



Invited Discussion on: A New Tool for Breast Anthropometric Measurements—Presentation and Validation for Women and Men



Maurice Y. Nahabedian¹

Received: 28 July 2019 / Accepted: 7 August 2019 / Published online: 16 August 2019
© Springer Science+Business Media, LLC, part of Springer Nature and International Society of Aesthetic Plastic Surgery 2019

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.

In this manuscript, the authors have created a tool for indirect breast measurements using the BreastIdea (BI) as an adjunct or alternative to direct breast measurements. The BI method captures a two-dimensional photographic image that is anthropometrically analyzed by a computer software package. Digital markers are manually placed on the breast image at specific points allowing the computer to then measure the distances between two corresponding points. These measurements can be used as a reference to assess breast symmetry and to assist in the design and planning of breast operations. The reasons for developing this tool were to overcome some of the shortcomings of traditional breast measurements and to create a platform that would be easy to use and portable and with smart phone capability.

To validate the BreastIdea, the authors studied 10 men and 10 women, all of whom had unique breast characteristics. All patients had direct and indirect measurements taken as described in the manuscript. To determine the accuracy of the indirect method, patients having direct measurements had a 2-cm marker placed on the breast to allow for virtual length to be translated into actual length. These patients were photographed, and the images were uploaded to a computer analyzed by the software package

and compared to the indirect measurements generated by the BI. The conclusions of the study were that indirect breast measurements using BI are reliable with high correlation to standard direct measurements. The primary limitation was in women with larger or more ptotic breasts. To partially overcome this limitation, a second photographic image was taken that included manual elevation of the breast in order to depict the location of the inframammary fold (IMF) and to more accurately demonstrate the upper breast border.

Accurate measurements are one of the most important determinants of outcome for surgeons planning aesthetic and reconstructive breast surgery. Measurements will demonstrate asymmetries with respect to the footprint, conus, skin envelope and also demonstrate the relative positions of important landmarks such as the nipple areolar complex and IMF. Other important factors not amenable to measurement include skin quality, elasticity, degree of ptosis and parenchymal density. When a surgeon uses the BI system, the image is uploaded, and the surgeon will determine where the breast borders are by placing a digital marker where they believe it to be. This will be easy to identify in a smaller and non-ptotic breast but more arbitrary for the larger ptotic breast.

Regardless of the measurement system used, all measurements will have a subjective component based on where some of the start and end points are. This is usually not an issue when measuring the sternal notch to nipple distance because these are fixed points and easy to identify; however, the exact location of the medial, lateral, superior, and inferior mammary borders are sometimes not as obvious. For example, when measuring the base width of the breast, there will usually be some degree of variability based on where the surgeon feels the exact medial and lateral border of the breast actually is. The same is true for

✉ Maurice Y. Nahabedian
DrNahabedian@aol.com

¹ Inova Branch, National Center for Plastic Surgery, Virginia Commonwealth University, 7601 Lewinsville Dr., #400, McLean, VA 22102, USA

the upper breast border that is usually not defined and often requires some degree of breast manipulation to determine. In the ptotic breast, the distance between the nipple areolar complex and the inframammary fold may vary based on the amount of energy required to physically lift the breast and the amount of stretch that occurs when obtaining the measurement. When the breast is manually lifted to identify the position of the IMF, its true position can be altered. Even though the IMF is fixed at rest, the mobility and the ability to manipulate its position are evident when comparing its location in the upright and supine position. The relative position of the IMF relative to the chest wall is variable based on the principles of soft tissue compliance and tissue excursion. Thus, all techniques that measure the horizontal and vertical dimensions of the breast are usually subject to some degree of subjective analysis because identification of the exact location of the lateral, medial and superior borders is not always clear. In the smaller, non-ptotic breast, these landmarks are relatively easy to identify; however, in the larger and more ptotic breast, these landmarks are obscure. That is why the authors do not recommend this technique for the larger and more ptotic breast.

When comparing the BreastIdea to currently available three-dimensional systems, three-dimensional imaging has the advantage of providing volume information in addition to linear measurements. Three-dimensional systems are able to determine breast projection more accurately compared to measurements obtained with two-dimensional imaging or a direct measurement device. In addition, three-dimensional imaging can assess volume change over time and is the preferred tool when discussing option to patients considering augmentation or augmentation mastopexy because it provides visual imagery than cannot be equally achieved using two-dimensional systems that utilize direct or indirect measurements. The primary limitation with the

three-dimensional systems is also that accurate measurements are hindered in patients with large or ptotic breasts because it is not able to accurately assess skin stretch and glandular displacement (1).

In summary, the need to develop a software package that would be easy to use, highly reliable, with a minimal learning curve, that is reproducible and independent of operator variability was the focus of this manuscript. The authors have demonstrated that the BreastIdea can provide surgeons with an accurate tool for accurate breast measurements and to detect measurable asymmetries that correlate with direct measurements. The authors have also pointed out the limitations with this system for ptotic breasts but are encouraged because it is more standardized.

Compliance with Ethical Standards

Conflict of interest Dr Nahabedian is a consultant for Allergan (Irvine, CA) and Chief Surgical Officer for PolarityTE (Salt Lake City, UT). No assistance (financial or otherwise) was obtained in preparation of this discussion.

Ethical Approval This article does not contain any studies with human participants or animals performed by the author.

Informed Consent For this type of study informed consent is not required.

Reference

1. Galdino GM, Nahabedian M, Chiamonte M, Geng JZ, Klatsky S, Manson PN (2002) Clinical applications of three-dimensional photography in breast surgery. *Plast Reconstr Surg* 110:58

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.