ORIGINAL ARTICLE

The role of fine needle aspiration cytology and core biopsy in the diagnosis of palpable breast masses

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ABSTRACT

Background: The modern approach to palpable breast masses is to get cytopathologic diagnosis before definitive surgery. We aimed to compare fine needle aspiration cytology (FNAC) with core biopsy in histopathologic diagnosis of palpable breast masses. **Materials and Methods:** Data were collected on 123 women who have suspicious palpable breast masses from 2007 to 2010. **Results:** Of the 123 patients, core biopsies were performed on 64 patients (Group 1) and FNAC on 59 patients (Group 2). Malignancy was confirmed in 25 out of 32 clinically suspicious patients in Group 1 (78.1%), and 20 out of 21 participants in Group 2 (95.2%). Among the clinically suspicious patients, 81.8% of 33 patients in Group 1, and 90.3% of 31 patients in Group 2 were identified malignancy. Sensitivity was 100% for core biopsy and 95% for FNAC. Specificity was 100% in both procedures. False negativity rate in FNAC were 5%. **Conclusion:** Sensitivity and specificity showed that in the case of true histopathologic classification, core biopsy is superior to FNAC. Nevertheless, FNAC's role as a fast, simple and cheap diagnosis cannot be ignored. It is an effective diagnostic tool in most patients, in comparison to the correct and specific typing of core biopsies in benign lesions which protect patients from the open biopsy.

Key words: Biopsy, breast, core needle, fine needle aspiration

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INTRODUCTION

Breast cancer is the most frequently diagnosed life-threatening cancer in women and the leading cause of cancer death among women all over the world. Early breast carcinomas are asymptomatic, and most of them are discovered during breast screening programs.[1] Larger tumors may present as a painless breast mass. Pain is not usually a symptom of breast cancers.[2] However, most breast masses are benign, and the main concern of women with breast masses is the probability of breast cancer. Evaluation of the breast masses begins with investigating the symptoms and learning the general clinical history. This is followed by a clinical examination, imaging studies, and biopsy if necessary.

Cytological or pathological diagnosis is usually needed to ensure that a breast mass is malignant or benign. Both fine needle aspiration cytology (FNAC) and core biopsy have roles to play in the evaluation of breast lesions.[3] We aimed to present our clinical experience and compare the FNAC with core biopsy in the diagnosis of palpable breast masses for sensitivity and specificity.

MATERIALS AND METHODS

The study started following the approval of ethics committees of Ankara University, School of Medicine (153-4855). In accordance with the Helsinki declaration, patients signed a written informed consent form. From December 2007 to March 2010, totally 123 stereotactic biopsies with both core biopsy (64 patients, Group 1) and FNAC (59 patients, Group 2) were performed in patients who presented with a clinically suspicious palpable breast mass. The study was designed prospectively, and the

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patients were divided into two groups by simple random sampling method.

Core biopsy

The skin overlying the breast mass was disinfected with betadine and anesthetized, then broken with a #11 scalpel blade. A Pro-Mag ultra-automatic biopsy instrument (Medical Device Technologies, Gainesville, FL) was used to obtain samples; a biopsy needle was introduced into the mass, and a specimen of approximately 1 cm length was obtained. Specimens were fixed in 10% formalin, examined grossly, and microscopically. Paraffin sections were stained with hematoxylin and eosin and evaluated by pathologists.

Fine needle aspiration cytology

The skin overlying the mass was prepared with betadine, and locally anesthetized. An ordinary 21-gauge needle was introduced into the tumor, and suction was applied with a 10 mL plastic syringe. The needle was detached, and smears were prepared from the drops at the tip of the needle. The procedure was repeated twice with new needles. The cytological specimens were stained with May-Grünwald-Giemsa and modified fast Wright stain (Diff-Quik) and evaluated by a cytopathologist.

Benign lesions were followed up without any additional intervention. Surgical treatment was applied to the patients with malignant lesions and all patients had undergone an operation by one surgeon.

Statistical analysis

All statistical data were analyzed by Statistical Package for Social Sciences (version 20.0, SPSS, Inc, Chicago, IL, USA). The data were expressed as mean ± standard deviation for metric variables, and as frequency (percentage) for categorical variables. To compare two interventions, Student's *t*-test was used for metric variables, and Chi-square test for categorical variables. The statistical significance value was set at $P < 0.05$.

RESULTS

Sixty-four patients as Group 1 and 59 patients as Group 2 were included in our study. All of the patients were female. The mean ages of Group 1 and 2 were 49.7 years (range, 21–83 years) and 49.3 years (range, 27–89 years), respectively [Table 1]. We performed core biopsy on 33 right breast masses (51.6%), and 31 left breast masses (48.4%), and most of the masses (40.6%) were localized in the upper outer quadrant of the breast.

We also performed FNAC to 39 right breast masses (66.1%), and 20 left breast masses (33.9%), and most of the masses (45.8%) were localized in the upper outer quadrant of the breast. As a complication, ecchymosis and hematoma were occurred at only 2 patients in Group 1.

We diagnosed benign lesions pathologically for 5 patients in Group 1 and 8 patients in Group 2. Clinically suspicious breast masses of 32 patients in Group 1 are evaluated pathologically and diagnosed as malignant in 25 patients (78.1%). Pathological evaluation was performed on 21 clinically suspicious masses in Group 2 and 20 of them were diagnosed with malignant lesions (95.2%).

Surgical procedures were performed in 33 patients in Group 1 and 31 patients in Group 2. Modified radical mastectomy was the most used procedure and performed in 38 patients (59.4%). Furthermore, breast-sparing surgery, breast-sparing surgery with sentinel lymph node biopsy, and simple excision were performed in 7 (10.9%), 8 (12.5%), and 11 (17.2%) patients, respectively. The pathological evaluations of surgical specimens were compared with the results of core biopsy and FNAC, and we identified malignancy for 27 patients (81.8%) among the clinically suspicious 33 patients in Group 1, and 28 patients (90.3%) among the clinically suspicious 31 patients in Group 2; and the differences between the groups were not statistically significant ($P > 0.05$). It was only after taking into account both benign and malignant lesions that sensitivity was determined for core biopsy and FNAC as 100% and 95%, respectively. The identified specificity was 100% in both procedures [Table 2]. The false negativity rate in FNAC was determined as 5%.

Table 1: Demographic data of the groups

	Group 1	Group 2
Size of group	64	59
Age (years)		
Mean	49.7	49.3
Minimum	21.0	27.0
Maximum	83.0	89.0
Localization (%)		
Right breast	33 (51.6)	39 (66.1)
Upper outer quadrant	26 (40.6)	27 (45.8)
Complications		
Ecchymosis and hematoma	2	-

Group 1 – Tru-cut biopsy; Group 2 – Fine needle aspiration cytology

Table 2: Comparing results obtained from the biopsy and surgical pathology when considered as benign and malignant lesions

Tissue biopsy	Surgical pathology		
	Benign	Malignant	Total
Core biopsy (%)			
Benign	1 (100)	0	1
Malignant	0	27 (100)	27
Fine needle aspiration cytology (%)			
Benign	5 (83.3)	1 (16.7)	6
Malignant	0	18 (100)	18

DISCUSSION

Breast cancer is the most common cancer in women both in the developed and the developing countries. Incidence rates vary from 19.3 per 100,000 women in Eastern Africa to 89.7 per 100,000 women in Western Europe. In 2008, breast cancer caused 458,503 deaths, and the World Health Organization estimated that over 508,000 women died in 2011 due to breast cancer worldwide.[4,5]

Many early breast cancers are asymptomatic when they were identified during a cancer screening program. Larger breast cancers may present as a painless breast mass. Early diagnose and treatment of breast cancers are very important because of high incidence and mortality rates. Therefore, it is essential to evaluate tissue diagnosis in clinically suspicious breast masses. Radiological imaging facilitated an increase in assessment, and in this way has the number of breast biopsies has seen a rise.[6]

FNAC is a relevant and important for preoperative pathological evaluation in the management of breast cancer. Furthermore, core needle biopsy is increasingly replacing FNAC in many centers in developed countries.[7,8] With the FNAC procedure, the diagnosis is simple, quick, cost-effective, and relatively painless.[9] FNAC results are reported as benign, suggestive of malignancy or nondiagnostic. Effective results for FNAC and triple assessments are reported in literature. This approach has an accuracy of over 90% for palpable breast masses when three components are concordant for benign or malignant lesions. However, in as many as 40% of cases, the cytological findings are not concordant.[10] The sensitivity of FNAC for carcinomas varies from 35% to 95%, and specificity varies from 48% to 100% in the literature.[11-15] False positivity of the procedure was low, and this rate was reported as <1% in the literature.[3,16,17] Garg *et al*.[18] performed both FNAC and core biopsy on the same patients in a 50-patient study and assessed sensitivity as 78% and specificity as 94% for FNAC. We determined sensitivity and specificity of FNAC in our study as 95% and 100%, respectively in accordance with the literature.

FNAC is also an operator-dependent procedure and reporting of breast cytological results is more demanding than histological analysis, and requires more experiences. Cellular samples limit identifying the grade or invasiveness of the tumor. It is well known that FNAC has high sensitivity and specificity for mass lesions; however, in terms of low-grade malignancies and papillary lesions, diagnosis using FNAC might be difficult.[3,19]

Core biopsies are performed as quickly as FNAC and get tissue samples accurately and identify the benign and malignant disease in more than 95%.[20] It requires local anesthetics and a small incision must be made in the skin. Breast core biopsies are processed in a manner identical with other types of tissue biopsies. Samples are embedded into a paraffin block. The presence of estrogen receptor, progesterone receptor, and c-erbB2 can be evaluated by using formalin fixed paraffin embedded tumor tissue samples, so neoadjuvant treatments become applicable for breast carcinomas.[21,22] In our study, we compared the presence of receptors on the material of core biopsies and postoperative specimens and found significant similarity between them. Furthermore, there is a correlation between the results of core biopsies and open surgical biopsies in the literature. However, compared to FNAC and core biopsy, excision biopsy is more expensive and associated with a greater degree of patient morbidity and visible scar which is cosmetically undesirable.[8,23,24] On the other hand, the diagnosis of ductal carcinoma *in situ* (DCIS) is difficult with core biopsies.[25] The diagnostic difficulties associated with DCIS are due to several factors: Typically presenting as calcifications, often impalpable, and subtle form of breast cancer. The underestimation rate for diagnosis of DCIS by core biopsy varied from 26% to 78%.[25,26] We cannot evaluate the relationship between DCIS and core biopsy because of the small number of patients with DCIS. The complications of core biopsies are well defined in the literature, and these complications are bleeding, hematoma, mastitis, pneumothorax, vasovagal reaction, and rarely pseudoaneurysm and milk fistulization.[27,28] We identified only 2 patients with hematoma after intervention.

CONCLUSION

The diagnosis of breast cancer is often established following a "triple assessment:" Clinical, radiological, and pathological. Both FNAC and core biopsy are useful modalities, achieving high sensitivity and specificity for most breast masses, although core biopsy seems to have more advantages over FNAC such as lower inadequate and suspicious rate, accurate diagnosis, easier grade assessment, and facilitates further testing (hormone receptor, HER2). However, it has much lower efficacy in diagnosing DCIS with a significant upgrade rate to invasive cancer at excision. For palpable breast masses, core biopsy is seen as being more advantageous as it gives more detailed information about the masses. The findings of our study indicate that core biopsy is superior to FNAC in the diagnosis of breast lesions in terms of sensitivity, specificity, and correct histopathologic classification. Nevertheless, rapid diagnosis obtained using the simple and cost-effective method of FNAC cannot be totally ignored.

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Conflicts of interest
There are no conflicts of interest.

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