

LETTER TO THE EDITOR

Upright, Standing Technique for Breast Radiation Treatment in the Morbidly-Obese Patient

To the Editor:

Many women with early-stage breast cancer receive mastectomy when they could be “potential” candidates for breast conservation therapy (BCT). Smitt et al. reported that while 46% of patients have a medical or personal contraindication to BCT, the rest could use specialty consultation (1). Morbidly obese patients are a particularly vulnerable population in cancer care. The incidence of female obesity in the US has risen greatly, and obesity is a known barrier to screening and radiation treatment in breast and gynecological malignancies (2–4).

Radiation therapy may not be offered because of more side-effects. For example, body mass index predicts for an increased incidence of radiation pneumonitis in breast cancer patients (5). Newer techniques like prone positioning allow the breast to hang away from the chest wall and decrease moist desquamation in the skin folds. Unfortunately, whether lying supine or prone on the linear accelerator treatment couch, the patient can only receive radiation if she does not exceed the weight limitation of the equipment. The only other treatment option is mastectomy.

We report on a morbidly obese, 37-year-old African-American woman who refused mastectomy and was treated using BCT. She presented with a bulging, palpable mass without nipple or skin involvement. Mammogram revealed a highly dense, mostly circumscribed 9 cm mass in the 12–1 o'clock position of the right breast without any associated calcifications. The ultrasound described a superficial, lobulated cyst, and aspiration of 160 mL of blood-tinged fluid was positive for malignancy.

She was seen in the multi-disciplinary setting. On physical exam, she was 165 cm tall (5'4") and

weighed 186 kg (411 lbs), with a body mass index of 68.5. The weight limitation for the couch of the CT scanner for planning is 400 lbs and for the Varian Trilogy linear accelerator for treatment is 350 lbs. The patient was offered mastectomy with reconstruction or a lumpectomy with interstitial brachytherapy (accelerated partial breast irradiation); however, she refused either treatment option.

The patient underwent right breast lumpectomy and sentinel lymph node mapping which revealed a 9.6 cm, poorly differentiated invasive ductal carcinoma that was estrogen, progesterone, and HER-2/neu receptor negative with >2.4 cm surgical margins, and no lymphovascular invasion. Both nodes were negative. She was staged as pT3N0, group IIB. She then received adjuvant dose dense adriamycin (60 mg/m²) and cytoxan (600 mg/m²) for four cycles followed by dose dense weekly paclitaxel (175 mg/m²) for four cycles with pegfilgrastim support.

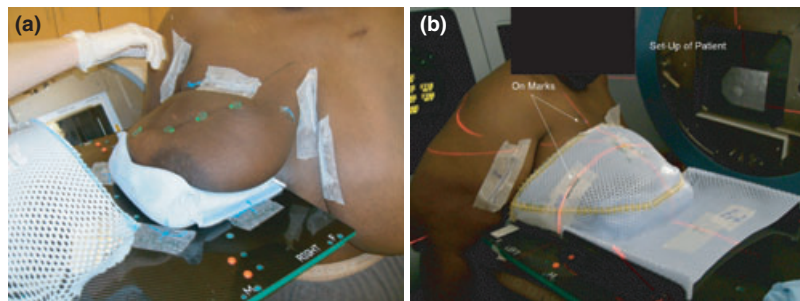
She was seen pre and postoperatively by radiation oncology to explore the feasibility of external beam radiation to the right breast in the form of tangents while in the upright, standing position. A carbon fiber stereotactic body board (body frame: baseplate, part#70–2B, 3Dline Medical Systems, Elekta AB, Stockholm, Sweden) measuring 1.5 cm thick was attached to the head of the treatment couch to allow separation of the breast from the patient's underlying belly. The treatment couch was brought to the level of the inframammary fold. A soft, 20 × 25 cm mold cushion (Moldcare® pillow, WFR Aquaplast Corp, Avondale, PA, USA) was secured to the edge of the board to cushion the breast. Opaque wires were placed to mark the patient's breast borders and the avoidance structures (contralateral breast, ipsilateral arm, and belly). An aquaplast pelvic body cast (Precut Pelvic 6 point Fixation Mask; Part #75–3A, Elekta AB, Stockholm, Sweden) was cut and molded over the breast and affixed to the stereotactic breast board (Fig. 1a). The patient stood with the right breast in position while keeping

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DOI: 10.1111/j.1524-4741.2010.00932.x

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The Breast Journal, Volume 16 Number 4, 2010 448–450

Figure 1. (a) Set-up positioning of right breast postoperatively using black carbon-fiber board, blue moldable cushion, and aquaplast body frame; (b) patient standing in treatment position next to lateral gantry.



the ipsilateral arm behind her back and out of the field (Fig. 1b).

The empty breast mold was CT scanned, and the planning software filled the empty space with a “tissue equivalent” density that mimicked the breast. Modern three-dimensional CT based planning determined a medial tangent of 18.5×22.5 cm (X, Y coordinates), 80° gantry, 6° collimation, and a lateral tangent of the same size, 260° gantry, 84° collimation with a 30° wedge. Six and 18 MV photons were used with multi-leaf collimation (MLC) blocking the abdomen inferiorly and the contralateral arm superiorly (Fig. 2). Dose prescribed was 50 Gray in 25 fractions to the entire breast volume with 95% coverage. Verification films and actual light fields were compared before treatment to ensure adequate coverage (Fig. 2). Imaging found <5 mm deviation in reproducibility from the plan.

The patient was treated without disruptions and had some grade 2 hyperpigmentation by week 4. Some mild grade 2 inframammary moist desquamation by week 5 healed with silvadene by week 7 (Radiation Therapy Oncology Group grading system). At 6 months follow-up, the breast was supple with skin darkening fading normally.

Here we describe a novel, upright (standing up) breast irradiation technique using 3D CT planning to help this morbidly obese patient undergo BCT. Our patient had a lumpectomy site that exceeds the size of a Mammosite balloon or related brachytherapy devices. Also, one-time intraoperative radiation is still investigational and not available at our center. Thus, in obese patients who absolutely refuse mastectomy, the only other option is a lumpectomy followed by a multicatheter interstitial implant to treat the surgical site in an accelerated partial breast fashion. The

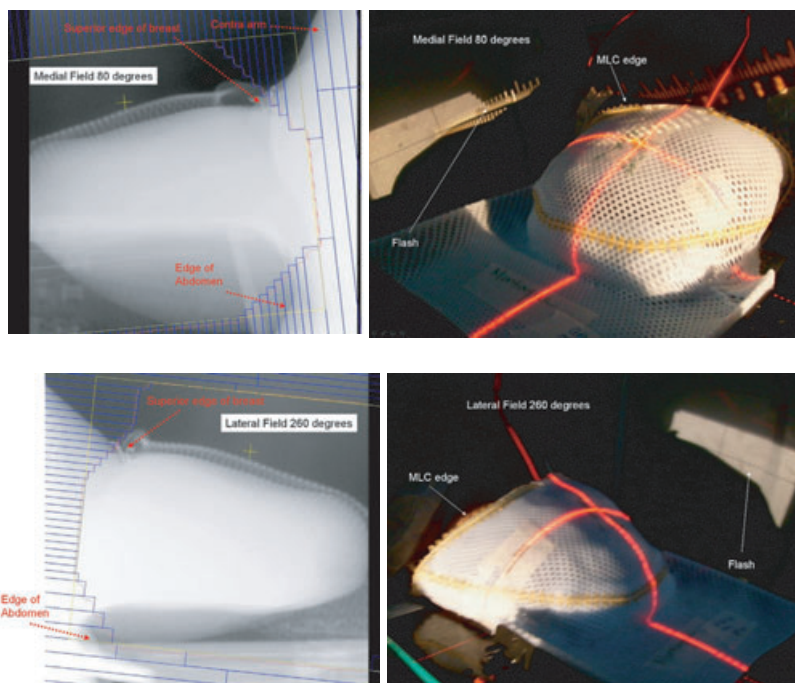


Figure 2. Fluoroscopic tangent films (left) show agreement with treatment light fields (right). MLC blocking for the arm (superiorly) and abdomen (inferiorly) with the MLC edge posteriorly along the chest wall is seen with the light fields, covering the majority of the breast.

patient rejected this treatment option because of the invasiveness of the procedure and because the current standard of care for a T3N0 breast cancer is whole breast treatment.

In an effort to protect normal structures, the coverage of the chest wall may be slightly less than a supine treatment position. Our aim was to provide coverage similar to prone treatment, which often allows lung sparing. Our treatment fields covered the lumpectomy site by more than 5 cm margin to the edge of the chest wall (rib cage), but our technique may not provide enough margin for some patients with lumpectomy cavities abutting the chest wall itself.

One limitation of our technique is the inability to add a matching supraclavicular or axillary field. It may be possible to add this field if the patient was moved to either the right or left side of the head of the couch (90° to her current position) while keeping the couch stationary and rotating the treatment gantry laterally to 90°. Matching such a field to the tangents may be difficult though.

In a select number of morbidly obese patients, breast conservation is a viable option if the patient is sufficiently motivated. Technical feasibility for external beam radiation should be explored preoperatively in a multi-disciplinary setting. With the patient standing near the edge of the treatment couch, the breast can be draped on the couch and tangents can be created using CT simulation and rigid immobilization. The patient will need some training regarding positioning, but reproducibility is achievable. A specialized chair support (instead of standing) may be of further

assistance. For morbidly obese patients, this upright, standing up positioning should be considered as a possible technical solution for BCT.

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