Practice Patterns in the Delivery of Radiation Therapy After Mastectomy Among the University of California Athena Breast Health Network

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Abstract

Practice patterns vary with the planning and delivery of radiation therapy after mastectomy (PMRT). We use a survey to investigate the role of bolus and a boost. Fifty-five percent of the respondents routinely use a boost to the chest wall in PMRT. Our study will help guide clinicians in the delivery of PMRT.

Background: Practice patterns vary with the planning and delivery of PMRT. In our investigation we examined practice patterns in the use of chest wall bolus and a boost among the Athena Breast Health Network (Athena). **Materials and Methods:** Athena is a collaboration among the 5 University of California Medical Centers that aims to integrate clinical care and research. From February 2011 to June 2011, all physicians specializing in the multidisciplinary treatment of breast cancer were invited to take a Web-based practice patterns survey. Sixty-two of the 239 questions focused on radiation therapy practice environment, decision-making processes, and treatment management, including the use of a bolus or boost in PMRT. **Results:** Ninety-two percent of the radiation oncologists specializing in breast cancer completed the survey. All of the responders use a material to increase the surface dose to the chest wall during PMRT. Materials used included brass mesh, commercial bolus, and custom-designed wax bolus. Fifty percent used tissue equivalent superflab bolus. Fifty-five percent of the respondents routinely use a boost to the chest wall in PMRT. Eighteen percent give a boost depending on the margin status, and 3 of 11 (27%) do not use a boost. **Conclusion:** Our investigation documents practice pattern variation for the use of a PMRT boost and the use of chest wall bolus among the University of California breast cancer radiation oncologists. Further understanding of the practice pattern variation will help guide clinicians in our cancer centers to a more uniform approach in the delivery of PMRT.

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Introduction

The Oxford overview of the randomized trials of radiation after mastectomy established the benefit of radiation in decreasing local-regional recurrence rates and increasing breast cancer survival in axillary node-positive women.[1] After mastectomy, the chest wall or reconstructed breast is the most common location for a local-regional recurrence.[2,3] The randomized trials used standard radiation doses of up to 50 Gy to the chest wall without a supplemental dose to a portion of the chest wall, known as a boost. Unlike the intact breast setting, there are no prospective data on the benefit of

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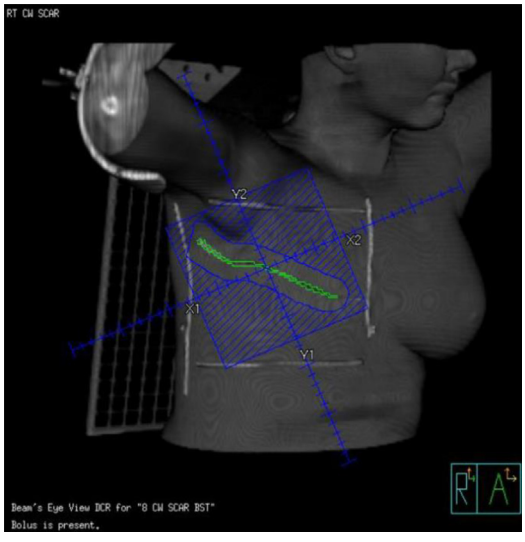
a chest wall boost or when it should be used.[4-7] Risk factors that might contribute to a chest wall recurrence include an inadequate skin or subcutaneous dose of radiation. To potentially decrease this risk, a boost to the chest wall is often used at the discretion of the treating physician.[5] In fact, some centers routinely use a chest wall boost.[5,6] In a recent survey of academic and private practice centers in the United States, 77% of the respondents routinely use a chest wall boost.[8]

However, there is no consensus on the chest wall site after mastectomy that is at the greatest risk for local-regional recurrence to warrant a boost. As described in the literature, the most common practice is to design the boost volume to include a 2-cm circumferential margin to the mastectomy scar as shown in Figure 1.[5] Depending on the surgery and risk profile, this volume might not represent the area of highest risk of recurrence on the chest wall. In women who have had breast reconstruction, the surgical scar might have no relationship to the primary tumor site. In expander/implant-based reconstruction, the incision is frequently in the inframammary fold. In addition, focusing on the mastectomy scar ignores the chest wall recurrences that occur away from the mastectomy scar or that are diffuse (almost 40%).[9]

The skin and immediate subcutaneous tissues represent the sites at risk for a chest wall recurrence. Conventional opposed tangential megavoltage photon fields are "skin sparing." Factors influencing skin dose include the photon energy, electron contamination from the flattening filter, skin to source distance, beam modifiers, the angle of incidence, and field size. When 4-MV photons are used on the chest wall, there might be no significant difference between the delivered dose with or without a bolus as demonstrated in a study from Harvard.[8] However, for higher-energy photons, the skin (surface dose) might be significantly less than the prescription dose. Techniques to increase superficial dose in radiation therapy after mastectomy (PMRT) vary among institutions.[10] Often a tissue-equivalent bolus is used during the course of PMRT to increase surface dose to the target tissue volume.[10-13]

Figure 1 Design of the Boost Volume to Include a 2-cm Circumferential Margin to the Mastectomy Scar



Because of the lack of an established standard protocol for the delivery of PMRT in regard to use of bolus and a chest wall boost, we sought to identify the practice patterns among radiation oncologists specializing in breast cancer at the University of California (UC) Medical Centers (UCMCs), inclusive of UC Los Angeles, UC Davis, UC San Francisco, UC Irvine, UC San Diego. Although all centers operate under the UC umbrella, delivery of care at each site might vary according to local protocols and distinct practice patterns and guidelines. The UCMCs might therefore be a good representation of academic medical centers in California. The present study was conducted through the Athena Breast Health Network (Athena), a collaboration of the 5 UCMCs to drive innovation in breast health care. Athena, through its collaborative environment and infrastructure for data collection and sharing, provides a framework for quality improvement and development of new standards across UC campuses.[14] We report data from a study conducted to understand practice patterns in breast cancer management within the 5 UCMCs.

Materials and Methods

From February to June 2011, medical oncologists, radiation oncologists, and surgeons who specialize in the treatment of breast cancer patients at any of the UCMCs were invited by e-mail to take a Web-based practice patterns survey. Sixty-two of the 239 questions in the practice patterns survey focused on radiation therapy practice environment, decision making processes, and treatment management. The responses from this portion of the survey were collected from radiation oncologists who had a specific expertise in the management of breast cancer patients.

Results

There were 42 (72%) responses to the Web-based practice patterns survey. Of these responses, 11 (26%) were radiation oncologists, 12 (29%) were surgical oncologists, and 19 (45%) were medical oncologists. All of the UCMCs were represented, with all of the responders working in an academic center with a dedicated breast cancer service. Thirty-four responders (81%) were trained in a fellowship dedicated to breast cancer. Nineteen participants treated more than 100 new breast cancer patients per year. Among the 5 UCMCs, there are 12 radiation oncologists with expertise in treating breast cancer patients. All were solicited to participate, and 11 completed the survey, including the section related to the PMRT decision-making processes. Of these responders, 10 (91%) had 10 or more breast cancer patients being treated per day. Seven participants worked in a facility that has a dedicated breast radiation oncology service.

In terms of treatment planning, 100% of the surveyed radiation oncologists use computed tomography-based planning for their treatment planning for patients who have had a mastectomy. The planning parameters are shown in Table 1. Eighty percent of those surveyed contour the mastectomy scar on their treatment plans, and 60% contour the drain sites. One hundred percent of the participants contour the whole heart and ipsilateral lung, but only 30% contour the ventricles of the heart, and 10% contour the