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● *Original Contribution*

PHYLLODES TUMORS OF THE BREAST: ULTRASONOGRAPHIC FINDINGS AND DIAGNOSTIC PERFORMANCE OF ULTRASOUND-GUIDED CORE NEEDLE BIOPSY

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Abstract—We evaluated ultrasonography (US) findings between benign and malignant phyllodes tumors and analyzed diagnostic performance of US-guided core needle biopsy (CNB) for phyllodes tumors. Surgically removed phyllodes tumors of 168 women were divided into two groups according to the benign and malignant (including borderline tumor) groups and 116 were benign and 52 were malignant. On US, the complex cystic echogenicity ($p = 0.021$), presence of cleft ($p = 0.005$) and higher final US assessment ($p = 0.008$) were more frequent in the malignant group. The sensitivity of CNB including fibroepithelial tumors was 67.9% (114/168) and the concordant rate between CNB and surgical excision was 82.1% (32/39) and 5.8% (3/52) in the benign and malignant group. Our results suggested that the US findings of complex cystic echogenicity, cleft, higher final US assessment were more frequent in malignant phyllodes tumors. The sensitivity of CNB was 67.9% (114/168) and malignant phyllodes tumors were rarely diagnosed as malignant by US-guided CNB. (E-mail: ekkim@yuhs.ac) © **2013 World Federation for Ultrasound in Medicine & Biology.**

Key Words: **Breast, Phyllodes tumor, Ultrasound, Grade, Core needle biopsy.**

INTRODUCTION

Phyllodes tumors of the breast are rare fibroepithelial tumors and represent less than 1% of all breast neoplasms (Jorge Blanco et al. 1999; Liberman et al. 1996). They are usually classified as benign, borderline or malignant according to the World Health Organization criteria (Choi and Koo 2012). Despite being evaluated into subclassifications, the actual characteristics and prognosis of these tumors remain poorly understood because of their rarity. In general, borderline or malignant phyllodes tumors can both recur and metastasize, whereas benign phyllodes tumors can recur but not metastasize (Tsang et al. 2011).

Phyllodes tumors grow rapidly, and a palpable lump is the most common symptom, representing up to 90% of cases (Pandey et al. 2001). The initial diagnosis for a palpable lump of breast is made by physical examination and imaging studies. Ultrasound (US)-guided core needle biopsy (CNB) is well known as an easy and accurate technique that is important to use for most breast masses (Ciatto and Houssami 2007); however, differentiating phyllodes tumors from cellular fibroadenoma by CNB can be difficult, and diagnostic accuracy has been reported to be variable (Bode et al. 2007; Dillon et al. 2006; Komenaka et al. 2003).

Surgical excision is the treatment of choice for phyllodes tumors, but the extent of surgery needed remains controversial. In general, the enucleation procedure is thought to be sufficient for benign phyllodes tumors, but wide excision including radical mastectomy is necessary in borderline or malignant tumors because of their higher local recurrence rate and tendency for systemic metastasis (Ben Hassouna et al. 2006). There would be a chance to develop different therapeutic plans for phyllodes tumors if an accurate diagnosis of benign and malignant phyllodes tumors becomes possible through preoperative US-guided CNB. However, to our knowledge, there have been few studies of the overall diagnostic performance of CNB and different US findings between benign and malignant phyllodes tumors (Ben Hassouna et al. 2006; Jorge Blanco et al. 1999).

The purpose of this study is to evaluate US findings of benign and malignant phyllodes tumors, including borderline tumors and to analyze the sensitivity and concordance rate of US-guided CNB.

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MATERIALS AND METHODS

Patients

Our institutional review board approved this study, and informed consent was waived by the participants. Between September 2002 and March 2012, phyllodes tumors of the breast were confirmed in 220 patients by surgical excision at our institution. Among them, 52 subjects were excluded because they did not undergo preoperative core needle biopsy. Finally, 168 women (mean age, 40.2 y; range, 15–73 y) with 168 surgically removed phyllodes tumors for whom records of preoperative US-guided CNB were available were enrolled in this retrospective study.

In our institution, the US-guided CNB was performed in 11,621 patients with 14,863 breast lesions over the same period of time, and the results were as follows: 10,982 benign results (73.9%), 3528 malignant results (23.7%), 153 atypical lesions (1.0%) and 200 fibroepithelial tumors or phyllodes tumors (1.3%). Among the 10,982 benign lesions, fibroadenoma was diagnosed in 1853 cases (16.9%).

Radiologic and histopathologic studies

Preoperative ultrasound scanning (*LOGIQ E9*, General Electric, Milwaukee, WI, USA; *HDI 5000*, Advanced Technology Laboratories, Bothell, WA, USA; *HDI 3000*, Advanced Technology Laboratories; *PHILIPS iU22 platform*, Philips, Bothell, WA, USA) was performed in all patients with a 10–12-MHz linear transducer. Two experienced breast radiologists retrospectively reviewed the US images in consensus. The reviewers were blinded to both the CNB results and the pathologic subclassifications of the phyllodes tumors. All US images were interpreted according to the Breast Imaging-Reporting and Data System (BI-RADS) lexicon by two experienced breast radiologists in consensus with the following: size (maximum diameter [mm]), shape (oval, round or irregular), orientation (parallel, not parallel), margin (circumscribed, not circumscribed), boundary (abrupt, echogenic halo), echogenicity (hypoechoic, isoechoic, hyperechoic, complex echoic mass with cystic and solid components), posterior feature (enhancement, shadowing, combined, absent, not assessed) and final category assessment (D'Orsi et al. 2003). In addition to these descriptions, we evaluated for the presence of a cleft within the mass, which is a characteristic feature of phyllodes tumors (Liberman et al. 1996). A cleft was defined as the multiple slit-like natures of cystic spaces within the solid mass (Stavros 2004). US-guided CNBs were performed with 14-gauge needles and an automated biopsy gun (Promac 2.2; Manan Medical Products, Northbrook, IL, USA) or a TSK Stericut (Standard type with Co-axi; TSK Laboratory, Tochigi, Japan) using a freehand technique and local anesthesia, and four to five samples were obtained.

The histopathologic diagnosis of all preoperative US-guided CNBs and surgical specimens were recorded retrospectively through a pathology report. The results of the excision specimens were classified into two groups: benign phyllodes tumor or malignant phyllodes tumor. Borderline phyllodes tumors were included in the malignant group.

Statistical analysis

We compared US findings of benign and malignant phyllodes tumors. All statistical analyses were performed using the SPSS for Windows, version 20.0 (SPSS Inc., Chicago, IL, USA). The sizes of all lesions were expressed as mean ± standard deviationSD (mm). The t-test or Mann- Whitney test of variance was used to analyze group differences in continuous variables (age and size), and the χ^2chi square test or Fisher's exact test were was used for categorical data analysis according to the US findings (shape, orientation, margin, boundary, echogenicity, presence of cleft, posterior feature, final category assessment). Statistical significance was established at a two-sided p value defined as <0.05.

We calculated the sensitivity and concordant rate of US-guided CNB results. Sensitivity was defined as the percentage of phyllodes tumors or fibroepithelial tumors diagnosed by CNB among the surgically diagnosed phyllodes tumors. The concordant rate was defined as the percentage of tumors diagnosed correctly as benign phyllodes by CNB among the cases diagnosed as benign phyllodes tumors through surgical excision, and as the percentage of malignant phyllodes diagnosed by CNB among the malignant phyllodes tumors confirmed through surgical excision (Foxcroft et al. 2007). We excluded the CNB results of fibroepithelial tumor or just phyllodes tumor without sub-classification when calculating the concordant rate.

RESULTS

Among the total 168 women, 116 (69.0%) had benign phyllodes tumors, whereas 52 (31.0%) had malignant phyllodes tumors (31 borderline and 21 malignant tumors). The mean ages of the women in the benign and malignant groups were 38.7 and 43.4 y, respectively, which was statistically significant ($p = 0.010$). Most women (69.6%, 117/168) had palpable breast masses—68.1% of the patients in the benign group and 73.8% in the malignant group. The mean time duration between surgical excision and US-CNB was 50.6 ± 73.5 d (median, 28 d; range, 4–481 d).

The US findings of phyllodes tumors are presented in Table 1. The mean US sizes of benign and malignant