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Original article

The value of a combination of wire localization and ultrasound-guided vacuum-assisted breast biopsy for clustered microcalcifications

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Abstract

The purpose of this study is to introduce and evaluate the usefulness of the combination of wire localization and ultrasound (US)-guided, vacuum-assisted breast biopsy (VAB) to histologically diagnose mammographically detected clustered microcalcifications in the absence of sonographic and clinically palpable masses. Fifty-eight consecutive patients (mean age 53 years) with 58 mammographically detected microcalcification clusters underwent mammographically guided wire localization followed by VAB with US guidance for targeting the wire. Mammography of the specimens obtained was performed in all cases for identification of microcalcifications. The procedure took approximately 24 min (range, 18–52 min). No significant immediate and delayed complications were observed. Microcalcifications were evident on both specimen radiographs and microscopic slides in 56 cases (97%). The combination of wire localization and US-guided VAB could provide an accurate and useful method for diagnosing mammographically detected, clustered microcalcifications.

Keywords: Ultrasound; Microcalcification; Indeterminate microcalcification; Vacuum-assisted breast biopsy

Introduction

Clustered microcalcifications may be a sign of early breast cancer, and mammography has been shown to be the best modality for the detection and characterization of microcalcifications.[1,2] The specificity of mammography, however, remains low because benign microcalcifications visible on mammography cannot always be differentiated from malignant microcalcifications.[3]

Over the past decade, there has been a marked change in practice in the diagnosis of mammographically detected microcalcifications, and the development of a stereotactically guided core needle biopsy (CNB) technique has led to both an increase in the preoperative diagnosis rate of cancer and a subsequent reduction in the number of open biopsy procedures performed.[4]

Vacuum-assisted breast biopsy (VAB) was introduced in 1995 and has advantages in addressing microcalcifications, since material obtained from CNB has a lower sensitivity in making the correct diagnosis compared with VAB, and stereotactic VAB is now the diagnostic technique of choice for indeterminate clusters of microcalcifications.[4]

Stereotactic VAB, however, is very expensive, and substantial space is required for the prone type of stereotactic mammography unit. Therefore, this report introduces the procedure of ultrasound (US)-guided VAB following mammography-guided wire localization for mammographically detected clustered microcalcifications as an alternative to stereotactic VAB.

To our knowledge, this is the first study tailored exclusively to the combination of wire localization and US-guided VAB for mammographically detected clustered microcalcifications.

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Patients and methods

Patients

Between July 2005 and August 2007, 58 consecutive patients, aged 39–68 years (mean age, 53 years), who had been scheduled to undergo surgical breast biopsy on the basis of clustered microcalcifications detected at mammography underwent US-guided VAB after hook wire localization. All patients wished to undergo biopsy. Neither a palpable tumor nor a visible mass on mammography or US was associated with the area of microcalcifications. All patients gave full informed consent for this study. These patients represented 95% (58 out of 61) of the patients eligible for the study during that period. Three patients, who had microcalcification clusters in diffuse or regional distributions measuring greater than 4 cm in diameter were excluded because of the difficulty in the correlation of mammographic, US, and histologic findings.[3]

Mammography

Microcalcifications were classified on mammography by one breast radiologist and one breast surgeon, each of whom had more than 5 years' experience of reading mammography (more than 5000 patients per year) with consensus according to the Breast Imaging Reporting and Data System (BI-RADS). The size of the microcalcification area ranged from 4 mm to 20 mm (mean 11 mm). Seventy-four percent ($n = 43$) of the lesions were less than 10 mm in size and the minimum number of microcalcifications in the cluster was five. The lesions were categorized as probably benign (BI-RADS 3), with suspected malignancy (BI-RADS 4) or highly suggestive of malignancy (BI-RADS 5). Because of the broad spectrum and correspondingly wide range of risk of malignancy of the BI-RADS 4 category, this group was subdivided into groups 4A, 4B, and 4C. For lesions categorized as probably benign (BI-RAD 3) follow-up was generally recommended. Biopsy, however, was performed in those cases in which the family history was strongly positive or the patient and referring physician expressed particular concern.

Wire localization

In all 58 patients, hook wire localization was performed using a fenestrated compression plate and a 21-gauge hook wire needle (Kopans spring hook localization needle; Cook, Bloomington, IN. USA) under full-field digital mammography (Novation DR; Siemens, Erlangen, Germany) guide. All procedures were performed as carefully as possible in order to avoid tissue damage or bleeding in the breast. Wire placement mammography was obtained with both craniocaudal and true lateral projections. The localizing wire was placed within 5 mm of the all lesions, and the sheath was not withdrawn completely from the wire so as to achieve more accurate US guidance (Fig. 1). After placement of the hook wire, the patient was moved to the US room for the US-guided VAB.

US-guided, vacuum-assisted breast biopsy

All US-guided VAB procedures were performed by one breast surgeon or one breast radiologist, each of whom had more than 5 years' experience of performing VAB. Patients

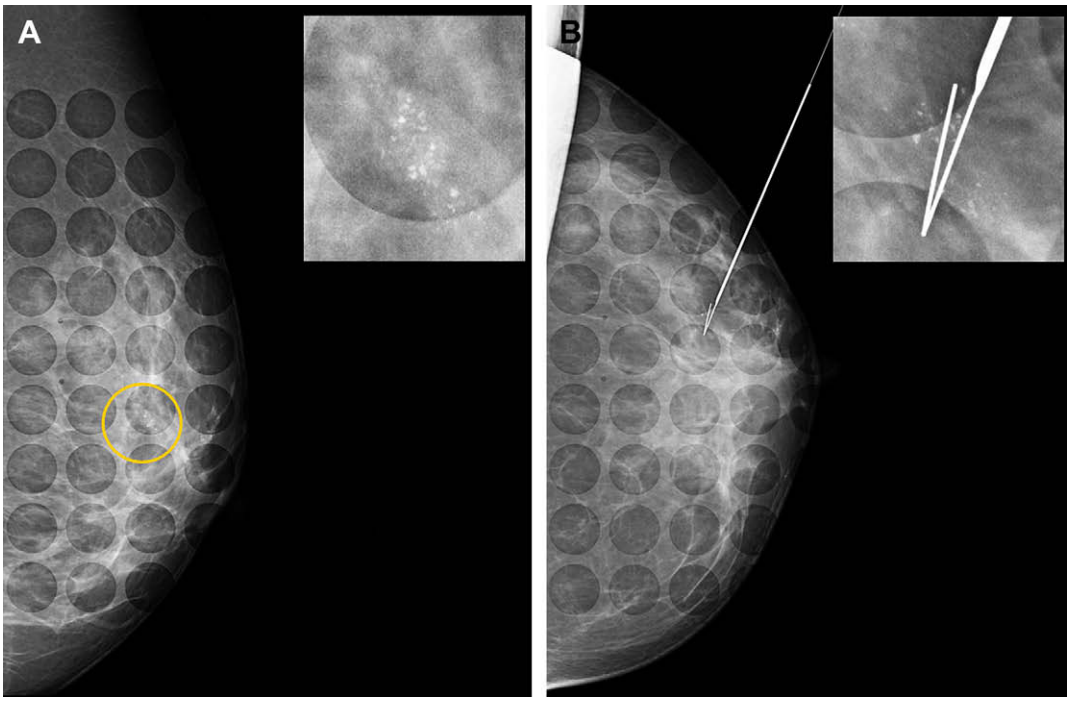

Fig. 1. (A, B) Mammography shows clustered pleomorphic microcalcifications (the Breast Imaging Reporting and Data System 4C, magnified view). The hook wire (the sheath was not separated completely from the wire for better ultrasound guidance) was located in the center of the clustered microcalcifications.