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Effect of Reduction Mammoplasty on Pulmonary Function Test and Back Pain in Patients with Macromastia

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ABSTRACT

Background: Macromastia has been related with number of physical and mental issues in spite of the fact that it is basically a physiological condition. This study aimed to discuss the effect of reduction mammoplasty on pulmonary function tests and back pain in patients with macromastia.

Patients and Methods: This is a clinical study including thirty female patients with macromastia suffered from back pain, all underwent reduction mammoplasty, we used three pedicles techniques for reduction mammoplasty; medial, superior medial and inferior pedicles. Regarding pulmonary function test (spirometry) and carbon monoxide diffusion test, pre-operative and 3 months postoperative was done. Back pain was assessed preoperative and 3 months post operative according to facial pain scale.

Results: The mean preoperative Forced Expiratory Volume 1% in this study was 89.10±19.45% which significantly increased to 100.28±19.87% post-operatively (p=0.0010). Regarding Forced Vital Capacity in this study, it significantly increased from 86.22%±21.08% pre-operatively to 100.42% ±19.85% post-operatively (p<0.001). Diffusion Capacity for Carbon Monoxide (DLCO) significantly increased from 99.90 ±11.08mL/min/mmHg preoperatively to 90.15±13.21mL/min/mmHg post-operatively (p<0.001). There was significant improvement of back pain after breast reduction compared to preoperative back pain.

Conclusion: Breast reduction surgery through different surgical pedicles has positive effects on pulmonary function test values as it leads to decrease breast weight, hence improve respiratory function and chest wall movement. Also, it decreases patient's back pain in different surgical pedicles used.

Key Words: *Mammoplasty – Pulmonary function – Back pain – Macromastia.*

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INTRODUCTION

Macromastia or gigantomastia is defined as a disproportionate breast size to the regular frame of an individual **[1]**. It may be described as breast weight of more than 3% of the total body weight or a breast in need of reduction of at least 1500mg **[2]**.

Macromastia can cause musculoskeletal disorders, hyperkyphosis, shoulder pain, back pain, parasthesia in arms, headaches, intertrigo and scarring on the shoulders due to pressure of the bra straps **[1]**.

Shortness of breath is another important symptom as the weight on thorax diminishes the chest wall compliance **[3]**.

Reduction mammoplasty is one of the foremost common breast operations performed. The esthetic and psychological impacts of macromastia include being incapable to find fitting clothes and less self-confidence. The motivation for surgery is to relief physical symptoms caused by the heaviness due to breast size such as back, neck and shoulder pain **[4]**.

In some studies, no statistically significant difference was found regarding breast tissue weight excised following breast reduction and PFTs between the groups **[5]**.

Others showed the restrictive effects on chest wall compliance caused by macromastia. Statistically significant improvement in pre and post-operative pulmonary functions was documented **[6]**.

This study aimed to discuss the effect of reduction mammoplasty on pulmonary function tests and back pain in patients with macromastia.

PATIENTS AND METHODS

This study was done at Benha University Hospital during the period from September 2020 till September 2021.

The study was accepted by the scientific and Ethical Committee of General Surgery Department of Benha University Hospitals. Patients agreed verbally and signed an informative written consent for the operation and participation in the study.

This is a clinical study including thirty female patients, between the age of 22 and 46 years. All patients suffered from macromastia, all underwent reduction mammoplasty.

Patients who were chronic heavy smokers, with chronic lung disease e.g. asthmatic or COPD, uncontrolled medical co-morbidities e.g. diabetes or hypertension, vertebral column diseases were excluded.

In this study we used three pedicle techniques for reduction mammoplasty, these techniques were medial, superior medial and inferior techniques. Regarding pulmonary function test (Spirometry) and carbon monoxide diffusion test, pre-operative and 3 months postoperative were done. While back pain was assessed pre-operative and 3 months post operative according to facial pain scale **[7]**.

Preoperative assessment:

A detailed history was obtained from patients, including personal data, height and weight, BMI, previous surgeries, family history of breast cancer and drug allergies. Thorough medical history we obtained including the main complaints (physical and psychological).

Breast examination was done while the patient was sitting, upright, leaning forward and lying supine for detection of any lumps or abnormalities in breast.

Spirometry carbon monoxide diffusion test was used for assessment of lung function according to the standards of the American Thoracic Society before surgery while preparation. This was done at the chest diseases Department at Benha University. Procedure was explained to patients in detail. Spirometric and PFT results were printed and kept for later comparison with the postoperative test 3months later. Their back pain was evaluated according to facial pain scale.

Any intertrigo is treated with topical antifungal and patient should be free from the disease at least one week prior to the operation.

Laboratory investigations for preparation to surgery & anesthesia (including full blood picture, liver function tests, fasting blood sugar) were done as well as Pre-operative mammogram for high risk patients and those older than 35 years.

The location and length of the possible scars were shown and described to the patients, who desire influenced the choice of the technique.

Preoperative views of photos were taken and reviewed with the patient to point out conditions such as pre-existing asymmetry. Representative before and after photos also should be reviewed to insure that the patient understands possible scars and has realistic expectations.

Operative procedure:

Reduction mammoplasty was done using inferior pedicle technique on 12 cases, superior-medial pedicle on 13 cases and medial pedicle on 5 cases (according to breast size, shape, pedicle length and pre-operative counseling).

Preoperative markings were designed in standing position according to the technique and pedicle used. Markings included midline, breast meridian, infra-mammary fold (IMF) position, new nipple position, vertical tangential limbs and pedicle base. (Fig. 1).

High risk patients received prophylactic clexan (40mgIU) dose at night of surgery and all patients received prophylactic antibiotics 2 hours preoperative.

Surgery was performed with the patients in the supine position, with arms abducted and under general anesthesia.

The pedicle was de-epithelialized (Fig. 2). Then cut to the depth with dissection straight down just above the pectoralis fascia. The rest of breast tissue was carefully dissected and excised with assessing of the remaining breast size many times during operation and closure of pillars was not under tention. The breast tissue to be excised was removed en bloc and its weight was measured. (Fig. 3).

Assessment of both breasts was done for bilateral symmetricity in size, shape and new nipple position in semi sitting position. (Fig. 4). Suction drains inserted in each side. Then fixation of NAC in the new position and breast envelope was performed in layers. Light dressings and support bra were applied.

Table (3): Comparing pre-operative and post-operative 3 months results regarding FEV1 %, FVC %, Ratio, PEF %, FEF25-75%, DLCO (mL/min/mmHg), RV % and TLC %.

	Pre	Post	Test value*	*p*-value	Sig.
	No.=30	No.=30			
FEV1 %:					
Mean ± SD	89.10±19.45	100.28±19.87	–2.761	0.01	S
Range	65-125	66.97-130			
FVC %:					
Mean ± SD	86.22±21.08	100.42±19.85	–2.743	0.001	HS
Range	65-125	66.97-130			
(FEV1/FVC) Ratio:					
Mean ± SD	86.63±7.67	87.06±7.79	–1.370	0.181	NS
Range	75-99	75.07-100			
PEF %:					
Mean ± SD	84.76±7.64	83.70±6.92	1.296	0.205	NS
Range	74-98	74-97.42			
FEF25-75%:					
Mean ± SD	87.97±7.79	68.99±7.34	2.710	0.061	NS
Range	75.07-100	75-99			
DLCO (mL/min/mmHg):					
Mean ± SD	99.90±1.08	90.15±13.21	3.643	0.001	HS
Range	75.47-113	72-110			
RV %:					
Mean ± SD	94.90±19.52	96.44±20.97	–1.025	0.314	NS
Range	65-129	64-128.26			
TLC %:					
Mean ± SD	95.88±12.04	96.14±19.83	–0.059	0.953	NS
Range	75-116.96	65-129			

Table (4): Classification of the studied cases based on back pain pre-operative and post-operative results.

	Pre	Post	Test value*	*p*-value	Sig.
	No.=30	No.=30			
Back pain:					
Mean ± SD	5.467±1.042	1.500±0.630	30.243	0.0001	HS
Range	4-7	0-2			

We found the pre-operative pain score was 5.467±1.042. While, it was 1.500±0.630 3 months post-operatively. This difference is shown in (Fig. 6).

Patient satisfaction and complications is shown in (Fig. 7).

Complete patient satisfaction was achieved in 90% of our patients according to postoperative questionnaire. On the other hand, there was partial necrosis in NAC in one patient and treated with secondary sutures that lead to unpleasant nipple shape. There was seroma accumulation in two patients after drain removal and they was treated with ultrasonography assistant aspiration. Asymmetrical breast size was reported by 3.3% of them and uncomfortable body shape was reported by 3.3% (Fig. 7).

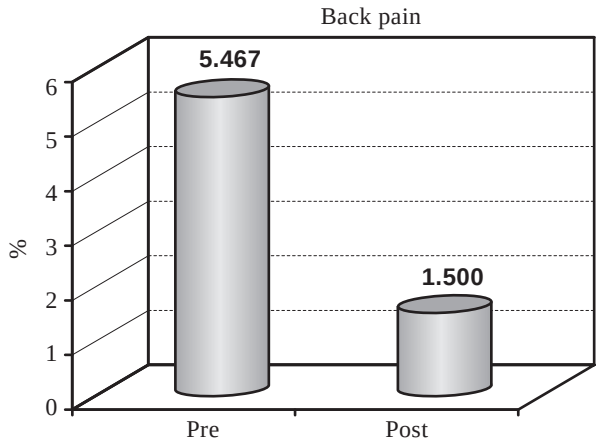

Fig. (6): Back pain pre-operative and post-operative.

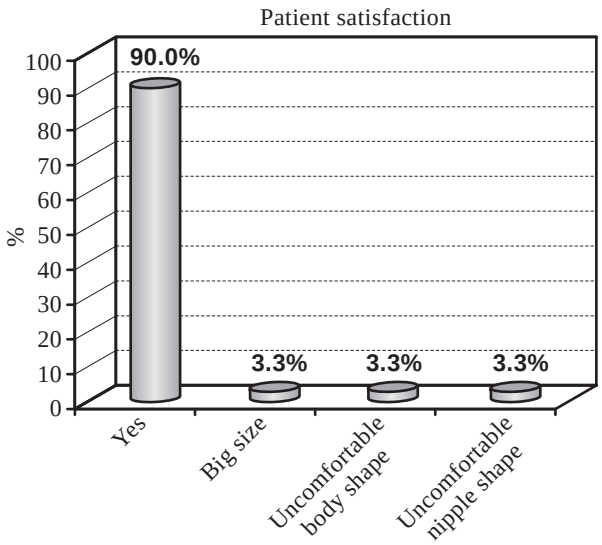

Fig. (7): Distribution of the studied cases according to Patient satisfaction.

DISCUSSION

The effect of reduction mammoplasty on the pulmonary function was an issue of debate since long time. Theoretically big breast could restrict chest wall movement by its weight **[8]**.

While some studies prove the positive effect of mammoplasty on the pulmonary function test **[6,9]**, others deny this effect **[5,10]**. The debate extended between those who stated the beneficial effect of breast reduction surgery and how much this surgery improves the lung function and oxygen saturation, with others who had a contradictory results.

This prospective randomized study included 30 patients with hypertrophy and gigantic typed of macromastia according to Jones 2006 **[10]** classification eth 56.7% of our study patients had gigantic hypertrophy while the rest of them (43.3%) had major hypertrophy type.

Reduction mammoplasty was done with three different surgical pedicle techniques. 13 cases (43.3%) were done with superior-medial pedicle technique, while 12 cases (40%) with inferior pedicle technique and 5 cases (16.7%) with pedicle medial technique.

In to our study, the mean pre-operative forced expiratory volume 1% in this study was 89.10± 19.45% which significantly increased to 100.28± 19.87% post-operatively (p=0.0010). Regarding Forced Vital Capacity, it significantly increased from 86.22%±21.08% preoperatively to 100.42% ±19.85% post-operatively (0.001). Also, Diffusion capacity for carbon monoxide (DLCO) significantly decreased from 99.90±11.08mL/min/mmhg preoperatively to 90.15±13.21mL/min/mmHg postoperatively (0.001).

On the other hand, there was no statistically significant difference between pre-operative and post-operative regarding inspiratory expiratory ratio, peak expiratory flow rate, forced expiratory flow rate 25-75%, residual volume and total lung capacity.

Uğurlu et al., which included 19 patients who underwent reduction mammoplasty found a significant increase in forced expiratory volume 1 (FEV1). Also, there was meaningful increase in FVC values was detected in postoperative period (94.00±14.03% preoperative vs 98.05±12.33 postoperative) with p=0.006. There was meaningful decrease in the value of DLCO in postoperative period (93.89±9.21 vs 90.53±9.25; p=0.002). This situation can be explained by the decrease in DLCO as a result of a decrease in thoracic blood volume with decrease venous return associated with increased transpulmonary pressure due to increase in chest wall compliance together with the breast reduction **[3]**.

Also, Ceber et al., study was comparable with ours. In his study, 30 women were included. A significant improvement was found between certain pre-operative and post-operative predicted FVC%, predicted FEV1% and predicted FEF 25-75 **[9]**.

The study made by Aly et al., can be compared to our study. As he performed reduction mammoplasty on 21 patients using inferiorly based pedicle only. Their study showed an increase in FVC from 3.05±0.54L pre-operatively to 3.28±0.50L post-operatively. Also there was significant change in FEV1/FVC ratio from 81.96±4.65% pre-operatively to 77.70±4.47% post-operatively (p<0.001) **[12]**.

Finally, Kececi et al., study showed an improvement in FVC and FVC performed/predicted ratio. Pre-operative and post-operative forced vital capacity values were 2.72±0.06 and 2.79±0.05L, respectively. FVC performed/predicted ratio which was 81.9 (0.91)%. Pre-operatively and increased to 83.8 (0.87)% post-operatively **[13]**.

On the other hand, Onuk et al., found no statistically significant difference was found regarding breast tissue weight excised following breast reduction and PFTs between the groups. But the mean breast tissue weight resected in their study from one side was (951.6±4.646g) that cannot be comparable to our study as the mean breast tissue weight in one side was (1641.67±393.33g) **[5]**. While, in Turhan-Haktanır et al., study, they depended on the effect of breast size on lung functions in different breast weights but not the effect after reduction mammaplasty. That was unreliable result in comparison to ours **[10]**.

According to the relationship and impact of reduction mammoplasty on back pain, the preoperative pain was ranging from distressing to very intense with mean value (5.467±1.042). While, post-operative pain reduced to discomforting up to no pain with mean value (1.500±0.630).

The distressing pain score was found in patients with gigantic breast according their facial score. Long-standing condition of macromastia may influence patient's evaluation and assessment of pain due to psychological stress. This may illustrate the dramatic response and pain reduction in postoperative pain assessment with p-value (<0.001).

Although our results show improvement in back pain after breast reduction with different grades, patients with discomforting pain score postoperatively may show more improvement on longer follow-up period.

This post operative improvement was presented in the study of Mizgala et al., as percentage of patients free of back pain rose from 9% preoperatively to 59% postoperatively **[14]**.

Also, In Foreman et al., study, the result demonstrated 35% decrease in low-back compressive forces and back pain with p<0.05 **[15]**. Knox et al., reported that reduction mammaplasty was associ-

ated with postoperative physical fitness improvements among US Army active duty women. Which supports our result **[16].**

Conclusion:

Breast reduction surgery through different surgical techniques has positive effects on pulmonary function test values as it leads to decrease breast breast weight, hence improve respiratory function and chest wall movement. Also decreases patient's back pain in different surgical techniques.

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