Original Study

Ultrasonography Mapping Combined With Mammography Before Breast-Conserving Surgery for Primary Breast Cancer With Microcalcifications: A Novel Approach

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Abstract

Preoperative mapping for breast cancer with microcalcifications is challenging because the microcalcifications may spread beyond the lesions detectable by ultrasonography. A combinatorial approach using ultrasonography and mammography was developed for such lesions. The study reviewed 133 lesions mapped with this method. It yielded fairly good outcome, with a negative surgical margin rate of 72.2% and a 5-year local recurrence rate of 0.8%.

Introduction: Evaluation for the spread of breast cancer with microcalcifications is challenging, because the microcalcifications sometimes spread beyond the lesions detectable by ultrasonography (US). An original method for preoperative mapping was performed for such lesions, using US in combination with mammography (MG) (US + MG mapping) before breast-conserving surgery (BCS). **Materials and Methods:** A total of 885 consecutive patients underwent BCS for primary breast cancer. Of the 885 patients, 154 (17.4%) with ductal carcinoma in situ or invasive carcinoma having microcalcifications underwent US + MG mapping preoperatively. Five patients who received neoadjuvant chemotherapy and 17 patients who were lost to follow-up were excluded. Accordingly, 133 lesions in 132 patients were retrospectively evaluated. The associations among this method, surgical margin (positive, close, or negative), pathologic characteristics, the area of the lesion within the specimen, and local recurrence rate during 5 years of follow-up were analyzed. **Results:** The median age and follow-up duration were 51.3 years (range, 28-80 years) and 71.4 months (range, 60-79 months), respectively. The surgical margin was negative in 96 lesions (72.2%), close in 27 lesions (20.3%), and positive in 10 lesions (7.5%). Local recurrence was noted in 1 patient (0.8%). There was no significant association between surgical margin status and the presence of invasive carcinoma. Larger lesion area was significantly associated with positive or close margin ($P = .027$). **Conclusion:** US + MG mapping is useful and results in a high complete-resection rate and an extremely low 5-year local recurrence rate.

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Introduction

Accurate preoperative evaluation of tumor extent is essential for complete resection in breast-conserving surgery (BCS), because positive surgical margins have been found to be associated with local recurrence.[1]

In Japan, ultrasonography (US) is widely used for preoperative evaluation of primary breast cancer before BCS. An evaluation for invasive carcinoma without an intraductal component may not be difficult. However, that for breast cancer with a prominent intraductal component shown by microcalcifications on mammography (MG) (eg, ductal carcinoma in situ [DCIS] and invasive carcinoma

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with predominant intraductal component) is challenging. Microcalcifications sometimes spread beyond the lesions that are detectable by US. Although US findings of DCIS have recently been reported,[2] it is often difficult to perform an accurate preoperative mapping of lesions with microcalcifications by US alone. In contrast, MG is a well-established technique for detecting microcalcifications. To maximize the advantages of both modalities, the present authors conducted an original preoperative mapping method for primary breast cancer with microcalcifications using US in combination with MG (US + MG mapping). This article describes this method for patients with DCIS or invasive breast carcinoma with microcalcifications spread over the mass formation and the local recurrence rate in the 5-year follow-up period.

Materials and Methods

Institutional review board approval was obtained, and informed consent was waived because of the retrospective nature of this study.

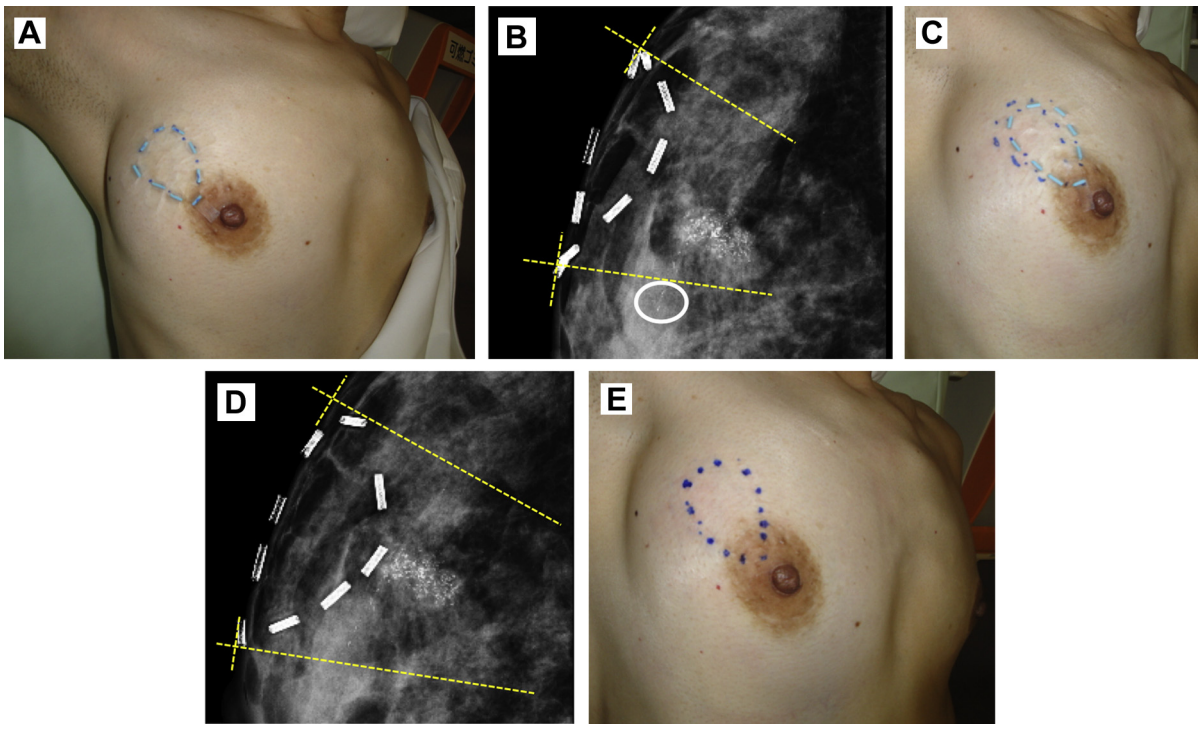
Patients

A total of 885 consecutive patients underwent BCS for primary breast cancer between April 2005 and March 2007. Of the 885 patients, 154 (17.4%) with DCIS or invasive carcinoma with microcalcifications regardless of presence of mass formation underwent US + MG mapping preoperatively. Five patients who received neoadjuvant chemotherapy and 17 patients who were lost to follow-up were excluded from further analysis. Accordingly, 133 lesions in 132 patients were retrospectively evaluated. All patients received postoperative radiation therapy. This method was not performed for breast cancer lesions whose microcalcifications were contained entirely within a mass, because the extent of such lesions is easy to detect by US alone.

Preoperative Mapping

The margins of the tumor were outlined on the skin under US guidance. Radiopaque plastic tips were placed along the line so that the outline could be visualized on MG (Fig. 1A). Mediolateral and craniocaudal MG was performed to precisely assess the distribution of microcalcifications. The perpendicular lines to the skin from the edge of the markings were used to surmise the area to be resected by surgery (Fig. 1B). If microcalcifications were detected outside the area delineated by the radiopaque tips or the perpendicular lines, an adjustment of the markings on the skin was made (Fig. 1C). MG was then repeated to confirm that no microcalcifications were beyond the markings on the skin (Fig. 1D). Finally, the plastic tips

Figure 1 **Procedures of Ultrasonography Plus Mammography Mapping. The Patient was a 50-Year-old Woman With Ductal Carcinoma in Situ in the Right Upper Breast. A, the Margins of the Tumor Were Outlined on the Skin Under Ultrasonographic Guidance, and Radiopaque Plastic Tips Were Placed Along the Line to Facilitate Visualization of the Outline During Mammography. B, Craniocaudal Mammography Shows Microcalcifications (Circle) Outside of the Perpendicular Lines (Dotted Lines) Drawn From the Edge of the Mark. In This Case, the Marking was Slightly too Lateral to the Possible Lesion Spread. C, The Markings on the Skin Were Moved Medially for Adjustment. D, Mammography was Repeated to Confirm That no Microcalcifications Were Beyond the Perpendicular Lines. E, The Plastic Tips Were Removed, and the Remaining Markings Were Used to Determine the Surgical Site**



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