Abstract:

- **Background/Objective:** Survivorship beyond breast cancer treatment includes both function and appearance of the breast after cancer surgery. A radiated surgical defect in the breast negatively impacts cosmesis and survivorship. Oncoplastic procedures bring surrounding tissues into the lumpectomy cavity to lessen the appearance deficit. Yet, advancing tissue from 1 site to another adds no volume and thins the depth of the breast. Recent use of a 3-dimensional tissue implant used for targeting radiation has the additional benefit of adding volume to the breast at the site of lumpectomy. This volume is similar to the excised tumor volume and enhances the overall cosmetic appearance. We have used the 3-D tissue implant for more than 3 years and have initial 2-year data on the cosmetic appearance of treated patients.

- **Methods:** Between May 2014 and October 2017, we implanted a 3-D tissue implant marker in 157 patients at the time of lumpectomy for breast cancer, often combined with oncoplastic reconstruction and followed by radiation treatment. All patients had serial interviews, physical exams, and serial mammograms to evaluate their cosmetic appearance. We also objectively measured and compared the pre-treatment mammogram and the 2-year, post-treatment mammogram for symmetry and size using each breast as its own control. We compared the relative anterior-posterior measurement of the quadrant bearing the implant as well as the non-cancer quadrant to the similar locations of the pre-treatment mammogram (Figure). Both mammogram positioning and radiation effects would balance. We compared the relative change from baseline in the non-cancer portion of the breast to the change from baseline in the cancer portion of the breast as a percent difference.

- **Results:** All 157 patients were treated with lumpectomy, oncoplastic reconstruction, and placement of a 3-D tissue implant. Three implants were removed due to positive margins. No implants were removed for any other reason. There have been no cancer recurrences. Overall, radiation oncologists felt the 3-D implant was useful for treatment planning in 85% of patients. Of the 20 consecutive patients who have completed at least 2 years of follow-up, cosmesis was rated as excellent/good by clinicians (96%) and patients (94%). Mammograms taken at 2 years were closely examined. Both MLO and CC views were examined for changes in forward projection in the quadrant of the cancer, compared with forward projection in the non-cancer bearing quadrant. Whole breast radiation effect varied among patients. Some had significant shrinkage while others had none. On average, we found that there was a slight decrease in forward projection in the MLO view of 2.4%, while in the CC view there was an increase in forward projection of 0.8%. These changes were not large enough to visualize clinically. Our use of the 3-D implant and oncoplastic tissue advancement maintained the pre-operative contour of the breast after lumpectomy.

- **Conclusions:** The cosmetic appearance of the breast post-lumpectomy and radiation is often complicated by retraction and volume loss. We found that using a combination of oncoplastic surgery combined with a 3-D tissue implant, the forward projection of the breast at the lumpectomy site was preserved and patient satisfaction was good to excellent. Further investigation of the long-term cosmetic effects of breast cancer surgery should be encouraged.