20- 40 mg /day) according to international guidelines, the first dose was given two hours prior to induction and continued till the patient was discharged from the hospital. Preoperative Hb and Hct was done for all patients. The baseline BP, before the start of the procedure, was within normal range in all patients.

All patients underwent a standard technique by a single surgeon. No use was made of local adrenaline solution was made preoperatively. [13-19] Marking of the breasts was done according to Wise-pattern. The procedure was performed using sharp dissection and resection with a scalpel. Mono-polar diathermy for homeostasis. Closure of the skin was done in layers using 4-0 Vicryl sutures as deep dermal closure, and 4-0 Monocryl for intracuticular closure, with compressive dressing. Free nipple graft technique was not used. All patients had a 14 G suction drain inserted and drainage continued in the postoperative period until it fell below 30 ml in

24 hrs. The patients were kept warm by keeping the ambient temperature of the operating room in the range of 22-24 C°, and by applying a heating mattress and giving warm fluids. The drip policy was as follows: in the first half hour, 10ml/Kg glucose-NaCl were given. From then on, 6ml 10ml/Kg glucose-NaCl. The blood loss was compensated by Ringer's Lactate in the ratio of 1:3.

Controlled hypotensive anesthesia, i.e. a reduction in systolic tension by 30%, on average, was used, with the aim of reducing blood loss. Hypotensive anesthesia was conducted by a single anesthesia consultant, using remifentanyl (narcotic) with an induction dose of 1µg / kg / hr, and a maintenance dose from 0.2-.0.7 µg / kg / min, and isoflurane (volatile anesthetic agent) 1-3% v/v inspired concentration to keep the pressure readings within our target range. The patients were monitored intraoperatively by ECG, oxygen saturation and indirect blood pressure measurement.

The operation was divided into two periods: the first period for actual cutting, and the second period for hemostasis, creation of a new nipple-areola complex and wound closure. The lowest value of systolic blood pressure (Low SBP), the highest value of systolic pressure (Peak SBP) and the mean Arterial Blood Pressure (MBP) were recorded for each phase of the operation.

Blood loss was measured by weighing soiled gauzes and measuring suction bottles, and by the measurement of a postoperative hemoglobin and hematocrit levels. Blood pressure monitoring was continued postoperatively in the recovery room, and the patients were transferred to the word with normal range of BP. All tissues that were removed were sent to the pathology department.

The BMI of the patients was classified into 4 categories according to WHO classification: [36, 37] underweight < 18.5, normal weight 18.5-24.99, overweight ≥ 25, obesity ≥ 30.

Wound hematoma was classified as either small or large. A small hematoma was defined as a palpable or visible swelling and the size is less than one inch in diameter, noticed in the first 48 hours following surgery and was treated conservatively. On the other hand, large hematoma is larger than one inch in diameter and required surgical evacuation.

The patients were divided into three phases depending on their menstrual cycle: phase I periovulatory (days 8-20), phase II perimenstrual (days 0-7 and 21-28) and phase III amenorrhea. The menstrual dates of the patients were normalized to a 28-day cycle according to the following formula (46):

Adjusted day of cycle =

$$\frac{\textbf{\textit{14 x day of the cycle at the time of surgery}}}{\textbf{\textit{Length of the follicular phase (cycle length-14)}}}$$

None of the patients were on hormonal therapy.

Statistical Methods

Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 16.0 (SPSS Inc., Chicago, IL, USA). The characteristics of patients with and without a hematoma were compared. The comparison for continuous covariates (age, resected mass, hospital stay, duration of operation, estimated blood loss, hemoglobin and blood pressure at different periods) was done by independent samples, t-test. For categorical covariates (prophylactic anticoagulants, smoking, medical illnesses and phases of menstrual cycle) the comparison was done using Fisher's exact test.

Mann Whitney U test was used to examine the mean blood pressure in the first and second periods, peak systolic blood pressure in the second period and BMI as the t-test assumptions of quality of variances were violated (Leven's test was significant).

Logistic regression analysis was used to determine whether or not the recorded variables were explanatory factors in hematoma development. All statistical procedures were performed using α=0.05, 2-tailed.

Results

Sixty six patients who underwent Wise-pattern, inferior – pedicle reduction mammaplasty were enrolled in the chart review. Some medical illnesses were encountered in 16 patients (24%) of our study group. These include: controlled hypertension (6 patients), diabetes mellitus (2 patients), bronchial asthma (2 patients), breast cancer (2 patients), ductectasia (one patient), grand malepilepsy (2 patients) and kyphosis (one patient).

Of the sample, 9 % (n=6) of the 66 reported patients, developed post-operative wound hematoma. In four patients (6%), the hematoma was small and treated conservatively; two patients (3%) had a large hematoma, which required surgical evacuation. Table (1) shows that there was a statistically significant (P = 0.031) difference in the incidence of wound hematoma between patients who had preoperative subcutaneous heparin prophylaxis (37 patients, 56%) and those patients who had no prophylactic anticoagulation (29 patients, 44%). It also shows that neither smoking nor the presence of a medical illness had statistically significant (P values: 0.335, 0.548, respectively) impact on postoperative wound hematoma. All phases of the menstrual cycle had no impact on wound hematoma as well.

According to Table (2), continuous variables were analyzed in relation to wound hematoma development. Although the age among those patients who developed hematoma post breast reduction (*Mean*= 39.83) was not different (*P*=0.175) compared to those patients who did not develop hematoma (*Mean=34.75)*; duration of operation and length of stay were significantly different (*P*=0.05, P=0.02, respectively). Moreover, weight of the resected breast mass (total, left, right) significantly affected the likelihood of postoperative wound hematoma development (*P* =0.002, *P* < 0.001, *P*=0.002, respectively). The blood loss during surgery was significantly higher in the hematoma group (*P* < 0.001). BMI showed a significant difference (*P*=0.018) among patients who developed hematoma and those who did not develop it.

Additionally, postoperative hemoglobin was significantly less (*P*=0.03) among those patients who developed hematoma (*Mean*= 9.3gm/dl) compared to those patients who did not develop wound hematoma *(Mean*= 10.3gm/dl).

In patients who developed wound hematoma, the mean BP was lower than in the non-hematoma group, among different periods of the operation (first and second) and different stages (low, mean, and peak). These differences (at Low SBP in the second period, mean BP in the first period, Mean BP in the second period, Peak SBP in the first period, and Peak SBP in the second period) are interpreted as a statistical significance between those patients who developed wound hematoma and those who did not (*P*=0.03, *P*=0.002, *P* < 0.001, *P*=0.012, and *P* < 0.001, respectively).

The logistic regression used the forward conditional method. The probability for stepwise entry was at 0.05 and removal at 0.10 for maximum iterations of 20. The analysis report included Wald x^2, B coefficient estimation associated with each predictor, P value, and Odds Ratio (OR) to provide estimated relative risk. Logistic regression analysis was performed at $\alpha = 0.05$ level of significance and 95% CI.

Logistic regression analysis was used to estimate the probability of recorded variables to predict hematoma development among the study population. As shown in Table (3), the outcome of logistic regression analysis showed a predictive model of one predictor compared to the constant that was significantly related to hematoma development, which is the peak SBP, in the second period. The other recorded variables have neither protective nor predictive effects on hematoma development post breast reduction procedure. The risk of hematoma development was more than one and a half times as great among those patients who had 90.8mmHg as a mean peak SBP in the second period compared to those who had a different mean peak SBP (OR = 1.440).

Table (1): Factors associated with the development of hematoma. (n = 66)

Factors	***Hematoma***		***P value***
	Yes(n=6)	***No(n=60)***	
Prophylactic anticoagulants (Heparin)			
Yes	*6*	*31*	
No	*0*	*29*	*0.031**
Smoking			
Yes	*0*	*14*	*0.335*
No	*6*	*46*	
Medical illness			
Present	*1*	*15*	*0.548*
Not present	*5*	*45*	
Menstrual phase			
phase I (periovulatory)	*1*	*26*	*0.38*
phase II (perimenstrual)	*4*	*28*	*0.42*
phase III (amenorrhea)	*1*	*6*	*0.45*

* ***Significant using Fisher's exact test at α=0.05, 2-tailed***

Table (2): Variables associated with hematoma post breast reduction.

Variables	***Hematoma Mean (SD) (n=6)***	***No Hematoma Mean (SD) (n=60)***	***P Value***
Age (Years)	*39.83 (6.8)*	*34.75(8.8)*	*0.175* [a]
Total mass (gm)	*3186.67(932.4)*	*1829(969.6)*	*0.002** [a]
Left breast mass (gm)	*1585(433.3)*	*868.1(449.4)*	*< 0.001** [a]
Right breast mass (gm)	*1601.6(502)*	*940.3(469.4)*	*0.002** [a]
Hospital stay(day)	*6.3(1.2)*	*4.7(1.6)*	*0.02 ** [a]
Duration of operation(hr)	*3.4(0.66)*	*2.8(0.66)*	*0.05 ** [a]
Estimated blood loss(ml)	*566.6(87.5)*	*327.5(118.7)*	*< 0.001** [a]
Low SBP first period (mmHg)	*86.1(5.49)*	*88.6(8.5)*	*0.48* [a]
Low SBP second period (mmHg)	*81.3(5.3)*	*89.8(9.5)*	*0.03* [*a]
Mean BP first period (mmHg)	*63.6(1.2)*	*71.2(5.8)*	*0.002* [*b]
Mean BP second period (mmHg)	*62.3(2.05)*	*75.1(6.9)*	*< 0.001* [*b]
Peak SBP first period (mmHg)	*97.1(4.02)*	*107.8(10)*	*0.012* [*a]
Peak SBP second period (mmHg)	*90.8(3.7)*	*115.9(13.6)*	*< 0.001* [*b]
BMI (4 International Categories)	*50.83 (mean rank)*	*31.7 (mean rank)*	*0.018* [*b]
Hemoglobin preoperative (gm/dl)	*12.6(0.79)*	*12.4(1.17)*	*0.663* [a]
Hemoglobin postoperative (gm/dl)	*9.3(1.16)*	*10.3(1.1)*	*0.03 ** [a]

**** Significant at α=0.05, 2-tailed***
a t-test
b Mann Whitney U test was used as t-test assumptions were violated
SBP: Systolic Blood Pressure, BMI: Body Mass Index

Table (3): Predictors for the development of hematoma using the Logistic regression model. (N=66)

Predictors	***B***	***Wald x^2***	***P value***	***Odds Ratio (OR)***
Peak SBP second period	*.365*	*5.539*	*.019**	*1.440*
Constant	*-33.816*	*5.421*	*.020**	*.000*

* ***Significant at α = 0.05 (2-tailed) using CI = 95%***
SBP: Systolic Blood Pressure

Discussion

Macromastia is a condition causing psychological and physical problems, and it seems that it has become more common nowadays, possibly due to the fact that obesity has become a global problem. There was no difference in the occurrence of postoperative wound hematoma, in relation to the surgical team, as all operations were led by a single surgeon. In our series, six patients developed post-operative wound hematoma within 48 hrs, only two patients (3%) required surgical evacuation, which correlates with the reported incidence in the literature. [5, 8, 9, 39]

Many studies in the plastic surgery literature addressing the correlation between obesity and post reduction mammaplasty hematoma formation had divergent results. Some of these studies found a significant increase in the rate of complications with obesity, [6, 23, 33] other studies revealed that obesity had weak impact on the rate of complications. [7, 21, 20, 22, 39] In our study, there was a significant difference (p=0.018) in the BMI between the patients who developed a wound hematoma and those who didn't. In an attempt to explain the divergent results, the significant difference in reporting hematomas, surgical techniques of the reduction, definition of obesity and experience of the surgeon must be noted. Likewise is the resected mass of the breast which had correlation with increased risk of post-operative hematomas in some series [5, 21, 22, 38, 33] while it had no significant correlation with hematoma formation in others. [7, 20, 24, 34, 39] In our study, the patients who developed hematoma had an average weight of 3186.67 gm, while those who did not develop hematoma, their average weight was 1829 gm. These contradicting observations could be explained by difference in surgical experience, the nature of breast tissue whether it was fatty or glandular, and its vascularity.

The mean age of patients who developed hematoma was 39.83, and for patients who did not develop hematoma, it was 34.75, but in our study age had no positive correlation with the risk of hematoma. None of our six patients who developed hematoma was an active smoker, and only one patient had controlled hypertension, so no solid conclusions can be drawn in our study regarding smoking and the presence of medical illnesses as risk factors.

The hospital stay and duration of operation was significantly longer (P=0.02 and 0.05, respectively), in the hematoma group and this is a logical consequence: the presence of hematoma as a complication will lengthen both the hospital stay and the duration of the operation.

There was also a positive correlation between the estimated blood loss and postoperative hematoma, which is also a logical consequence: patients with hematoma will lose more blood. There was a significant negative correlation (P=0.03) between blood loss and postoperative Hb.

There is paucity of reports in the plastic surgery literature about the effect of prophylactic subcutaneous heparin on the incidence of wound hematoma after the mammoplasty reduction. [24] There are few studies, however, addressing this issue after breast cancer and onco plastic surgery. One study by Friis et al. [40] on 425 patients who underwent primary breast cancer surgery, showed that there was a three fold increase in the risk of hematoma among 313 patients who received low dose Low Molecular Weight Heparin (LMWH), compared to 112 patients who did not receive it. Other studies, [41] comparing LMWH with Unfractionated Heparin (UFH) regarding hemorrhagic complications in breast cancer and oncoplastic surgery, revealed that the risk of hematoma was significantly greater with LMWH. Lio et al. [42] found in their retrospective study on 679 patients who underwent Transverse Rectus Abdominis Myocutaneous (TRAM) flap for breast reconstruction, that both types of heparin did not increase the risk of hematoma among the 392 patients who received them. The same observations were noticed by the single study done in the literature by Hussein et al. [24] addressing the effect of prophylactic subcutaneous heparin on the risk of hematoma formation after breast reduction. It was a retro-

spective study on 238 patients, 160 patients (67%) received unknown type of heparin, and 78 patients (33%) did not. There was an insignificant difference (P=0.15) between the two groups regarding the risk of hematoma. In our study, the patients who needed prophylactic heparin according to international guidelines were given LMWH. There was a significant (P=0.013) risk of hematoma in the 37 patients (56%) who received heparin versus 29 patients (33%) who did not. The main limitation of all these studies is that they were retrospective ones.

Controlled hypotensive anesthesia is defined as a deliberate reduction of systemic arterial pressure by 30 % on average, in order to minimize blood loss and facilitate surgery. We used the recommended induction and maintenance doses of remefentanil in combination with volatile anesthesia to get the benefit of titration of blood pressure during anesthesia, since the remifentanil is known to have a quick onset and a short period of action.

Complications of hypotensive anesthesia are known to increase, if the mean arterial pressure is reduced below 70 mmHg. Intraoperative hypotension is significantly associated with the development of paraplegia following surgery for traumatic aortic rupture, [29] visual loss after spinal surgery [30] and acalculus cholecystitis after aortic reconstruction. [31] Intraoperative hypotension is also a significant factor associated with the development of postoperative wound hematoma after carotid endarterectomy. [32]

The association of controlled hypotensive anesthesia with the risk of hematoma formation after reduction mammaplasty was addressed once, in the literature by Hussein et al. [24] In their retrospective study, they reviewed 238 patients who underwent reduction mammaplasty by different techniques over a 10 year period. They used hypotensive anesthesia along with adrenaline solution for local infiltration. The operation time was divided into three periods: first, middle, and last. The first period was used for actual cutting, the middle period for hemostasis and the last period for wound closure. The lowest value of Systolic Blood Pressure (low SBP), the highest value of Systolic Blood Pressure (peak SBP) and the mean arterial pressure (mean BP) were recorded for each of the three periods. In their series, 16 patients developed a wound hematoma; only four patients required operative evacuation (1.7%). They found that using logistic regression analysis, that the lowest systolic blood pressure in the middle period (hemostasis) was significantly lower in the hematoma group (p=0.0007). Our study however, showed that the peak systolic blood pressure during the hemostasis period was significantly lower in the hematoma group (p=0.019). In theory, hypotension results in less conspicuous bleeding during the procedure and over the estimation of the adequacy of hemostasis; with the return of normal blood pressure, possibly after the wounds have been closed; bleeding may ensue, with an increasing chance of developing a hematoma, in spite of wound drainage, and this may explain our findings.

A policy should be adapted to normalize blood pressure during the time of hemostasis and the closure of the wound by increasing intravenous fluids or decreasing anesthetic agents, and not by the use of pressors because of the possible bleeding when the vasoconstrictive effect wears off.

Unique to our research is the study of the relationship between the phase of the menstrual cycle and the risk of hematoma formation after reduction mammaplasty. Breasts are known to show cyclic changes associated with the menstrual cycle that affect all aspects of breast morphology, protein expression, and cell kinetics. Vogel et al. [45] demonstrated an increase in intralobular stromal edema and venous congestion during the perimenstrual phase, this explains the breast engorgement during this phase.

Sariguney et al. [46] in their only study in the literature addressing the blood loss during different phases of the menstrual cycle in 35 reduction mammaplasty patients, found a significant increase in the blood loss in patients during the perimenstrual phase. They divided the

menstrual cycle into phases depending on the medical history alone. They reported no hematoma or seroma. In our study on 66 patients, we found no significant relationship between the phase of the cycle and the risk of hematoma formation. This could be explained by the relatively small number of patients who developed hematoma (6 patients 9%), and that the hormonal status of these patients is not known whether they had an ovulatory cycle, since no hormonal assay or endometrial biopsies were taken.

Conclusions

Our study suggests that intraoperative hypotension, in the second period of reduction mammaplasty, which is the period when hemostasis is achieved, is associated with the development of postoperative wound hematoma. Based on our research, normalization of blood pressure during that period of the operation is worthy of consideration. It also suggests that body mass index, weight of the resected breast tissue and Low Molecular Weight Heparin (LMWH) play a role in the development of hematoma.

This can affect patients counseling and assessment preoperatively. Further prospective study may be necessary to confirm these findings.

References

1. Handchir Mikrochir. Plast Chir. 2000; 32(5): 316-320.
2. Psillakis JM, Melchiades CO, History of reduction mammaplasty. In: Goldwyn RM, ed. Reduction mammaplasty. Boston: Little, Brown and Co, 1990: 255-266.
3. Ribeiro L, A new technique for reduction mammaplasty. Plast Reconstr Surg 1975; 55: 330-334.
4. McKissock PK. Complications and undesirable results with reduction mammaplasty. In Goldwyn R M, ed. The Unfavorable Result in Plastic Surgery: Avoidance and Treatment, 2nd ed. Boston: Little, Brown and Co, 1984: 739-759.
5. Cunningham BL, Gear AJ, Kerrigan CL, Collins ED. Analysis of breast reduction complications derived from the BRAVO study. Plast Reconstr Surg 2005; 115: 1597-1604.
6. Setala L, Papp A, Joukoinen S, et al.: Obesity and complications in breast reduction surgery: Are restrictions justified? J Plast Reconstr Aesthet Surg 2009; 62: 195-199.
7. Roehl K, Craig ES, Gomez V, Philips LG. Breast reduction: Safe in the morbidly obese? Plast Reconstr Surg 2008; 122:370-378.
8. Berthe JV, Massaut J, Greuse M, et al.: The vertical mammaplasty: a reappraisal of the technique and its complications. Plast Reconstr Surg 2003; 111: 2191-2199.
9. Lejour M, Vertical mammaplasty: early complications after 250 personal consecutive cases. Plast Reconstr Surg 1999; 104(3): 764-770.
10. Van Aken H, Miller Ed, JR. Deliberate hypotension. In: Miller RD, editor anesthesia, 5th ed vol. 1. USA: Churchill Livingstone. Inc.; p. 1470-1490.
11. Rosenblatt MA. Strategies for minimizing the use of allogenic blood during orthopedic surgery. Mt Sinai J Med 2002; 69: 83-87.
12. Lindop MJ. Complications and morbidity of controlled hypotension. Br. J Anaesth 1975; 47: 799-803.
13. Hartman EH, Hendriks Jc, Koeijers VF. Preoperative injection using a diluted anesthetic / adrenaline solution significantly reduces blood loss in reduction mammaplasty. Plast Reconstr Surg 1998; 102: 373-376.
14. Brantner JN, Peterson HD. The role of vasoconstrictors in control of blood loss in reduction mammaplasty. Plast Reconstr Surg 1985; 75: 339-341.
15. Armour AD, Rotenburg BW, Brown MH. A comparison of two methods of infiltration in breast reduction surgery. Plast Reconstr Surg 2001; 108: 343-347.
16. Blomqvist L, Sellman G, Strombeck JO. Reduction mammaplasty with adrenaline infiltration: effects on perioperative bleeding. Scand J Plast Reconstr Surg Hand Surg 1996; 30(1): 29-32.
17. Debono R, Rao GS. Vasoconstrictor infiltration in breast reduction surgery: is it harmful? Br J Plast Surg 1997; 50: 260-262.
18. Reinisch J, Myers B. The effect of local anesthesia with epinephrine on skin flap survival. Plast Reconstr Surg 1974; 54: 324-7.
19. Tran DT, Miller SH, Buck D, Imatani J, Remuth RJ, Miller MA. Potentiation of infection by epinephrine. Plast Reconstr Surg 1985; 76: 933-934.

20. Blomqvist L. Reduction mammaplasty: Analysis of patients' weight, resection weight, and late complications. Scand J Plast Reconstr Surg Hand Surg 1996; 30: 207-210.
21. Zubowski R, Zins JE, Foray- Kaplon A, et al.: Relationship of obesity and specimen weight to complications in reduction mammaplasty. Plast Reconstr Surg 2000; 106: 998-1003.
22. O'Grady KF, Thoma A, DalCin A. A comparison of complication rates in large and small inferior pedicle reduction mammaplasty. Plast Reconstr Surg 2005; 115: 736-742.
23. Gamboa- Bobadilla G M, Killings worth C. Large volume reduction mammaplasty: The effect of body mass index on post-operative complications. Ann Plast Surg 2007; 58: 246-249.
24. M. Hussein, S.Lea and A. Maylon et al. The impact of intraoperative hypotension on the development of wound hematoma after breast reduction. Br J Plast Surg 2001; 54: 517-522.
25. Koch A, Bouges S, Ziegter S, et al.: Low molecular weight heparin and unfractionated heparin in thrombosis prophylaxis after major surgical intervention: Update of previous meta-analysis. Br J Surg 1997; 84: 750-759.
26. Liao EC, Taghinia AH, Nguyen LE, Tuch JH, May Jw Jr, Orgill DP. Incidence of hematoma complication with heparin venous thrombosis prohylaxis after TRAM flap breast reconstruction. Plast Reconstr Surgery 2008; 121(4): 1101-1107.
27. Nur Mohamed MT, Ros endaal FR, Buller HR, et al. Low molecular- weight heparin versus standard heparin in general orthopedic surgery: A meta-analysis. Lancet 1992; 340: 152-156.
28. Hardy RG, Williams L, Dixon Jm. Use of enoxaparin results in more haemorrhagic complications after breast surgery than unfractionated heparin. Br J Surg 2008; 95 (7): 834-836.
29. Attar S, Cardarell MG, Downing SW, et al. Traumatic aortic rupture: recent outcome with regard to neurologic deficit. Ann Thorac Surg 1999; 67: 959-965.
30. Myers MA, Hamilton SR, Bogosian AJ, Smith CH, Wagner TA. Visual loss as a complication of spine surgery: a review of 37 cases. Spine 1997; 22: 1325-1329.
31. Hagino RT, Valentine RJ, Clagett GP. A calculous cholecystitis after aortic reconstruction. J Am Coll Surg 1997; 184: 245-248.
32. Self DD, Bryson Gl, Sullivan PJ. Risk Factors for post- carotid endarterectomy hematoma formation. Can J A nesth 1999; 46: 635-640.
33. Atterhem H, Holmners S, Janson PE. Reduction mammaplasty: Symptoms, complications, and late results. Scand J Plast Reconstr Surg Hand Surg 1998; 32(3): 281-286.
34. Hunter JG, Ceydeli A. Correlation between complication rate and tissue resection volume in inferior pedicle reduction mammaplasty: a retrospective study. Aesthet Surg J 2006 Mar-Apr; 26 (2): 153-6.
35. Schumacher HHA. Breast reduction and smoking. Ann plast surg. 2005; 54 (2): 117-119.
36. WHO. Physical status: the use and interpretation of anthropometry. Report of a WHO expert committee. WHO Technical Report Series 854, Geneva: World Health Organization, 1995.
37. WHO. Obesity: preventing and managing the global epidemic. Report of a WHO Consultation. WHO Technical Report Series 894, Geneva: World Health Organization, 2000.
38. Dabbah A, Lehman Jr. JA, Parker MG, et al.: Reduction mammaplasty: An outcome analysis. Ann Plast Surg 1995; 35(4):337- 341.
39. Wagner DS, Alfonso DR. The influence of obesity and volume of resection on success in reduction mammaplasty: an outcome study. Plast Reconst Surg 2005; 115(4):1034-80.
40. Friis E, Horby J, Sorenson LT, et al.: Thrombo embolic prophylaxsis as a risk factor for postoperative complications after breast cancer surgery. World J Surg 2004; 28:540-543.
41. Hardy RG, Williams L, Dixon JM. Use of enoxaparin results in more hemorrhagic complications after breast surgery than unfractionated heparin. Br J Surg 2008; 95: 834-836.
42. Liao EC, Taghinia AH, Nguyen LP et al.: Incidence of hematoma complication with heparin venous thrombosis prophylaxsis after TRAM flap breast reconstruction. Plast Reconst Surg Apr; 121(4):1101-7.
43. Ramakrishnan R, Khan S, Badve S. Morphological changes in breast tissue with menstrual cycle. Mod Pathol 2002; 15: 1348-1356.
44. Olsen H, Jernstrom H, Alm P, et al. Proliferation of the breast epithelium in relation to menstrual cycle phase, hormonal use, and reproductive factors. Breast Cancer Res Treat. 1996; 40:187-196.
45. Vogel PM, Georgiade NG, Fetter BF, et al. The correlation of histologic changes in the human breast with menstrual cycle. Am J Pathol 1981; 104: 23-34.
46. Sariguney Y, Demirtas Y, Findinkcioglu F, et al.: Proper timing of breast reduction during the menstrual cycle. Ann Plast Surg 2004; 53(6): 528-531.

العوامل المؤثرة في حدوث تجمعات دموية بعد عمليات تصغير الثديين: التطبيقات والمسببات الجديدية

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الملخص

الهدف: الهدف من هذه الدراسة بأثر رجعي هو تحليل عوامل ما قبل العملية الجراحية وبعدها والتي قد تسهم في حدوث الورم الدموي بعد رأب الثدي التصغيري وسيساعدنا هذا على تقدير المضاعفات التالية للجراحة المحتملة للمريض بشكل فردي تقوم على عوامل محددة مختارة، وتسهيل اختيار المريض وتقديم المشورة قبل الجراحة.

الأساليب: ستة وستون مريضاً ممن خضعوا Wise-pattern, Inferior pedicle reduction mammaplasty خلال 10 سنوات ما بين 1999–2008 اجريت من قبل جراح واحد، أجريت الدراسة عليهم. العوامل التالية كانت موجهة: العمر، التاريخ الطبي، الأدوية، التدخين، منسب كتلة الجسم (BMI)، المرحلة من دورة الحيض، الكتلة المزالة، الهيبارين الوقائي، مدة العملية الجراحية، كمية الدم المفقود اثناء العملية، خضاب ومكداس الدم قبل وبعد الجراحة، قياسات مختلفة لضغط الدم وتشكل الورم الدموي. وقد قسمت مدة الجراحة الى فترتين وبناءً على خبرتنا يتم الرقئ في الفترة الثانية.

النتائج: ستة مرضى اصيبوا بورم دموي بعد الجراحة فقط، اثنتان منهم احتاجوا الى تفريغ (3%). منسب كتلة الجسم، الكتلة المزالة والهيبارين الاتقائي تحت الجلد اثر بشكل كبير على احتمالية حدوث الورم الدموي (قيمة p:0.018 و0.002 و0.031 بشكل متتالي). التدخين، العمر، مرحلة الحيض، التاريخ المرضي لم تكن ذات اهمية من الناحية الاحصائية في حدوث الورم الدموي. تحليل الانحدار اللوجستي بين ان ذروة ضغط الدم الانقباضي خلال الفترة من الإرقاء أقل بكثير في المرضى الذين طوروا الورم الدموي (p=0.019).

الاستنتاجات: بياناتنا تشير إلى أن هناك علاقة كبيرة بين الورم الدموي بعد الجراحة ومنسب كتلة الجسم (BMI)، حجم الكتلة المزالة، الهيبارين الوقائي، هبوط الضغط اثناء الجراحة اثناء فترة الارقاء.

الكلمات الدالة: هبوط الضغط اثناء العملية، رأب الثدي التصغيري، الورم الدموي.