Updates in the Treatment of Breast Cancer with Radiotherapy

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KEYWORDS

• Breast cancer • Breast neoplasms • Radiotherapy
• Accelerated partial-breast irradiation • Hypofractionated whole-breast irradiation
• Intensity-modulated radiotherapy • Toxicity

KEY POINTS

- In early stage breast cancer and ductal carcinoma in situ, breast-conserving therapy with breast-conserving surgery and adjuvant radiotherapy is one of the most significant evidence-based advancements of modern cancer care.
- Accelerated partial breast irradiation and hypofractionated whole-breast radiation therapy provide shorter treatments with lower costs, while maintaining oncologic outcomes and cosmetic results.
- Multidisciplinary recommendations for acceptable margin status in invasive and noninvasive disease have been established; similar guidelines have been recently established in the postmastectomy setting.

INTRODUCTION

Breast-conserving surgery followed by radiation therapy is a widely accepted standard approach that allows for organ preservation in most early stage breast cancers.[1–3] Postmastectomy radiation therapy remains a widely accepted standard of care in the management of advanced breast cancer for appropriate indications.[4–6] Over the last several years, multidisciplinary guidelines have been updated to standardize prior controversies in breast cancer management with respect to margin status, use of postmastectomy radiation therapy, and use of advanced therapies, including accelerated partial breast radiation therapy.[7–10] In addition, new advances in the use of hypofractionated treatment are also gaining wide popularity because

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of their comparable toxicity profiles and ability to treat patients with a shorter course of therapy, thus adding value and cost savings to the management of breast cancer.[11] This article serves to update the reader with what's new in radiation therapy management of breast cancer with an emphasis on breast-conserving approaches. Please see Jean L. Wright and Arti Parekh's article, "Updates in Postmastectomy Radiation," in this issue, for more information on the topic.

HISTORICAL CONTEXT

Breast-conserving therapy with breast-conserving surgery and adjuvant radiotherapy for early stage breast cancer and ductal carcinoma in situ (DCIS) is one of the most remarkable achievements of evidenced-based modern cancer care. Moving away from the Halsteadian approach to breast cancer with radical mastectomy, Dr Fisher and his collaborators[1] completely changed the approach to management of early stage disease. Standard whole-breast radiotherapy (WBRT) has become the most widely accepted standard of care for most women diagnosed with early stage invasive breast cancer and DCIS who choose a breast-conserving approach. Radiation has been shown to reduce the risk of local recurrence in invasive cancer and noninvasive disease by 60% to 70% and 50% to 60%, respectively, as established by a myriad of trials conducted by the National Surgical Adjuvant Breast and Bowel Project (NSABP), European Organisation for Research and Treatment of Cancer (EORTC), and United Kingdom Coordinating Committee on Cancer Research.[1–3,12,13] The Early Breast Cancer Trialists' Collaborative Group (EBCTCG) meta-analyses have reported 15-year durable results, along with a breast cancer survival advantage in invasive disease.[14] Furthermore, significant evidence has been building on safe strategies to decrease the duration, length, dose, and cost of radiotherapy, while maintaining oncologic and cosmetic outcomes.

In advanced-stage breast cancer, there are more substantial challenges with the use of postmastectomy radiation to eliminate long-term potential complications; however, the evidence continues to support a wide indication for adjuvant radiotherapy with a local control benefit of 60% to 70% relative reduction in recurrence and a 10% improvement in absolute survival.[4–6] Significant technical advances allow delivery of radiation to target regions, including the internal mammary lymph node basin (IMNs), while reducing dose and toxicities to normal structures including the heart. The most recent consensus statement on postmastectomy radiation therapy from the Society of Surgical Oncology (SSO), American Society of Clinical Oncology (ASCO), and the American Society of Radiation Oncology (ASTRO) has potentially expanded the use of postmastectomy radiotherapy.[10]

CONSENSUS GUIDELINES ON MARGINS

Over the last 2 years, there have been significant agreements between several oncologic societies on margin assessment. In an era of multidisciplinary collaboration, the use of no ink on tumor as the standard for an adequate margin in invasive cancer has been endorsed by SSO, ASCO, and ASTRO.[7] This widely accepted consensus guideline aims to lower re-excision rates, improve cosmetic outcomes, and decrease health care costs, while maintaining low rates of ipsilateral breast tumor recurrences.[7] More recently, SSO, ASCO, and ASTRO developed a consensus guideline on margins in DCIS.[8] The standard adequate margin in DCIS treated with breast-conserving surgery and WBRT has been defined as a 2-mm margin from the DCIS edge.[8] This wider margin, compared with invasive disease, is based on the accepted notion that DCIS can have skip lesions and higher rates of recurrence with closer margins. The use