Aesth Plast Surg
https://doi.org/10.1007/s00266-024-04451-x

Sisters But Not Twins: A Critical Appraisal of Long-Term Results in Breast Asymmetry Correction

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Received: 22 July 2024 / Accepted: 8 October 2024

Abstract

Background Breast asymmetry is a common disorder, which can lead to significant emotional distress. Despite this, there is currently no widely accepted approach for managing this prevalent condition. Due to the high dimorphism of the breast, despite a satisfactory result in the short-term post-op, the recurrence of asymmetry is one of the most common weak points of breast recontouring. The purpose of this paper is to investigate the long-lasting maintenance of breast symmetry in women who have undergone surgical correction of asymmetric breasts through mastopexy or reduction mammoplasty and to try to identify some specific elements to achieve more stable outcomes in the long term.

Methods A retrospective study was conducted on 1,984 breast surgical procedures carried out between 2002 and 2020 to evaluate patient satisfaction and the recurrence rate of asymmetry disorders. All the patients enrolled in this study were given a questionnaire to evaluate their satisfaction level. A retrospective iconographic-chart review was investigated by the same senior surgeon, who recorded the presence or the absence of recurring breast asymmetry.

Results In total, 1984 patients were enrolled who respected the minimum standard of the study; 596 showed up at post-op follow-up longer than three years. Most of the patients showed great satisfaction with the results, even if several recurrences of asymmetry were reported.

Conclusions The recurrence of asymmetry is one of the most common weak points of breast asymmetry correction procedures due to the high dimorphism of the breasts. In order to fully assess the results of asymmetric breast correction, patients should be required to attend a post-op follow-up examination after a long time frame. Indeed, the strength of this paper lies in the focus on long-term post-operative follow-up.

Level of Evidence V This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Breast asymmetry · Breast recontouring · Breast surgical procedure · Follow-up · Aesthetic

Introduction

As evidenced in the literature, symmetry is one of the factors that plays a very important role in determining the ideal appearance of the breasts. Woman's breasts are usually asymmetric to some degree; however, symmetry remains a key element in determining the right balance and aesthetically pleasing appearance [1–4]. Symmetric breasts are perceived as being more attractive, younger and healthier, regardless of their size and their proportion to the rest of the body [5–7].

Based on our experiences, once they have stabilized after a year, the results of other types of plastic surgical procedures undergo little modification in subsequent years. However, this does not seem to be the case with the correction of asymmetric breasts, which reports a higher frequency of recurrence of the disorder over time. Autologous

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Published online: 24 October 2024

breast tissue follows the bodily changes that occur during a woman's lifetime, such as weight changes and the effects of the aging process [8–11]. In fact, since fat and glands act in very dissimilar ways to the physiological inputs, a woman's breasts are considered to be highly dimorphic body parts, at the same or different times and in different conditions [12, 13]. Their mutability represents an additional delicate difficulty that requires complex and articulated clinical-and-surgical considerations [14]. For these reasons, surgical correction procedures for asymmetric breasts represent a significant challenge for surgeons, particularly when aiming for long-lasting results [15, 16]. The purpose of this paper is to investigate the long-lasting maintenance of breast symmetry in women who have undergone surgical correction of asymmetric breasts and to try to identify specific elements to obtain more stable outcomes in the long term.

Patients and Methods

This was a board-exempt 18-year iconographic-chart review retrospective cohort study of women who underwent mastopexy or reduction mammoplasty between January 2002 and December 2020 in a single center.

Data Source

This study analyzed trends in the maintenance of symmetry of the breasts that underwent surgical recontouring between 2002 and 2020, regardless of the type of symmetrization procedure performed, using a personal database including 1984 patients, allowing for a personal-level investigation of the results in the long term.

Patient Selection

The study included patients who were 18 years of age or older and had undergone mastopexy or reduction mammoplasty during the study period. For all patients, preoperative admission diagnosis included asymmetry, and—for all patients—correction of asymmetry was one of the main goals of the procedure, along with mammary ptosis or breast reduction.

Study Design

The present study analyzes the patterns of breast symmetry maintenance obtained with breast recontouring procedures over a long period. Pre-and-postoperative symmetry evaluation included: volume, shape and, following the Regnault classification, degree of ptosis [17, 18]. The collected data included: demographic data, medical and surgical history, BMI, pre-and-postoperative breast measurements, surgical procedure, complications, outcomes and patient satisfaction. Pre-and-postoperative digital photographs were collected in standard conditions by the author. All the patients enrolled in the study underwent asymmetric breast correction through reduction mammoplasty or mastopexy. All the patients underwent the procedures in the supine position with arms placed along the thorax according to the preoperative planned markings. To avoid tissue overheating, all the procedures were performed using electrocautery with low energy; gentle manipulation of tissue, especially in the presence of predominantly adipose breast tissue, was carried out to avoid tissue damage.

There were two main objectives in establishing the results: (1) to evaluate pre-operative patients' discomfort with asymmetric breasts and postoperative patient's satisfaction by means of a questionnaire; and (2) to assess the recurrence rate of the asymmetry disorder through a clinical consultation by the senior surgeon. The questionnaire included three different points:

1. To evaluate pre-operative patients' discomfort with asymmetric breasts: "How do you rate the discomfort considering the preoperative appearance of your breast? "(Table 2)
2. To evaluate postoperative patients' satisfaction at 3 years and longer than 3-year follow-up with the maintenance of breast symmetry: "How do you rate the postoperative appearance of your breast? "(Table 3)
3. To evaluate postoperative patients' dissatisfaction at 3 years and longer than 3-year follow-up with the eventual recurrence of breast asymmetry: "What are your main complaints considering the post-operation appearance in terms of volume, ptosis and shape asymmetry" (Table 4)

The results were first determined by evaluating long-lasting patient satisfaction with breast symmetry [19]. Following the Likert scale, five-point scoring was used to assess pre-operative patient discomfort with the disorder and postoperative patient satisfaction: poor 1; fair 2; good 3; very good 4; beyond expectation 5. Patient satisfaction level was investigated at minimum three and maximum fourteen years post-op. To evaluate it, the patients were given a questionnaire and a stamped, self-addressed envelope during their consultation so that they could return the questionnaire to our office anonymously to give sincere answers to the questions without the possible bias of the patient–physician relationship. Questionnaires were scheduled at minimum and maximum 3 and 14 years, respectively. Photographs were taken at each follow-up visit, and on each chart, there were three checkboxes related to each of the two issues: "presence of symmetry

outcomes" and "recurrence of asymmetry." The answers to choose from were "yes," "no" and "perhaps." When the recurrence of breast asymmetry was not clear, although some imperfection was present, the box "perhaps" was ticked. The boxes were ticked only by the senior surgeon (A.I.) after a careful examination of each case. Following these criteria, pre-and-postoperative volume, shape and ptosis discrepancy were considered as the most relevant aesthetic clinical features present. The results obtained from the questionnaires are shown in Table 4. A secondary analysis was conducted by iconographic investigation by the senior author (A.I.)

All the operations were performed by the same senior author. All the procedures were performed in a single stage, on an outpatient basis under local or general anesthesia. All patients had medical clearance and were American Society of Anesthesiologists class I or II. Inclusion criteria included: candidates with asymmetric breasts who underwent mastopexy or reduction mammoplasty surgical procedures. Exclusion criteria: patients reporting a previous history of breast surgery and patients that did not respect the standard of the study. The follow-up period ranged from a minimum of three to a maximum of fourteen years.

Following the author's standard practice, clinical examination and photographic documentations were routinely carried out for all the patients at 1–3–6–12–24 and 36 months; further follow-up documentations were collected for the patients who agreed to return for check-ups after a longer time frame.

Throughout the entire procedure, an anesthesiologist closely monitored the vital parameters, including blood pressure, O2 saturation and heart activities, of all the patients. All the patients who underwent local anesthesia received an infiltration of 100–200 ml of saline solution, 20 ml of xylocaine 2%, 20 ml of carbocaine 2%, 20 ml of naropin 10% and 1 mg of adrenalin to aid hemostasis and long-lasting anesthesia [20, 21].

Following the aim of this study, the sole complication that was considered was the recurrence of asymmetry. The distinction between major and minor asymmetry recurrence was determined by the need for secondary surgical revision. Surgical revision was defined as any further surgical procedures to restore breast symmetry. Unsatisfactory results (NAC or IMF disorders as well as malposition of the mammary cone in the thorax) due to uncorrected surgical planning were excluded from this study. Prosthesis implantation was not considered in the present study. To avoid bias, the following cases were excluded from the study: cases with a follow-up period of less than three years; asymmetric breasts that had undergone correction though prosthesis implantation; and breasts that had undergone fat grafting. Needless to say, breast asymmetry resulting from unilateral heterologous breast reconstruction following cancer surgery was also excluded from this study.

All patients were adequately informed. The study was carried out according to the principles of the Declaration of Helsinki; written informed consent was obtained, and permission to use the clinical data and photographs provided in this report was obtained from all the subjects who participated in this study.

Results

Overall, the weighted study sample consisted of 1,984 women with asymmetric breasts who underwent recontouring breast surgery: The total number of operated breasts was 3,968. The mean age of the patients was 41.4 years (range: 18–63 years). Preoperative assessment: 1,666 patients (83.97 percent) presented mostly volume discrepancy, with varying degrees of ptosis between the two breasts; 206 cases showed a different grade of ptosis between the two breasts without significant volume inconsistency; and the 112 remaining subjects reported mostly a discrepancy in the shape of the breasts. Out of the latter, 98 were normoplastic tuberous breasts: 74 type I (75,5%) and 24 type II (24,5%), following the Innocenti classification [22]. Out of the enrolled patients, 1,679 reported Grade 3 ptosis and 305 Grade 2 following the Regnault classification; 2,419 (61%) breasts underwent reduction, and 1549 (39%) breasts underwent mastopexy. The minimum and maximum post-op follow-up was 3 and 14 years, respectively. Out of the 1,984 enrolled subjects, 1,666 remained included in the study for three years, while 596 patients reported a longer follow-up period with an average of 10.7 years, ranging between 4 and 14 years.

Following the preoperative evaluation by the physician, the most recurrent asymmetry concerned volume discrepancies between the two breasts, followed by ptosis and shape discrepancies with an incidence rate of 84%, 10.4% and 5.6%, respectively. The data are listed in Table 1.

When drains were used, they were removed depending on the amount of fluid between the first and the fourth days, with an average duration of 2.02 days. An elastic compression bandage was used as a dressing and removed along with the drains.

Volume discrepancy was the main source of discomfort, according to the patients' own evaluations regarding their breast asymmetry (Table 2). Of the 1,984 questionnaires given to patients, 1,322 (66.63%) showed patient satisfaction evaluation after a 3-year follow-up; 596 (30.04%) returned for consultations after a longer period. Most of the patients showed great satisfaction with the results, even those with initial recurrence of asymmetry (Table 3).

Table 1 Preoperative findings following senior surgeon's evaluation

Main preoperative asymmetric findings out of 1,984 cases	N° of cases (%)
Finding	
Volume asymmetry	1,666 (84%)
Ptosis asymmetry	206 (10.4%)
Shape asymmetry	112 (5.6%)

Table 2 Preoperative findings following patients' discomfort with asymmetric breasts

How do you rate the discomfort considering the preoperative appearance of your breast?	N° of cases (%)
Volume asymmetry	1,646 (83%)
Ptosis asymmetry	193 (9.7%)
Shape asymmetry	145 (7.3%)

Table 3 Postoperative patient satisfaction in the long and short term at 3-year and longer follow-ups according to the Likert scale: results of the received questionnaires

How do you rate the postoperative appearance of your breast?	1,322 questionnaires after a 3-year follow-up N° of patients (%)	596 questionnaires after a follow-up longer than 3 years N° of patients (%)
Poor	–	–
Fair	–	34 (5.7%)
Good	208 (15.7%)	77 (12.9%)
Very good	698 (52.8%)	301 (50.5%)
Beyond expectation	416 (31.5%)	184 (30.9%)

Although the average reported level of patient satisfaction rate continued to be quite high over time, a slight decrease in satisfaction level was observed at a follow-up consultation after a long period of time. Even among the most satisfied patients, the recurrence of volume imbalance between the two breasts was the most common postoperative criticism, both at short- and longer-term post-op follow-ups. Regarding the main complaints, 36 patients lamented a recurrence of volume asymmetry, 21 ptosis imbalances and 4 shape incongruities at 3-year follow-up. These incidences decreased slightly at post-op follow-ups after a longer period of time (Table 4)

However, the physical examination by the physician three years after the operation showed some recurrence of volume asymmetry, even among the most satisfied patients. The incidence increased at a later post-op follow-up, ranging from 8.5% up to 35.7% (Table 5). This result, which is worse than the self-assessment recorded by the questionnaires, could be due to the surgeon's more critical and professional analysis of the result. In all patients, however, the recurrent asymmetries were definitely less

Table 4 Main complaints reported regarding patients' assessment of visible flaws and patient satisfaction rate with the postoperative results

What are your main complaints considering the post-operation appearance in terms of recurrence of	At 3-year postoperative follow-up N° of patients (%)	At longer follow-up N° of patients (%)
Volume asymmetry	36 (2.7 %)	12 (2 %)
Ptosis asymmetry	21 (1.6 %)	8 (1.3%)
Shape asymmetry	4 (0.3 %)	5 (0.8 %)

Table 5 Results of physical examination of the patient by the senior surgeon.

Postoperative patient physical examination regarding:	3-year follow-up n° cases (%)		Longer follow-up n° cases (%)	
Recurrence of volume asymmetry	No	778 (58.8%)	No	272 (45.7%)
	Perhaps	432 (32.7%)	Perhaps	111 (18.6%)
	Yes	112 (8.5%)	Yes	213 (35.7%)
Recurrence of ptosis asymmetry	No	1002 (75.8%)	No	396 (66.5%)
	Perhaps	288 (21.8.%)	Perhaps	136 (22.8%)
	Yes	32 (2.4%)	Yes	64 (10.7%)
Recurrence of shape asymmetry	No	1254 (94.8%)	No	530 (88.9%)
	Perhaps	60 (4.6%)	Perhaps	60 (10.1%)
	Yes	8 (0.6%)	Yes	6 (1%)

visible than they were preoperatively, and all patients still showed great improvement in breast appearance.

Following physician evaluation, most volume recurrences (91 [6.9%] and 174 [29.2%] patients at three-year and longer follow-up, respectively) occurred in the younger women (average 34.5 years ranging from 19 to 44) who underwent only mastopexy without volume adjustment. This is probably due to the lack of rebalancing between fat and gland, which instead was more carefully performed during reduction procedures, making them less sensitive to weight variations and hormonal inputs.

Irrespective of the assessments made by the surgeon, only 16 patients required secondary surgical correction; among these, we reported the following: 12 subjects underwent volume rebalance, 1 was readmitted for ptosis correction and 3 for shape recontouring. Surgical or medical procedures required for complications other than recurrent asymmetry were excluded from this study.

Discussion

What does symmetry mean? Symmetry is commonly defined as balanced and harmonic correspondence in size, shape, projection and position appearances between elements [23, 24]. Skin quality, difference in volume and breast projection, height and width discrepancy of the mammary cone, unbalanced contouring of the upper and lower pole, as well as inframammary fold (IMF) or areola complex disorders are the most evident and common disorders affecting asymmetric breasts [25, 26].

Breast asymmetry is a very frequent disorder and requires correction during almost all breast surgical procedures [27]. Numerous techniques are discussed in the literature regarding breast recontouring that vary from conservative to more invasive approaches in order to reestablish breast symmetry [28–39]. Volume discrepancy could be efficiently restored through the removal of parenchyma surplus [40–42]; moreover, shape and projection rebalance could be obtained by extra tissue displacement wherever it can be recruited [43–48]. Furthermore, a different grade of ptosis, differences between the areolas, as well as incongruity in the lower poles could be satisfactorily recontoured by several surgical procedures [49, 50]. Nevertheless, recontouring of breast asymmetry represents a difficult challenge for surgeons because satisfactory results achieved in the short term might not be maintained over time [51, 52]. Although volume, position and shape of the mammary cones, as well as NAC appearance, represent the first key elements in restoring pleasing mammary symmetry, surgical planning of breast discrepancy correction procedures should aim for the maintenance of stable results, limiting the recurrence of the disorder as much as possible [53–55].

Why Might Breast Asymmetry Recur Even Relatively Quickly After Satisfactory Aurgical Results?

Breasts are soft appendages, consisting of fat and gland wrapped in a skin envelope. Skin quality is important in the maintenance of symmetric results because atrophic skin acts differently compared to eutrophic skin. The former offers minor support, heightening the risk of ptosis recurrence. However, the difference in skin quality between the two breasts represents a rather rare occurrence, except in particular cases such as in normoplastic type II asymmetric tuberous breasts following the Innocenti classification [56–60]. Therefore, skin quality should not have a relevant role in symmetry maintenance [44]. The ratio between gland and adipose tissue could strongly diverge between the two breasts. These two different tissues have different textures and act in very dissimilar ways to the physiological inputs. Following the variations in body weight, each breast will change its volume independently, according to the percentage of adipose tissues present. In the same way, breast appearance is affected by the glandular modifications resulting from the hormonal stimuli or the aging process; the entity of these changes diverges between the two mammary cones, according to the percentage of

parenchyma present in each breast. In other words, fat and glands undergo different modifications, in the same subject, at the same or at different times and in different conditions. Glandular tissue is interspersed unevenly in the adipose tissue, thus often creating an unequal balance between the two breasts, which is often a challenge to correct. Nevertheless, this should be a key aim in asymmetry correction procedures to avoid the reoccurrence of the disorder. Based on these considerations, pre-operative evaluation should not be limited to a simple visual inspection; instead, it requires a careful palpatory investigation of each breast. Palpatory comparison of the two breasts is important to assess their consistency; a significant texture incongruity reveals an unbalanced ratio between the two different tissues [44]. This aspect is not an insignificant detail because it might strongly interfere with the maintenance of a long-lasting symmetry [61]. Depending on personal sensitivity and individual experience, it may not be easy to assess; the Rancati score or other radiological investigations, which produce an accurate evaluation, could be useful, especially in the case of large and heavy breasts [62, 63]. A significant assessment of texture incongruity should be thoroughly discussed with the patients pre-operatively; this will render them aware, avoiding future complaints in case of recurrent disorder.

Despite the high level of patient satisfaction, the clinical impression derived from the comparison of many photographs taken during the routine postoperative check-up showed some recurring asymmetries. They slowly increased over time, and several patients who were asymmetry-free at a short follow-up, started some recurrence of the disorder subsequently.

During the study period, a large number of surgical breast procedures were carried out by the author. Although most of the patients were satisfied with the results obtained, when we followed these subjects over a long-term period, more recurrences of breast asymmetry were found at the physician examination than we had expected. This was the

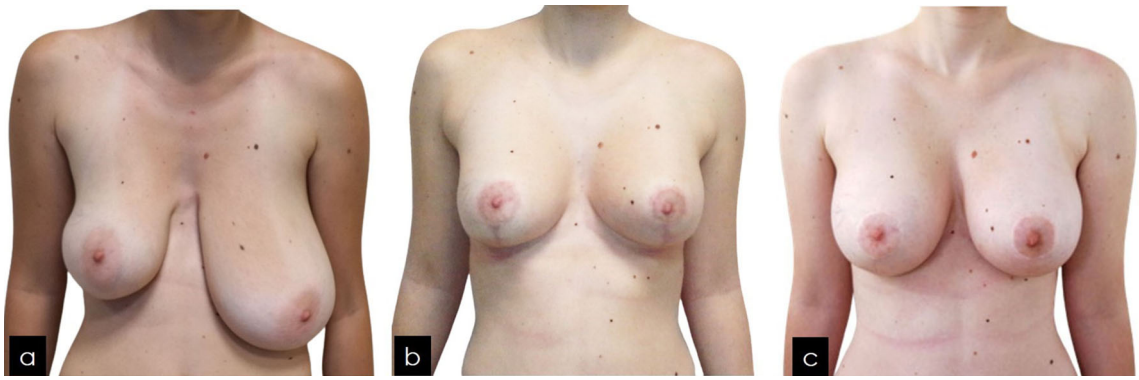

Fig. 1 **a** Preoperative appearance showing striking breast asymmetry including dimension, unattractive shape and difference in width of the mammary base. The shoulder that is ipsilateral to the heavier breast is significantly lower compared to the contralateral one. **b** Postoperative appearance three years after surgery showing a satisfactory maintenance of the breast symmetry and rebalance of the shoulder position. **c** Appearance eight years after surgical correction; both breasts have symmetrically increased in volume due to weight changes and three pregnancies.

Fig. 2 **a** Preoperative appearance showing significant breast asymmetry: The right breast shows greater volume, a wider mammary base and more evident ptosis. **b** Postoperative appearance three years after bilateral breast reduction showing a not perfect but acceptable symmetry. **c** Nine years post-op: Both breasts show an increment of volume due to the increase in body weight and a pregnancy. Nevertheless, a discrepancy in volume between the breasts has recurred with a greater increase on the right side.

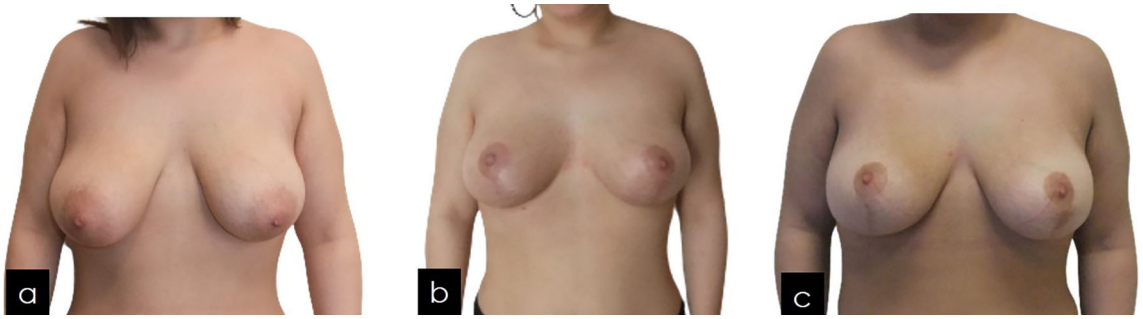

Fig. 3 **a** Preoperative appearance showing significant breast asymmetry: The right breast is larger than the left; it is more divergent considering the mid-sternal line; **b** postoperative appearance three years after bilateral breast reduction showing a not perfect but acceptable symmetry; **c** seven years post-op: Both breasts show an increase in volume due to weight changes. Nevertheless, a discrepancy in volume between the breasts has recurred with a greater increase on the right side.

reason why we carried out this review. In fact, despite a satisfactory symmetry reported in the early postoperative period, its maintenance proved to be unpredictable, representing one of the major causes of frustration for surgeons who strive for perfection, even when applying great attention and complex approaches to obtain optimal results in breast recontouring.

Unfortunately, for follow-up that was longer than 3 years after the procedure, only 596 (30.04%) patients showed up; this high number of patients who dropped out of the trial three years after the surgery represents the weak point of the study. Indeed, follow-up after a long period of time is a common challenge for aesthetic surgery. Nevertheless, despite the fact that a large number of subjects did not fully complete the study, 596 patients who showed up for longer follow-ups represent a fairly significant cohort. Despite the decreasing number of patients remaining in the study and its retrospective nature, which certainly represents a bias of the study, a follow-up period of an average of 10.7 years, ranging from 4 to 14 years, could offer significant reflections regarding breast asymmetry correction. Another bias that may influence the judgment of the final outcomes is the difference between the procedures carried out on the patients. Obviously, a different procedure (mastopexy or reduction mammoplasty) to treat symmetry deficiency could significantly interfere with the results. Furthermore, patients who underwent reduction mammoplasty, as they suffered from heavy bodily discomfort, could perceive a better result in physical wellbeing, score better satisfaction and be less meticulous regarding aesthetic breast appearance. In other words, as the inclusion of their results may have partially modified the evaluation of the collected data, this does limit the objective data that can be taken from this review. An important issue brought up by this study is that asymmetry recurs more than previously thought. Despite the fact that the reason for these recurrences is not perfectly clear and depends on many things, a meticulous preoperative assessment and, as far as possible, a suitable surgical balance between breast tissues could improve final outcomes. Based on these insights, further investigation is necessary to define a more appropriate surgical strategy to deal with this common condition.

Clinical cases are shown in Figs. 1, 2, 3.

Conclusion

The recurrence of asymmetry is one of the most common weak points of breast asymmetry correction procedures. The high dimorphism of the breast makes asymmetry correction a significant challenge. Although shape, size and position represent the key elements to define mammary symmetry, breast consistency represents a further variable that should be seriously considered. It might be a significant factor in comparing the symmetry between two separate organs, so close one to each other in the thorax.

Funding The authors received no financial support for the publication of this article. No external funding supported this study.

Declarations

Conflict of interest The author has no commercial associations or financial interest to declare in relation to the content of this article. The authors declare that they have no conflicts of interest to disclose.

Ethical approval Not required.

Informed consent Written informed consent and permission to use the clinical data and photos provided in this report was obtained from all the subjects who participated in this study.

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