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Relative Distribution of Common Breast and Chest Asymmetries in 2051 Primary Augmentation Mammoplasties in Nonptotic Subgroup of Patients

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Background: Breast and chest asymmetries are extremely common, and primary augmentation mammoplasty can be challenging in these cases. However, there is a paucity of information on the relative distribution of these asymmetries and the implant sizes used in these patients.

Methods: A retrospective chart review of all consecutive cases of primary augmentation mammoplasty performed by a single surgeon from May 1999 to May 2012 was conducted. Patients with chest and breast asymmetries were noted by clinical examination and observation. These patients were selected to review how many patients had similar or different-sized implants. Patients presenting with unilateral or bilateral ptosis and requiring mastopexy were excluded.

Results: A total of 2051 patients underwent primary augmentation mammoplasty. Uneven chest wall or uneven ribs were noted in 274 patients (right more prominent 72, left more prominent 202). Of these, 169 patients had implants of the same size, and 37 patients had implants of different sizes. Similarly, 1008 patients presented with uneven breasts, and of these, 272 patients had different-sized implants. One patient needed revision surgery for implant size and breast volume readjustment.

Conclusions: Chest and breast asymmetries are extremely common. Routine clinical examination is more than adequate to delineate such asymmetries. The majority of these patients have small differences, and not all patients with asymmetries require implants of different sizes. *(Plast Reconstr Surg Glob Open 2024; 12:e6016; doi: 10.1097/GOX.0000000000006016; Published online 1 August 2024.)*

INTRODUCTION

Chest and breast asymmetries are extremely common in patients undergoing breast augmentation mammoplasty.[1] Various studies have been performed to evaluate these asymmetries and their prevalence in various settings.[2–4] These asymmetries can also be evaluated more precisely using available imaging and simulation techniques.[5] On the other hand, one of the most common causes of revision surgery following breast augmentation mammoplasty is a change in device size and profile.[6] These nonclinical causes for revision surgery due to breast cup size or projection can be successfully determined during consultation and examination process.[7–9] The presence of chest and breast asymmetries in patients presenting for augmentation mammoplasty can potentially compound the risk of this prevalent nonclinical cause of revision surgery and enhance the importance and necessity for a thorough and objective process of consultation. A careful preoperative trial of implants of various profiles and sizes in such patients greatly reduced the risk of revision surgery.[10,11] The current retrospective study was carried out on a large cohort of patients from 1999 to 2012 to assess the prevalence of clinically noticeable chest and breast asymmetries, their relative distributions on their respective sides, and how many of these patients had different-sized implants based on clinical examinations and implant trials alone.

MATERIALS AND METHODS

A retrospective chart review of all consecutive patients who underwent primary augmentation mammoplasty performed by a single surgeon from May 1999 to May 2012 was conducted. Patients who presented with unilateral or bilateral ptosis and who required mastopexy

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were excluded. Patients with a history of implant surgery were also excluded. Smokers were asked to stop smoking 2 weeks before surgery. All patients were examined, operated on, and followed up by the same surgeon, and the consultation process involved a meticulous visual clinical examination. Simple measuring was used to measure the distance from the jugular notch to the nipple areolar complex and nipple areolar complex to the inframammary fold, and breast calipers were used to measure the breast width. When asymmetries were noted, patients were asked whether they were aware of any preexisting asymmetry or not and were asked to view themselves in a life-size mirror. When asymmetry was agreed upon, patients were requested to use asymmetrical and symmetrical size and profile implant sizers in the desired cup size brassiere for simulation. They were asked to view themselves in a plain brassier and in white and colored closely fitting vests. Patients were asked to view themselves looking down, sideways, and head on for expected breast size symmetry. After mutual consent agreed about the selection of implants, patients were informed that exact size and symmetry can be difficult to achieve and that small differences may persist to some degree. Patients presenting with a nipple-level difference of less than 2 cm were offered a multiplane technique for internal mastopexy/glandulopexy.[12] Patients with a difference of 2 cm or more between nipple levels on the two sides were strongly recommended and considered for mastopexy. Images of results of similar patients with asymmetrical breasts and chests were shown. All patients underwent surgeries under general anesthetics in an approved and regulated facility. In this retrospective analysis, patients with chest and breast asymmetries were selected to review how many patients had similar or different-sized implants and how many needed revision surgery for volume correction. All patients underwent subjective analysis, and implant sizers were used for breast cup size simulation without the help of three-dimensional (3D) assessment or objective analysis.

Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences, version 19.0. The results are presented in the text as the frequency and percentage for qualitative/categorical variables (differences in implant size) and the mean ± SD for quantitative/continuous variables (age and implant size). The chi square test was used to compare the categorical variables, and the *t* test was used for quantitative/continuous variables. For all the statistical analyses, only *P* values less than 0.05 were considered significant.

RESULTS

A total of 2051 patients underwent primary augmentation mammoplasty between May 1999 and May 2012. Age was recorded for 2042 patients with a mean age of 30 ± 8.5 years (range 18–67). The smoking status of 2034 patients was recorded, and of these, 646 (31.5%) patients were smokers. A prominent rib cage or chest was noted in 274 (13.3%) patients; of these, 202 (9.8%) were present on the left side, and 72 (3.5%) were present on the right side. In eight patients (0.4%), chest asymmetries were not recorded. Similarly, 1008 (49.1%) patients had noticeable breast size asymmetries; of these, 638 (31.1%) had larger asymmetries on the left side, and 370 (18%) were larger on the right side. Breast size asymmetries were not recorded in 31 (1.5%) patients (Fig. 1).

Takeaways

Question: We aimed to look into common breast and chest asymmetries, their relative distribution, and size of implants used in patients presenting for breast augmentation.

Findings: In this series, nearly 50% and 13% of patients had visible or noticeable breast asymmetries, respectively.

Meaning: These are important data on distribution of common asymmetries and implants size selection in this group of patients.

Of the 202 left prominent ribs or chest patients, 165 (81.7%) had implants of the same size (mean 335 ± 47.9 cm^3, range 230–465), and 37 (18.3%) had implants of different sizes (right mean 357 ± 50.2 cm^3, range 260–495; left mean 326 ± 49.7 cm^3, range 240–445; $P = 0.009$). Among the 72 right prominent rib cage chest patients, 51 (70.8%) had implants of the same size, with a mean of 345 ± 49.5 cm^3 (range 240–470), whereas 21 (29.2%) had implants of different sizes (right mean 327 ± 51.9 cm^3, range 260–440; left mean 350 ± 52.8 cm^3, range 290–500; $P = 0.162$) (Fig. 2A). Similarly, of the 638 left noticeably larger breasts, 456 (71.5%) had implants of the same size (mean 332 ± 52.6 cm^3, range 200–615), and 182 (28.5%) had implants of different sizes (right mean 354 ± 56.1 cm^3, range 249–605; left mean 321 ± 62.2 cm^3, range 170–555; $P = 0.001$). Among the 370 right larger breast patients, 280 (75.7%) had implants of the same size (mean 339 ± 53.0 cm^3, range 170–550), whereas 90 patients (24.3%) had implants of different sizes (right mean 319 ± 56.7 cm^3, range 200–525; left mean 354 ± 65.1 cm^3, range 225–545; $P = 0.001$) (Fig. 2B). Of the 330 patients who had different-sized implants, in the chest and breast asymmetry groups, 21 (6.36%) patients had a combination of different profile implants (Fig. 3).

In 2051 patients, suprasternal notch (SN) to nipple areolar complex (NAC) measurements were available for 2023 patients. Among these, 591 patients (29.2%) had asymmetrically placed nipples with different measurements (mean 20.7 ± 2.31 cm, range 15.5–31.0 cm on the right and a mean of 20.9 ± 2.20 cm, range cm 15–28 on the left; Table 1). Similarly, among 2051 patients, the NAC to inframammary crease (IMC) was recorded in 1755 patients. Among these 1755 patients, 454 (25.8%) had different measurements (mean 6.6 ± 1.57 cm, range 3.0–4 on the right side; mean of 6.6 ± 1.50 cm, range 4.0–14.0 on the left side; Table 2). Of the 591 patients with asymmetrical SN-to-NAC measurements, 183 (30.9%) had different-sized implants (mean 345 ± 62.3 cm^3 range

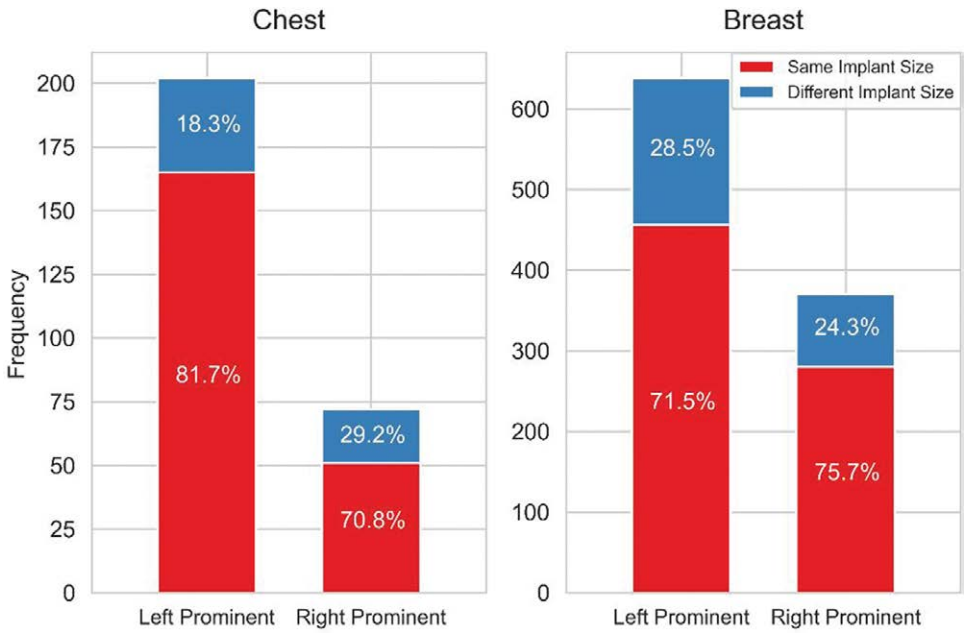

Fig. 1. Relative distribution of different-sized implants used in asymmetrical chests and breasts. The graph represents that the vast majority of the patients with breast and chest asymmetries do not require different-sized implants.

200–605 on the right and 335 ± 65.8 cm^3 range 170–555 on the left). Among the 454 (25.86%) patients with asymmetrical NAC to IMC measurements, 166 patients had asymmetrically sized implants (mean 341 ± 59.3 cm^3 range 200–605 on the right side and 334 ± 67.8 cm^3 range 170–555 on the left side). When different volume implants were used in patients with asymmetrical SN-NAC in 183 patients, mean difference between two different volume implants used was 48 cm^3 SD ± 34.9 (range 21–95). Similarly, when two different volume implants were used in asymmetrical NAC-IMC in 66 patients, mean volume difference between the two sides was 47 cm^3 SD ± 35.2 (range 10–195; Table 1).

Tuberous breasts with varying types of deformities and asymmetries were recorded in 83 (4.0%) patients. Similarly, noticeable scoliosis was noted in 30 (1.5%) patients. Of the 2051 patients, 1584 had the split-muscle technique, 337 had subglandular techniques, 50 had partial submuscular techniques, 35 had multiplane techniques, and 44 patients had a combination of multiplane and split-muscle pockets.[12] One patient had a bilateral muscle-split technique, but later, one side changed to a subglandular pocket due to ongoing tightness and discomfort. Among the 330 patients who received implants of different sizes, one (0.3%) patient was not happy with persistent noticeable breast size asymmetry and underwent surgery to improve symmetry.

DISCUSSION

The process of consultation for augmentation mammoplasty is extremely important for reducing nonsurgical or nonclinical revision procedures due to changes in the size or profile of the implants.[7,8] This process helps clinicians and patients to select an appropriately sized implant with bilateral interaction and consent. The implant size selection must be consistent with the tissue characteristics and footprint of the breast.[7–9] A detailed consultation process along with a thorough physical examination also allows a clinician to evaluate common and noticeable breast and chest asymmetries that may require attention and correction using implants of different sizes and profiles. These chest and breast asymmetries are extremely common, and when all different types are combined, they can be present in 87% of patients on observation alone or can reach 100% when 4D imaging is used.[4,5] Patients required different sizes of implants due to either chest or breast asymmetry or a combination of both (Fig. 4).

The relative incidence of these asymmetries along with their relative distribution and use of different-sized implants in these patients has been described.[1,10] Interestingly, more prominent or larger chests and breasts were reported on the left side more than on the right side in a smaller study published by the author, and the difference was significant, as observed and noted in the present series.[1] However, the asymmetries may not stand out and are often not noticed by the patient. More importantly, a vast majority of these asymmetries, even when picked up, do not require or need different sizes of implants, as they may result in overcorrection.[1,10] However, identification of these asymmetries and the merit of appropriate implant selection are paramount in these primary augmentation mammoplasties, and a decision and opportunity for the selection of different implant sizes must be discussed and availed where necessary.

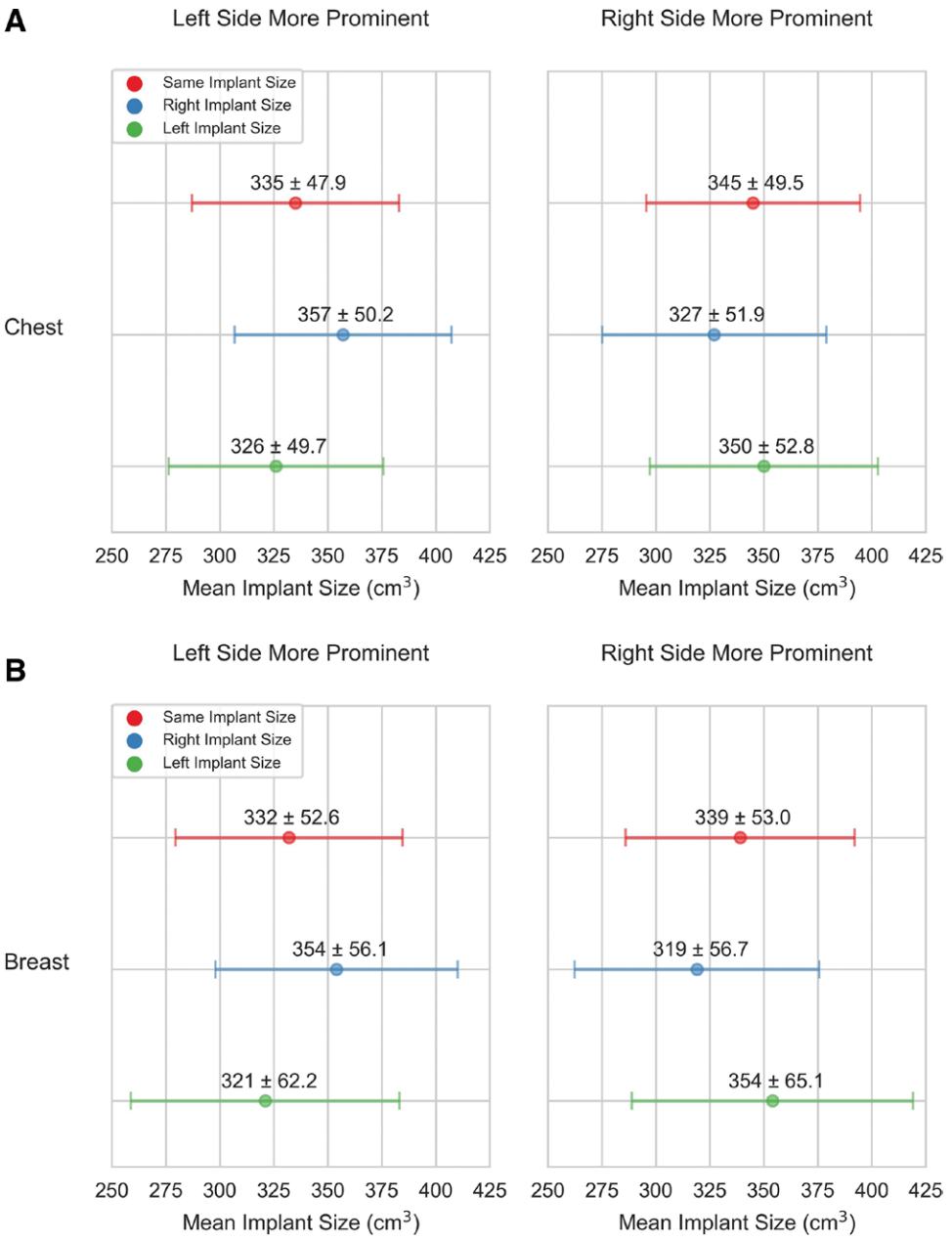

Fig. 2. Implant volumes used in asymmetrical chest and breasts. A, Graphic representation of the volume (mean, SD, and range) of the implants used in asymmetrical chests. When larger size implants were used on the right side in left larger and prominent chest, the difference was statistically significant ($P = 0.009$). In the right larger chest group of patients, requiring larger implants on the left side, the difference was not statistically different ($P = 0.162$). B, Graphic representation of the volume (mean, SD, and range) of the implants used in asymmetrical breasts. When different size implants were used in the left larger and right larger breast group of patients, the difference was statistically different ($P = 0.001$).

In the present study, when asymmetries were noted by the author, patients were asked if they were aware of any preexisting asymmetry or not and were asked to view themselves in a life-size mirror. When asymmetry was agreed upon, patients were requested to use asymmetrical size and profile sizers in the desired cup size brassiere for simulation. The patients were asked to view themselves in plain brassier and in white and dark colors closely fitting vests. Patients were asked to view themselves looking down, sideways, and head on for breast size symmetry. After mutual consent about the selection of implants, patients were informed that exact size and symmetry can be difficult to achieve and that small differences may persist to some degree. Images of the result of patients with asymmetrical breasts and chests are shown. Difficulty arises in subjective analysis alone when the differences are small, and a sensible decision is made whether a small asymmetrical breast justifies an asymmetrical implant size or

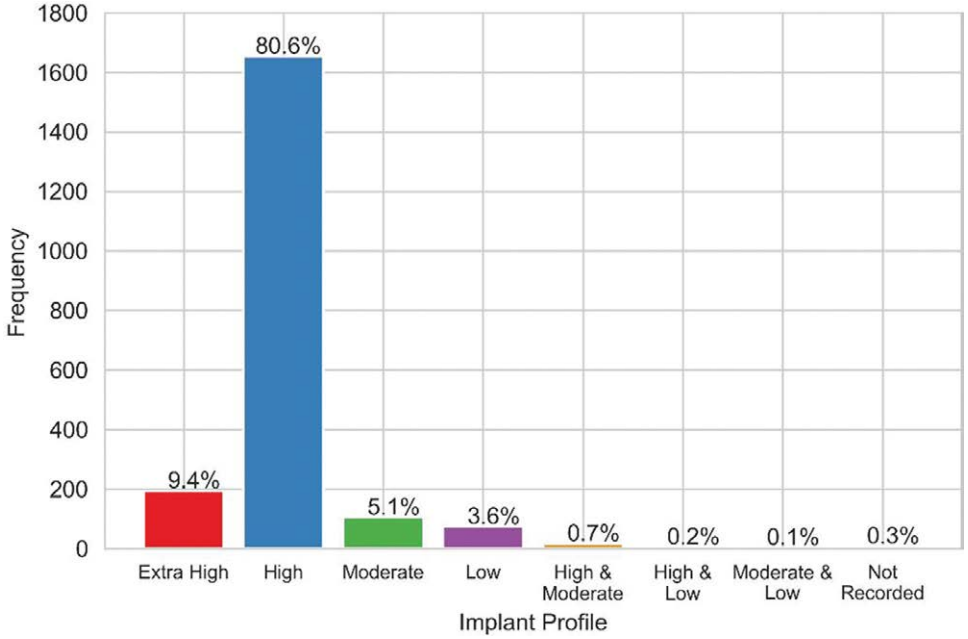

Fig. 3. Graphic representation of different profile implants used in the series.

Table 1. Symmetrical and Asymmetrical NAC to Inframammary Crease (IMC) and SN to NAC Measurements

		Asymmetrical		*P*: Right versus Left
	Symmetrical	Right	Left	
	N, Mean ± SD (Range)	N, Mean ± SD (Range)	N, Mean ± SD (Range)	
SN-NAC, cm	1432, 19.9 ± 2.13 (9.0–28.0)	591, 20.7 ± 2.31 (15.5–31)	591, 20.9 ± 2.20 (15–28)	0.001
NAC-IMC, cm	1301, 6.5 ± 1.31 (range 3.5–12)	454, 6.6 ± 1.57 (3.0–14.0)	454, 6.6 ± 1.50 (4.0–14)	0.858

Table 2. Mean Volume (cm^3) and Volume Percentage (%) Difference, SD, and Range of the Different Volume Implants Used on Two Sides in Symmetrical and Asymmetrical NAC to Inframammary Crease (IMC) and SN to NAC Patients

	Symmetrical Measurements		Asymmetrical Measurements	
	Different Size Implants N, Mean Volume Difference cm^3 ± SD (Range of Difference)	Different Size Implants N, Mean Volume Percentage Difference ± SD (Range of Difference)	Different Size Implants N, Mean Volume Difference cm^3 ± SD (Range of Difference)	Different Size Implants N, Mean Volume Percentage Difference ± SD (Range of Difference)
SN-NAC	125, 35 ± 18.6 (10–145)	125, 10.5 ± 5.4% (2.9 %–40%)	183, 48 ± 34.9 (21–195)	183, 14.3 ± 10.5% (2.4%–60%)
NAC-IMC	115, 34 ± 18.1 (10–140)	115,10.1 ± 4.7% (2.4%–32%)	66, 47 ± 35.2 (10–195)	166, 14.1 ± 10.6% (2.9%–60%)

profile implants. It is imperative to discuss the advantages, disadvantages and limitations of implants of the same size versus those of asymmetrical size and profiles. Patient choice, based on simulation, is paramount to avoid future dissatisfaction. Sometimes, it can be hard or difficult to follow an algorithm, as individual or subjective conflicting opinions may exist before surgery; however, the authors have devised a flowchart based on their experience, which can be helpful for readers (Fig. 5). Although most of the patients whose breast width was noted for appropriate implant size and profile selection, this information was not included in the data analysis in this series.

Considering the prevalence of asymmetries in the normal population, surgeons and patients can easily reach sensible decisions, with an emphasis on the difficulty of achieving complete symmetry, regardless of the methodology used. In patients with unilateral or bilateral ptosis requiring mastopexy with augmentation, a surgeon has more liberty and choice of either selecting larger implants for the smaller breasts or removing excess tissue from the larger breasts.[11]

For primary augmentation mammoplasties presenting with breast and chest asymmetries without ptosis, various preoperative and intraoperative approaches have

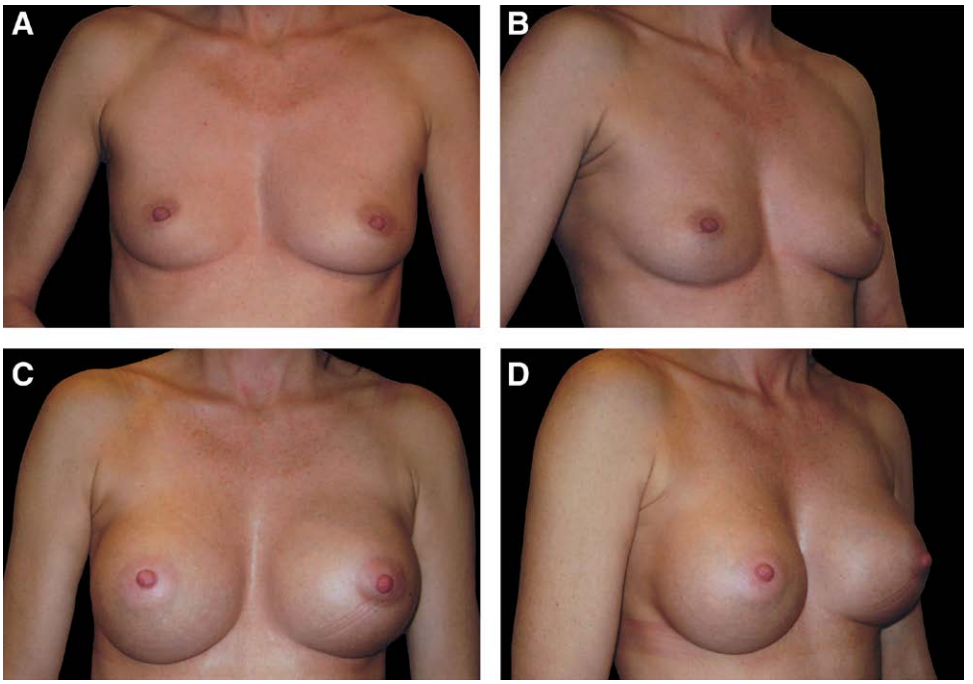

Fig. 4. Combination of ribcage and breast asymmetries. A–B, A 37-year-old patient who had loss of her breast volume following two pregnancies. She presented with a larger left breast and a left prominent ribcage (hemithoracic disjunction). C–D, Postoperative pictures taken after 1 year. She had 330 cm^3 extra high profile and 270 cm^3 moderate profile round silicone gel implants on her right and left side, respectively.

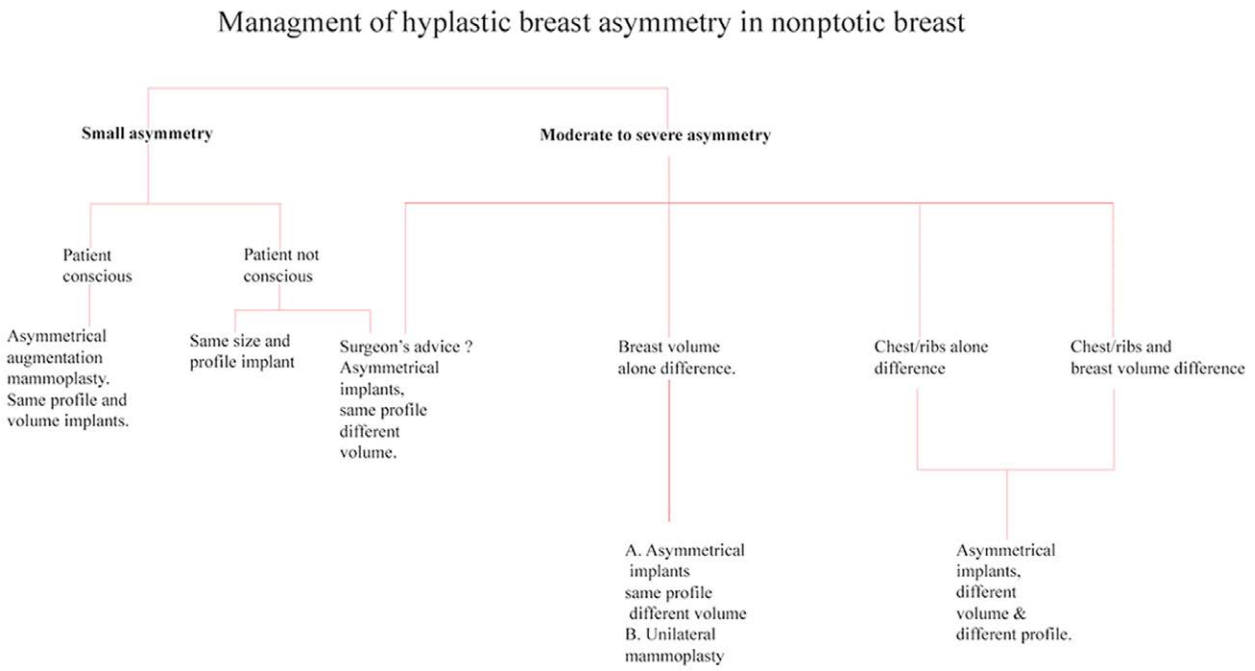

Fig. 5. Flowchart presentation of the selection of same or different volume implants in patients presenting with asymmetrical chest and breasts.

been described for the correction of these differences. An outpatient-based approach includes a trial of different sizes and profiles of implants in an appropriately sized brassiere for predicted symmetry and simulation.[7,8,10] For expected breast size simulation, different volumes of prefilled rice bags have been used preoperatively, and the same methods can possibly be used in patients presenting with asymmetrical breasts.[13] Preoperative three-dimensional imaging can

be expensive, operator-dependent, and time-consuming but helps simulate the desired cup size and appearance of the outcome. Imaging can also help detect chest and breast volume differences in this set of patients.[5,14,15] The current study involved only subjective analysis and the use of the implant sizers for the simulation of the proposed implant size selection. Intraoperative methods for a range of implant selections have been used and include different volume sizers or the use of inflatable expanders.[16,17] The intraoperative use of inflatable expanders and different preformed prosthetic sizers can be extremely useful for the desired cup size and the correction of asymmetry. These methods, however, can be time-consuming and not as cost-effective compared with the use of different sizes and profiles of implants in outpatient settings. The implant simulation method also has its uses in practices where modern technologies are not available or where clinicians undertake a small volume of breast implant procedures. The low revision rate with implant simulation technique makes it an acceptable alternative and corroborates the usefulness of adequate consultation process with informed consent. Regardless of the method used for implant size selection for the correction of asymmetry, all patients must be warned that small volume and shape differences between the two sides remain a possibility and that absolute symmetry can be impossible to achieve in some cases. Once explained, these patients are happy to accept small differences and can avoid the potential risk of revision surgery.

Breast asymmetries and their type, incidence, and classification based on morphological appearance have been reported from time to time.[1–4,18–20] The selection of implant size on the basis of age, parity, and period has also been published.[21] Although the selection of implant profile and size may vary on the basis of individual practice, regional variation, and trends,[21] limited information is available on implant size selection in patients with breast asymmetries.[22]

In the present study, in the majority of patients, the left breast was larger than on the right side; however, less than two-thirds of the patients had implants of different sizes (Fig. 1). Similarly, of the patients who had larger right breasts, only a quarter went for different size implants (Figs. 1, 2A, and 2B). Similarly, a majority of the patients had noticeably prominent chest or rib asymmetries on the left side than who had more prominent chest or ribs on the right side (Fig. 1). For reasons not known or explored, the left-side breasts and chest tend to be noticeably larger than the right.[1]

Even though a larger number of patients with right-sided prominent chest needed different-sized implants, the differences between implant sizes were not significant, suggesting that the asymmetry was not as noticeable when compared with the patients who had larger left chests. In patients with left-sided larger or prominent chest, a lower percentage of the patients needed larger implants on the right; however, the size difference was significant, suggesting that when the left side chest is prominent, the difference is more noticeable (Fig. 2A).

In a previous study where patients had different-sized implants, nearly twice the number of patients had larger implants on the smaller right breasts, a finding consistent with the current study.[10] If an objective analysis is performed in the group of patients who have small differences between the two sides and who do not prefer or choose to have implants of different sizes and those who had asymmetrical implants of a difference of 30 cm^3, there will definitely be a volume difference in patients who have implants of the same size. However, analyses in different studies have shown that there are calculation errors associated with objective analysis, as mentioned in the Discussion section.[15] Additionally, patients often prefer not to have different-sized implants after a trial of implants of the same or different sizes, as the anticipated results may exceed the existing difference, which is more difficult for patients to mentally accept. The consultation process emphasized that the risk of natural differences is unlikely to be overcome with the available tools, which are subjective and objective; these small differences are well tolerated by the patients.

Sternal deformities may also present with asymmetrical breasts or chests (Fig. 6). When there is associated breast or chest asymmetry, it can be improved or corrected using implants of different sizes. However, such patients may have to be informed about the cleavage lines that may not be close enough as desired by the patients. Patients with tuberous breasts presenting with breast asymmetries and who were not interested in extra nipple treatment or scarring on the nipples were treated in line with the rest of the patients (Fig. 7). Patients with scoliosis were counseled that nipple-level asymmetry was secondary to shoulder-level discrepancies and that these asymmetries would persist following surgery. In the current series, no extra treatment for scoliosis-related nipple-level symmetries was proposed for the patients (Fig. 8). Nipple areolar asymmetries in the horizontal axis are also common, with a high prevalence of the right nipple being more lateralized than the left-lateralized or medialized nipples. In the article, the author suggested laterization of pocket dissection to offset the lateralized nipple areolar complex[23] (Fig. 9). Noticeable asymmetry of the inframammary crease could be quite challenging in well-developed breasts. When augmentation mammoplasty is performed in such cases, it is difficult to match breast aesthetics without surgical manipulation of the inframammary crease and nipple areolar complex. Most of the patients are not keen to undergo such extensive procedures with associated scarring (Fig. 10). Hemithoracic disjunction, where two chest halves can be disproportionate in the horizontal or anteroposterior dimension, may or may not be associated with breast asymmetries at the same time.[1] Three-dimensional information will be useful for measuring horizontal and anteroposterior discrepancies when present. These patients often need different profiles as well as implants of different volume (Figs. 4 and 5). In another study by Patlazhan on breast asymmetries, patients were treated on the basis of examinations, measurements, and physical assessments using a volume shift test.[24] No preoperative volume difference assessment was performed using 3D simulation due to the possibility of preoperative and postoperative volume assessment inaccuracies.[15,24]

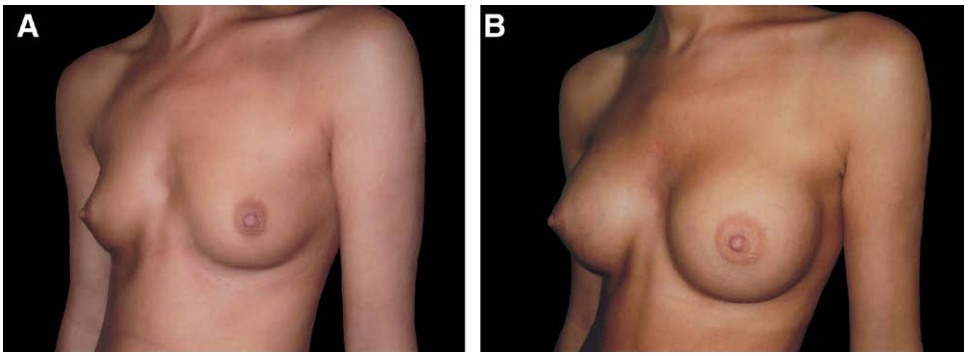

Fig. 6. Sternal deformities. A, Preoperative quarter view of a 20-year-old patient who presented with hypoplastic breasts. She had a combination of pectus carinatum and excavatum sternal deformity (S-shaped sternal deformity). B, Postoperative view taken 10 months following surgery using 300 cm^3 round silicone gel implants on both sides.

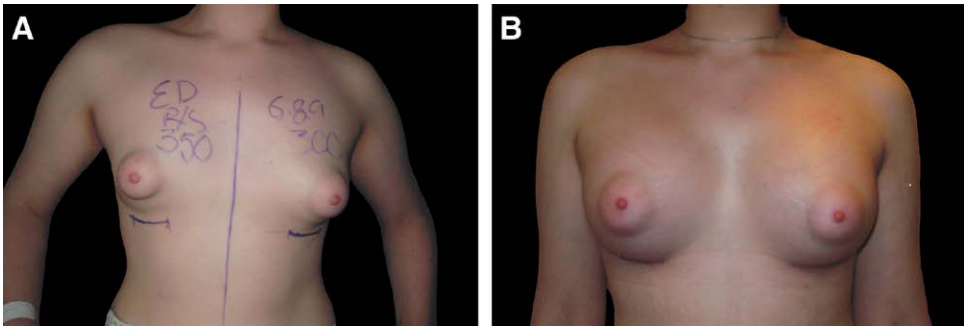

Fig. 7. Tuberous breast with breast asymmetries. A, Preoperative anteroposterior view of a 22-year-old patient who presented with a larger left breast with significant tuberous breast deformity. B, Postoperative view taken a year after surgery using 350 cm^3 and 300 cm^3 round silicone gel implants on her right and left side, respectively. She was not interested in tuberous deformity correction due to nipple scarring.

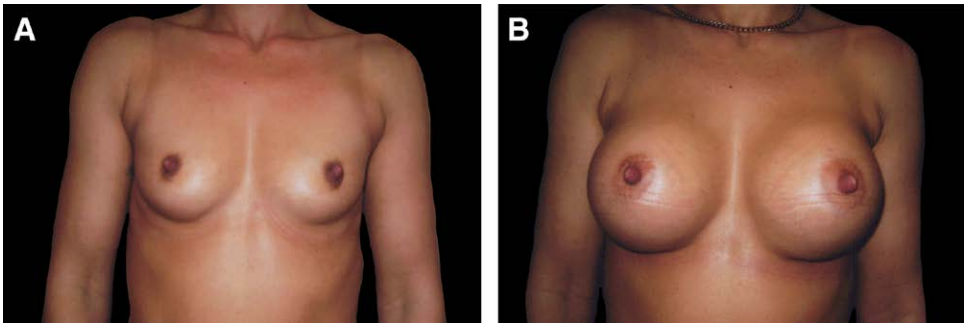

Fig. 8. Nipple areolar complex level asymmetry secondary to scoliosis. A, Preoperative view of a 37-year-old athletic patient and mother of two who presented with hypoplastic symmetrical breasts with nipple-level asymmetry secondary to scoliosis. B, Postoperative view taken 1 year after surgery with persistent nipple-level asymmetry. She had 325 cm^3 round silicone gel implants.

The authors treated patients with implants of different sizes only if the measured volume difference of the volume shift test was less than 40 cm^3. All patients with an estimated difference of 40 g or more or patients who presented with ptosis were treated with a size reduction of the larger breast and implants of the same size on both sides.[24]

STRENGTHS AND WEAKNESSES OF THE STUDY

The data are extensive but limited in terms of subjective analysis, and implant sizers are used for simulations instead of 3D simulation tools. In the current series, most of the patients had their breast width recorded for

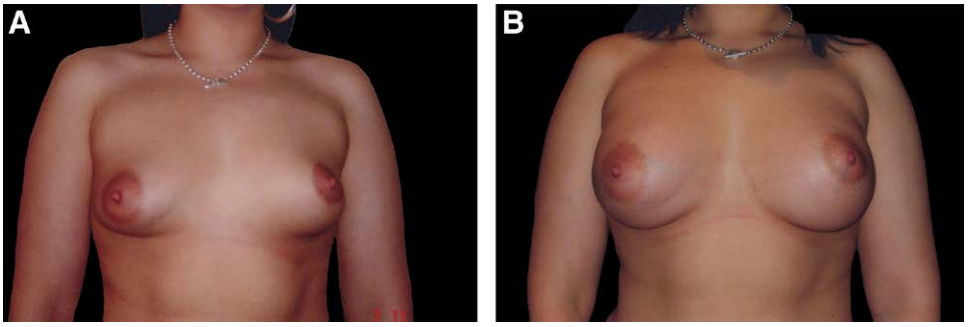

Fig. 9. Unilateral laterised nipple. A, Preoperative view of a 22-year-old patient who presented with a lateralized left nipple. She also had an accessory crease on lower pole of the right breast. B, Picture taken a year after augmentation mammoplasty using 350-cm^3 round silicone gel implants. Her left implant pocket was dissected laterally to offset lateralized nipples.

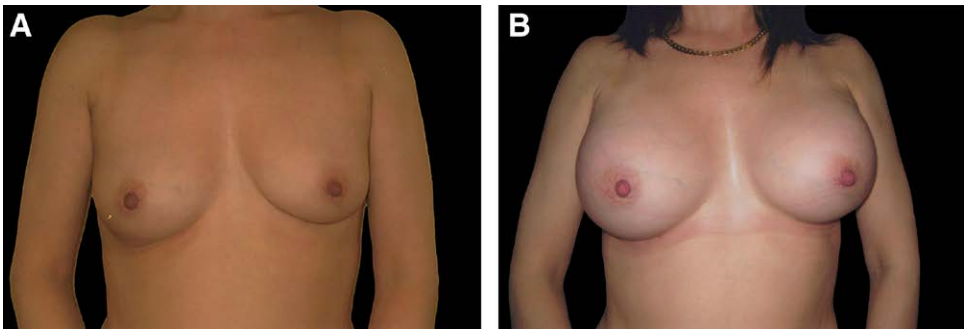

Fig. 10. Inframammary crease fold asymmetry. A, Preoperative view of a 45-year-old mother of two children who presented with a larger right breast along with significantly higher left inframammary crease. The patient chose to have same-size implants without any desire to intervene to correct asymmetry of inframammary crease and NAC level discrepancy. B, Postoperative view following augmentation mammoplasty using 350-cm^3 round silicone gel implants with persistent breast and inframammary crease level asymmetry.

appropriate implant size and profile selection; however, this information was not included in the data analysis in this series. Although an extremely low revision rate and high postoperative satisfaction were noted, no objective assessment or analyses were performed using a standard BREAST-Q questionnaire. The data collection period in the study was limited from to 1999 to 2012, and the data were collected from only one practice, where only subjective analysis was performed. Subsequent studies will include subjective and objective analyses.

CONCLUSIONS

Breast and chest asymmetries are extremely common. Preoperative examination, assessment, and appropriate management plans should be meticulously executed to correct or minimize these asymmetries when patients seek augmentation mammoplasty. The left breast and chest tended to be larger than the right breast. A thorough examination and consultation process is essential for a low reoperation rate. Preoperative three-dimensional technology can be used but is expensive, time-consuming, and not without errors in volume difference estimation. A complete set of deformities and their related treatments is beyond the scope of this article. Only the major and most common presentations are included in the article.

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DISCLOSURE

The author has no financial interest to declare in relation to the content of this article.

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ETHICAL APPROVAL

All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

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