RESEARCH ARTICLE

A clinical score for predicting complications following breast reduction

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Abstract

Objective: To establish a clinical score for morbidity prediction based on patient-related risk factors after breast reduction surgery.

Method: The retrospective study was conducted at the Department of Plastic and Reconstructive Surgery, Kafrelsheikh University Hospital, Egypt, and comprised data of female patients with bilateral macromastia who underwent breast reduction, using the inferior pedicle inverted T technique between February 2019 and June 2020. After data retrieval, risk factors and complications were documented and related to the patients' risk factors Data was analysed using SPSS 20.

Results: Of the 30 cases, 20(66.7%) were aged ≥35 years, 16(53.3%) had body mass index ≥37kg/m^2 and 27(90%) were non-smokers. The mean preoperative haemoglobin level was 12.15±1.115g/dL and the mean weight of tissue resected on both sides was 2074.17±696.12gm. Factors significantly associated with complications included smoking, suprasternal notch to nipple distance ≥38cm, haemoglobin <12.5g/dL, the weight of excised tissue ≥2000gm and a positive family history of macromastia. The total score of the morbidity prediction scale ranged 2-190, with the best cut-off value being ≥93. The scale had 100% sensitivity, specificity, positive predictive value, negative predictive value and 100 percent accuracy.

Conclusion: Ability to predict postoperative surgical-site morbidity may optimise safety as well as outcome after reduction mammaplasty.

Keywords: Gigantomastia, Nipples, Mammaplasty, Macromastia, Morbidity, Pedicle. **DOI: 10.47391/JPMA.EGY-S4-18**

Introduction

Macromastia is a common surgical problem that can lead to breast and neck pain, exercise intolerance and psychological problems.[1] The optimal results in reduction mammaplasty and mastopexy, depend on choosing a technique that is foolproof for both the surgeon as well as the patient with long-lasting results, fast recovery, and minimal complications.[2] There are multiple approaches of reduction mammaplasty, including vertical scar reduction mammaplasty, wise pattern marking design with different types of pedicles, as well as breast amputation. However, the inverted-T inferior pedicle technique is the approach is safe in large-volume reductions.[3] Regarding elective surgery, it is necessary to optimise the patient-related factors preoperatively.[4] Several studies have reported numerous postoperative complications based on relevant preoperative risk factors, such as obesity, smoking, suprasternal notch to nipple distance and weight of the excised tissue.[5,6] These complications include nipple areola complex (NAC) necrosis, wound dehiscence, seroma, haematoma and wound infection. However, to the best of our knowledge, there is no clinical score to predict post-procedure outcome incorporating specific risk factors. The current study was planned to establish a clinical score for morbidity prediction after breast reduction surgery to optimise safety and outcomes.

Patients and Methods

The retrospective study was conducted at the Department of Plastic and Reconstructive Surgery, Kafrelsheikh University Hospital, Egypt, and comprised data of female patients with bilateral macromastia who underwent breast reduction, using the inferior pedicle inverted T technique between February 2019 and June 2020. After approval from the institutional ethics review board, data was retrieved in August 2020 using the routine registry form. For missing data, medical record files were reviewed and patients were contacted over the telephone as well, if needed. Cases with contraindications to general anaesthesia (GA) and those with previous breast surgeries or breast cancer were excluded. Informed consent had been signed by all the patients at the time of the surgery.

In line with literature[3], preoperative markings were done with the patient in the standing position (Figure 1). The base of the pedicle was marked 5cm laterally and 5cm medial from the breast meridian. The outlines of the pedicle were drawn, extending beyond the NAC. De-epithelialisation of the pedicle was done. The medial, lateral and upper breast skin flaps were lifted with beveling down toward the chest wall till the loose areolar tissue layer, overlying the pectoral fascia was reached and preserved.

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The breast tissue was removed in the shape of a horseshoe pattern around the lower pedicle. The pedicle was shaped by inserting absorbable sutures. The skin edges were grouped together, then the periareolar incision and the vertical limb were closed. Intraoperative data was noted, including the weight of the excised tissue and the operative time. Postoperatively, all patients were followed up every week for one month to assess the viability of flaps, the vascularity of NAC and other minor complications (Figures 2-3). The findings were related to the previously noted patient-related risk factors.

Data was analysed using SPSS 20. Quantitative variables were expressed as means and standard deviations. Kolmogorov-Smirnov test was used to test data normality. Categorical variables were expressed as frequencies and percentages, whereas chi-square test was used to compare the variables. Binary logistic regression was used to identify the most significant risk factors for complication among those that were significant in the univariate analysis for developing the new scale items. Receiver operating characteristic (ROC) curve analysis was used to assess the best cut-off value of the new scale for diagnosing complications. P<0.05 was considered statistically significant.

Results

Of the 30 cases, 20(66.7%) were aged ≥35 years, 16(53.3%) had body mass index (BMI) ≥37kg/m^2 and 27(90%) were non-smokers. The mean preoperative haemoglobin (Hb) level was 12.15±1.115g/dL, mean weight of tissue resected on both sides was 2074.17±696.12gm, and mean suprasternal notch to nipple distance was 38.558±4.436cm. Complications included wound dehiscence in 8(26.7%) patients, infection 2(6.7%), and seroma 1(3.3%). Partial and complete right NAC necrosis was documented in 1(3.3%) case each. Partial and complete left NAC necrosis was seen in 2(6.7%) and 4(13.3%) cases, respectively (Table 1).

Univariate analysis showed several patient-related factors associated with complications after reduction mammaplasty (Table 2). Logistic backward regression analysis confirmed that factors significantly associated with complications included smoking, suprasternal notch to nipple distance ≥38cm, Hb<12.5g/dL, the weight of excised tissue ≥2000gm and a positive family history of macromastia.

These items formed the new scale for morbidity

Table-1: Complications noted in the study patients. (n=30).

Parameter	n (%)
Complications:	
Yes	8 (26.7%)
No	22 (73.3%)
Right NAC necrosis:	
No	28 (93.3%)
Partial	1 (3.3%)
Complete	1 (3.3%)
Left NAC necrosis:	
No	24 (80%)
Partial	2 (6.7%)
Complete	4 (13.3%)
Seroma	1 (3.3%)
Dehiscence	8 (26.7%)
Infection	2 (6.7%)

NAC: Nipple areola complex

Table-2: Univariate analysis of complications-related variables among the studied patients.

Parameter	Complications Complicated n=8 (%)	Test Non-complicated n=22 (%)	*p-value*	COR (95% CI)
Age:				
<35 years	0 (0)	10 (45.5)	0.029*	Undefined
≥ 35 years	8 (100)	12 (54.5)		
BMI:				
<37 kg/m2	1 (12.5)	13 (59.1)	0.039*	10.11
≥ 37 kg/m2	7 (87.5)	9 (40.9)		(1.05 – 97.01)
Marital status:				
Divorced	1 (12.5)	2 (9.1)	>0.999	1.43
Married	7 (87.5)	20 (90.9)		(0.11 – 18.3)
Number of children:				
0	1 (12.5)	1 (4.5)	0.725	3.2
1 – 3	5 (62.5)	16 (72.7)		(0.17 – 61.03)
4 – 5	2 (25)	5 (22.7)		
Family history:				
Negative	3 (37.5)	20 (90.9)	0.007*	16.67
Positive	5 (62.5)	2 (9.1)		(2.17 – 128.18)
Smoking:				
Negative	5 (62.5)	22 (100)	0.014*	Undefined
Positive	3 (37.5)	0 (0)		
Hypertension:				
No	6 (75)	22 (100)	0.064	Undefined
Yes	2 (25)	0 (0)		
Preoperative haemoglobin:				
<12.5 g/dL	7 (87.5)	7 (31.8)	0.007*	15 (1.53 – 146.55)
≥ 12.5 g/dL	1 (12.5)	15 (68.2)		
Operative time:				
<184 minutes	3 (37.5)	12 (54.5)	0.68	2 (0.38 – 10.51)
≥ 184 minutes	5 (62.5)	10 (45.5)		
Mean Weight of excised tissue:				
<2000 gm	1 (12.5)	14 (63.6)	0.035*	12.25
≥ 2000 gm	7 (87.5)	8 (36.4)		(1.27 – 118.37)
Suprasternal notch to nipple distance:				
<38 cm	1 (12.5)	14 (63.6)	0.035*	12.25
≥ 38 cm	7 (87.5)	8 (36.4)		(1.27 – 118.37)

COR: Crude odds ratio, CI: Confidence interval, BMI Body mass index. *p<0.05 is statistically significant

Table-2: Multivariate analysis of variables significantly associated with complications among the studied patients.

	Score	β	p	AOR	95% C.I.for EXP(B) Lower	Upper
Suprasternal notch to nipple distance(≥38 cm)	38	37.564	0.997	2.06 (10)[16]	.000	.
Positive family history	2	1.745	>0.999	5.727	.000	.
Haemoglobin <12.5 g/dL	37	36.735	0.97	8.99 (10)[15]	.000	.
Smoking	76	76.096	0.997	1.117 (10)[33]	.000	.
Weight of excised tissue (≥2000 gm)	36	36.218	0.997	5.36 (10)[15]	.000	.

CI: Confidence interval, AOR: Adjusted odds ratio, EXP(B): Expected beta, p: Probability, β: Beta.

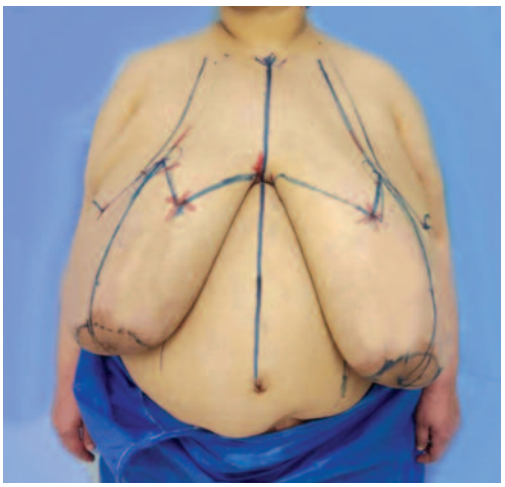

Figure 1: Preoperative frontal view.

Figure : 2: Postoperative image showing partial nipple areola complex (NAC) necrosis on the left side.

Figure 3: Postoperative image showing complete nipple areola complex (NAC) necrosis on the right side.

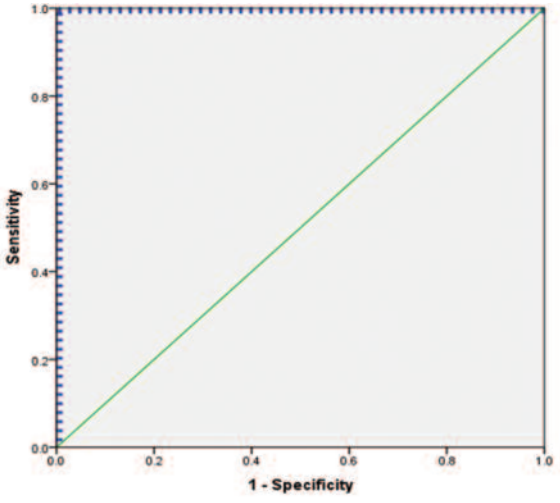

Figure 4: Receiver operating characteristic (ROC) curve showing performance of the new scale in the diagnosis of complications.

prediction, with a total score ranging 2-190 (Table 3). The best cut-off value of the scale was ≥93, with area under curve (AUC) 1, with 100% sensitivity, 100% specificity, 100% positive predictive value (PPV), 100% negative predictive value (NPV), and 100% accuracy (Figure 4).

Discussion

Breast hypertrophy is a clinical condition that affects many females in a disturbing way. The actual cause of the condition varies. For instance, in young females, it is mostly due to overweight and virginal mammary hypertrophy, while in older cases, it can be attributed to the postmenopausal effect.[1] Large, ptotic breasts can lead to neck and back pain. From a psychological perspective, huge breasts can be troubling and embarrassing, causing low self-esteem. Raising awareness of a feasible solution contributed to a significant increase in surgical correction requests.[1] Various procedures for reduction mammaplasty

were described, depending on skin pattern design, as well as pedicle selection for transposition of the NAC.[7] There are multiple available approaches for breast reduction, such as free nipple[8], wise pattern[9], inferior pedicle[2], vertical pedicle [10], superomedial[11], and septal-based pedicle.[12] Free nipple grafting often induces a flat, insensate nipple.[13] A wise-pattern inferior pedicle procedure is prone to wound healing problems and hypertrophic scar at the inverted-T[14], in addition to a propensity towards bottoming.[15] Nevertheless, it is safer in large reductions.[14] Superomedial techniques face difficulties in pedicle folding, particularly with increased transposition distances.[16] Previous studies have reported complication rates ranging from 7% to 51%.[17]

There were multiple predisposing factors in the current study that were strongly associated with surgical-site complications post-surgery. These factors included smoking, BMI, suprasternal notch to nipple distance, mean weight of the excised tissue, positive family history of macromastia and preoperative Hb level, which are consistent with previous studies.[5,18,19] The suprasternal notch to nipple distance gives an idea of the length of the pedicle; the greater the length of the pedicle, the greater is the distance the blood travels towards the nipple. The risks of NAC necrosis, wound dehiscence and infection were found to be significantly increased over a distance of 38cm or more. The increased weight of the excised tissue significantly increased the risk of complications. Lewin et al. reported similar results.[20] Smoking is often associated with delayed wound healing as well as complications following reduction mammaplasty.[4] In addition, obesity is a predisposing factor for surgical-site morbidity.[19] According to a survey conducted in Egypt which screened 49.7 million adults, 39.8% suffered from obesity (BMI ≥30 kg/m^2). Obesity was more prevalent in adult females than adult males.[21]

Baltodano et al. reported a score for predicting postoperative complications after breast reduction surgery. The predisposing factors identified were resident participation, BMI, smoking, steroid usage, and surgery in the third quarter of the year.[22] Nonetheless, no specific risk factor for breast reduction surgery have been reported, such as the suprasternal notch to nipple distance and the weight of excised tissue intraoperatively, which represents preoperative breast volume. The previous score for breast reduction included variables, such as resident participation and steroid use, that may change according to the surgical centre.

The breast reduction score becomes more important when applied to clinical practice. Many of these predisposing factors are adjustable, such as smoking status, preoperative Hb, and BMI. When surgeons recognise any of these predisposing factors in a patient, they can apply approaches to adjust these factors, reorganise the risk, and decrease the possibility of complications.

The current study has its limitations, like the sample size was not calculated. Also, the outcome was limited to postoperative complications and did not evaluate the effect of breast reduction surgery on the quality of life or patient satisfaction. These are essential variables that must be included in any cost-benefit calculation.

Conclusion

Breast reduction surgery is associated with a significant rate of postoperative complications. A clinical score for predicting postoperative outcome would optimise patient safety. In order to focus interventions on modifiable factors that may be helpful in reducing surgical-site complications, effective identification of cases with a high risk of postoperative complications is critical.

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