

The American Society of Breast Surgeons

# Scientific Presentation Award: The combination of axillary ultrasound and ultrasound-guided biopsy is an accurate predictor of axillary stage in clinically node-negative breast cancer patients

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## KEYWORDS:

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## Abstract

**BACKGROUND:** The study aim was to determine the accuracy of axillary ultrasound (AUS) and fine-needle aspiration biopsy (FNAB)/needle core biopsy in axillary breast cancer staging.

**METHODS:** We reviewed 256 patients with clinically node-negative breast cancer who underwent AUS ± FNAB/needle core biopsy. AUS-guided FNAB/needle core biopsy was compared with histopathology to determine sensitivity, specificity, negative predictive value, and positive predictive value.

**RESULTS:** AUS-guided FNAB/needle core biopsy and final pathology were positive in 72 of 256 patients (28%). In 125 of 256 cases (49%), the AUS and final pathology were negative. Two of 110 patients had a false-positive FNAB (1.8%); both received neoadjuvant chemotherapy. Nine patients (8%) had a false-negative FNAB/needle core biopsy; the median size of lymph node metastasis was 3 mm. The sensitivity and specificity of AUS-guided FNAB/needle core biopsy was 71% and 99%, respectively, with a negative predictive value of 84% and a positive predictive value of 97%.

**CONCLUSIONS:** AUS-guided FNAB/needle core biopsy is accurate in predicting the status of the axilla in 70% of clinically node-negative breast cancer patients. This technique is minimally invasive with a low complication rate and can obviate the need for staged lymph node procedures.

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Lymph node status is an important factor in the medical and surgical management of women with breast cancer.<sup>1</sup> The presence of metastatic disease in the axillary lymph

nodes is considered the single most important prognostic factor for patients with breast cancer, whereby patients have a poorer prognosis with increasing numbers of metastatic lymph nodes.<sup>2</sup>

Evaluation of the axilla by sentinel lymph node biopsy (SLNB) is an accurate, less invasive alternative to axillary lymph node dissection (ALND), and it has become the standard of care in patients with clinically node-negative

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breast cancer.<sup>3,4</sup> Although SLNB is clearly less invasive than ALND, SLNB is not without morbidity and anesthetic risk. A recent randomized prospective trial of SLNB versus ALND confirmed that complications of SLNB include seroma formation, lymphedema, sensory nerve injury, and limitation in range of motion.<sup>5</sup> In addition, SLNB often is performed as a staged procedure, requiring that breast cancer patients undergo 2 or more surgeries for definitive staging and treatment of the axilla. Such patients include those who have node-positive disease by SLNB and require completion ALND, those who require axillary staging before breast reconstruction, and those undergoing neoadjuvant chemotherapy.<sup>6</sup> These clinical scenarios represent up to 40% to 50% of patients treated for breast cancer. Finally, staged SLNB/ALND may result in greater surgical morbidity.<sup>7</sup>

Multiple reports in the literature suggest that axillary ultrasound (AUS) is a potentially valuable technique for identifying axillary metastases.<sup>8-10</sup> AUS permits the visualization of lymph node size, shape, contour, and changes in cortical morphology and texture that appear to be associated with the presence of axillary metastases. However, sonographic signs of metastatic disease sometimes overlap with those of benign reactive changes, limiting the ability of this modality alone to accurately stage the axilla.<sup>11</sup> The addition of fine-needle aspiration biopsy (FNAB) has been shown to increase the specificity of nodal staging.<sup>12-17</sup>

The aim of the current study was to evaluate our experience with AUS and FNAB to determine the feasibility and accuracy of these techniques for staging the axilla. We also sought to identify factors that may result in discordance between the preoperative imaging and cytopathologic assessment compared with final histopathologic staging.

## Patients and Methods

Institutional review board approval was obtained before the commencement of this retrospective study. Written informed consent of patients was not required. The surgical, radiology, and pathology databases at Washington University/Barnes Jewish Hospital were queried from January 1, 2004, to December 31, 2006, to identify all patients with a diagnosis of stages I to III invasive breast cancer who underwent surgical treatment of their cancer at our institution. Patients who were referred from other centers after surgical excisional biopsy of their breast cancer were excluded from the study. A total of 311 patients underwent AUS before their surgical treatment; 55 had clinically positive axillas and were excluded from the final analysis. Charts of 256 consecutive patients with clinically node-negative operable breast cancer who underwent AUS were reviewed retrospectively. This represented approximately 40% of the total number of patients eligible for axillary ultrasound during the study period. Demographic and tumor characteristics evaluated included patient age, tumor histol-

ogy, tumor size, tumor grade, overall pathologic stage, use of neoadjuvant chemotherapy before definitive surgical therapy, type of surgical therapy, estrogen receptor status, progesterone receptor status, Her-2-neu status, and final pathology findings.

AUS was performed with either a Siemens Sonoline Antares or a Siemens Acuson Antares (Siemens Medical Solutions, Inc., Malvern, PA) using a standard 5- to 13-MHz linear array transducer. AUS was performed prospectively by dedicated breast imaging radiologists, most often at the time of ultrasound interrogation of the primary tumor, before a tissue diagnosis of the primary lesion was performed. Axillary lymph nodes were determined to be either normal in appearance or suspicious in appearance. Suspicious lymph nodes were identified based on standard criteria, including generalized or focal thickening of the cortex, disparity in size of one or more lymph nodes compared with others, rounded appearance, and effacement of the lymph node fatty hilum.<sup>8-10</sup>

Only suspicious-appearing lymph nodes were sampled with FNAB or needle core biopsy. The decision to perform FNAB versus core needle biopsy was at the discretion of the attending radiologist. Of the 256 patients, 13 (5%) had a needle core biopsy and 243 (95%) had FNAB. FNAB was performed manually using a 25-gauge needle attached to a 10-mL syringe, after administration of superficial local anesthesia with 1% Xylocaine (APP Pharmaceuticals, LLC, Schaumburg, IL USA). Needle core biopsy was performed with the Achieve 14-gauge Programmable Automatic Biopsy System (Cardinal Health Inc., Dublin, OH) after local anesthesia with 1% Xylocaine. Both techniques were performed under ultrasound guidance with direct visualization of the needle entering the cortex of the lymph node to confirm position of the needle tip in the appropriate location. On average, 3 passes were made during FNAB and 1 or 2 passes were made during needle core biopsy.

Aspirates were prepared with standard Giemsa and Papanicolaou staining and examined by a dedicated cytopathologist. Cytology was classified as benign, malignant, suspicious (but not definitive for malignancy), or quantity not sufficient for diagnosis. Malignancy was defined by the presence of cells with enlarged irregular nuclei and prominent nucleoli based on standard cytopathologic criteria.<sup>15,16</sup> Needle core specimens were submitted for standard pathologic analysis.

Patients with a malignant FNAB or needle core result underwent complete ALND at the time of definitive surgery. Patients with benign, suspicious, or quantity not sufficient for diagnosis results underwent standard SLNB using radio-colloid and/or blue dye injection. For patients undergoing neoadjuvant chemotherapy, standard institutional practice is to perform SLNB before chemotherapy initiation. The types and number of cycles of neoadjuvant therapies used varied anthracycline-based regimens were most common.

The performance of AUS and FNAB/needle core biopsy for staging the axilla was summarized using sensitivities

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