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Concepts in aesthetic breast dimensions: Analysis of the ideal breast☆

P. Mallucci [a,b,*], O.A. Branford [b]

[a] The Cadogan Clinic, 120 Sloane street, London SW1X 9BW, United Kingdom
[b] Department of Plastic Surgery, Royal Free Hampstead NHS Trust, Pond Street, London NW3 2QG, United Kingdom

Summary   *Background:* This article identifies the key parameters that define the aesthetic ideal of the breast. Whilst much has previously been written on the aesthetic characteristics of the breast, thus far objective indices of beauty have not been identified.
Methods: In this observational study the breasts of 100 consecutive women in three quarter profile pose, having been chosen as topless models for the attractiveness of their breasts by editors of mass print media, were analysed to identify specific proportions common to all of them. Analysis of a series of less attractive breasts was subsequently carried out looking at divergence from the 'norms' identified in the first part of the study.
Results: We have identified 4 key features consistently found in all the models in the consecutive series: the proportion of the upper to the lower pole is a 45:55 ratio, the angulation of the nipple is upwards at a mean angle of 20° from the nipple meridian, the upper pole slope is linear or slightly concave, and the lower pole is convex.
Conclusions: Deviation from this pattern yields a less attractive breast — the greater the deviation, the less attractive the breast. The importance of this template lies in its use as a guide for the design of aesthetic breast surgery as well as objective analysis of both good and bad results.
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Introduction

An essential part of aesthetic surgery is an understanding of the aesthetic ideals of the body. These are the guidelines which allow for interpretation, manipulation and modification in order to create or recreate a determined aesthetic outcome. Much has been written about such norms particularly in the face.[1−3] A good example is the work done on facial proportion − the division into thirds and fifths by Leonardo da Vinci in horizontal and vertical dimensions respectively, as well as orthognathic angles and proportions.[2−4] These act as guides in facial reconstruction and cranio-facial surgery. Also in the nose the precise establishment of nasal proportion by Gunter and colleagues has led to a template for basic nasal ideals - a 'map' for aesthetic rhinoplasty.[5] In addition Burget has described aesthetic units of the nose to serve as a guide for nasal reconstruction.[6]

Whilst much has been written on breast form[7] no specific objective template has previously been described as a basis for the attractive norm. Several authors have contributed to principles about breast re-shaping as part of reconstruction, without specifically defining the end goal.[8,9] The purpose of all surgical classifications and guidelines is ultimately to direct surgery towards creating a better and more predictable outcome, as well as providing a framework by which results can be assessed in an objective manner.

The aim of this observational study has been to try and establish such a template − identifying specific parameters which contribute to the attractiveness of a breast. We studied 100 consecutive topless models with natural breasts published in the popular print media, presumably attractive to the general public. The models' breasts were analysed in order to establish whether certain identifiable features were common to all of them as clear indices of their attractiveness. 4 key features were identified: the proportion of the upper pole of the breast to the lower pole, the angulation of the nipple, the upper pole slope, and lower pole convexity. A number of clinical examples were then examined illustrating that deviation from these norms yields a less attractive breast, the greater the deviation, the less attractive the breast.

Materials and methods

Study design

The study design comprised two parts:

A quantitative assessment of ideal proportions in natural breasts of 100 topless models measuring − upper pole:-lower pole (U:L) ratio, nipple angulation, upper pole slope, lower pole convexity.

Analysis of a series of attractive and unattractive breasts: both natural i.e. unoperated, as well as those with good or poor aesthetic outcomes following surgery. Proportions and parameters described above are compared and assessed.

Defining aesthetically pleasing breast proportions in natural breasts

For the purpose of this study the natural breasts from 100 topless models were analysed photographically to determine whether there were any consistent features common to all of them. These models were chosen from the Sun newspaper web site, published in the United Kingdom by News International Ltd. This publication has the 10th greatest circulation in any language in the world, and exclusively photographs topless models that have not had aesthetic breast procedures. The publication is famous for the editors selecting the models for the attractiveness of their breasts.

100 consecutive three quarter profile views of models from the newspaper's website[10] from between 2009 and 2010 were analysed: images were assessed by defining and measuring the breast parameters described below (Figure 1). This was achieved using the ruler tool in Adobe® Photoshop® CS4 (Adobe Systems, Inc., San Jose, Calif.). While we acknowledge that these images are not clinical photographs we have taken care to include images that are as standardised as possible by being three quarter profile views.

A horizontal line was drawn through the breast at the level of the nipple − the nipple meridian (NM in Figure 1).

An upper horizontal line was drawn at the point of take off of the breast from the chest wall − the area of breast between the upper pole line (UPL in Figure 1) and the nipple meridian was defined as the upper pole (U in Figure 1).
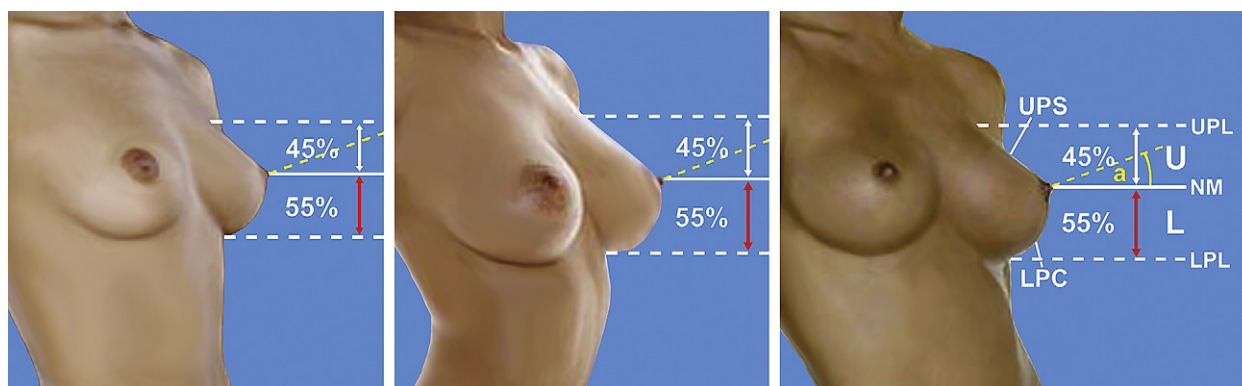
Figure 1 Three quarter profile view with standard breast parameters: U:L proportion, nipple angulation, contour of upper and lower poles. These images show three different breast sizes: all 3 models have a U:L ratio of 45:55, straight or concave upper poles, 20° upward angle of nipple pointing, and concave lower poles. U = Upper pole, L = Lower pole, UPL = Upper Pole Line, LPL = Lower Pole Line, NM = Nipple Meridian, UPS = Upper Pole Slope, LPC = Lower Pole Convexity, a = nipple angulation.

Table 1 Table showing results of analysis of breasts for 4 key features in 100 models: U:L ratio, upper pole contour, angulation of nipple pointing, lower pole convexity.

Breast Parameter	Result ($n = 100$)
Vertical Height of Upper Pole (%) Mean $\pm$ SD	45 $\pm$ 3
Vertical Height of Lower Pole (%) Mean $\pm$ SD	55 $\pm$ 3
Nipple Pointing from Horizontal (°) Mean $\pm$ SD	20 $\pm$ 7
Upper Pole Contour (%) Concave:Straight:Convex	61:33:6
Lower Pole Convexity (%)	100

A lower horizontal line was drawn at the level of the inframammary fold. The area between the lower pole line (LPL in Figure 1) and the nipple meridian was defined as the lower pole (L in Figure 1) of the breast.

In each case the distance between the nipple meridian and upper pole line was measured and compared to the distance between the nipple meridian and lower pole line in order to establish the U:L proportion (Figure 1).

The angulation of the nipple was measured as the angle from the horizontal plane at the nipple meridian (a in Figure 1).

In each case the curvature of the upper pole slope (UPS in Figure 1) was noted and defined as straight, concave or convex.

The lower pole curvature (LPC in Figure 1) was analysed.

Statistical assessment
Collated data from the 100 models was analysed to produce mean values for each parameter using SigmaStat 2.0 (Jandel Scientific Software, San Rafael, Calif.).

The results were summarised and tabulated to highlight the findings (Table 1).

Analysis of a series of attractive and unattractive breasts
The second part of the study consisted of a selected number of clinical cases, both operated and unoperated, used to illustrate why a breast might be seen as attractive or unattractive by comparing their proportions with the norms established in the group of 100 models. The images were subjected to the same analysis and measurement through standardised AP and three quarter view photographs comparing the various parameters to those of the attractive breasts, illustrating that those breasts approximating the established template were attractive and those deviating were less attractive.

Results

Defining aesthetically pleasing breast proportions in natural breasts

Statistical analysis of the various measurements of the breasts in 100 topless models is presented in Table 1, with results presented as mean $\pm$ SD. The digital images had sufficient resolution when uploaded to Adobe® Photoshop® CS4 for the described breast parameters to be accurately assessed, given the variation in posture.

The analysis revealed that the lower pole of the breasts was invariably fuller than the upper pole. The nipple meridian lay at a point such that on average the proportion of breast above it was 45% and below it 55% ($n = 100$): the so called 45:55 ratio. There was a narrow spread of data about the mean with the standard deviation being 3%. The range of values for the upper pole was 37%—54%. The range for the lower pole was 46%—63%.

In the vast majority of breasts the upper pole was either straight or concave (61% and 33% of cases respectively). The upper pole was convex in only 6% of cases.

The angulation of the nipple was upwards from the horizontal at a mean angle of 20° $\pm$ 7° ($n = 100$; range 0°—34°).

In all cases the breasts demonstrated a tight convex lower pole. No ptotic breasts were seen.

Three examples are shown in Figure 1, demonstrating three different breast sizes: all 3 models have a U:L ratio of 45:55, straight or concave upper poles, upward pointing nipples, and tight convex lower poles.

Analysis of a series of attractive and unattractive breasts

Figure 2 represents a patient with a good result following breast augmentation conforming to the parameters described where the 45:55 ratio, straight line upper pole
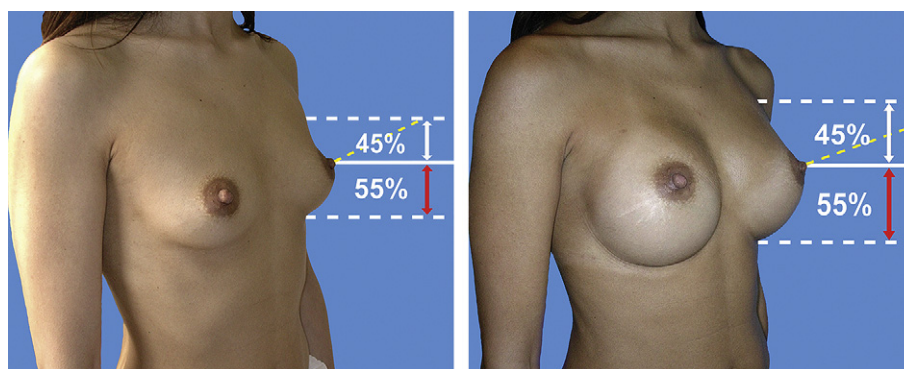
Figure 2 Analysis of the good result. (Left) Preoperative view. (Right) Postoperative view. Three quarter profile view of a patient with a good result following breast augmentation where the 45:55 ratio, upper pole contour, upward pointing nipple and lower pole convexity have been maintained.
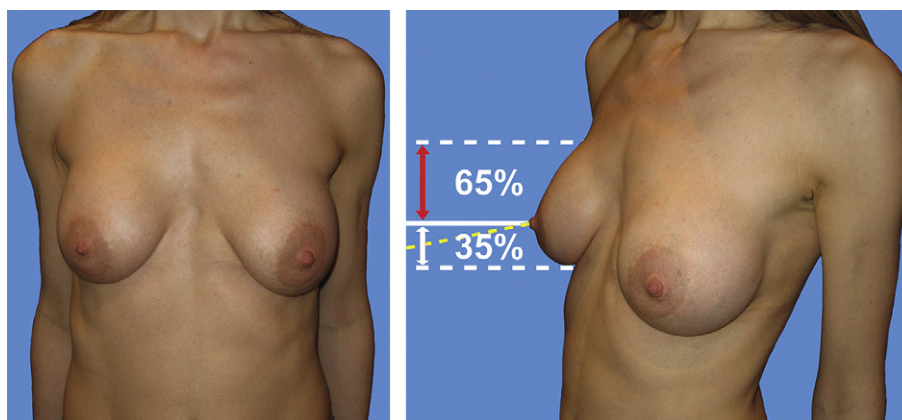
Figure 3   Analysis of the poor postoperative result following breast augmentation. (Left) Anteroposterior view. (Right) Three quarter view. The U:L ratio is 65:35. There is upper pole convexity and downward pointing nipples.

slope, upward pointing nipple and lower pole convexity have all been maintained. Her preoperative picture illustrates good initial proportions, the key to good design in breast augmentation is to preserve and not distort these dimensions.

Figures 3—6 represent analyses of unattractive breasts which demonstrate the deviation from the described ideal parameters. Figures 3—5 show the results from poorly carried out breast augmentations. In these cases there is increasing U:L disproportion, upper pole convexity, and downward pointing nipples. The more the breasts deviate the less attractive they are.

Figure 6 demonstrates a vertical scar augmentation/mastopexy with bottoming out of the breast - leading to an unattractive appearance. On this occasion there is an inverse disproportion between the upper pole and lower pole compared with the previous cases where there is far too little upper pole and far too much lower pole; U:L ratio = 28:72 rather than 45:55, the nipple angulation is 40° as opposed to 20° and the lower pole has a long, lax convexity. All of these transgressions lead to an equally unattractive breast as the others.

Figure 7 is a demonstration of how the patient's breasts have been made less attractive following surgery. The poorly planned surgery has resulted in further deviation from the aesthetic norm postoperatively as compared with preoperatively. The U:L disproportion has been made greater, with marked convexity of the upper pole and downward pointing nipples. Preoperatively, although proportions were not ideal, the upper pole slope was reasonable as was the nipple angulation more favourable. Both of these have been distorted following surgery as has her U:L pole ratio.

Conversely Figures 8 and 9 demonstrate that as parameters are normalised the breast becomes more attractive even if perfection is not reached. The breasts in Figure 9 (after an implant exchange and periareolar mastopexy) are marginally more attractive than those in Figure 8 - examination shows that the distortion is lessened in Figure 9 as compared with Figure 8 in all parameters, U:L disproportion, nipple angulation, upper pole convexity, lower pole profile are closer to the ideal than in Figure 8 therefore the breast is more attractive.

The analysis is not restricted to implant based aesthetic breast surgery, evaluation of a ptotic breast before mastopexy shows the disproportionate length of the upper pole
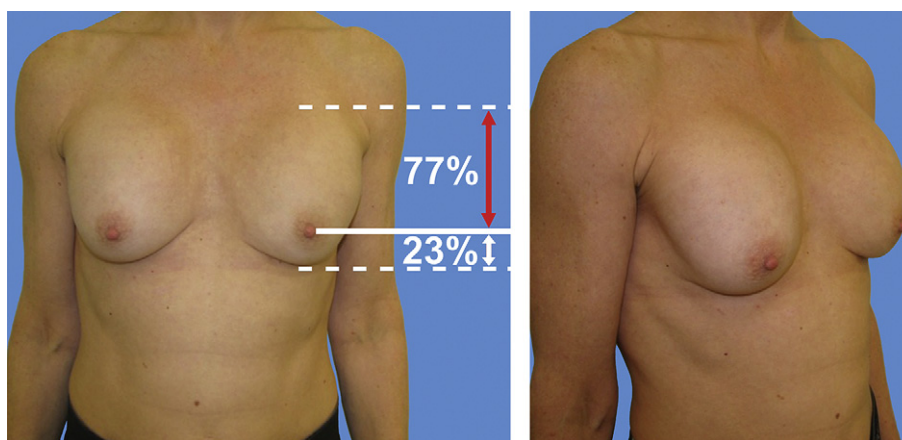
Figure 4   Analysis of the poor postoperative result following breast augmentation. (Left) Anteroposterior view. (Right) Three quarter view. The U:L ratio is 77:23. There is marked upper pole convexity and downward pointing nipples.
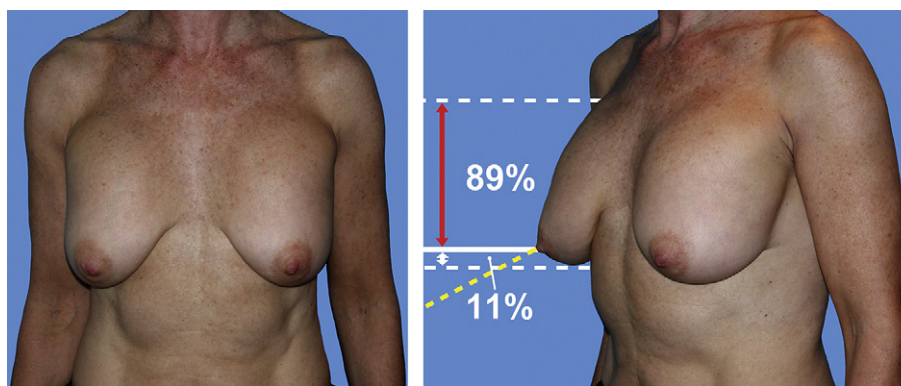
Figure 5   Analysis of the poor postoperative result following breast augmentation. (Left) Anteroposterior view. (Right) Three quarter view. The U:L ratio is grossly disproportionate at 89:11. There is upper pole convexity and downward pointing nipples.

to the lower pole render it unattractive − the process of mastopexy has reversed these dimensions in order to create a more attractive breast (Figure 10).

This series of clinical cases illustrate that the closer the breast fits to the parameters defined, the more attractive it becomes. Conversely, the more it deviates from the norms the more unattractive it becomes.

Discussion

Much has been written on what constitutes the ideal breast, but it has never been distilled into quantifiable parameters. Vague terms are often used such as proportion, harmony, shape and position[11] which are not helpful as objective measurements of breast beauty. Until now the establishment of a basic template for breast beauty has eluded us.

In this study of the 100 topless models selected by the newspaper editors because of their naturally attractive breasts, it is presumed that the editors responsible for their selection (like many of us) are able to recognise their attractiveness without knowing specifically what contributes to that attractiveness. Through analysis we have been able to identify a consistent pattern in these breasts which we believe defines this sense of beauty.

The essence of the attractiveness of these breasts has been distilled into 4 key parameters which characterise

simply and consistently an aesthetic norm for the breast, these are essential for rendering the beast attractive and deviation from these characteristics yields an unattractive breast. They can be summarised as follows:

☐ The U:L ratio is always such that the upper pole is not as full as the lower pole − with 45% of the breast being made up of upper pole and 55% by lower pole − the so called 45:55 ratio.
☐ The nipple sits at this upper/lower pole boundary (nipple meridian) and is upward pointing (mean angle of 20°).
☐ The upper pole slope should ideally be either a straight line or mildly concave.
☐ The lower pole is a smooth convex curve.

The authors would like to emphasise that this study is not based on their opinion of what is deemed an aesthetic ideal, but is an observational study examining aesthetic proportions in a consecutive series of images of female breasts chosen for their attractiveness by the print media. The observations are simple but when used as a template upon which to analyse breast form, they are powerful indices of breast attractiveness. This is demonstrated in the second part of the study, where the same parameters are analysed in a series of clinical photographs. This is best illustrated when analysing the unattractive breast −
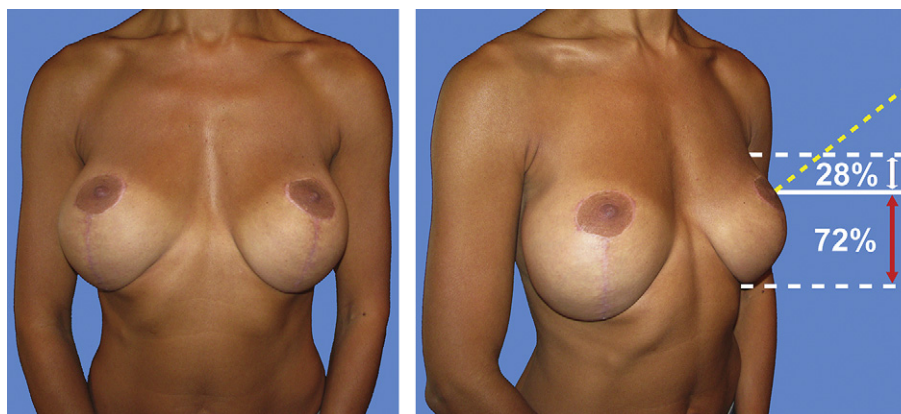
Figure 6   Vertical scar mastopexy. (Left) Anteroposterior view. (Right) Three quarter view. In this case the bottoming out of the breast is associated with a U:L ratio of 28:72.
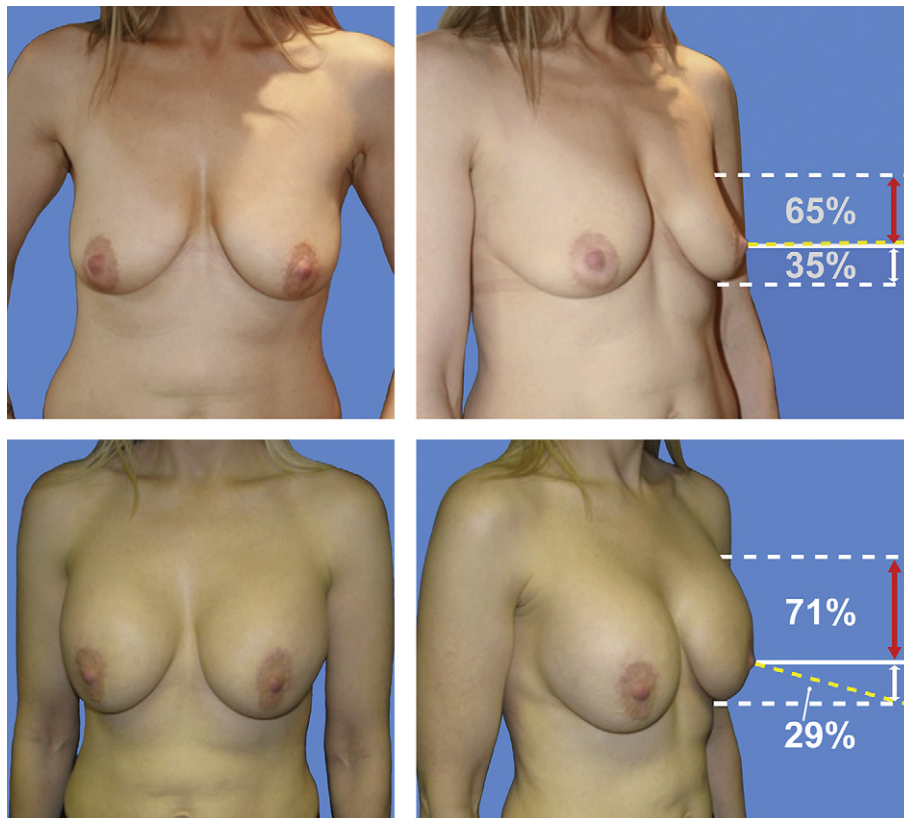
Figure 7   Poor postoperative result. (Above Left) Preoperative anteroposterior view. (Above Right) Preoperative three quarter view. (Below Left) Postoperative anteroposterior view. (Below Right) Postoperative three quarter view. This patient's breasts have been made less attractive following surgery. The U:L disproportion has been made greater from 65:35 to 71:29. Surgery has resulted in marked convexity of the upper pole and downward pointing nipples.

deviation from this norm in either one or all of these parameters results in a decrease in attractiveness of the breast — the greater the deviation from these norms, in which ever direction, the less attractive the breast. Both excess upper pole (Figures 3—5) or excess lower pole (Figure 6) are as unattractive as each other — their deviation is very marked from the norm. Figures 8 and 9 illustrate how the breast becomes more attractive as the ideal norms are approached. Preoperatively the U:L disproportion is greater than post op and the nipple angulation is downward as opposed to upward pointing. Whilst ideal proportion is not reached postoperatively, the incremental improvement visualised quantitatively translates into a more attractive breast postoperatively with better implant placement and periareolar mastopexy.

The template therefore enables us at a very quick glance to understand why a result is suboptimal (or good for that matter) and by how much, and thus to act as an analytical
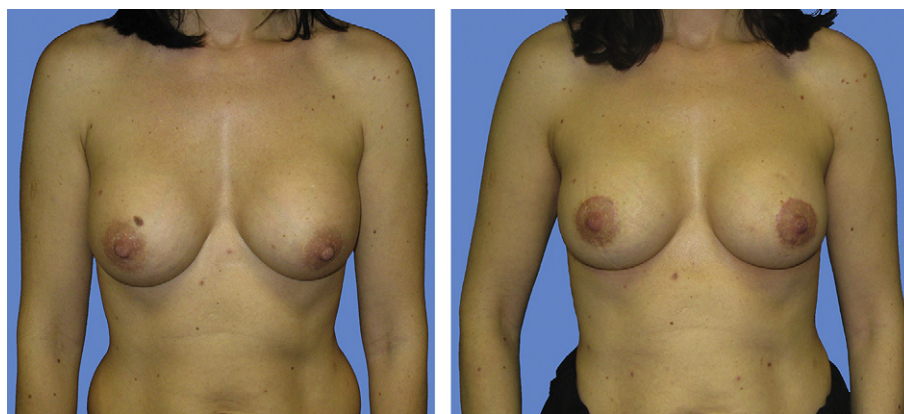
Figure 8   Improvement in aesthetic appearance following implant exchange and periareolar mastopexy. (Left) Preoperative view (Right) Postoperative view.
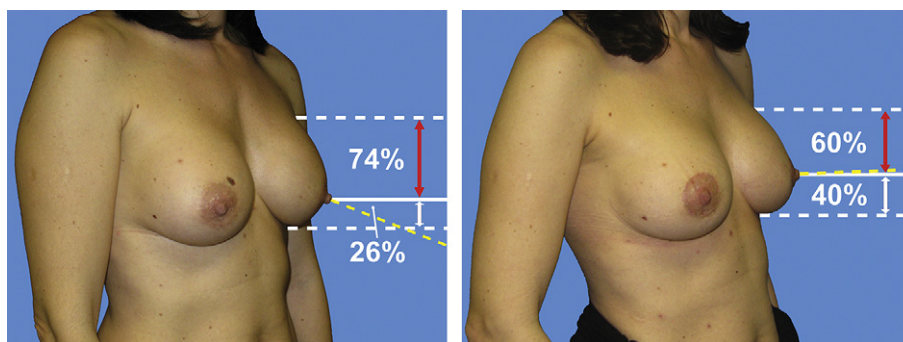
Figure 9 Same patient as in Figure 8 on three quarter views. (Left) Preoperative view (Right) Postoperative view. The U:L ratio is improved from 74:26 to 60:40 with elevation of the angulation of the nipple. Although the 45:55 ratio is not achieved the improvement in the ratio towards the ideal proportion is clearly seen.

guide as to what might be necessary to correct or improve a given situation. It will influence implant selection and placement, as well as mastopexy and breast reduction design and allows for a more meaningful interpretation of shape or disharmony. An example of this is with nipple malposition or ptosis — this could more meaningfully be described as U:L disproportion. Empirical distance values of the nipple are not important per se, it is the context of nipple position on the overall breast mound which counts. We have established that as long as it lies on the 45:55 meridian it is likely that 'harmony' will be achieved - the closer to the meridian the more harmonious and vice versa.

Penn described a triangle as a measurement of nipple distance observed in a selected group of women with attractive breasts.[7] He did not however, consider or define shape or form or the relative position of the nipple on the breast mound. Indeed it would be perfectly possible to have the Penn dimensions and still have an unattractive breast if the other parameters defined by this paper are transgressed.

Hauben and colleagues examined breast-nipple-areola proportion in 50 randomly selected female volunteers (with 13 of these being excluded by the authors).[12] Their group included women aged between 24 and 64 years as well as women with body mass indexes ranging from 20.4 to 30.8. No attempts were made by the authors to correlate attractiveness to the breast-nipple-areola ratio described.

Hauben described a random population study seeking to define averages across a wide range, and made no attempt to define attractiveness. Therefore there are distinct differences between Hauben's study and our observational study which focussed on the definition of the aesthetically pleasing breast.

Fabié and colleagues examined breast proportions in photographs of 70 volunteer women and one mannequin.[13] They selected the 10 women that obtained the best scores given by a panel of 20 people including plastic surgeons and lay people. The findings of that study have been particularly interesting on two counts. Firstly, that the nipple position is significant in determining aesthetic proportion in the breast as determined by sternal notch to nipple distance (termed breast arrow by the authors), relative to trunk height. This confirms the findings in our study, where the nipple position is the main determinant in the observed aesthetic U:L ratio. The initial population of women included in their study were not selected for the attractiveness of their breasts. The study involved small final numbers of patients, just 10 patients, who were the 'best of the volunteers' and may not have had attractive breasts. All of the women in their study had breasts with greater upper pole length relative to their lower pole length. However, when the mannequin was assessed, considered by the authors as having breasts approximating to a 'utopian ideal', they did find that the lower pole length was greater
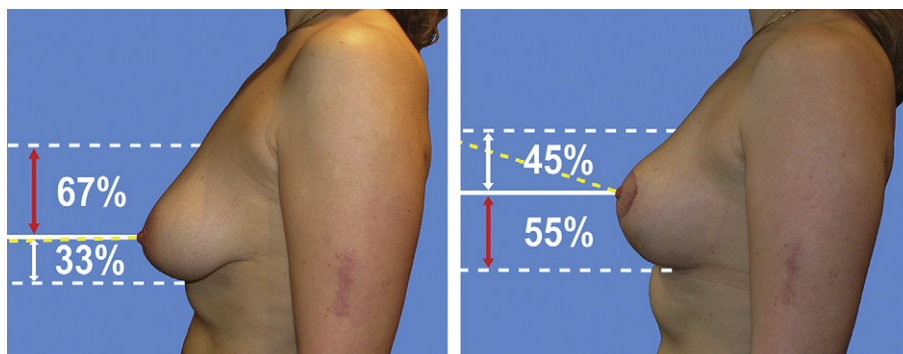
Figure 10 Improvement in aesthetic appearance following mastopexy alone on lateral views. (Left) Preoperative view (Right) Postoperative view. The U:L ratio is improved from 67:33 to the ideal 45:55 ratio with elevation of the nipple angulation. These images demonstrate that the proportions can be readily assessed on lateral views.

than the upper pole length, which is exactly in keeping with our observation. This second interesting observation reinforces the findings of our study.

Other authors have recommended guidelines for reconstructive breast templates touching on some of the concepts discussed without simplifying and formulating them precisely.[8,9,14]

Tebbets and others have advocated the concept of tissue based implant selection - using the template of the breast, the tissue distribution and quality to guide implant selection rather than to be led solely by patient choice.[15–17] This has greatly contributed to a 'healthier' selection of implants with the long term interests of the patient in mind. Whilst respect for the tissues and such careful analysis is crucial to the aesthetic outcome, definition of what precisely constitutes a beautiful breast has not previously been articulated in quantifiable terms.

Some implant manufacturers have implemented systems to try and optimise implant selection for a given thoracic form and breast dimension. A good example is the Biodynamics® Breast Analysis System designed by Allergan. Whilst this is a very useful adjunct to implant selection for both patient and physician it falls short of defining the end goal in terms of aesthetic definition of the breast.

It is a common experience that women presenting for breast augmentation, often think of volume and not shape, yet the line between enhancement and distortion is easily crossed. However, discussion and explanation around the concept of proportion and form as the principal contributors of beauty rather than just sheer volume allows for a better understanding of outcome goals and thereby implant selection and operative planning. It is difficult to be dogmatic or empirical about beauty and perhaps especially about the breast. Undoubtedly there are significant cultural overtones borne out by this study. The women studied are western women observed by western observers. It is natural to assume that this ideal may not be entirely cross cultural. The findings from 100 models in an equivalent publication from another culture might be quite different. In addition, individual taste and preference is also not taken into account, and it is well known that there is a great variation in such.

It is important to note that there is some variation in pose by the models and that the first part of the study used print media rather than clinical photographs. However, the models have deliberately made slight alterations to their posture to make their breasts more attractive. It is this aesthetic ideal that we have observed in the photographs. Only three quarter profile views were assessed in order to reduce variability. In addition, the high numbers of breasts studied relative to other studies using clinical photographs will have contributed to diminishing the variation due to posture.

Hsia and Thompson have also raised the issue that what the surgeon considers to be aesthetic, may differ from what the patient wants.[18] They examined upper pole slope and noted that surgeons preferred a straight or a concave upper pole slope, whilst patients often expressed the desire for a convex one. Interestingly in our breast analysis 94% of attractive breasts in 100 models had either a straight or a concave upper pole. These were not chosen by surgeons, but by lay people for the appreciation of the general public. The authors experience is that patients will often comment that they would like a full upper pole (especially in the post pregnancy breast) because they feel flat from deflation. However, when shown images of 'ideal' enhancement compared to upper pole full breasts very few will ever choose the latter. In other words they too are able to detect harmony in ideal proportion when it is shown to them. Whilst it is essential that we listen to our patients desires it is also imperative that we guide them so that choices are made in their best interests.

Conclusions

The importance in establishing guidelines ultimately serves as a potential template for design in aesthetic breast surgery — it allows for much more 3 dimensional interpretation of form, and for more meaningful discussion than such isolated measurements as nipple position alone. Ultimately the purpose of a template is in the production of a more predictable outcome — it is difficult to strive towards a goal without being clear about the nature of that goal. It seems fundamental to aesthetic breast surgery and indeed to reconstructive breast surgery that in order to be able to create or recreate ideal breast form we must have an ideal to aspire towards. This article establishes the 4 key features which define breast attractiveness simply and objectively.

Funding

Conflict of interest

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