IMPROVED TARGETING OF THE LUMPECTOMY CAVITY USING A SPIRAL 3-D MARKER

Linda Ann Smith MD | Robert Raymond Kuske MD | Michael J. Cross MD

A Division of Arizona Center for Cancer Care

PURPOSE/OBJECTIVES
✦ Targeted radiotherapy for breast cancer irradiation requires precise delineation of the tumor bed for CT contouring
✦ Ambiguity is introduced by oncoplastic closures, post-op surgical edema, dense tissue, migrated marking, and healing during chemotherapy
✦ Incisions may be remote from the tumor site
✦ We are reporting on initial clinical experience with a spiral PLA-based bio-absorbable marker with imbedded titanium clips

MATERIALS/ METHODS
PLA absorbable spiral polymer Surgical placement of BioZorb with 6 embedded Titanium markers
✦ The cavity marking device was introduced in 4 locations, New Zealand, Arkansas, New Mexico, Arizona, and Kentucky
✦ The device is tethered at the tumor site during the time of surgery
✦ Surrounding normal tissue is secured around the devise
✦ Following postoperative healing, 7 patients received whole breast irradiation with 3-D conformal or interstitial boost
✦ 13 patients underwent Accelerated Partial Breast Irradiation (APBI) with interstitial brachytherapy alone

RESULTS
✦ All spiral markers were retained without complication, migration, or extrusion
✦ The device provided a supporting structure for the oncoplastic repair, resulting in excellent cosmesis
✦ Radiation target volumes were precise, resulting in smaller planned treatment volumes (PTV's) and smaller integral doses of radiation for both boost and APBI
✦ On average PTV's were reduced by 55%, reducing the number of brachytherapy catheters by 47%

PATIENTS IMPLANTED 51
AVERAGE AGE 61.8 yrs (45-83)
AVG. TIME FROM SURGERY TO PLANNING CT 44.9 days (13-176)

DIAGNOSIS
69% IDC
14% DCIS
16% Other

NODE STATUS
82% Negative
18% Positive

RADIATION THERAPY TYPE
49% Conventional WBI + Boost
41% HypoFX WBI + Boost
10% APBI

BOOST TYPE
52% Electron
48% Photon

MARKER UTILITY FOR BOOST OR APBI PLANNING
90% Very or Fairly Useful
10% Somewhat or Not Useful

CONCLUSIONS
✦ Previous technology lacked the precision marking the tumor bed, resulting in large PTV's
✦ The spiral marker secured at the tumor site allows precise treatment planning
✦ The precision endures post-operative change, post-op imaging and post-op chemotherapy
✦ Patients implanted with the spiral marker can be assured of precise delineation at the tumor bed with more reliable dosimetry minimizing normal tissue radiation exposure.

PATIENT #1 - Left Lower Inner Quadrant at 1 year

PATIENT #2 - Mid-lateral right breast, peri-areolar incision, at 1 year

AVERAGE NUMBER OF NEEDLES

\[
\begin{array}{ccc}
\text{without} & \text{with} & \text{difference} \\
36.4 & 19.4 & 17 \\
\end{array}
\]
Needle Reduction 47%

AVERAGE PTV VOLUME FOR PLAN

\[
\begin{array}{ccc}
\text{without} & \text{with} & \text{difference} \\
299 & 135 & 164 \\
\end{array}
\]
Volume Reduction 55%