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Breast cancer prognosis and isolated tumor cell findings in axillary lymph nodes after core needle biopsy and fine needle aspiration cytology: Biopsy method and breast cancer outcome

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Abstract

Background: It is unknown whether performing a core needle biopsy (CNB) to diagnose breast cancer increases the incidence of isolated tumor cells (ITC) in the axillary sentinel lymph nodes.

Methods: Patients diagnosed with unilateral invasive pT1 breast cancer (≤2 cm in diameter, n = 1525) at a single center between February 2001 and August 2005 were included in this prospective observational cohort study. The patients were categorized into two groups according to the type of the preoperative breast needle biopsy performed, the CNB and the fine needle aspiration cytology (FNAC) groups, and followed up for a median of 9.5 years after breast surgery.

Results: 868 (56.9%) patients had FNAC and 657 (43.2%) CNB. In the subset of patients with no axillary metastases (pN0, n = 1005) 70 patients had ITC, 37 (4.3%) out of the 546 patients in FNAC group and 33 (5.0%) out of the 459 patients in the CNB group ($p = 0.798$). The type of tumor biopsy did not influence breast cancer-specific survival ($p = 0.461$) or local recurrence-free survival ($p = 0.814$) in univariable survival analyses. Overall, survival favored the CNB group in a univariable analysis, but no difference in survival emerged in a multivariable analysis ($p = 0.718$).

Conclusions: CNB was not associated with a greater incidence of ITC in axillary lymph nodes as compared with FNAC, and did not have an adverse effect on survival outcomes in a patient population treated with modern adjuvant therapies.

Keywords: Breast cancer; Prognosis; Outcome; Core needle biopsy; Fine needle aspiration cytology

Introduction

Core needle biopsy (CNB) has largely replaced fine needle aspiration cytology (FNAC) as a diagnostic procedure for breast cancer, as CNB has proven more accurate and fewer further biopsies are needed after CNB.[1] Complications are rare after either CNB or FNAC, but CNB provides a tissue sample that can be analyzed for several tumor biological characteristics, including steroid hormone receptor contents, HER2 status, and cell proliferation rate.[2,3]

Yet, FNAC is still often preferred, possibly in part due to concerns about CNB increasing the risk of cancer dissemination, as CNB has been reported to cause tumor cell

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displacement.[4–6] Nonetheless, performing CNB did not affect the local recurrence rates after breast conserving surgery and radiotherapy despite conspicuous seeding of tumor cells into the needle track,[7,8] but these results were based on limited numbers of patients and relatively short follow-up times.

Some data suggest that preoperative CNB, in particular, might detach breast cancer cells that may invade the sentinel lymph nodes.[9] Micrometastases, and especially isolated tumor cells (ITC), have become frequent findings after the introduction of the sentinel node biopsy (SNB), and serial sectioning of the sentinel nodes and immunohistochemical staining of the sections, but the clinical significance of these findings is controversial.[10,11] Some studies suggest that the ITCs might represent rather benign transport of tumor cells from the primary tumor into the regional lymph nodes than true invasive deposits with clinically significant metastatic potential, and that such transport may occur after tumor cell displacement at the needle biopsy site.[12,13] Breast massage performed prior to a SNB and even the breast compression used at mammography have been suggested to cause tumor cell transportation.[14,15]

In this study we investigated whether breast cancer patients who undergo preoperative CNB have more ITCs in their sentinel lymph nodes than patients who have FNAC, and whether the type of the needle biopsy influences breast cancer recurrence and survival.

Patients and methods

Patients

After excluding patients who had received neoadjuvant chemotherapy for a breast tumor, a total of 1865 breast cancer patients with pT1 cancer (≤2 cm in diameter) had surgery for breast cancer at the Breast Surgery Unit of the Helsinki University Central Hospital, Helsinki, Finland, between February 2001 and August 2005. From these, 340 patients were excluded as described in Fig. 1. The remaining 1525 patients were included in this prospective observational cohort study. The patient and tumor characteristics are provided in Table 1. The research protocol of the study was approved by an Ethics Committee of the Helsinki University Central Hospital.

Preoperative tumor biopsy

The preoperative biopsy method, whether CNB or FNAC, was chosen by the preference of the radiologist who performed the biopsy. Most needle biopsies were performed at the referring units and detailed information of the CNB or FNAC needles used is not available. All needle biopsies were image-guided.

Patients whom had both FNAC and CNB performed (n = 337) were included in the CNB group. Both FNAC and CNB were typically done when the patient had a very small tumor and/or lobular carcinoma histology with an inconclusive FNAC result.

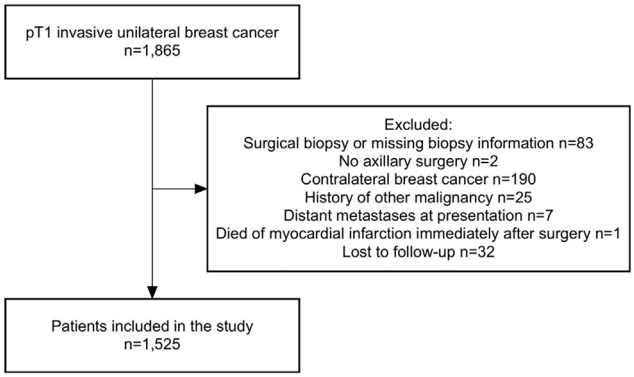

Figure 1. Excluded patients.

Surgery

Altogether 397 (26.0%) patients underwent mastectomy and 1128 (74%) had breast-conserving surgery. A sentinel node biopsy was performed in 1297 cases as described elsewhere.[16] Level I–II axillary nodes were harvested whenever axillary lymph node dissection (ALND) was done. Level III nodes were dissected when clinically suspicious level II–III axillary nodes were detected at surgery.

Axillary nodal staging was performed by ALND instead of the SNB in 168 cases due to presence of nodal metastases diagnosed preoperatively, prior major breast surgery, or radiologically multifocal tumor. In addition, 60 patients had ALND after an unsuccessful SNB.

In the remaining 1297 patients, a median of two (range 1–14) axillary sentinel nodes were harvested. A completion ALND was generally performed when the sentinel nodes contained metastatic tumor or ITC. In addition, 18 patients with tumor-negative sentinel nodes underwent a completion ALND without further findings due to surgeon or patient preference. ALND was omitted in 19 patients with tumor-positive sentinel nodes. One of these 19 patients had a sentinel node macrometastasis, seven had sentinel node micrometastases, and eleven ITC.

Histopathology

The breast and lymph node tissue specimens were handled and examined histologically as described elsewhere.[17]

Adjuvant treatment

The patients received radiotherapy and systemic adjuvant treatments according to the institutional guidelines (Table 1). Postoperative whole-breast radiotherapy was given after breast-conserving surgery to a cumulative