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ORIGINAL ARTICLE BREAST

Quality of Life and Alleviation of Symptoms After Breast Reduction for Macromastia in Obese Patients: Is Surgery Worth It?

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Abstract

Background Breast hypertrophy can cause a variety of symptoms and affect lifestyle and quality of life. Breast reduction, being the most effective treatment, is sometimes difficult to establish as standard treatment in obese patients (difficulties to differentiate symptoms from macromastia or from obesity, higher rate of complications).

Aim To evaluate the effect of reduction mammaplasty (quality of life and symptoms) in obese patients comparing with non-obese.

Methods This is a prospective study of patients undergoing reduction mammaplasty. Patients were allocated in non-obese (BMI < 29) and obese (BMI > 30). Demographic data, comorbidities, specific symptoms questionnaire, data from the surgical procedure, Spanish version of the Health-Related Quality of Life (SF-36) questionnaire, complications and sequels were recorded and collected before the operation and at 1 month and 1 year after. Chi-square, Fisher's exact *t* test, McNemar, Mann–Whitney *U* and Kruskal–Wallis tests were used for statistical analysis.

Results One hundred twenty-one consecutive patients were operated on; 54 (44.6 %) obese and 67 (55.4 %) non-obese. The average age of patients was 40.7 (18–78), average volume of resected tissue was 1.784 g (401–5.790), and average hospital stay was 2.94 days (1–11). There were no differences between obese and normal BMI patients with regard to length of hospital stay, complications, sequels, or reoperations. Symptoms improved in both groups. Physical and mental components of the SF-36 improved at 1 year in both groups ($p < 0.001$). The mental health component improved at 1 month ($p < 0.001$) in both groups.

Conclusions Obese patients should be considered for reduction mammaplasty surgery in the same way as women of normal weight.

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Keywords Breast hypertrophy · Reduction mammaplasty · Obesity · Quality of life · SF-36 questionnaire

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Introduction

Macromastia, or breast hypertrophy, is associated with a variety of physical symptoms that include back and neck pain, shoulder grooving caused by bra straps, submammary

intertriginous creasing, posture disturbances, headaches and chronic neuropathies [1, 2].

The condition can also affect the lifestyle of the individual with regard to sleep patterns, dress, sexual relations, work, sports and recreational activities; furthermore, there may be psychological problems that lead to anxiety, depression and low self-esteem [3].

All the above-mentioned symptoms influence quality of life, the measurement of which is essential for evaluating the results of all surgical interventions related to the breasts (cosmetic or repair surgery). Quality of life in women suffering macromastia is usually impaired and patients seek treatment aimed at improving well-being. Surgical intervention is recognised as the most effective treatment for breast hypertrophy: weight loss, hormonal therapy and physical therapy have had very little success [4].

Breast hypertrophy is sometimes associated with a high BMI, a condition that, in and of itself, can cause the same symptoms as macromastia. Obese patients exhibit most of the same physical or general life characteristics as macromastia sufferers, so it is sometimes difficult to distinguish the symptoms of macromastia patients from symptoms that are caused by obesity alone [5].

In spite of the wide diversity of symptoms, it is not easy to establish a specific clinical profile for breast hypertrophy: many of the symptoms are inexact and are shared by obese women with normal-sized breasts [6]. Reduction mammaplasty is a safe procedure and highly effective in relieving symptoms caused by breast hypertrophy [7]. Difficulties arise when it is not clear if symptomatic hypertrophy alone causes an impairment of quality of life or it is associated with a more complex syndrome related to obesity.

The demand for breast reduction operations is increasing in Spain and the public health system is not sufficiently resourced to be able to fully respond—access to surgery is limited and waiting lists are long. In Sweden, only women with a normal BMI and large breasts have access to breast reduction operations through the public healthcare system [7], this is also true in Spain and many other countries. Restricted access to waiting lists generally focuses on the obese population.

In many institutions, obesity is considered as a contraindication for breast reduction surgery due to the increased possibility of complications [8], difficulties in finding related symptoms and the presence of comorbidities; the potential benefits of surgery in this population are therefore difficult to evaluate.

Breast reduction operations in the general population have a low rate of complications [9]. They are mostly related to the surgeon's experience and skills, the surgical technique and comorbidities (if the patient is a smoker, has diabetes or is obese). The obese population presents a higher rate of surgical complications in conventional and reduction breast surgery and this may limit the effect of reduction operations and obscure results [10, 11].

The present study was undertaken to determine how breast reduction affects the quality of life and alleviates symptoms in an obese (BMI $\geq$ 30 kg/m^2) population compared with normal, non-obese women.

Patients and Methods

A prospective study was carried out on a consecutive series of bilateral breast reduction patients at the breast unit of our centre. All operations used the same surgical technique: inferior pedicle reduction mammaplasty with inverted T-Scar (Wise Pattern).

The inclusion criteria (a minimum of two) were as follows:

- Patients suffering symptomatic macromastia, as diagnosed by an orthopaedic surgeon, rheumatologist, or psychosomatic specialist.
- Objective, measurable data demonstrating breast hypertrophy (the surgeon's criteria): a sternal notch to nipple distance of more than 26 cm.
- Behavioural disturbances caused by breast hypertrophy (the psychosomatic specialist's criteria).

Patients under 18 years old, individuals who had suffered a breast tumour or undergone radiotherapy, and patients who demonstrated psychiatric problems or had unrealistic expectations with regard to the operation were excluded. We also excluded patients with morbid obesity (BMI $\geq$ 40 kg/cm^2 or BMI $\geq$ 35 kg/cm^2 and comorbidities caused by overweight (diabetes and hypertension).

The patients' weights were categorised as follows: a BMI equal to or less than 18.5 kg/m^2 was classified as 'underweight'; a BMI between 18.5 and 24.99 kg/m^2 was 'normal weight'; a BMI between 25 and 29.99 kg/m^2 was 'overweight' and a BMI of 30 kg/m^2 or more was 'obese' (in line with the WHO general classification of obesity) [12]. Based on their BMIs, the patients were divided into two groups (underweight, normal, and overweight formed the 'non-obese' group; the remainder comprised the 'obese' group).

All the data were collected by the same researcher in personal interviews. Conventional demographic data (age, BMI, smoker/non-smoker, employment, education and comorbidities) and the patient's medical history (presence of comorbidities: hypertension, diabetes, vasculopathy, steroid treatment and reactive airway disease) were recorded. A questionnaire on specific symptoms related to breast hypertrophy using a 9-item scale was completed, supplying information on the alleviation of symptoms related to

macromastia and the overall satisfaction of the patient with regards to the operation. This questionnaire included assessment of pain, physical symptoms, skin lesions, daily activities, appearance, exercise and respiratory problems.

Data from the surgical procedure (duration of the operation and volume of resected tissue), the postoperative period (length of hospital stay, complications and reoperation) and long-term sequelae were also recorded.

Patients completed the Spanish version of the Health-Related Quality of Life (SF-36) Questionnaire [13] before the operation and at 1 month and 1 year after the intervention. The questionnaire consists of 36 items that measure 8 domains: physical function; physical role (including any physical limitations); pain; perception of general health; vitality; social function; emotional role and mental health (emotional well-being). The scores range from 0 to 100, a higher score indicates a better state of health.

Surgical Technique

The same technique (conventional inferior pedicle reduction mammaplasty) was used with all the cases, irrespective of the patients' BMI, breast size or degree of ptosis. The surgical interventions were undertaken by 4 experienced reduction mammaplasty surgeons; at the University Hospital, reduction mammaplasty has been a conventional procedure for more than 20 years.

Postoperative complications were registered during the hospital stay and 1 month after surgery. Complications were considered as those occurring in the first month after the operation. After discharge, patients were checked at 1 week and whenever necessary, focusing on the discovery of specific complications. If the patient had no major complaints, the second follow-up was scheduled at 1 month after surgery and the final visit was 1 year after surgery. Sequelae were considered as effects that lasted more than 1 month after the operation.

The hospital ethics committee gave approval for recording the data, and permission was obtained from the owners of the copyright for the use of the test included in this study (SF-26 Spanish version). All specimens were analysed by a pathologist to identify occult pathological or premalignant conditions.

Statistical Analysis

Data were expressed in means with standard deviations (SD) or in frequencies and percentages. The Chi-square and Fisher's exact t tests were used to analyse the independent qualitative variables. The McNemar test was used to examine the association between two related qualitative variables. Results for the three stages of data collection were compared using the Wilcoxon or Friedman test. The Mann–Whitney U was utilised for comparing means between independent groups, and the Kruskal–Wallis test was employed for two and three groups, respectively. Data normality was screened with the Kolmogorov–Smirnov test. A confidence level of 95 % was selected. The statistical analysis was carried out with SPSS (v 15.0).

Results

Our sample of 121 patients underwent breast reduction surgery between 2012 and 2013. Table 1 gives information on the classification of the patients in accordance with their BMI. Demographic data are shown in Table 2. BMI was used to divide the population into two groups: 54 (44.6 %) patients were considered as obese and 67 (55.4 %) as non-obese. The average age was 40.7 (SD 12.02, range 18–78 years) and average weight was 76.5 kg. (SD 12.84, range 49–111 kg).

The average volume of resected tissue was 1.784 g (SD 876.17), (401–5.790 g). Average hospitalisation time was 2.94 days (SD 1.32), the minimum was 1 day and the maximum was 11 days.

Data from the operations can be seen in Table 3. The volume of resected tissue was higher in the obese group ($p < 0.001$). There were no differences between obese and normal BMI patients with regard to length of hospital stay and reoperations. The rate of complications (Table 4) was low (27.3 %); the most common was skin dehiscence (11.6 %) that produced delayed healing, followed by hematoma (3.3 %). There were two cases of NAC necrosis: one was partial and recovered after 2 weeks; the other was complete and required additional surgery. There were no medical complications in the postoperative period and there were no significant differences in the rate of surgical complications between obese and non-obese patients ($p = 0.911$); this was also true for smokers and non-smokers ($p = 0.845$), the volume of resected tissue ($p = 0.097$) and age ($p = 0.945$). Two patients required reoperation within 24 h after the procedure (both were from the non-obese group) due to active bleeding that caused voluminous haematoma.

Table 1 Patient classification in accordance with BMI: obese (BMI $\geq$ 30 kg/m^2) and non-obese (BMI $<$ 30 kg/m^2) groups

	n	%		*n*	%
Underweight	1	0.8			
Normal	23	19.0	Non-obese	67	55.4
Overweight	43	35.5			
Obese	54	44.6	Obese	54	44.6
Total	121	100.0	Total	121	11.0

Table 2 Characteristics of the study population before surgery (mean ± SD)

Demographic data	Total $n = 121$	Non-obese $n = 67$	Obese $n = 54$	p value
Age (mean ± SD)	40.7 (12.0)	38.8 (11.6)	43.1 (12.2)	**0.050**
BMI (mean ± SD)	29.6 (5.3)	25.9 (2.8)	34.3 (3.6)	**0.000**
Smoker?[a]				
Yes	42 (34.7)	24 (35.8)	18 (33.3)	0.775
No	79 (65.3)	43 (64.2)	36 (66.7)	
Residence				
Rural	68 (56.2)	39 (58.2)	29 (53.7)	0.620
Urban	53 (43.8)	28 (41.8)	25 (46.3)	
Employment				
Working	75 (62.0)	45 (67.2)	30 (55.6)	0.191
Unemployed	46 (38.0)	22 (32.8)	24 (44.4)	
Education				
Primary	47 (38.8)	18 (26.9)	29 (53.7)	**0.005**
Secondary	53 (43.8)	38 (56.7)	15 (27.8)	
University	21 (17.4)	11 (16.4)	10 (18.5)	
Comorbidity				
Yes	61 (50.4)	36 (53.7)	25 (46.3)	0.416
No	60 (49.6)	31 (46.3)	29 (53.7)	
Reasons for surgery PAIN				0.690
Yes	118 (97.5)	65 (97.0)	53 (98.1)	
No	3 (2.5)	2 (3.0)	1 (1.9)	

Statistically significant p values are given in bold

[a] Smoker: more than 10 cigarettes per day

Table 3 Operation data (mean ± SD)

Results	Total $n = 121$	Non-obese $n = 67$	Obese $n = 54$	p value
Average resected tissue (g)	1785.5 (876.2)	1376.6 (544.2)	2292.7 (946.5)	**0.000**
Hospital stay (days)	2.9 (1.3)	2.8 (1.4)	3.1 (1.2)	0.211
Reoperation (1 month)				
Yes	2 (1.7)	2 (3.0)	0 (0.0)	0.200
No	119 (98.3)	65 (97.0)	54 (100.0)	
Long-term re-intervention				
Yes	13 (10.7)	8 (11.9)	5 (9.3)	0.636
No	108 (89.3)	59 (88.1)	49 (90.7)	

Statistically significant p value is given in bold

The long-term rate of sequelae was 30.6 %; the most common problems were hypertrophic scaring (15.7 %) and 'dog ears' (7.4 %). The incidence of other sequelae was very low (<2 %), and there was no statistically significant difference between the two groups ($p = 0.323$) (Table 5). We found no association between the rate of sequelae and smoking status ($p = 632$), age ($p = 0.665$) or the volume of resected tissue ($p = 0.153$).

The results of the questionnaire on symptoms (Fig. 1) revealed a significant improvement in both groups. All the symptoms, except NAC sensitivity, showed improvement at 1 year after the operation, with no significant differences between the two groups.

NAC sensitivity improved in the obese group at 1 year, in comparison with the results at 1 month ($p = 0.011$).

The sports activities category showed significant improvement in the non-obese group at 1 year (compared with results at 1 month) but this was not the case for the obese group ($p < 0.001$ year vs. month for non-obese and $p = 0.017$ year vs. month for obese). Respiratory

Table 4 List of immediate complications (1 month) (mean ± SD)

Immediate complications *n* (%)	Total $n = 121$	Non-obese $n = 67$	Obese $n = 54$
Delayed wound healing	14 (11.6)	7 (10.4)	7 (13.0)
Hematoma	4 (3.3)	4 (6.0	
Suture stitches intolerance	3 (2.5)	2 (3.0)	1 (1.9)
Fat necrosis	2 (1.7)		2 (3.7)
NAC necrosis	2 (1.7)	2 (3.0)	
Cellulitis/Mastitis	2 (1.7)	1 (1.5)	1 (1.9)
Infection	2 (1.7)	1 (1.5)	1 (1.9)
Skin necrosis	1 (0.8)		1 (1.9)
Chronic fistulae (stitch abscess)	1 (0.8)	1 (1.5)	
Other	2 (1.7)		2 (3.7)
Total	33 (27.3)	18 (26.9)	15 (27.8)

Suture stitches intolerance: inflammatory reaction to sutures, deep and superficial

NAC nipple areola complex

Table 5 List of delayed sequels (mean ± SD)

Sequelae *n* (%)	Total $n = 121$	Non-obese $n = 67$	Obese $n = 54$
Hypertrophic scars	19 (15.7)	8 (11.9)	11 (20.4)
Dog ears	9 (7.4)	3 (4.5)	6 (11.1)
Snoopy deformity	2 (1.7)	2 (3.0)	
Periareolar Fistulae	2 (1.7)	1 (1.5)	1 (1.9)
Hyperpigmented scars	1 (0.8)	1 (1.5)	
Keloid scars	1 (0.8)	1 (1.5)	
Nodules	1 (0.8)	1 (1.5)	
Fat necrosis	1 (0.8)		1 (1.9)
Asymmetry	1 (0.8)	1 (1.5)	
Total	37 (30.6)	18 (26.9)	19 (35.2)

'Snoopy deformity': Increased distance between inferior pole of the areola and the submammary crease

symptoms improved in the obese population at 1 month ($p = 0.038$) and at 1 year ($p = 0.026$) compared with results before, but there was no change in the non-obese population ($p = 0.317$ year vs. before and $p = 0.317$ month vs. before).

Exercise and daily activities decreased at 1 month, in both groups, but improved after 1 year (this is probably due to the convalescence period) (Exercise: $p = 0.094$ year vs. before for obese and $p = 0.042$ year vs. before for non-obese) (daily activities: $p < 0.001$ year vs. before for both groups).

The results of the SF-36 Quality of Life questionnaire (Fig. 2) showed an improvement in the physical component at 1 year for both groups ($p < 0.001$); however, there was no improvement at 1 month ($p = 0.091$) in the non-obese group.

Mental health improved at 1 month ($p < 0.001$) and at 1 year ($p = 0.001$) but the improvement was not statistically significant in the obese population ($p = 0.051$) at 1 year in comparison with the results at 1 month.

Discussion

Should we operate on obese patients with symptomatic macromastia? Does the rate of complications in obese patients mean that they should not be considered for breast reduction surgery? Can the symptoms of obesity nullify the benefits of breast reduction surgery? Should obese patients receive different surgical attention than non-obese patients? These are the most important questions and issues concerning the surgical treatment of symptomatic

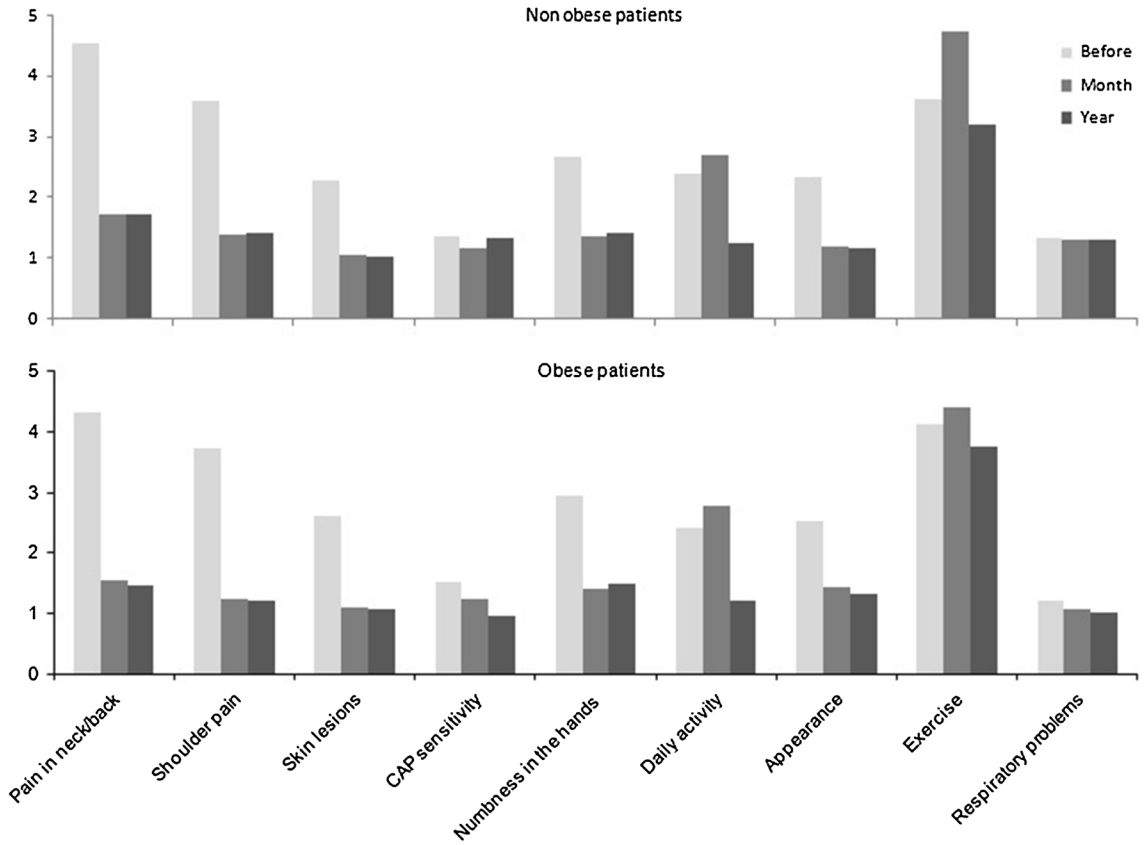

Fig. 1 Evaluation of symptoms: symptoms before the operation, at 1 month and at 1 year after surgery. (from '5', the worst value, to '0', the best). Columns of SF-36 scores divided into sub-scores. *Upper graph* non-obese patients; *lower graph* obese patients. The values are expressed by the average score of each component

macromastia in obese patients; this study was undertaken in an attempt to provide the answers.

Postoperative Complications, Length of Hospital Stay and Sequels

Several studies have evaluated the incidence of complications of breast reduction surgery in obese patients [8, 10]. In most instances, the rate of complications could be affected by the definition of the complication itself. The vast majority of studies conclude that breast reduction surgery in the obese population has a significantly higher rate of complications than in the non-obese population [8], although there is some evidence to the contrary [5, 10]. The rate of complications could be used to prevent obese women from having access to major breast or cosmetic surgery; in fact, a BMI of more than 28 kg/m^2 has been considered as an exclusion criterion [3]. Health insurance companies use these data to deny coverage for such procedures. The rate of complications in our study (27.3 %) was very low compared with other research, even with regard to the normal BMI population. Our study had 44.6 % of participants with a BMI of 30 kg/m^2 or more; in most other studies, the percentage of obese patients was lower.

The most common complication in our research was suture dehiscence, mainly due to tension in the skin suture line. This should be considered as a minor complication; although in some studies, this has not been the case [14].

It has been reported that the risk of NAC necrosis increases with an increase in BMI [14]. Our results did not concur with this finding and we used the same technique with all patients. A similar study [15], based on 186 reduction mammaplasties using the inferior pedicle technique, concluded that complications after reduction mammaplasty are similar in both obese and non-obese populations, and it should be noted, however, that the number of obese patients in the aforementioned work was lower than in our series.

Seroma formation and delayed wound healing are the most commonly documented complications [15]; they should also be viewed as minor complications.

We found that that neither the BMI nor the surgical technique was responsible for the rate of complications. Other authors have concluded that the volume of resected tissue, which is greater in obese patients, is directly related

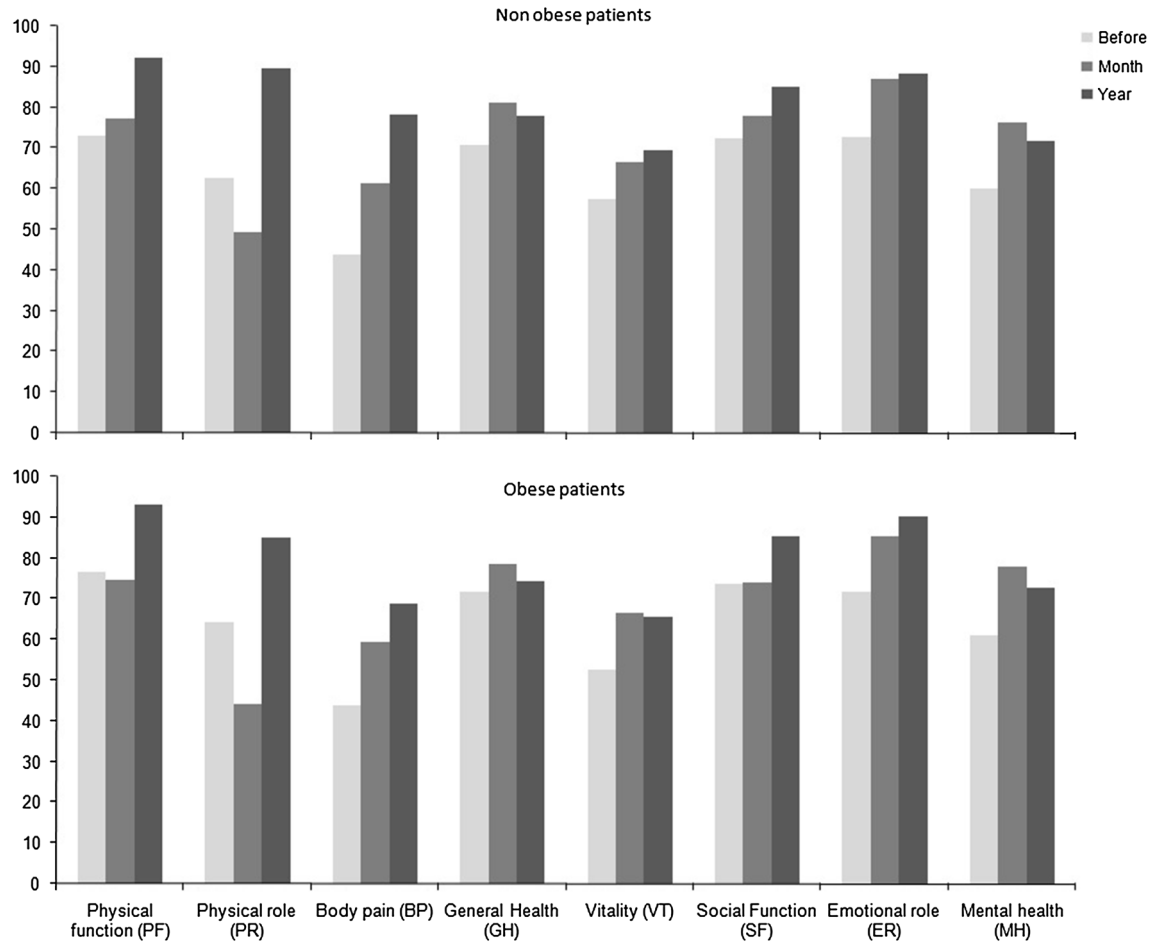

Fig. 2 SF-36 questionnaire results: Quality of life evaluation: before the operation, at 1 month and at 1 year after surgery. (100 = the best value, except body pain, 0 = the worst value, except body pain). Columns of SF-36 scores divided into sub-scores. *Upper graph* non-obese patients; lower graph: obese patients. The first four items (PF, PR, BP, GH) are considered as the physical component, and the following four items (VT, SF, ER, MH) are considered as the mental component. The values are expressed by the average score of each component

to the rate of complications [16, 17]. Some authors argue that the use of the free nipple graft technique avoids NAC necrosis and may diminish the rate of complications; however, because the cost is a loss of sensitivity and a worse NAC appearance [18], we rejected the use of this technique.

We have obtained the same results with obese and non-obese patients with regard to complications, length of hospital stay and long-term sequels, irrespective of the volume of resected tissue. The results are not affected by age, employment status, the presence of comorbidities or the level of education (Table 4).

Surgical Technique

There are no specific reduction mammaplasty techniques for obese patients. In our study, all the patients were satisfactorily operated on using the inferior pedicle method—the most widely employed technique—as described in most of the published scientific literature. We use this technique regardless of breast size, degree of ptosis, the age of the patient or any other characteristic (our unit only treats symptomatic macromastia, there are no purely cosmetic operations that utilise other techniques, such as Lejour breast reduction [19], lateral pedicle [20], combined superior and inferior pedicle [21], etc.). We are not the only physicians that exclusively use this procedure; some prefer using the same technique for all patients regardless of their BMIs [15]. This can be seen as a notable strength of our study as different techniques could result in different rates of complications in patients with differing BMIs.

Quality of Life

This is probably the most important issue. The SF-36 questionnaire is the most commonly utilised tool for post-

surgery evaluation [22]. There is no doubt that reduction mammaplasty affects the quality of life of women with symptomatic macromastia: the vast majority of studies conclude that breast reduction operations improve quality of life though very few of them differentiate between obese and non-obese patients [23, 24]. In our study, we observed a similar, significant improvement ($p < 0.001$) in quality of life, at 1 month and at 1 year in both groups, with no statistically significant differences, except for physical and social functions which did not improve at 1 month (in the obese and non-obese groups) but did improve at 1 year (also in both groups), with no statistically significant differences. These findings are compatible with other published works: Eggert et al. [7] reported similar results for the physical function, but not for the social function, which improved at the second visit (2 months after the operation). These results may be explained by the fact that both the physical and social functions are closely related to the surgical intervention and the physical convalescence period is a minimum of 1 month. A number of studies have used a three-month follow-up in order to take account of this fact [7, 23].

Some authors argue that the operation can encourage patients to maintain and even reduce their weight [25, 26], a tendency that we have observed among our patients (data not published). A possible explanation for this is that when breast size is reduced, women are more inclined to do physical exercise and involve themselves in activities outside the home. It is also possible that women have more energy as the operation may result in improved glucose levels [25].

Alleviation of Symptoms

The questionnaire on symptoms showed an improvement in both groups for all the symptoms that were considered. There was a significant improvement at 1 month, with the exception of physical exercise (Fig. 1), which is quite normal as the operation recovery period imposes limits on physical activity. Nevertheless, at 1 year, levels of physical exercise and activity improved in both groups; as shown in Fig. 1, results were very similar for both groups, irrespective of age, BMI, smoking status or volume of resected tissue. Many articles agree on this [27].

Conclusions

Our results, despite being based on a relatively low number of subjects, lead us to conclude that obese patients (BMI > 30 kg/m^2) could be considered for breast reduction surgery in the same way as women of normal weight.

Limitations of the Study

The main limitation of this work is that we do not consider morbidly obese patients, who comprise a significant number of cases. In fact, this may be the crux of the matter: What happens to the obese population if there are no selection criteria? We do not currently offer breast reduction surgery to morbidly obese women.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest with regard to this work.

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