

Objective Assessment of the Aesthetic Outcomes of Breast Cancer Treatment: Measuring Ptosis from Clinical Photographs

Min Soon Kim¹, Gregory P. Reece², E. Neely Atkinson³, and Mia K. Markey¹

¹ Biomedical Engineering Department, The University of Texas at Austin

² Department of Plastic Surgery, The University of Texas M. D. Anderson Cancer Center

³ Department of Biostatistics and Applied Mathematics, The University of Texas M. D. Anderson Cancer Center

PURPOSE

Our long-term goal is to develop decision aids that will improve breast cancer treatment. The aesthetic outcome of breast cancer treatment is an important factor in breast cancer survivors' quality of life. Quantitative, objective measures with high reliability are needed to meaningfully relate patient and surgical variables to aesthetic outcomes and to compare the outcomes of different kinds of breast cancer treatments (*e.g.*, reconstruction procedures).

METHODS

Our approach to quantifying breast aesthetics is to make measurements between anatomical landmarks (fiducial points) on clinical photographs. Prior efforts in this area have focused on symmetry properties and used only anterior-posterior views. We investigated new quantitative, objective measurements of breast ptosis based on ratios of measurements between fiducial points manually identified in oblique and lateral clinical photographs. Ptosis refers to the extent to which the nipple is lower than the inframammary fold. The new objective measures were compared to ratings using an existing subjective scale for assessing ptosis and the sensitivity of the measures to intra- and inter- observer variability in marking fiducial points was studied.

RESULTS

We found that an existing subjective scale for rating ptosis showed high intra-observer agreement. New objective measures of ptosis showed encouraging levels of concordance with ratings by an experienced surgeon using the subjective scale. The objective measures were found to be robust to intra- and inter- observer variability in marking fiducial points, including "novice" observers.

CONCLUSIONS

New objective measures for assessing the degree of ptosis from clinical photographs show considerable promise. Further development of these and related measures will enable future studies in three significant clinical areas: (1) outcome analyses of treatment options (*e.g.*, comparison of breast conservation therapy to mastectomy followed by reconstruction), (2) development of new approaches to patient education about treatment options, and (3) investigations of intra-operative imaging to guide surgeons in breast reconstruction.

KEYWORDS: breast cancer, reconstructive surgery, image analysis