

Ultimate Benefits of US-Biopsy Vs Guided Mammography Biopsy for Possible Mini-Analysis without a Specific Breast Mass

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Article Received: 19 October 2019

Article Accepted: 21 December 2019

Article Published: 11 January 2020

ABSTRACT

The purpose of this research is to compare the diagnostic results of basic ultrasound-guided needle biopsy (USCNB) versus biopsy-guided biopsy for suspicious microscopic calcifications and to assess the usefulness of USCNB in diagnosing microscopic calcifications by comparing histological results according to the results whether or not lesions exist on Ultrasound. Retrospectively, we reviewed 178 cases of suspected partial calcification of mammography without a specific mass in 158 patients underwent biopsy-guided images. Patients with US-CNB (n = 47) and ultrasound-guided biopsy (US-LEB) (n = 72), and those with invisible lesions in the United States underwent an X-ray biopsy (MG-LEB) (n = 32) and vacuum-assisted biopsy (S-VAB) (n = 27). The results of x-ray mammography were analyzed and false negative rates were evaluated. Histological diagnosis, breast imaging reports and Data Classification System (BI-RADS) were evaluated. Of all lesions, 119 of 178 (66.9%) were visible to the United States. US vision was more frequently associated with malignant tumors (27.7% vs. 11.9%, P = 0.012) and with the highest BI-RADS category (32.8% vs. 15.3%, P = 0.019). The overall false negative rate was 10.0% (4/40). Three of the four erroneous negative outcomes occurred in US-CNB and 1 in SVAB. The frequency of the malignant tumor was significantly higher in the visible microscopic calcifications in the United States that were within a cluster or associated with duct dilatation (72.7% vs. 17.5%, P < 0.001). Micro-visible calcifications of the United States were associated with a higher BI-RADS class and higher malignancy rate versus invisible lesions in the United States.

Keywords: Mammography, Breast cancer, Ultrasound.

1. INTRODUCTION

Mammography is a sensitive test for the detection of micro calcifications in the breast. Microcalcifications are detected at mammography in 30% to 50% of breast cancer cases, and calcifications are found at histology in 60% to 80% of cases. Among patients with non-palpable tumors, fully 42% had microcalcifications reported at mammography. Stereotactic vacuum assisted biopsy (S-VAB) or mammography-guided localization excision biopsy (MG-LEB) are usually recommended when microcalcifications are visible only on mammography [1], [2], [3]. There are disadvantages to S-VAB. It is costly and time-consuming, and it requires further exposure to ionizing radiation. In addition, there are limitations in lesion localization and assessment of breast tissue thickness compared to other methods.

Ultrasound (US)-guided techniques are more comfortable for patients, and they are less time-consuming and less costly than mammography-guided methods [4], [5], [6]. Also, there is no exposure to ionizing radiation and they are real-time procedures, which both doctors and patients should prefer. Technical advances in ultrasonography including increased resolution and the introduction of high-frequency transducers have improved US-detection of calcifications, and combining other imaging findings with microcalcifications on ultrasound may be helpful [7], [8], [9].

Current methods for the diagnosis of microcalcifications include US-guided core needle or vacuum-assisted biopsy (US-CNB; USVAB), S-VAB, US- or MG-localization excision biopsy (LEB), and others [10], [11], [12]. The first purpose of this study was to compare the diagnostic accuracy of US-CNB, US-LEB, S-VAB, and MG-LEB in patients with microcalcification. The second purpose of this study was to evaluate the usefulness of US-CNB in the diagnosis of microcalcifications by comparing histologic findings according to presence or absence of the lesions on ultrasound [13], [14], [15].

2. MATERIALS AND METHODS

Among 6230 patients who underwent mammography from March 2013 to September 2016, 485 had BI-RADS category 4 or 5 tissue changes, and 178 biopsies (158 patients), including 47 US-CNB, 72 US-LEB, 27 S-VAB, and 32 MB-LEB, were performed for microcalcifications on mammography with no additional findings [Figure 1].

A. Imaging Techniques

Digital mammography with standard craniocaudal and mediolateral oblique (CC and MLO) views and magnification for microcalcifications was performed with a Lorad/Hologic Selenia full field digital mammography system (Lorad/Hologic, Danbury, CT, USA). High-resolution ultrasonography (iU22, Philips Medical Systems, Bothell, WA, USA, or Logiq 9, GE Medical Systems, Milwaukee, WI, USA) was performed with 12-MHz linear transducers by 3 radiologists with breast imaging experience of 2 to 13 years. All patients underwent ultrasonography prior to biopsy. Imaging findings were retrospectively reviewed by 2 radiologists.

B. Biopsy Techniques

All biopsies were performed by 3 radiologists with 2 to 13 years of experience. US-CNB or US-LEB was performed when there was calcification on mammography with no other finding and microcalcification could be relatively well observed with ultrasound. When necessary, radiopaque markers were attached to the skin above US-visible microcalcifications and mammography was performed to confirm the match. US-CNB was performed with a 14-gauge core needle (Stericut; TSK Laboratory, Tochigi, Japan). For US-LEB, the guide wire was placed in the target lesion under US guidance, localization was confirmed by mammography, and the specimen mammography was performed after excision to confirm inclusion of the target lesion. Patients underwent mammography-guided procedures when microcalcifications were not visible on ultrasound. The biopsy method was determined by the location of the lesion and the clinical characteristics of the patient. S-VAB was performed with 8- or 11-gauge needles, lateral view, with the patient in a lateral decubitus position. For MG-LED, the horizontal and vertical coordinates of the target lesion were obtained using windowed compression paddles, the needle was inserted vertically, and the position of the needle was confirmed using 90-degree direction mammography. Specimen mammography was performed in all cases to confirm the presence of microcalcifications. The histology reports were compared with mammography and ultrasound findings. A benign diagnosis of a BI-RADS category 4c or 5 lesion was regarded as imaging-pathology discordance, and rebiopsy was recommended in these cases. Further measures after benign diagnoses of BI-RADS category 4b lesions were determined according to imaging findings, histologic findings, and clinical findings. Surgical resection was recommended for atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), lobular carcinoma in situ (LCIS), papillary lesions, and radial scar. Patients with imaging-pathology concordance and benign lesions were followed at 6-month or 1-year intervals according to histologic findings.

C. Data analysis

Age, breast parenchymal pattern, microcalcification features, BI-RADS category, and histologic findings were analyzed according to biopsy method. We evaluated rates of malignancy, histological underestimation, and

false-negative diagnoses, as detected in patients who underwent follow-up procedures or were monitored by mammography for at least 1 year after the initial diagnosis. The ratio of benign lesions to malignant lesions according to the presence of US-visible micro calcifications was also investigated and the invasiveness of malignant lesions was characterized. The correctness of US-CNB and S-VAB was compared, and for CNB, the ratio of benign lesions to malignant lesions according to the presence of allied findings and invasiveness was studied. Statistical analyses were done with SPSS 20.0 software (SPSS Inc., Chicago, IL, USA). The chi-square test was performed and p-values < 0.05 were considered statistically significant.

3 RESULTS The average age of the 158 patients was 49.5 years (range 27 to 77). Of the total 178 lesions, 106 (59.6%) were associated with heterogeneous density patterns, and heterogeneous density patterns were observed most frequently in all biopsy groups. The extent of micro calcification in the US-CNB group was significantly greater than that observed in the other groups (p < 0.001). There were no significant differences according to the distribution pattern or shape of micro calcifications. Overall, BI-RADS category 4a lesions were most common (130/178, 73.0%), and among 15 BI-RADS category 5 lesions (15/178, 8.4%), 14 were US-visible and 12 were evaluated by US-CNB in table 1.

Table 1

Correlation of sonographic finding & histologic diagnosis of mammoographically detected microcalcifications

US-Visible Microcalcification (n=119)	Only Calcification	Calcification with mass or ductectasia	p
benign	80/97 82.5%	6/22 27.3%	<0.001
malignant	17/97 17.5%	16/22 72.7%	
Malignant pathology(n=34)			
Non-invasive	15/17 88.2%	11/16 68.8%	0.1
invasive	2/17 11.8%	5/16 31.3%	74

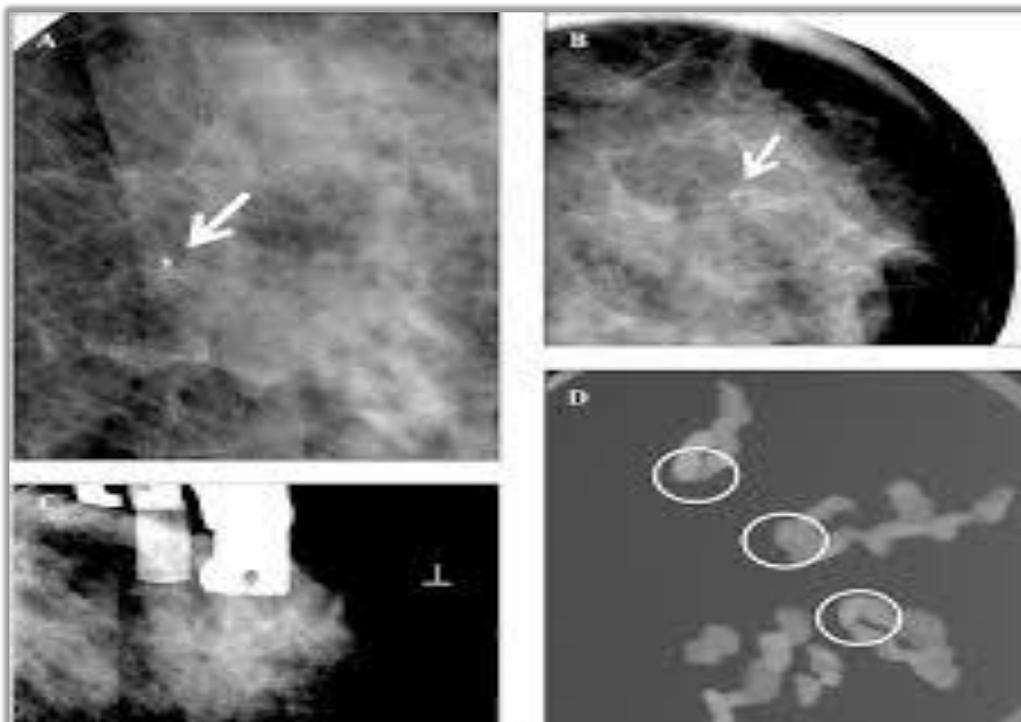


Figure 1: Histopathology shows fibrosis and small several cysts with microcalcifications

3. CONCLUSION

US-CNB is an accurate and acceptable diagnostic technique for US visible microcalcifications. US-visible microcalcifications are associated with higher BI-RADS category and higher rates of malignancy compared to US-invisible microcalcifications. The frequency of malignancy was significantly higher for US-visible microcalcifications that were within a mass or associated with ductal dilation.

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