

Evaluation of pulmonary function in patients submitted to reduction mammoplasty

Avaliação da função pulmonar em pacientes submetidas à mastoplastia redutora

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A B S T R A C T

Objective: To prospectively evaluate the pulmonary function in patients undergoing reduction mammoplasty. **Methods:** Twelve female patients with Gigantomastia and without medical antecedents were submitted to reduction mammoplasty at our University Hospital. The patients underwent lung function testing and arterial blood gas measurements in the preoperative and postoperative period (three to six months). The data were analyzed using the Wilcoxon test and the level of statistical significance was $p < 0.05$. **Results:** As for lung function tests, total lung capacity and residual volume were higher postoperatively ($p < 0.05$). As for the arterial gases, there was no statistically significant difference. **Conclusion:** The increase in total lung capacity and residual volume may suggest a better lung function after reduction mammoplasty for Gigantomastia treatment, although not altering blood gases in healthy patients.

Key words: Mammoplasty. Spirometry. Respiratory function test.

INTRODUCTION

Reduction mammoplasty is one of the most common procedures in plastic surgery. The main indications of reduction mammoplasty for patients with Gigantomastia range from improving the shape of the breasts to somatic symptoms. There are several associated symptoms in the breast and musculoskeletal system (back, shoulder and cervical spine)^{1,2}. Several retrospective and prospective studies have documented statistically significant improvement in symptoms and quality of life of patients who underwent reduction mammoplasty³⁻⁶. Despite this documentation, it has been considered a more aesthetic than strictly medical procedure.

The lung function has been studied in patients undergoing reduction mammoplasty, however, few studies have evaluated objective data^{3,7,8}. This can be done through lung function tests and measurement of arterial blood gases. Bulky and heavy breasts can cause restriction and reduction of chest wall compliance, which interferes with pulmonary ventilation.

The aim of this study was to prospectively evaluate, by means of pulmonary function tests and measurement of arterial blood gases, the pulmonary function in patients undergoing reduction mammoplasty.

METHODS

The project and consent form were approved by the Ethics Committee on Research of the Hospital of UFBA.

We studied 12 patients with Gigantomastia seeking plastic surgery care at Hospital of UFBA from July 2007 to March 2008 with indication of reduction mammoplasty, aged 18-42 years (mean 29.25), body mass index (BMI) of 23.24 kg/m² to 30.48 kg/m² (mean 26.83 kg/m²), non-smokers and without medical backgrounds.

We requested preoperative tests, mammography and breast ultrasonography (for patients over 40 years). The patients who showed abnormalities in mammograms or ultrasound examinations were evaluated by a mastologist.

The individuals were intravenously anesthetized with sufentanil (0.02 mcg/kg/min) and propofol (200 mcg/kg/min) by the same team of anesthesiologists. They were ventilated with the Inter 5* microprocessor ventilator with positive end-expiratory pressure (PEEP) of 5 mmHg and a tidal volume of 10ml/Kg.

Bilateral breast resections were performed under the superomedial pedicle technique described by Ferreira *et al.*¹ and Costa *et al.*⁹. The procedures were performed by the same surgeon, with surgical times of 150 to 210 minutes. (Figures 1,2 and 3).

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The patients underwent lung function testing and arterial blood gas measurements in the preoperative period, as well as in the early postoperative period, three and six months after surgical procedure. The tests were carried out by the same team, with the same technique and equipment.

The data were analyzed using SPSS 15.0 (Wilcoxon). Values with $p < 0.05$ indicated statistical significance.

RESULTS

The total amount of breast tissue resected ranged from 730g to 2,720g, with mean of 1,525g.



Figure 1 - Patient with Gigantomastia (preoperatory).



Figure 2 - Marking the superomedial pedicle intraoperatively.

The results of pulmonary function tests are shown in table 1. Variables that were statistically significant at different times were: total lung capacity (TLC) and residual volume (RV).

The results in the measurement of arterial blood gases were not statistically significant (Table 2).

DISCUSSION

There are few studies addressing the changes in lung function and respiratory mechanics in patients undergoing breast reduction.

The first published work, an observational one, is attributed to Conway and Smith¹⁰. The authors found better respiratory dynamics reported by patients undergoing reduction mammoplasty, deeming this benefit as possibly resultant of an increase in chest wall compliance.

Goldwyn¹¹ published a study with ten patients in 1974 assessing the lung function before and after resection of the breast (mean resection 1,980g), finding no change in the variables addressed. Starley *et al.*⁷ used the same methodology of Goldwyn's study in 1998, with 19 healthy women with a mean age of 34.9 years and mean body mass index of 27.62, the average weight of resected breast of 1,546g. All preoperative pulmonary function tests were within normal limits. Seventeen patients experienced improvement in pulmonary function tests postoperatively. A statistically significant improvement was found in peak expiratory and peak inspiratory flows.

In 2003, Sood *et al.*³ found statistically significant improvement in spirometry in the parameters inspiratory capacity, peak expiratory flow and maximal voluntary



Figure 3 - Patient in the postoperative period (six months) of reduction mammoplasty.

Table 1 – Results of pulmonary function tests.

Parameters	Preoperative(M/SD)	Postoperative (M/SD)	P
FEP (l/s)	5,80/ 2,02	5,77/ 2,07	0,875
FVC (l)	3,41/ 0,58	3,52/ 0,66	0,062
FEV1 (l)	2,87/ 0,49	2,89/ 0,50	0,530
FEV1/FVC	84,08/ 5,41	82,50/ 6,43	0,058
TLC (l)	4,48/ 0,89	5,21/ 1,08	0,005
RV (l)	1,07/ 0,53	1,66/ 0,54	0,005
ERV (l)	0,63/ 0,14	0,76/ 0,25	0,084
IC (l)	2,38/ 0,54	2,50/ 0,58	0,224

FEP - Forced expiratory peak; FVC - Forced vital capacity, FEV1 - Forced expiratory volume in one second; TLC - total lung capacity, RV - residual volume; ERV - expiratory reserve volume; IC - inspiratory capacity, (l/s) - liters per second (l) - liters; M - Mean, SD - Standard Deviation, FEV1/FVC - Ratio between forced expiratory volume in one second and forced vital capacity.

Table 2 – Analysis of arterial blood gases.

Parameters	Preoperative(M/SD)	Postoperative (M/SD)	P
pH	7,42/ 0,02	7,40/ 0,01	0,121
PaO ₂	100,30/ 11,26	110,83/ 16,80	0,263
PaCO ₂	35,72/ 3,62	34,90/ 2,02	0,623
HCO ₃	23,33/ 1,83	22,16/ 1,49	0,183
Sat O ₂	97,63/ 0,85	98,05/ 0,84	0,206

PaO₂ - partial pressure of oxygen; PaCO₂ - partial pressure of carbon dioxide; HCO₃ - bicarbonate; SpO₂ - oxygen saturation; M - mean; SD - standard deviation.

ventilation (2,220g of mean weight of resected breast). These parameters were also positively correlated with body mass index: the more obese the patients, the better the parameters of lung function.

In 2006, Iwuagwu *et al.*⁸ found no statistical significance in the same parameters in a randomized controlled study with 73 patients (mean of resected breast 1,381g), but when those data were analyzed with the weight of resected breast, they showed a positive correlation: forced expiratory volume over vital capacity, forced expiratory volume over forced vital capacity, peak expiratory flow and forced vital capacity.

In the present study (average of resected breast 1,525g) we observed a statistically significant increase in total lung capacity and residual volume.

Big and bulky breasts could exert a restraining effect on the chest, decreasing chest wall compliance and negatively affecting respiratory dynamics, reducing TLC and RV. We observed an increase in TLC and RV after reducing the size of the breasts of the studied patients.

There were no statistically significant results in the analysis of arterial blood gases. This fact can be explained by the large existing pulmonary functional reserve, since the patients in the study were healthy and young. However, it is possible that in situations of physiological stress or lung diseases, these can be altered.

The increase in total lung capacity and residual volume may suggest a better lung function after reduction mammoplasty in Gigantomastia, although not affecting blood gases in healthy patients.

R E S U M O

Objetivo: Avaliar prospectivamente a função pulmonar de pacientes submetidas à mastoplastia redutora. **Métodos:** Doze pacientes femininas portadoras de gigantomastia e sem antecedentes médicos, realizaram mastoplastia redutora no Hospital das Clínicas da UFBA. As pacientes foram submetidas ao teste de função pulmonar e medidas de gases sanguíneos arteriais nos períodos pré-operatório e pós-operatório (três a seis meses). Os dados obtidos foram analisados por meio do teste de Wilcoxon e o nível de significância estatística foi $p < 0,05$. **Resultados:** Nos dados obtidos por intermédio dos testes de função pulmonar, a capacidade pulmonar total e o volume residual foram maiores no pós-operatório ($p < 0,05$). Quanto aos dados de gases arteriais, não houve variações estatisticamente significantes. **Conclusão:** O aumento da capacidade pulmonar total e volume residual podem sugerir uma melhor função pulmonar após mastoplastia redutora em gigantomastia, apesar de não alterarem os gases arteriais das pacientes saudáveis.

Descritores: Mastoplastia. Espirometria. Teste de função respiratória.

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