Is there Enough Justification for Questioning Body Mass Index (BMI) as Exclusion Criteria of Reduction Mammoplasty in the Surgical Treatment of Symptomatic Macromastia?

F. Hernanz*, M. Fidalgo, P. Muñoz, M. González Noriega and M. Gómez-Fleitas

Oncoplastic Breast Unit, Department of Surgery, Valdecilla Hospital, University of Cantabria, Avda. Cardenal Herrera Oria, s/n. 30011 Santander, Spain

Abstract:

***Background*:** Despite the fact that reduction mammaplasty is an effective and efficient treatment to symptomatic macromastia, frequently, women demanding this treatment are accepted or not depending on body mass index criteria. The aim of this work was to compare changes of quality of life on obese and no-obese women who undergoing breast reduction mammaplasty.

***Methods*:** A prospective study was performed on 56 consecutive women undergoing bilateral reduction mammaplasty for symptomatic macromastia, 21 of them had a BMI lower than 30 (No-obese group) and 35 with 30 or higher BMI (Obese group). Short Form SF-36 quality of life questionnaires were answered at interviews a week before the surgery and six months after. To evaluate the change of quality of life we used "effect size".

Results: Preoperative SF36 scores did not make differences between both groups. Six months after surgery only postoperative physical score of no-obese patients was significantly higher than obese one (52.11 vs 48.47, $p>0.05$). Both groups increased clearly their quality of life showing an increment of all SF36 domains with an effect size ranged from 0.53 to 2.07. More than seventy percent of obese women improved their scores exceeding means of preoperative scores.

***Conclusion*:** According to our results and the fact that the main goal of the breast reduction is ameliorate the quality of life there is no justification for exclusion obese patients with BMI >30 who suffer from symptomatic macromastia from reduction mammaplasty.

***Therapy*:** Level III of Evidence.

Keywords: Reduction mammaplasty, Symptomatic macromastia, Obese, SF-36 health questionnaire, Effect size.

1. INTRODUCTION

Reduction mammaplasty (RM) and obesity is a frequent topic but most published articles are concerned with early surgical complications in those obese patients who undergoing a RM for symptomatic macromatia (SM) describing frequently an increment of the risks of complications in this group of patient. Although, some of them quantifying this risk stated that obesity status increases the odds ratio of experiencing complication by 11.8-fold after adjusting for other variables [1] or that a body mass index (BMI) greater than 35 is associated with a 2fold-higher risk of complication [2-5], the majority of complications are minor and they do not affect cosmetic and functional outcomes [6,7].

Other point related to obesity and RM is that despite the effectiveness of RM for the treatment of symptomatic macromastia showing a strong degree of scientific evidence [8] such surgery is often considered cosmetic and is rationed. BMI is often used as a criterion of selection, for example, a survey of funding criteria for RM conducted in United Kingdom over 303Trust in 2007 revealed that 198 of 245 responded specified a maximum BMI (range 25 to 32) as exclusion [9].

Although some articles [10-14] comment that these patients improved significantly their quality of life after breast reduction with the same extent as do those who are at normal weight, there is a paucity of specifically designed studies for the particular purpose of evaluate the effect of RM on obese patient and to compare them with those caused on no-obese patients.

2. PATIENTS AND METHODS

A prospective study was performed on 56 women who underwent bilateral RM for SM by one surgeon at Valdecilla University Hospital (Santander, Spain) from March 2010 to March 2013. Preoperative data such as age, measurement for height, weight, sternal notch-to-nipple distance, presence of morbidities such as arterial hypertension, diabetes, chronic respiratory disease, smoking habit were recorded during at an appointment a week before surgery. Weight and height were converted to BMI using the following formula weight (kg)/ height^2 (m).

*Address correspondence to this author at the Urb. Las Pérgolas 10, 39110 Sancibrian, Cantabria, Spain; Tel: 34699436877;
E-mail: hernanzf@unican.es and cgdhff@humv.es

E-ISSN: 0000-0000/15

The RM technique consisted of the wise keyhole pattern with two different pedicles for translation of the nipple areola complex (NAC) a superomedial an inferior one and a free nipple graft was used in three patients (mean of breast tissue removed was 2652 g deviation standard (DS) 605.5). The amount of breast tissue removed was obtained by weighing the fresh breast tissue on a digital scale in the operating theatre. The average time of surgery was 2.9, (DS) 0.47 hours. Early surgical complications which happened during 30 days after surgery were gathered prospectively.

Short Form SF-36 quality of life (Spanish version 1.4, June 1999) [15] questionnaires were answered at interviews a week before the surgery and six months after surgery. The Short Form-36 Health Survey is a validated and widely used questionnaire to assess health-related quality of life. It contains 36 items building eight health subscales (physical function and activities, daily activities, emotional status, social activities, mental health, vitality and energy, pain and general health) and two summary scores, physical health and mental health. Higher scores represent better health. We used the physical and mental summary scores to demonstrate changes separately for physical and mental functions.

To evaluate the changes after RM, “effect size” was calculated according to the method recommended by Hedges,LV [16]. It has been suggested that an effect size of 0.2 or less is small, 0.5 is moderate and 0.8 or greater is large [17].

We made comparison between two group of patients, No-Obese (BMI >30 Kg/m2) and Obese (BMI ≥30 Kg/m2).

3. RESULTS

Characteristic of the patients are described on Table **1**. Tables **2** and **3** show mean and SD of SF-36 scores of the both groups at week before and six months after surgery. Effect size as method to evaluate the effect-

Table 1: Characteristic of 56 Patients with Symptomatic Macromastia who Undergoing Reduction Mammaplasty

Group	No Obese (n=21)	Obese (n=35)	p*
Age (years)	38.9 (12)	42 (13.3)	0.370
BMI (kg/m^2)	27.6 (1.8)	34.2 (3.8)	0.001
Total amount of breast tissue removed (g.)	1278.5 (588.9)	1654.2 (620.2)	0.023
Smoker	45 %	41%	0.784
Co-Morbidities	9.5 %	38.9%	0.015
Early complications	19%	31.4%	0.311

n = Number of patients; SD = Standard deviation; BMI = Body mass index.
*Mann-Whitney and Chi-Square test, statistical significance p<0.05.

Table 2: Short Form-36 Questionnaire Scores of Both Group of Patients a Week before Surgery

Dimension	No-Obese		Obese)		P*
	Mean	SD	Mean	SD	
Physical function	73.5	17.72	61.8	26.04	0.129
Role physical	41.6	40.56	56.6	42.77	0.247
Bodily pain	33.3	17.53	38.2	24.01	0.350
General health	62.2	18.28	59.8	20.24	0.671
Vitality	46.4	17.47	48.8	17.54	0.327
Social function	55.9	24.56	61.4	28.09	0.412
Role emotional	49.2	45.48	57.8	43.16	0.500
Mental health	49.7	18.65	59.0	22.61	0.110
Physical component	42.9	6.59	40.7	8.88	0.310
Mental component	36.0	11.60	42.0	13.58	0.131

SD = standard deviation.
*Mann-Whitney test, statistical significance p<0.05.

Table 3: Short Form-36 Questionnaire Scores of both Groups of Patients Six Months after Breast Reduction Surgery

Dimension	No-Obese		Obese)		P*
	Mean	SD	Mean	SD	
Physical function	91.7	13.80	84.7	18.45	0.108
Role physical	88.2	29.47	77.9	36.99	0.364
Bodily pain	77.7	24.59	67.7	21.73	0.107
General health	78.4	18.28	72.7	21.68	0.299
Vitality	68.2	17.61	70.8	17.81	0.626
Social function	90.4	15.00	83.0	24.27	0.435
Role emotional	92.1	18.74	87.0	30.64	0.947
Mental health	75.1	15.64	74.6	22.58	0.697
Physical component	**52.1**	**7.42**	**48.4**	**6.73**	**0.020**
Mental component	**50.2**	**7.35**	**50.0**	**10.99**	0.518

SD = standard deviation.
*Mann-Whitney test, statistical significance p<0.05.

Table 4: Effect Sizes on Both Groups of Patients after Breast Reduction Calculated using Hedges Method. P Adjusted or Proportion of Patients who Scored after Surgery a Higher Score than the Mean Preoperative One on Respective Domains

SF36 Scores	Effect Size		P Ajusted	
	No Obese	Obese	No Obese	Obese
Physical function	1.11	0.99	0.87	0.84
Role physical	1.26	0.53	0.90	0.70
Bodily pain	2.07	1.27	0.98	0.90
General health	0.87	0.61	0.81	0.73
Vitality	1.22	1.23	0.89	0.89
Social function	1.62	0.81	0.95	0.79
Role emotional	1.16	0.77	0.88	0.78
Mental health	1.43	0.68	0.92	0.75
Physical component	**1.28**	**0.97**	**0.90**	**0.83**
Mental component	**1.39**	**0.64**	**0.92**	**0.74**

Effect Size (Cohen's *d, r*) & Standard Deviation
Effect size is a standard measure that can be calculated from any number of statistical outputs.
One type of effect size, the standardized mean effect, expresses the mean difference between two groups in standard deviation units. Typically, you'll see this reported as Cohen's *d*, or simply referred to as "*d*." Though the values calculated for effect size are generally low, they share the same range as standard deviation (-3.0 to 3.0), so can be quite large. Interpretation depends on the research question. The meaning of effect size varies by context, but the standard interpretation offered by Cohen (1988) is: .8 = large (8/10 of a standard deviation unit); .5 = moderate (1/2 of a standard deviation); .2 = small (1/5 of a standard deviation.

iveness of RM is demonstrated on Tables **4**. Table **5** shows differences of SF36 domains between preoperative and postoperative evaluations of both groups.

4. DISCUSSION

Although obese patients had a major proportion of comorbidities such as diabetes mellitus, arterial hypertension, asthma (31%) and the fact that the amount of breast tissue removed was higher than no-obese patients with an average difference of 376 grams, so their breasts must have been quite larger, SF-36 domains scores did not make differences statistically significant between both groups. No-obese group scored a very low mental component 36.01.

RM results in great relief of physical symptoms and pain increasing physical and body pain scores dramatically with an amazing effect sizes on no-obese patients (1.26 and 2.07). As a result, by alleviating the physical complaints caused by heavy breasts, this surgical

treatment gives an excellent improvement in quality of life and physical appearance (Figures **1** and **2**).

Table 5: Comparison Between Both Groups. SF36 Score Differences Between Preoperatively and Postoperative Evaluations

Dimension	No Obese	Obese	p
Physical function	18.79	23.58	0.719
Role physical	51.56	19.72	0.062
Bodily pain	48.25	27.46	0.071
General health	11.48	10.74	0.877
Vitality	21.11	18.27	0.578
Social function	34.37	18.54	0.084
Role emotional	45.83	19.64	0.106
Mental health	22.83	11.67	0.123
Physical component	10.57	7.77	0.605
Mental component	14.29	5.50	0.049

*Mann-Whitney test, statistical significance p<0.05.

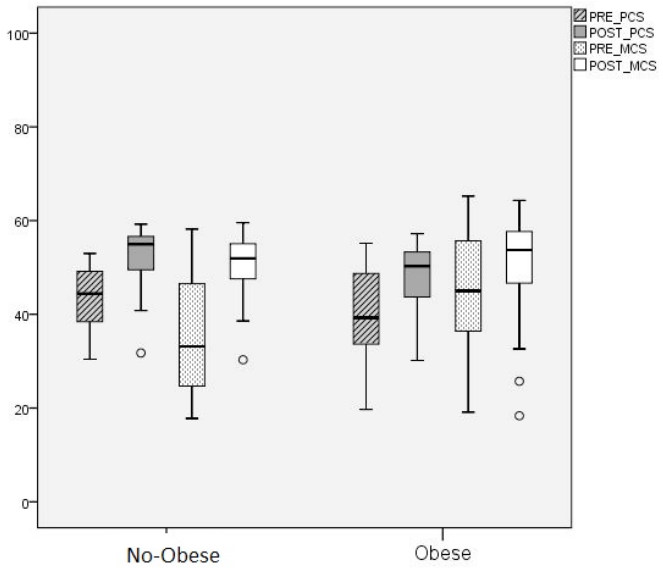

Figure 1: Schematic representation of physical and mental component scores of SF-36 questionnaires of both groups.

The size effects, which demonstrate the effectiveness of RM, were higher in no-obese patients ranged from 0.87 to 2.07; even though, changes in obese patients were relevant ranged from 0.53 to 1.27 and in all domains more than 70 percent of obese women improved their scores exceeded means of preoperative ones.

Comparison of preoperative and postoperative scores indicates that there was a significant improvement in health-related quality of life at six months after RM showing the effectiveness of this surgical treatment. Both groups improved their quality scores after surgery and only physical component of obese patients scored significantly lower comparing both groups.

Figure 2: Change of appearance after breast reduction.

In our study, obese patients, who have a BMI over 30, suffering macromastia benefited clearly from RM, which made a normalizing effect on the quality of life evaluated by Short Form SF-36 showing a defined improvement on all SF36 domains. These findings are similar to what have been published by Singh [8], Blomqvist L [14] and Saariniemi K [18] in patients with SM with less BMI. The improvement in health-related quality of life experienced by obese women with macromastia who underwent RM was mainly based on the improvement of physical health with a size effect of 0.97 (which is considered so large).

5. CONCLUSION

In summary, according to our findings obese patients with symptomatic breast hipertrophy are clearly positive affected by RM increasing their quality of life with a large size effects. Thinking that the amelioration

of quality of life is the main goal of this type of surgery there are not scientific reasons to exclude these patients from this surgical treatment based on BMI index by contrast there is enough justification for questioning BMI as selection criteria.

ACKNOWLEDGMENTS

This study could not have been conducted without the generous collaboration of the patients who completed the questionnaires.

REFERENCES

[1] Chen CL, Shore AD, Johns R, Clark JM, Manahan M, Makary MA. The impact of obesity on surgery complications. Plast Reconstr Surg. 2011; 128: 395e-402e.
http://dx.doi.org/10.1097/PRS.0b013e3182284c05

[2] Chun YS, Schwartz MA, Gu X, Lipsitz SR, Carty MJ. Body mass index as a predictor of postoperative compliactions in reduction mammaplasty. Plast Reconstr Surg. 2012; 129: 228e-233e.
http://dx.doi.org/10.1097/PRS.0b013e31823ae949

[3] Gust MJ, Smetona JT, Persing JS, Hanwrigt PJ, Fine NA, Kim JY. The impact of body mass index on reduction mammoplasty: a multicenter analysis of 2492 patients. Aesth Surg J. 2013; 33: 1140-1147.
http://dx.doi.org/10.1177/1090820X13508131

[4] Manahan MA, Buretta KJ, Chang D, Mithani SK, Mallalieu J, Shermak MA. An outcome analysis of 2142 breast reduction procedures. Ann Plast Surg. 2015; 74: 289-92.
http://dx.doi.org/10.1097/SAP.0b013e31829d2261

[5] Kalliainen LK. ASPS Clinical practice guidelines summary on reduction mammaplasty. Plast Reconstr Surg. 2012; 130: 785-789.
http://dx.doi.org/10.1097/PRS.0b013e318262f0c0

[6] Shah R, Al-Ajam Y, Stott D, Kang N. Obesity in mammoplasty: a study of complications following breast reduction. J Plast Reconstr Aesth Surg. 2011; 64: 508-514.
http://dx.doi.org/10.1016/j.bjps.2010.07.001

[7] Fisher JP, Cleveland EC, Shang EK, Nelson JA, Serletti JM. Complications following reduction mammaplasty: a review of 3538 cases from the 2005-2010 NSQIP data sets. Aesth Surg J. 2014; 34: 66-73.
http://dx.doi.org/10.1177/1090820X13515676

[8] Singh KA, Losken A. Additional benefits of reduction mammoplasty: a systematic review of the literature. Plast Reconstr Surg. 2012; 129: 562-579.
http://dx.doi.org/10.1097/PRS.0b013e31824129ee

[9] Wraight WM, Tay SK, Hduka C, Pereira JA. Bilateral breast reduction surgery in England: a postcode lottery. J Plast Reconstr Aesth Surg. 2007; 60: 1039-1044.
http://dx.doi.org/10.1016/j.bjps.2007.03.002

[10] Cohn AB, Agarwal S, Kulkarm A, Song D. Vertical reduction mammoplasty in the obese population. Open Reconstr Cosmet Surg. 2010; 3: 1-6.
http://dx.doi.org/10.2174/1876976401003010001

[11] Wagner DS, Alfonso DR. The influence of obesity and volume of resection on success in reduction mammoplasty: an outcomes study. Plast Reconstr Surg. 2005; 115: 1034-1038.
http://dx.doi.org/10.1097/01.PRS.0000154213.06888.F9

[12] Valtonen JP, Setälä LP, Mustonen PK, Blom M. Can the efficacy of reduction mammoplasty be predicted? The applicability and predictive value of breast-related symptoms questionnaire in measuring breast-related symptoms pre and postoperatively. J Plast Reconstr Aesthet Surg. 2014; 67: 676-81.
http://dx.doi.org/10.1016/j.bjps.2014.01.020

[13] Nguyen JT, Wheatley MJ, Schnur PL, Nguyen TA, Winn SR. Reduction mammaplasty: a review of managed care medical policy coverage criteria. Plast Reconstr Surg. 2008; 121: 1092-1100.
http://dx.doi.org/10.1097/01.prs.0000304238.43482.9c

[14] Blomqvist L, Eriksson A, Brandberg Y. Reduction mammoplasty provides long-term improvement in health status and quality of life. Plast Reconstr Surg. 2000; 106:991-997.
http://dx.doi.org/10.1097/00006534-200010000-00005

[15] Alonso J, Prieto L, Antó JM. La versión española del SF-36 Health Survey (Cuestionario de Salud SF-36): un instrumento para la med.ida de los resultados clínicos. Med Clin. 1995; 104: 771-776.

[16] Hedges, LV. Distribution theory for glass´s estimator of effect size and related estimators. J Educ Stat. 1981; 6: 107-128.
http://dx.doi.org/10.2307/1164588

[17] Cohen J. Statistical power analysis for the behavioural sciences. New York: Academic Press, 1977.

[18] Saariniemi KMM, Keranen UH, Salminen-Peltola PK, Kuokkane HOM. Reduction mammaplasty is effective treatment according to two quality of life instruments. A prospective randomised clinical trial. J Plast Reconstr Aesthet Surg. 2008; 61: 1472e-1478e
http://dx.doi.org/10.1016/j.bjps.2007.09.024

Received on 3-10-2015 Accepted on 12-10-2015 Published on 16-10-15