Breast Asymmetry in Women Requesting Plastic Surgery of the Breast

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Objective: Breast asymmetries have a high prevalence among women requesting breast augmentation. However, the prevalence of breast asymmetries in women undergoing other types of breast surgeries is not known.

Methods: The breast measurements of consecutively women evaluated for plastic surgery of the breast, but without prior breast surgery, were prospectively recorded in a plastic surgery database. They were classified into three groups according to the presenting breast problem: hypoplastic breasts, macromastia, and ptotic breasts. Comparisons were made between the right and left side of each patient regarding the symmetry of the nipple-areola complex (size and position), breast mound, and chest wall.

Results: The breast measurements of 304 women were analyzed. The mean age was 35 ± 12 years. The study population was distributed in the following manner: 126 hypoplastic breast cases, 100 macromastia cases, and 78 ptotic breast cases. Asymmetry of the position of the nipple-areola complex was found in 54%, 59%, and 56% of the groups, respectively. Asymmetry of the breast mound volume was found in 41%, 47%, and 44% of the groups. Asymmetry of the chest wall was present in 12%, 11%, and 10% of the groups, respectively. Overall, we found that 91% of the cases had at least one type of breast asymmetry. Prevalence of asymmetry was not different (p>0.05) among the groups, but the magnitude was larger in macromastia.

Conclusion: Breast asymmetries were detected in the majority of women and the prevalence was similar across the different groups, however the magnitude was greater in hypertrophic breasts. [*P R Health Sci J 2018;37:230-234*]

Key words: Breast, Asymmetry, Breast surgery

Breast asymmetries are common and may involve the nipple-areola complex, the breast mound, and the chest wall. It has been reported that 88% of women who had undergone breast augmentation surgery had preoperative breast asymmetry (1). The study also reported that 63% of the women had more than one type of asymmetry (1). In women undergoing breast augmentation, asymmetry between the right and left inframammary fold has been reported in 95.4% of the cases (2). A recent study using three-dimensional scanning to evaluate breast symmetry preoperatively in 100 breast augmentation patients reported that none of the patients had complete symmetry (3). Using 4D photographic analysis, the incidence of some degree of breast and chest wall asymmetry was confirmed in 100% of the 117 patients examined (4).

Pre-existing breast asymmetries are a problem for plastic surgeons, because they are often overlooked by the patient prior to surgery, but they are noticed after the surgery. Awareness of the asymmetries that may exist enables a physician to be more realistic in stating possible limitations of the expected surgical outcome. Asymmetry of the breasts may not only persist, but may also become more pronounced after surgery (5). If the patients have not been adequately counseled, they can reasonably question why their breasts are not equal postoperatively.

Although the prevalence of breast asymmetry has been well studied in women undergoing breast augmentation surgery, it has not been well studied in women undergoing other types of breast surgery. Our study compared the frequency of breast asymmetry in women who have small breasts (breast augmentation patients) with that in women who have other common breast problems, such as breast ptosis and macromastia.

Patients and Methods

The breast measurements and general demographic data on the participants who had not undergone prior breast

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The author/s has/have no conflict/s of interest to disclose.

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surgery were prospectively recorded in a plastic surgery database from February 2013 to August 2016. The women in the study were consecutively evaluated for possible plastic surgery of the breast area. The cases were classified into three groups according to the presenting breast problem: hypoplastic breasts, macromastia, and ptotic breasts. The usual presentation of women with these breast problems is shown in figures 1 to 3.

Comparisons were made between the right and left side of each patient, regarding the symmetry of the nipple-areola complex (size and position), breast mound, and chest wall. The following anthropomorphic breast measurement were made by a single evaluator: sternal notch-to-nipple distance, midclavicle-to-nipple distance, fold-to-nipple distance, areolar width, breast width, and inframammary fold to-fold projection distance (Figure 4). To evaluate discrepancies between the right and left inframammary fold position, the projection of the most caudal point of the fold to the chest midline was marked and compared to the opposite side; the distance between the two points was recorded.

Figure 1. Photograph of patient with hypoplastic breasts and asymmetry.

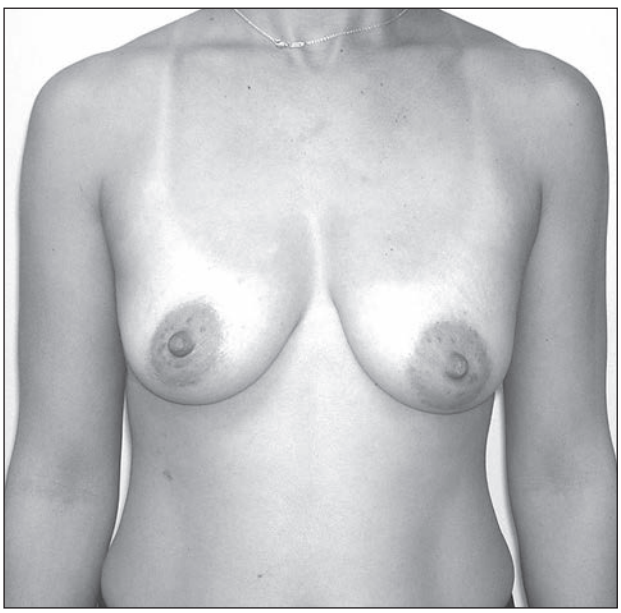

Figure 3. Photograph of patient with breast ptosis and asymmetry.

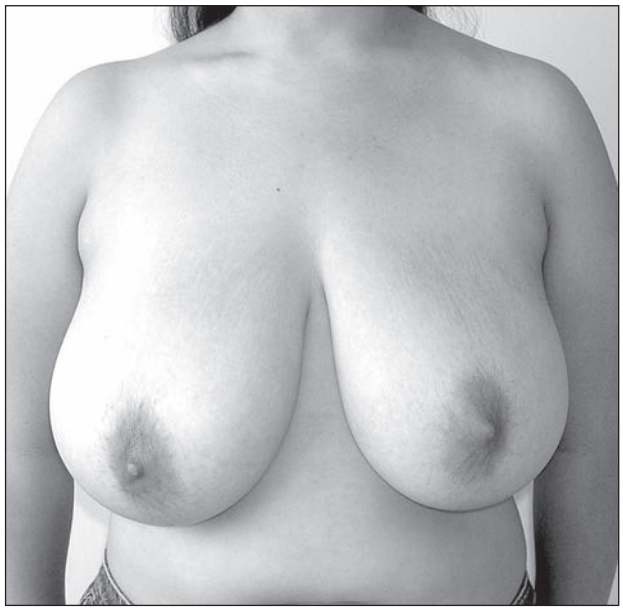

Figure 2. Photograph of patient with macromastia and asymmetry.

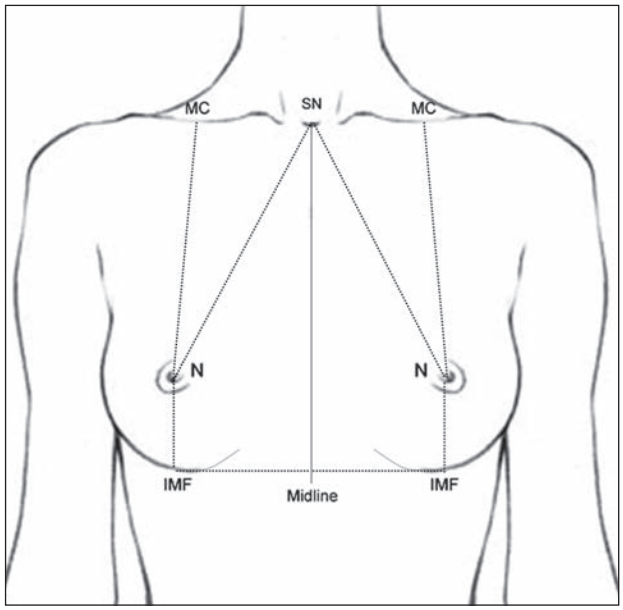

Figure 4. Breast measurements made included: sternal notch (SN)-to-nipple (N) distance, midclavicular (MC)-point-to-nipple distance, and inframammary fold (IMF)-to-nipple distance. To evaluate discrepancies between the inframammary fold positions, the projection of the most caudal point of the fold to the chest midline is marked and compared to the opposite side.

Breast volume assessments were performed using the BREAST-V anthropomorphic method described by Longo et al (6). This method published in 2013 uses a formula [Breast Volume= - 231.66 + 0.5747 x $(SN)^2$ + 18.5478 x (FF_p) + 14.5087 x (FN)] that employs three anthropomorphic measurements to calculate volume; the sternal notch-to-nipple distance (SN), the fold-to-fold projection point distance (FF_p), and the fold-to-nipple distance (FN). Longo's method provides a breast volume assessment with an expected relative error of 18%.

A discrepancy greater than 5 mm in length or 20 ml in volume between the breast measurements was considered as evidence of asymmetry in our study, since it has been reported that smaller differences can hardly noticed by the eye (3).

The presence of rib flaring or pectus carinatum/excavatum with asymmetry of the anterior chest wall was recorded as a yes or no variable, and was assessed visually with the patient both in the upright and supine positions.

The statistical analyses were performed with the software program SPSS, version 22.0 (Chicago, Illinois). Quantitative variables were expressed as the means plus or minus standard deviations. Categorical variables were presented as frequencies and percentages. Analysis of variance (ANOVA) was used to compare quantitative variables between the three groups. Differences between proportions were compared using the Chi-square test. Results were considered significant when the p value was less than 0.05.

This database was reviewed and approved by the Institutional Review Board (IRB) of the University of Puerto Rico Medical Sciences Campus.

Results

The breast measurements collected from 304 women who were consecutively evaluated for possible plastic surgery of the breast were analyzed. The mean age of the group was 35±12 years and the mean body mass index (BMI) was 24.7±5.8 kg/m^2. The study population was distributed in the following manner: 126 women had hypoplastic breasts, 100 women had macromastia, and 78 women had ptotic breasts. The mean age and BMI by groups is shown in table 1.

The results of the mean discrepancies in measurements of the parameters evaluated are shown in table 1. For example, the sternal notch-to-nipple distance showed a mean discrepancy of 10±9 mm in hypoplastic breasts, 21±5 mm in cases of macromastia, and 15±5 mm in ptotic breasts. There was a significant difference ($p<0.05$) among the three groups regarding the size of the discrepancies in the measurements between the sides.

The frequencies and percentages of asymmetries of the nipple-areola complex, breast mound, and chest wall are shown in table 2. Asymmetry of the position of the nipple-areola complex was the most common type and was present in over half of the patients in each group. The second most common type of asymmetry was that of the breast mound and the least

Table 1. Patient characteristics and breast measurement discrepancies between sides

Mean age Mean BMI Discrepancy between sides	Hypoplastic Breasts (n=126) 35±10 22.1±4.9 Mean±SD	Macromastia (n=100) 33±13 26.7±5.1 Mean±SD	Ptotic Breasts (n=78) 36±12 24±4.4 Mean±SD	P* 0.87 0.06 P*
Nipple-areola complex (position/size)				
Sternal notch-to-nipple	10±9 mm	21±5 mm	16±5 mm	0.02
Midclavicular-to-nipple	10±5 mm	21±7 mm	16±6 mm	0.02
Fold-to-nipple	6±5 mm	16±5 mm	10±4 mm	0.03
Size (areolar diameter)	6±5 mm	10±4 mm	8±5 mm	0.03
Breast mound				
Volume	57±50 cc	98±50 cc	75±45 cc	0.01
Base diameter	7±5 mm	15±5 mm	10±5 mm	0.02
Inframammary fold position	6±5 mm	11±4 mm	9±5 mm	0.02

*ANOVA used for p value.

Table 2. Frequency of breast asymmetry and number of asymmetric parameters

Asymmetry	Hypoplastic Breasts (n=126) n (%)	Macromastia (n=100) n (%)	Ptotic Breasts (n=78) n (%)	P*
Nipple-areola complex (position/size)				
Sternal notch-to-nipple	68 (54%)	59 (59%)	44 (56%)	0.94
Midclavicular-to-nipple	68 (54%)	59 (59%)	44 (56%)	0.89
Fold-to-nipple	42 (33%)	37 (37%)	27 (35%)	0.79
Size (areolar diameter)	29 (23%)	26 (26%)	19 (24%)	0.82
Breast mound				
Volume	52 (41%)	47 (47%)	34 (44%)	0.83
Base	52 (41%)	46 (46%)	33 (42%)	0.75
Inframammary fold position	57 (45%)	45 (45%)	32 (41%)	0.84
Chest wall				
Pectus excavatum/carinatum or rib flaring	15 (12%)	11(11%)	8 (10%)	0.71
Number of asymmetric parameters				
0	11 (9%)	9 (9%)	6 (8%)	0.85
1	31 (25%)	26 (26%)	19 (24%)	0.91
2	30 (24%)	23 (23%)	19 (24%)	0.79
3	30 (24%)	23 (23%)	18 (23%)	0.82
4	16 (13%)	11 (11%)	9 (12%)	0.76
5	3 (2%)	4 (4%)	3 (4%)	0.94
≥6	5 (4%)	4 (4%)	4 (5%)	0.73

*Chi-square test used for p value.

common asymmetry was that of the chest wall. The prevalence of asymmetry was not significantly different ($p>0.05$) among the groups.

Table 2 lists the number of asymmetric parameters found in the study patients. Overall, 91% of the cases had at least one type of breast asymmetry. Two or more asymmetric parameters were found in 67% of women with hypoplastic breasts, 65% of women with macromastia, and 68% of women with ptotic breasts.

Discussion

Our study detected breast asymmetry in the majority of women. Though the prevalence of this problem is not significantly different among the groups studied, the magnitude of the asymmetry is more severe in larger and hypertrophic breasts. However, the problem of asymmetry is more clinically relevant in women with hypoplastic breasts because asymmetry may not only persist, but may become more pronounced after surgery (5).

The prevalence of breast asymmetry among women requesting breast augmentation surgery has been studied using various methods. Rohrich et al. (1) published an analysis of 100 cases based on evaluation of preoperative photographs, and they reported asymmetries of the nipple areola position in 53%, breast mound volume in 44%, and chest wall in 9% of the cases. In that study, 88% of the patients had at least one parameter of asymmetry. Liu et al. (3) evaluated preoperative breast asymmetry in 100 augmentation cases, using a three-dimensional scanning technique, and reported significant asymmetry of the nipple level in 46%, breast volume in 76%, and chest wall in 36%. Our study used preoperative anthropomorphic measurements in 126 women with hypoplastic breasts and found asymmetry of the midclavicular to nipple distance in 54%, of the volume in 41%, and of the chest wall in 12% of the cases. Our findings compared favorably with the previous reports in the literature, but three dimensional scanning can detect a greater amount of volume and chest wall asymmetry than anthropomorphic measurements (3). Nevertheless, in our study 91% of the cases presented with at least one type of breast asymmetry.

The prevalence of preoperative breast asymmetry in patients with breast hypertrophy has not been studied well, because it is easier to change the nipple-areola position or size in a reduction mammoplasty procedure; thus, the issue has not been a major concern. A recent publication (7) suggested that in 20% of reduction mammoplasty patients, a breast size difference greater than 200 grams was found between the right and left breast. When the reasons for surgical revisions were evaluated by Grewal and Fisher (8), they reported that breast asymmetry accounted for 27% of the revisions among the breast reduction patients they evaluated. It is also known that asymmetries that initially appear corrected after surgery may recur on long term follow-up (9). Our study found at least one asymmetry in 91% of the macromastia cases, which was not significantly different from the patients with hypoplastic breasts. Nevertheless, the magnitude of the asymmetry was significantly greater in women who had macromastia.

In the cases of breast ptosis, evaluations of the prevalence of asymmetry have been very limited in the literature. When discussing the problems leading to a revision of augmentation/mastopexy, most commonly reported issues were capsular contracture and asymmetry correction (10-13). It is inferred from such reports that preoperative asymmetry is a very common problem. Our study found that the prevalence of asymmetry in the preoperative breast was the same in breast ptosis group as in the other two groups. The magnitude of the asymmetry also had a tendency to be higher than in women who had hypoplastic breasts.

Our results indicate that 91% of women have pre-existing breast asymmetries that can be documented with a simple measuring tape, without the need for expensive three-dimensional scanners. Asymmetries should be well explained to patients since at best the surgery will only improve them (10, 14-15).

This study has some limitations, since anthropomorphic measurements are evaluator dependent and volume assessment with such measurements have an expected relative error of 18%.6 On the other hand, very accurate methods of breast volume assessment like magnetic resonance imaging scans (16-21) and three-dimensional scanning techniques (22-26) are expensive and may not result in better surgical outcomes (11). Three-dimensional scanning can measure differences that are so tiny that they are not visible to the eye, so they define "significant" differences as a distance of more than 5 mm or a volume greater than 20 ml to document a discrepancy (3). Perhaps what our patients are concerned with is the "significant" differences that they can see in the mirror and that they can document with a measuring tape instead of the more expensive scanners.

Conclusion

Breast asymmetry occurs in the majority of women and the prevalence of this problem was not significantly different among the different groups. However, the magnitude of the asymmetry is greater in larger and hypertrophic breasts. The most frequent asymmetry is that of the position of the nipple-areola complex, followed by breast mound, and chest wall discrepancies. Since asymmetry may persist or become more pronounced after surgery, patients should be informed about how this may affect their surgical outcome.

Resumen

Objetivo: La prevalencia de asimetrías mamarias es alta entre las mujeres que solicitan aumentos mamarios. Sin embargo, no se conoce la prevalencia de estas asimetrías en mujeres que solicitan otras cirugías. Metodos: Las medidas mamarias de mujeres que consecutivamente fueron evaluadas para cirugía plástica de los senos, pero sin cirugía previa de ésta área, fueron

prospectivamente entradas a una base de datos. Se clasificaron en tres grupos; hipoplasia mamaria, macromastia y ptosis mamaria. Se compararon las medidas del lado derecho e izquierdo de cada paciente en cuanto a la simetría del complejo areola-pezón (tamaño y posición), el montículo mamario y la pared costal. Resultados: Analizamos las medidas de 304 mujeres. La edad media fue de 35 ± 12 años. La distribución del grupo fue la siguiente; 126 casos de hipoplasia mamaria, 100 casos de macromastia y 78 casos de ptosis mamaria. Encontramos asimetría del complejo areola-pezón en 54%, 59%, y 56% de los grupos respectivamente. Asimetría del montículo mamario se documentó en 41%, 47% y 44% de los grupos. La asimetría de la pared torácica estuvo presente en 12%, 11% y 10% de los grupos respectivamente. En general, se encontró que 91% de los casos tenían por lo menos un área con asimetría. La prevalencia de asimetría no fue diferente ($p>0.05$) entre los grupos, pero la magnitud de ésta fue mayor en macromastia. Conclusion: Las asimetrías mamarias son muy frecuentes y su prevalencia es igual entre los grupos, pero la magnitud de ésta es mayor en mujeres con hipertrofia mamaria.

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