

About Face

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By Mitchell Kamrava, MD; Dan Scanderbeg, PhD; and Catheryn Yashar, MD

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Multiple large randomized studies have shown that overall survival rates for mastectomy and breast conservation therapy are roughly equivalent in early-stage breast cancer. BCT provides women with a less drastic alternative to definitive breast cancer treatment: Lumpectomy is followed by traditional whole-breast radiotherapy in the supine position. But while this method traditionally provides excellent long-term control and cosmetic outcome, it still has serious drawbacks for some patients.

Women with large or pendulous breasts experience higher acute skin reactions and poorer long-term cosmetic outcomes with increased fibrosis and breast size differential.^{1,2} These side effects have been attributed to increased dose inhomogeneity as well as an unavoidable bolus effect of breast tissue overlying the inframammary skin. While high-energy beams with spoilers, intensity-modulated radiation therapy (IMRT), fishnet bras and lateral decubitus setup minimize acute and long-term morbidity in large-breasted women, these approaches come with challenges, including increased planning time and setup reproducibility.^{3,4} Also, when supine, large breasts displace laterally and posteriorly, a significant portion of lung-and, in left-sided lesions, even the heart-is exposed to radiation using traditional tangential field arrangements.

Prone setup

One alternative to supine treatment is to plan and treat in the prone position. Reproducible setup and comfortable patient positioning are critical, and commercially available prone breast boards can accomplish these goals. The prone breast system used at the University of California San Diego (UCSD), La Jolla, features a board that locks to the couch top; it provides reproducible positioning and patient comfort. The patient lies prone with her arms stretched overhead; her head rests on a face cushion resembling a massage table. A board aperture allows the involved breast to fall away from the chest wall, while the opposite breast is displaced laterally on a breast bridge. Additionally, the patient is positioned to allow part of the involved breast chest wall to extend into the breast board opening.

Prior to simulation, the medial and lateral aspects of the involved breast are defined clinically and marked. We then perform simulation using computed tomography, followed by 3-D-based planning around a CT-defined target volume. Alternatively, an IMRT technique can be used. CT-based planning is critical because it enables assessment of tumor bed coverage, particularly for lesions in the axillary tail and near the chest wall.

In one of the larger published studies of prone breast radiotherapy that included 245 women with early-stage breast cancer, the prone technique was well-tolerated, with only 4.9 percent of patients complaining of chest wall or rib pain during treatment.⁵ None of these cases necessitated a treatment break. Two women experienced rib fractures while being positioned on the prone breast board; however, no additional cases occurred after additional padding was added, and UCSD has not experienced this problem.

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Challenges

A potential disadvantage of prone treatment is poorer visualization of the treatment field by the therapists. In this study, however, shifts at the treatment machine were rarely needed to reproduce the simulation conditions. A half-beam block with coplanar beams can provide some reassurance of the medial border, so the tattoos aren't as crucial. Finally, elderly and morbidly obese women may have more difficulty with a prone setup, given the increased effort required to get onto the prone breast board compared with lying supine.

Our facility has noted improved dose homogeneity throughout the breast as well as decreased hot spots in the apex and base. Prone positioning minimizes dose to critical normal tissues such as the heart, particularly when treating left-sided breast cancers, the ipsilateral lung and the contralateral breast.

In a study assessing the clinical impact of improved breast dose homogeneity, Grade 3 acute dermatitis and edema were limited to 2 percent of patients, and at five years, chronic grade 2 and 3 skin and subcutaneous tissue toxicities were reported in 4.4 and 13.7 percent of patients, respectively.⁵ In contrast, another study found that 22 and 39 percent of women with medium- and large-sized breasts, respectively, developed moderate or severe late-term changes when treated in the supine position.¹

Some factions of the medical community hesitate to use a prone technique because of concern regarding decreased chest wall and axillary node

coverage compared with supine treatment. However, in a five-year update of its experience with prone breast radiotherapy, New York City's Memorial Sloan Kettering Cancer Center demonstrated that true local and elsewhere failures, disease-free and overall survival, regional nodal recurrences, distant metastases and contralateral breast cancer all occur at rates expected for standard supine-based approaches treated with modern adjuvant systemic therapy.⁵

Bottom line

Candidates for prone breast radiation include women with large or pendulous breasts, cardiac and/or pulmonary comorbidities, difficulties lying supine, an extensive history of tobacco use and a history of chest wall irradiation. This relatively simple technique is easily reproducible and well-tolerated. Additional benefits include improving dose distribution in the breast and decreasing dose to normal tissues while providing equal control rates. Overall, prone breast irradiation is a good alternative to whole-breast radiation therapy, particularly for women with large or pendulous breasts.

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