Modern Approaches to the Surgical Management of Malignant Breast Disease

The Role of Breast Conservation, Complete Mastectomy, Skin- and Nipple-Sparing Mastectomy

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KEYWORDS

• Oncologic • Nipple-sparing mastectomy • Skin-sparing mastectomy • Immediate reconstruction

KEY POINTS

- A variety of surgical approaches exist for the management of breast cancer.
- Options include breast-conserving surgery, including oncoplastic techniques, as well as mastectomy with a standard, skin- and nipple-sparing approach with reconstruction.
- Adjuvant therapies such as radiation and systemic treatment (chemotherapy, endocrine therapy) are used in conjunction with surgical management for most patients, dependent on their disease stage and prognostic features.

INTRODUCTION

Breast cancer is the second most common malignancy to affect women. In 2017, it is estimated that 255,180 women in the United States will be diagnosed with invasive breast cancer and another 63,410 will be diagnosed with ductal carcinoma in situ (DCIS).[1] Earlier diagnosis and improvements in adjuvant therapy have produced improved long-term survival with lower rates of disease recurrence than ever before. A personalized approach to the management of the disease means individualized decision making regarding not only adjuvant systemic treatments but also surgical and reconstructive choices.

The oncologic goal of breast cancer surgery has been to remove all clinical and radiologic evidence of the disease in the breast and stage the axillary nodes. Over the last 30 years, the surgical techniques used to achieve this goal have changed dramatically. At one time the only choice was whether to remove all (mastectomy) or part (lumpectomy) of the breast in combination with a level I/II axillary clearance. If the breast was conserved, radiotherapy was delivered. Currently, there is an

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expanded repertoire of surgical procedures designed to extirpate the tumor and achieve optimal cosmesis.

The focus of this article is to review the modern surgical approaches for the management of preinvasive, early-stage, and locally advanced breast cancer (LABC). For each stage, the authors discuss the considerations for surgical decision making and outcomes with breast-conserving surgery (BCS), including oncoplastic approaches, as well as simple, skin-sparing, and nipple-sparing mastectomies with reconstruction.

DUCTAL CARCINOMA IN SITU

DCIS or intraductal carcinoma is a preinvasive nonobligate precursor of invasive ductal carcinoma. Pathologically it can be defined by the presence of malignant epithelial proliferation within the mammary ducts without invasion across the basement membrane.[2] Since the widespread adoption of mammographic screening, detection of DCIS over the last 2 decades has increased 5-fold, now accounting for up to 25% of all new breast cancers.[3] DCIS usually presents as mammographic calcifications; indeed, few women have clinical findings, such as a palpable mass, nipple discharge, or Paget disease of the nipple.

Historically, the surgical management of DCIS involved mastectomy[2] (**Table 1** defines all breast surgical procedures). However, as clinical trials encouraged adoption of BCS for invasive disease, this was reflected in the management of DCIS. From 1985 to 1990, 4 large randomized control trials compared the outcomes of DCIS patients treated with lumpectomy alone versus those who had lumpectomy and radiation (the combined treatment called breast-conserving therapy or BCT).[4] In all of these trials, the addition of adjuvant radiation therapy to lumpectomy produced at least a 50% decrease in ipsilateral breast events (recurrence of DCIS or invasive cancer), with an absolute risk reduction of 15.2% over 10 years (28.1% lumpectomy vs 12.9% BCT). Breast cancer–specific mortality for DCIS treated with lumpectomy, BCT, or mastectomy is extremely low (2%–4%),[5] and there is no prospective randomized study that compares the different surgical options in terms of survival. After BCT, approximately 50% of recurrences are invasive; for these patients,

Table 1
Breast surgery terminology

Term	Definition
Halstead/radical mastectomy	Removal of the breast, including complete removal of pectoralis minor, extensive removal of pectoralis major and axillary lymph nodes up to the apex through a large oblique incision reaching the axillary fossa[64]
Modified radical mastectomy (MRM)	Removal of the breast and ALND (level I and II) with preservation of pectoralis muscles
Total (TM)/simple mastectomy (SM)	Removal of the breast with a large ellipse of skin, including the nipple and areola, without axillary dissection
Skin-sparing mastectomy (SSM)	Removal of all the breast, nipple, and areola with preservation of remaining breast skin
Nipple-sparing mastectomy (NSM) or total skin-sparing mastectomy (TSSM)	Removal of all the breast with preservation of breast skin, nipple, and areola
Quadrantectomy	Excision of a quadrant of breast tissue containing disease, including skin and pectoralis fascia
Lumpectomy	Excision of a segment of breast tissue with disease without skin, or muscle; also referred to as partial or segmental mastectomy and BCS
Oncoplastic surgery (OPS)	Excision of breast tissue with disease and use of techniques to reshape or rearrange remaining glandular tissue[65]
Axillary node dissection (ALND)	Removal of level I (inferior and lateral to pectoralis minor) and level II (posterior to pectoralis minor) axillary lymph nodes
Sentinel lymph node biopsy (SLNB)	Removal of the first few axillary nodes that drain the breast: identified by dual mapping using technetium-99m sulfur colloid and blue dye