Editorial

The need for a standardised anthropometric protocol for objective assessment of pre- and postoperative breast surgery

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Over the last three decades studies have demonstrated an increase in breast cancer incidence in both the United States (US) (1) and the United Kingdom (UK) (2). Globally, Forouzanfar *et al*. (3) report that breast cancer incidence increased from 641,000 cases in 1980 to 1,640,000 cases in 2012, representing an annual rate of increase of 3.1%. Surgery is the cornerstone of definitive treatment for breast cancer and may involve removal of part (breast conserving surgery) or all (mastectomy) of the breast tissue (4,5). Of the 45,000 women diagnosed with breast cancer annually in the UK, 30% to 40% undergo mastectomy (6). Furthermore, in a study of re-operation rates following breast conserving surgery in England, it was identified that of 55,297 women who had primary breast conserving surgery, 18.5% required a second breast operation, of which 7.7% were mastectomies (7). Breast reconstruction following mastectomy has become an integral part of patient rehabilitation (8,9) with approximately 75% of women who have undergone a mastectomy going on to have immediate or delayed unilateral or bilateral reconstruction surgery (10). In 2011 it was estimated that approximately 96,000 breast reconstructive surgeries were performed in the US (11).

Many studies have identified the negative psychosocial impact of mastectomy (12-14) and the benefits of breast reconstruction related to improving body image and restoring a lost sense of femininity is well documented (15-17). Consequently, objective evaluation of aesthetic outcomes after surgery for breast cancer is a consideration salient to reconstructive breast surgery. Restoring the shape and symmetry of the breast to correct the residual deformity following mastectomy and recreate a natural appearance that is satisfying to the patient is the primary objective of breast reconstruction (18,19). However, when assessing outcomes of reconstructive surgery it has been identified that patient perceptions may differ from those of their physicians (10) and the 2011 National Mastectomy and Breast Reconstruction Audit (4) indicates that around one-fifth of women undergoing immediate breast reconstruction were not satisfied with the size of their reconstructed breast in comparison to their unaffected breast. Furthermore, one-third of patients were dissatisfied with how closely their breasts matched each other when unclothed. Linear deterioration in satisfaction of overall cosmetic outcomes of breast reconstruction have also been identified, reported by Clough *et al*. (20) to reduce from an acceptable level of 86% two years after completion of reconstructive surgery to only 54% at five years. Moreover, in both the US and the UK an upward trend in claims for poor cosmetic result in breast care has been observed creating a significant cost burden (21,22).

Despite the development of a range of direct and indirect techniques to assess operative outcomes and appraise breast aesthetics, there is no general consensus on the best assessment method of cosmesis (18,23-26) and explicit criteria remain an elusive outcome. Without explicit criteria, surgeons must develop and use their own criteria, or that which they feel most appropriate, to plan their reconstructive surgery. This variability in surgical planning may result in poor surgical outcomes leading to increased incidence of subsequent revision procedures (27). Traditionally used subjective methods of assessment to evaluate the results of breast reconstructive surgery, such as ordinal scales and visual analogues scales, have been reported to lack accuracy

and reproducibility (28-30) and it is suggested that reliance on observer rating interpretations and visual size estimates may negatively impact surgical outcomes (27). More sophisticated three-dimensional (3D) imaging techniques have been employed such as stereophotogrammetry, laser scanning, 3D digital photography and light digitisers (18). However whilst these techniques are non-invasive most are based on limited validation (30-34) and the availability of 3D imaging hardware and software to improve patient care is limited (33). Furthermore, with single camera systems ranging from approximately $20,000 to $100,000 and the need for scanning systems to combine multiple cameras to obtain optimum results (27), these techniques may not be economically viable for routine use in clinical settings. An Archimedean method of quantifying breast volume, whereby a female patient lowers her breast into a water-filled vessel and breast volume is calculated based on displaced water, has been utilised to evaluate patients breasts preoperatively (35). Similarly, thermoplastic casting approaches have been developed to quantify breast volume (36). However, due to the time-intensive nature and expense of these volumetric methods (18), in addition to high levels of patient discomfort (30), these have also failed to gain acceptance and have limited application in everyday breast surgery (37).

Distinct anthropometric measurements of the breasts and its relative position from fixed skeletal and soft tissue landmarks provide a useful tool to appraise breast aesthetics, evaluate patients preoperatively and assess the outcome of surgical procedures to the breast (38-40). The absence of ptosis, a tear-drop shape, and proportional size with respect to the body are characteristics that are universally accepted criteria of the 'ideal' breast (26). However studies to determine ideal anthropometric values of the female breast, and establish standard values have relied on subjective aesthetic judgments of one surgeon alone or have conveyed no aesthetic judgment and instead used average linear measurements of the breast (41). Moreover, there is currently no consensus on how to assess breast anthropometry making comparison of outcomes difficult (33). However, this current lack of reference values should not negate the use of anthropometry as an assessment method of breast cosmesis. Rather further research should aim to establish reference values and develop a standardised objective pre- and postoperative assessment to aid the quantification and interpretation of desired outcomes and inform patients of realistic outcomes.

At the whole-body level of body composition skinfold thickness, circumference measures, skeletal breadths and segment lengths have been adopted as substitute measurement methods in clinical and public health works (42) as they are applicable to large samples and can provide national estimations and data for the analysis of secular changes in representative samples (43). Furthermore, the development of accredited systems to standardise techniques and increase the competencies of individuals involved in anthropometric measuring have been utilised successfully in other areas of anthropometric assessment. For example the International Society for the Advancement of Kinathropometry accreditation system for anthropometrists (44) has operated since 1996 with the aim of establishing a global standard for anthropometry. Over 3,000 anthropometrists from 49 countries have been accredited in anthropometric measurement techniques under this scheme (45). Adoption of these criteria allows standardisation of measurements between participants and of repeated measurements on the same participants. Furthermore, it allows comparisons to be made locally, nationally and internationally between sample groups.

Although the development of a standardised anthropometric protocol to evaluate breast cosmesis has substantial challenges, it is critical to the advancement of objective assessment of the breast pre- and postoperatively. The instruments needed to measure anthropometric values of the breast are portable and inexpensive (40) allowing for routine clinical use. It would provide a tool to audit breast surgery outcomes enabling comparison of outcomes of different surgical techniques which may assist health care providers in evaluating and developing reconstruction services and enhancing standards of breast reconstruction. Furthermore it would aid quantification and interpretation of desired outcomes to inform patients of realistic outcomes, thus increasing patient satisfaction and reducing the upward trend in claims for poor breast cosmetic results. Ultimately this could improve patient outcomes and enhance the long-term health and well-being of breast cancer patients. The development of a standardised evaluation method for aesthetic assessment of the breast is not limited to reconstructive surgery alone. An objective measurement procedure could also be utilised in all forms of plastic surgery to the breast including mastopexy, reduction mammoplasty and breast augmentation.

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References

1. Altekruse SF, Kosary CL, Krapcho M, et al. SEER Cancer Statistics Review, 1975-2007 [Internet]. Bethesda, MD: National Cancer Institute; 2012 [cited 2012 Sep 7]. Available online: http://seer.cancer.gov/csr/1975_2007/
2. Johnson A, Shekhdar J. Breast cancer incidence: what do the figures mean? J Eval Clin Pract 2005;11:27-31.
3. Forouzanfar MH, Foreman KJ, Delossantos AM, et al. Breast and cervical cancer in 187 countries between 1980 and 2010: a systematic analysis. Lancet 2011;378:1461-84.
4. Jeevan R, Cromwell D, Browne J, et al. eds. Fourth annual report of the national mastectomy and breast reconstruction audit 2011. Leeds: The NHS Information Centre, 2011.
5. Lantz PM, Janz NK, Fagerlin A, et al. Satisfaction with surgery outcomes and the decision process in a population-based sample of women with breast cancer. Health Serv Res 2005;40:745-67.
6. Winters ZE, Benson JR, Pusic AL. A systematic review of the clinical evidence to guide treatment recommendations in breast reconstruction based on patient- reported outcome measures and health-related quality of life. Ann Surg 2010;252:929-42.
7. Jeevan R, Cromwell DA, Trivella M, et al. Reoperation rates after breast conserving surgery for breast cancer among women in England: retrospective study of hospital episode statistics. BMJ 2012;345:e4505.
8. Nano MT, Gill PG, Kollias J, et al. Qualitative assessment of breast reconstruction in a specialist breast unit. ANZ J Surg 2005;75:445-53; discussion 371-2.
9. Roje Z, Roje Z, Janković S, et al. Breast reconstruction after mastectomy. Coll Antropol 2010;34 Suppl 1:113-23.
10. Morrow M, Pusic AL. Time for a new era in outcomes reporting for breast reconstruction. J Natl Cancer Inst 2011;103:5-7.
11. American Society of Plastic Surgeons. 2000/2010/2011 National Reconstructive Procedures. 2012 [cited 2012 Sept 7]. Available online: http://www.plasticsurgery.orgDocuments/news-resources/statistics/2011-statistics/2011-reconstructive-procedures-trends-statistics.pdf
12. Ganz PA, Schag AC, Lee JJ, et al. Breast conservation versus mastectomy. Is there a difference in psychological adjustment or quality of life in the year after surgery? Cancer 1992;69:1729-38.
13. Yurek D, Farrar W, Andersen BL. Breast cancer surgery: comparing surgical groups and determining individual differences in postoperative sexuality and body change stress. J Consult Clin Psychol 2000;68:697-709.
14. Brandberg Y, Sandelin K, Erikson S, et al. Psychological reactions, quality of life, and body image after bilateral prophylactic mastectomy in women at high risk for breast cancer: a prospective 1-year follow-up study. J Clin Oncol 2008;26:3943-9.
15. Al-Ghazal SK, Fallowfield L, Blamey RW. Does cosmetic outcome from treatment of primary breast cancer influence psychosocial morbidity? Eur J Surg Oncol 1999;25:571-3.
16. Parker PA, Youssef A, Walker S, et al. Short-term and long-term psychosocial adjustment and quality of life in women undergoing different surgical procedures for breast cancer. Ann Surg Oncol 2007;14:3078-89.
17. Sun C, Zheng R, Li J, et al. Image perception of female breast beauty and its relation to 3D anthropometric measurements. JFBI 2011;4:23-24.
18. Kim MS, Sbalchiero JC, Reece GP, et al. Assessment of breast aesthetics. Plast Reconstr Surg 2008;121:186e-94e.
19. Isern AE, Tengrup I, Loman N, et al. Aesthetic outcome, patient satisfaction, and health-related quality of life in women at high risk undergoing prophylactic mastectomy and immediate breast reconstruction. J Plast Reconstr Aesthet Surg 2008;61:1177-87.
20. Clough KB, O'Donoghue JM, Fitoussi AD, et al. Prospective evaluation of late cosmetic results following breast reconstruction: I. Implant reconstruction. Plast Reconstr Surg 2001;107:1702-9.
21. Richards E, Vijh R. Analysis of malpractice claims in breast care for poor cosmetic outcome. Breast 2011;20:225-8.
22. Vijh R, Anand V. Malpractice litigation in patients in relation to delivery of breast care in the NHS. Breast 2008;17:148-51.
23. Ching S, Thoma A, McCabe RE, et al. Measuring outcomes in aesthetic surgery: a comprehensive review of the literature. Plast Reconstr Surg 2003;111:469-80; discussion 481-2.
24. Turner AJ, Dujon DG. Predicting cup size after reduction mammaplasty. Br J Plast Surg 2005;58:290-8.
25. Munshi A, Kakkar S, Bhutani R, et al. Factors influencing cosmetic outcome in breast conservation. Clin Oncol (R Coll Radiol) 2009;21:285-93.
26. Avşar DK, Aygit AC, Benlier E, et al. Anthropometric breast measurement: a study of 385 Turkish female students. Aesthet Surg J 2010;30:44-50.
27. Tepper OM, Small K, Rudolph L, et al. Virtual 3-dimensional modeling as a valuable adjunct to aesthetic and reconstructive breast surgery. Am J Surg 2006;192:548-51.

28. Malata CM, Boot JC, Bradbury ET, et al. Congenital breast asymmetry: subjective and objective assessment. Br J Plast Surg 1994;47:95-102.
29. Lowery JC, Wilkins EG, Kuzon WM, et al. Evaluations of aesthetic results in breast reconstruction: an analysis of reliability. Ann Plast Surg 1996;36:601-6; discussion 607.
30. Kovacs L, Eder M, Hollweck R, et al. Comparison between breast volume measurement using 3D surface imaging and classical techniques. Breast 2007;16:137-45.
31. Galdino GM, Nahabedian M, Chiaramonte M, et al. Clinical applications of three-dimensional photography in breast surgery. Plast Reconstr Surg 2002;110:58-70.
32. Tanabe YN, Honda T, Nakajima Y, et al. Intraoperative application of three-dimensional imaging for breast surgery. Scand J Plast Reconstr Surg Hand Surg 2005;39:349-52.
33. Dabeer M, Fingeret MC, Merchant F, et al. A research agenda for appearance changes due to breast cancer treatment. Breast Cancer (Auckl) 2008;2:1-3.
34. Catanuto G, Patete P, Spano A, et al. New technologies for the assessment of breast surgical outcomes. Aesthet Surg J 2009;29:505-8.
35. Bulstrode NW, Shrotria S. Prediction of cosmetic outcome following conservative breast surgery using breast volume measurements. Breast 2001;10:124-6.
36. Parmar C, West M, Pathak S, et al. Weight versus volume in breast surgery: an observational study. JRSM Short Rep 2011;2:87.
37. Edsander-Nord A, Wickman M, Jurell G. Measurement of breast volume with thermoplastic casts. Scand J Plast Reconstr Surg Hand Surg 1996;30:129-32.
38. Penn J. Breast reduction. Br J Plast Surg 1955;7:357-71.
39. Westreich M. Anthropomorphic breast measurement: protocol and results in 50 women with aesthetically perfect breasts and clinical application. Plast Reconstr Surg 1997;100:468-79.
40. Khan HA, Bayat A. A geometric method for nipple localization. Can J Plast Surg 2008;16:45-7.
41. Liu YJ, Thomson JG. Ideal anthropomorphic values of the female breast: correlation of pluralistic aesthetic evaluations with objective measurements. Ann Plast Surg 2011;67:7-11.
42. Heyward VH, Wagner DR. eds. Applied body composition assessment, 2nd ed. London: Human Kinetics, 2004.
43. Bellisari A, Roche AF. Anthropometry and ultrasound. In: Heymsfield SB, Lohman TG, Wang Z, et al. eds. Human body composition. London: Human Kinetics, 2005:109-27.
44. Stewart A, Marfell-Jones M, Olds T, et al. eds. International standards for anthropometric assessment manual. Lower Hutt, New Zealand: International Society for the Advancement of Kinanthropometry, 2006.
45. International Society for the Advancement of Kinanthropometry. International Society for the Advancement of Kinanthropometry accreditation courses [Internet]. 2012 [cited 2012 Sep 7]. Available online: http://www.isakonline. com/ index.html

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