Materials/Methods: Patients who were diagnosed as having brain metastasis from breast cancer between January 2001 and December 2004 were eligible for this study. A total of 215 patients from 9 institutes were registered. Median age was 56 years. Median interval between initial surgery and the diagnosis of brain metastasis was 119 days. ECOG performance status (PS) at the diagnosis of brain metastasis was 0 in 25 patients, 1 in 75 patients, 2 in 45 patients, 3 in 20 patients, 4 in 3 patients, and unknown in 47 patients, respectively. The number of brain metastasis was 1–3 in 88 patients, 4–10 in 37 patients, >11 in 49 patients, and unknown in 41 patients, respectively. The initial treatment for brain metastasis was whole brain radiation therapy (WBRT) in 128 patients and Stereotactic Radiosurgery (SRS) in 87 patients, respectively.

Results: Median survival for all patients was 295 days from the diagnosis of brain metastasis. One-year, 2-year, and 3-year overall survival was 38.7%, 18.8%, and 10.9%, respectively. The most important prognostic factor for overall survival was PS. Intracranial progression was observed in 20/128 (15.6%) of WBRT group and 49/87 (56.3%) of SRS group (p = 0.0005). The median interval between treatment for brain metastasis and intracranial progression were 240 days for WBRT group and 253 days for SRS group. Neurocognitive disorder after treatment of brain metastasis was observed in 12/128 (9.3%) of WBRT group and 3/87 (3.4%) of SRS group (p = 0.09). Of note, 7 of 12 patients who developed neurocognitive disorder after WBRT received a total dose of 50 Gy.

Conclusions: Initial treatment of brain metastasis from breast cancer with SRS was associated with more intracranial disease progression than with WBRT. A randomized controlled trial for optimal dose/fractionation of WBRT is warranted as the survival of the patients with breast cancer has been prolonged with improved systemic treatment.

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2021 Clinical Fat Necrosis in Patients Treated With Multi-Catheter APBI: A 3D CT-Based Clinical Correlation

University of Wisconsin Hospital, Madison, WI

Purpose/Objective(s): To perform an analysis of dosimetric variables and their correlation with development of clinical fat necrosis in patients treated with image-guided high-dose rate (HDR) multi-catheter accelerated partial breast irradiation (APBI) with 3D CT-based treatment planning.

Materials/Methods: From May 2002 to December 2005, 173 women with favorable breast cancer were treated with lumpectomy followed by APBI. Selection criteria included tumor size <3 cm, negative surgical margins, 0–3 lymph nodes positive with no extracapsular extension, and negative post-lumpectomy mammogram. All patients had multiple interstitial catheters placed post-operatively with image-guidance (ultrasound, mammographic, or CT). The planning target volume (PTV) was defined as the contrast-enhanced seroma cavity and/or clips plus a 2-cm margin modified to 5-mm below the skin and along the pectoral muscle. 3D CT-based dosimetry with geometric optimization was performed for all cases to cover 100% of the seroma cavity and at least 98% of the PTV. The standard APBI regimen of 34 Gy in 10 twice-daily fractions over 5 days was delivered. Several dosimetric variables were analyzed including number of catheters, PTV, V100 and V150 (volume of tissue encompassed by the 100% and 150% isodose lines, respectively), and DHI (dose homogeneity index). Clinical fat necrosis was determined according to the RTOG late toxicity criteria. Clinical follow-up was performed every six months; only patients with a minimum of 12 months follow-up are included in this analysis.

Results: The median follow-up of all patients was 35.5 months (range: 13–57 months). For the entire cohort: the median number of catheters was 23 (range: 10–44), median PTV was 134.5 cc (range: 53.3–471 cc), median V100 was 187.9 cc (range: 59.9–437.3 cc), median V150 was 41.2 cc (range: 16.1–102.5) and median DHI was 0.79 (0.59–0.89). Development of clinical fat necrosis significantly correlated with larger overall PTV (167.6 vs. 134.5 cc; p = .006) and higher V150 (44.8 vs. 40.75 cc; p = .004). The number of catheters, V100, and DHI were not found to be significantly associated with clinical fat necrosis.

Conclusions: The integration of 3D CT-based planning has allowed more rigorous dosimetric analysis of APBI treatment plans. This study validates that wider-volume implants with associated larger regions of “hot spots” potentially lead to higher incidence of fat necrosis. The advent of image-guided techniques and sophisticated planning systems may allow a reduction of the PTV margin used in multi-catheter APBI and in turn less toxicity.

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2022 Risk of Hypothyroidism in Older Breast Cancer Patients Treated With Radiotherapy

G. L. Smith1, B. D. Smith2, S. H. Giordano1, Y. C. Shih1, W. A. Woodward1, E. A. Strom1, G. H. Perkins1, J. L. Oh1, W. Tereffe1, T. A. Buchholz1
1University of Texas M.D. Anderson Cancer Center, Houston, TX, 2Wilford Hall Medical Center, Lackland AFB, San Antonio, TX

Purpose/Objective(s): Hypothyroidism is a known complication after radiotherapy (XRT) when treatment fields include the thyroid gland. In breast cancer, though a portion of the thyroid gland may be included in treatment fields, no study has identified whether breast cancer patients have an increased risk of subsequent hypothyroidism. Therefore, in a cohort of older breast cancer patients, we sought to determine the incidence of hypothyroidism, quantify the magnitude of risk associated with XRT, and identify whether any higher-risk patient subgroup exists.

Materials/Methods: Using the Surveillance Epidemiology and End Results (SEER)-Medicare cohort, we identified 38,255 women (age ≥66) with stage 0 through III breast cancer diagnosed from 1992–2002 with no prior history of hypothyroidism (International Classification of Diseases codes 244; 244.0–3, 8–9). The association between XRT and subsequent hypothyroidism was tested using proportional hazards models adjusted for age, race, tumor characteristics (size, number of positive lymph nodes, grade, histology, receptor status), treatment course, comorbidities, income, urban/rural setting, physician visits, SEER region, and year of treatment.