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An analysis of fine needle aspiration versus core needle biopsy in clinically palpable breast lesions: a report on the predictive values and a cost comparison

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Breast cancer;
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Abstract

BACKGROUND: Although fine-needle aspiration (FNA) is an established tool in the biopsy of breast masses, there has been a trend toward using core-needle biopsy (CNB). The aim of this study was to determine whether FNA has comparable predictive value with CNB and whether FNA is more cost effective.

METHODS: A retrospective review was conducted on 162 patients who underwent either FNA or CNB of palpable breast lesions and had histologic confirmation with surgical biopsy in calendar year 2005.

RESULTS: There were no false-positives or false-negatives in either group. The sensitivity, specificity, and positive predictive value for FNA were 89%, 98%, and 94%, respectively. CNB had sensitivity, specificity, and positive predictive value of 100%, 90%, and 93%, respectively. The cost to perform FNA was $166.34, compared with $477.92 for CNB.

CONCLUSIONS: FNA and CNB had comparable predictive value, with FNA being more cost effective.

Triple assessment using physical examination, radiography, and biopsy is the basis for evaluating a palpable breast lesion for malignancy.[1,2] Fine-needle aspiration (FNA) is an established cell collection biopsy technique for breast masses. However, there has been a shift toward the use of core-needle biopsy (CNB) with image guidance because of concerns over decreased accuracy and high rates of inadequacy in FNA specimens.[3–7] The implications of biopsy techniques with significant false-positive and false-negative rates using FNA include patients being subjected to unnecessary procedures or delays in diagnosis, along with the emotional burden these situations may create. Others add that the FNA technique has limited ability to distinguish in situ carcinomas versus invasive cancers. However, as the benefit of accurate testing is weighed against its ever increasing cost, it is the clinician's responsibility to perform the test that offers the most reliable information at the lowest cost.

The purpose of this study was to determine if there exists a significant difference between FNA and CNB in diagnosing benign breast disease and malignancy for palpable breast lesions. In addition, we analyzed how much it would cost our patient population to receive each biopsy technique. We hy-

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pothesized that FNA has comparable predictive value with CNB and is more cost effective, making it a more attractive modality for use in the initial biopsy of palpable breast lesions.

Methods

A retrospective chart review using a computer database was conducted to identify 406 consecutive patients who underwent FNA or CNB for breast lesions in calendar year 2005. Patients who underwent either biopsy technique for palpable breast lesions and had subsequent surgical biopsy or had ≥1 year of postbiopsy radiographic stability were included in this study. Patients who underwent FNA with recovery of benign cystic fluid, had nonpalpable breast lesions, and who had received neoadjuvant chemotherapy were excluded. One hundred sixty-two patients fulfilled these criteria: 68 in the FNA cohort and 94 in the CNB cohort. Information collected included the following: age, sex, size of tumor as determined from imaging and pathologic reports, imaging studies, and surgical procedure conducted.

FNA or CNB was conducted by radiologists, surgeons, or pathologists, either in a dedicated breast imaging center or in the individual surgeon's office. Specimen reports from pathology were reviewed for both FNA and CNB. The open surgical procedures performed were conducted by surgeons within our institution. Pathologic specimens from FNA, CNB, and surgery were reported by the institution's pathology department. FNA and CNB specimens were classified in 1 of 4 categories: malignant, benign, suspicious for malignancy, or inadequate. FNA and CNB specimens were considered benign when either ductal proliferation without nuclear atypia or atypical benign changes indicative of fibroadenomas or fibrocystic disease was observed. The diagnostic category of malignancy was assigned to specimens in which malignant cells were identified within the specimen either cytologically or histologically. The diagnostic category of suspicious for malignancy was assigned to FNA aspirates that demonstrated atypical epithelial proliferation. In CNB, the diagnosis of suspicious for malignancy was made in specimens in which histology demonstrated atypical ductal or lobular hyperplasia, radial scar, or intraductal papilloma. Within the FNA cohort, inadequate specimens were characterized as those in which scant cellularity prevented the cytopathologist from making a diagnosis. Surgical specimens were classified as either malignant or benign.

For those patients not undergoing surgical excision, confirmation of a benign process was demonstrated radiographically using mammograms and ultrasound for a minimum of 1 year. In patients with benign biopsies who did undergo surgical excision, indications included discordance within the triple assessment, history of breast cancer, or patient request due to size, symptoms, or personal preference. The treatment algorithm to ultimate definitive management for each biopsy type was recorded.

Comparison between the CNB and FNA group and the surgical group was completed to determine predictive values. For purposes of calculating the most conservative sensitivity, patients with suspicious biopsies were considered to have malignant pathology.[8,9] The inadequate specimens were also included in the benign cytology group to calculate the most conservative specificity.

Finally, a cost analysis of performing either technique with or without ultrasound was conducted, on the basis of the billing codes for each biopsy type. In addition, the cumulative cost of all the steps of each treatment algorithm taken to both make the diagnosis and then proceed to definitive therapy was computed for each biopsy technique. The costs to perform mammography, diagnostic biopsy, and definitive surgery were included in this calculation. The cost to perform definitive surgery was calculated by averaging the cost to perform a partial mastectomy with sentinel lymph node biopsy and modified radical mastectomy, as both procedures were performed equally within the cohorts. Also, the cost to perform a frozen section was added to the cost of surgery if FNA was performed. This cost included reimbursement for facility fees. Professional fees were not included in this analysis.

Statistical analysis of categorical variables was undertaken using χ^2 tests, and continuous variables were analyzed using the paired t tests in MedCalc (MedCalc Software, Mariakerke, Belgium).

Results

The mean patient age was similar between FNA and CNB (50.4 ± 16.2 vs 52.2 ± 12.8 years, $P = .43$). Three of the 68 patients who underwent FNA were men, and all CNB patients were women. The average lesion diameters of the masses in the patients who underwent FNA and CNB were similar (2.07 ± 1.52 vs 1.87 ± 1.97 cm, $P = .49$). Basic demographic data are depicted in Table 1.

Ultrasound guidance was used in 17 of 68 patients (25%) in the FNA cohort compared with 69 of 94 patients (73%) in the CNB cohort ($P < .0001$). Ninety-two of the 94 patients (98%) in the CNB group received definitive

Table 1 Basic demographics

Variable	FNA	CNB	P
Age (y)	50.4 ± 16.2	52.2 ± 12.8	.43
Women	65/68 (96%)	94/94 (100%)	.14
Men	3/68 (4%)	0/94 (0%)	.14
Size (cm)	2.07 ± 1.52	1.87 ± 1.97	.49
Ultrasound	17/68 (25%)	69/94 (73%)	<.0001
Definitive diagnosis	51/54 (94%)	92/94 (98%)	.40

Data are expressed as mean ± SD or as number (percentage).