Final diagnosis **by** fine-needle **aspiration** biopsy **for** definitive diagnosis **in breast cancer**

Dr SAMER ALGHAZAWI, MD, JBS. King Hussein Medical Center, Amman- Jordan.
Dr SAHEM QUOSOUSS, MD, JBS. King Hussein Medical Center, Amman- Jordan.

Objective: To evaluate the importance of fine needle aspiration biopsy in establishing a definitive diagnosis of breast cancer. Method: We reviewed the charts and pathological reports of 2626 patients who had fine needle aspiration biopsy of breast lesions at king Hussein Medical Center from January 1990 to December 2004.
Result: During the 15 year study period, 2623 aspiration biopsies of breast lesions were performed, where 2290 classified as benign, 257 as malignant, and 76 as suspicious. The 257 aspirates classified as malignant were confirmed by histological examination of their specimen after definitive operation. There were no false-positive results, thus the positive predictive value was 100%. Hundred forty-four patients (95%) underwent definitive operation, such as, modified radical mastectomy lumpectomy and axillary node dissection, without open biopsy. In the remaining 13 patients, although definitive operation was recommended, an open biopsy was also performed at the request of the referring physician.

Material and Methods

We reviewed the charts and pathologic reports of 2,623 patients that had fine-needle aspiration biopsy of breast lesions at King Hussein Medical Center from January 1990 to December 2004. Specimens were aspirated from palpable breast masses.
Our procedure has been well described elsewhere .The necessary materials are routinely found on any hospital ward or physician's office. Briefly, an 18 to 22 gauge l'/2 inch disposable needle with an attached 3 ml disposable syringe is inserted into the lesion through a locally anesthetized site. As the needle is passed and re-passed through the mass, negative pressure is applied. Negative pressure is released when the needle is with-drawn. The specimen is then ejected forcibly onto a slide. A thin smear is made and the slide is fixed immediately in 95 percent alcohol or spray fixative. A second and, often, third aspiration is then performed. The slides, four to six in number, are stained by Papanicolaou's method.
All aspirations were performed by clinicians. Smears were screened by the cytotechnologists but final interpretation was made by our cytopathologist. The

specimens were reported as benign, suspicious, or positive for malignant tumor. As depicted in our management algorithm (Figure 1), patients whose specimens were positive for carcinoma underwent definitive surgical therapy, such as modified radical mastectomy or lumpectomy and axillary node dissection, as dictated by the philosophy of the operating surgeon and the clinical situation. Patients with specimens reported as suspicious for malignancy underwent open biopsy. Patients with specimens reported as benign either underwent open biopsy if the clinical findings did not correlate or were followed at appropriate intervals.

Results

During the 15 year study period, 2,623 aspiration biopsies of breast lesions were performed. were 2,290 classified as benign, 257 as malignant, and 76 as suspicious?

The 257 aspirates classified as malignant were confirmed by histologic examination of the specimen after definitive operation- There were no false-positive results, thus the positive predictive value was 100 percent. Two hundred forty-four patients (95 percent) underwent definitive operation, such as , modified radical mastectomy, lumpectomy and axillary node dissection, without open biopsy. In the remaining 13 patients, although definitive operation was recommended, an open biopsy was also performed at the request of the referring physician.

There were 76 specimens classified as suspicious. An open biopsy was performed in all of these patients and carcinoma was diagnosed in 36. Thirty-two minimal carcinomas (no greater than 1 cm in diameter) were included in this study (Table I). Nine were interpreted as positive (one measured 0.5 cm) and 8 more as suggestive of carcinoma. There were 30 false-negative diagnoses (9 percent). In these patients, open biopsy was performed because of suspicious clinical data or mammographic findings. These false-negative cases (Table II) included 15 of the minimal carcinomas, some of which were mammographically positive nonpalpable lesions aspirated without radiographic guidance. Other causes of the false-negative diagnosis were fibrosis occupying infiltrating lobular carcinoma and inexperience of the clinician performing the fine-needle aspiration biopsy.

The precise role of aspiration biopsy in the management of breast cancer has not been defined in surgical literature

Statistical analysis of our results was obtained. The sensitivity, that is, the probability that the test result would be positive when the disease was present, was 80 percent and increased to 90 percent when the suspicious group was excluded from the analysis and 94 percent when the group with non-palpable carcinomas was excluded. The specificity, that is, the positive predictive value, the probability that the disease was present when the test result was positive, was 100 percent.

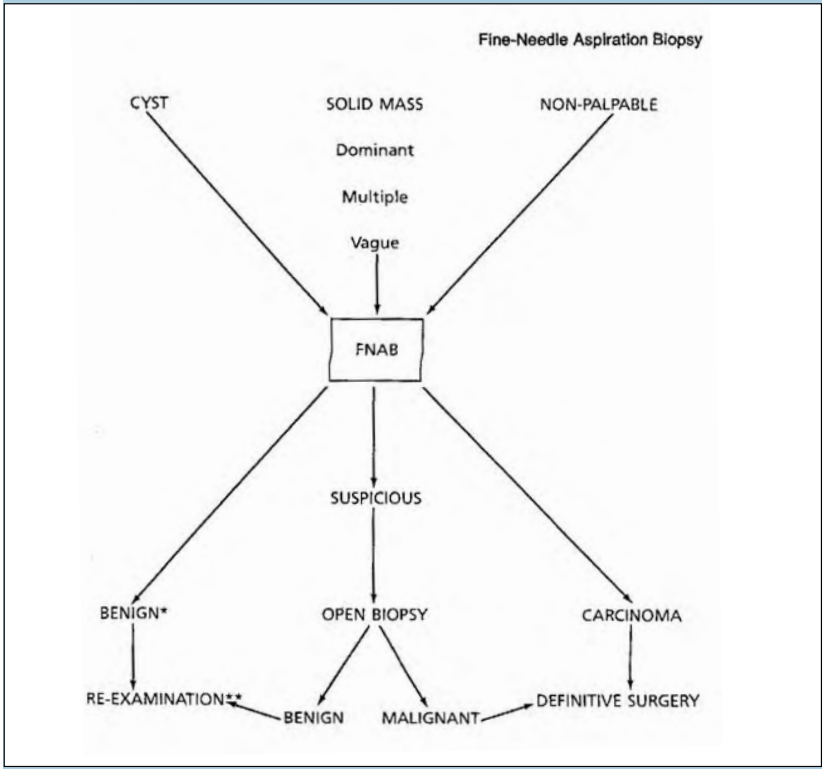

Figure 1 *- Fine-needle aspiration biopsy (FNAB) management algorithm. Single asterisk indicates clinically suspicious mass at open biopsy; double asterisks indicate reexamination by self-examination, clinical examination and fine-needle aspiration biopsy, and mammography, the frequency of which is dependent upon the risk factors present.*

Comment

The precise role of aspiration biopsy in the management of breast cancer has not been defined in surgical literature. The traditional approach has utilized incisional or excisional biopsy under general anesthesia, frozen section diag-

Lesion Size (cm)			
Diagnosis	**1**	**0.7 to 0.9**	**<0.7**
Carcinoma	7	1	1
Suspicious	3	4	1
Benign	6	5	4

Table 1 *- Diagnosis by fine-needle aspiration biopsy of 32 carcinoma 1 cm or less in diameter.*

False-Negative Diagnoses	
Cause	**Cases**
Minimal carcinoma, including nonpalpable masses	15
Infiltrating tabular carcinoma	7
Inexperience	4
No explanation	4
Total	30

Table 2 *- False-negative diagnoses*

nosis, and immediate mastectomy. However, its utilization by the surgeons might be regarded in many instances as more ritualistic than realistic. The rationale for this approach stemmed from a fear of spreading cancer by manipulating the tumor and of increasing the patient's anxiety by two operations. No correlation has been shown between survival and the type of biopsy performed or the interval from biopsy to definitive operation.

Currently, there is increasing emphasis on outpatient biopsy because of proliferating regulations and control by state health agencies. This diagnostic technique requires an operative procedure and a delay in therapeutic decision pending interpretation of permanent section.

Fine-needle aspiration biopsy is a simple procedure that is performed in the office, and it is almost as accurate as frozen section or open biopsy. The technique was well documented in Jordan for more than 15 years. Cytopathologists are more familiar with the technique than are surgeons, who frequently are skeptical about fine-needle cytologic study and prefer tissue biopsy. Diagnosis by aspiration biopsy has been the standard part of the initial examination at our institution .A cytological diagnosis may be made within 15 minutes and treatment options are discussed with the waiting patient.

The use of fine-needle aspiration biopsy for definitive breast operation without open biopsy remains controversial. The major concern is the risk of a false-positive diagnosis leading to unwarranted mastectomy. For this reason, some investigators re-serve the fine-needle aspiration biopsy diagnosis only for advanced breast malignancy to be treated by radiotherapy, whereas others recommend preliminary open biopsy in all cases of positive cytological diagnosis before- undertaking definitive operation.

The diagnostic accuracy of aspiration biopsy approximates or exceeds 90 percent (Table III). Only patients with an unequivocally positive diagnosis undergo mastectomy without preliminary histologic biopsy. Nonetheless, the suspicious diagnosis is of importance in programs such as ours where the technique is utilized for examination of all patients with breast masses.

The site of the lesion or its depth, particularly in a pendulous breast, may be a limiting factor

This interpretation indicates a necessity for immediate open biopsy. Less than 2 percent of our patient being diseased and, currently, only 16 percent of patients with malignancies have suspicious aspirates.

Both the nature of the institution and the biopsy method used influence the statistics. In a cancer referral center, patients are prescreened and the majority has carcinoma. The practice at Memorial Hospital in New York has been to limit the aspiration biopsy to those tumors that are clinically malignant.

On the other hand, at Radium-hemmet in Stockholm and Foundation Curie in Paris, the procedure is performed on all breast lesions. We have recommended aspiration cytological study of all breast masses at the time of initial examination and have come to view it as an extension of clinical examination. It must be understood that benign cytological findings do not exclude cancer. The false-negative diagnoses in the present study were due to a number of nonpalpable and, un-biopsied lesions and fibrosis, chiefly as a component of infiltrating lobular carcinoma (Table II). In more than 50 percent of our 30 false-negative diagnoses, the needle tract did not extend into the generally nonpalpable tumor. The site of the lesion or its depth, particularly in a pendulous breast, may be a limiting factor. Kline however, found malignant cells in 18 of 19 carcinomas that were less than 1 cm in diameter. We have made the diagnosis of carcinoma in a tumor less than 0.7 cm in size. In the present study, of 32 minimal carcinomas, more than half were interpreted as suspicious or positive for carcinoma.

In our institution, there have been no false-positive diagnoses with fine-needle aspiration biopsy. A recommendation for mastectomy by our cytopathologist came within 10 years of acquiring experience with the technique. In our previous report, mastectomy was recommended and carried out without open biopsy in 65.9 percent of patients with positive diagnoses by aspiration biopsy.

In the series of Wanebo *et al* fine-needle aspiration biopsy was the major reason leading to mastectomy in 71 percent of patients.

In the series by Zajicek et al, 77.1 percents of patients were recommended for mastectomy on the basis of aspiration cytologic diagnosis. In the present study, 95 percent of the patients with positive cytologic findings for malignancy by fine-needle aspiration biopsy underwent definitive surgical treatment without further excisional or incisional

biopsy, or frozen section biopsy. We currently recommend definitive surgical treatment in all patients with the definitive diagnosis of carcinoma by fine-needle aspiration biopsy.

Aspiration biopsy should be considered in the management of all patients with breast lesions. It is a reliable, easy, rapid, relatively painless, and complication-free procedure that offers assistance in diagnosis and treatment planning of patients with breast masses- It should be considered as an extension of the initial clinical examination. The method should not be limited to large cancer hospitals but rather to those in which clinicians understand how to perform fine-needle aspiration biopsy optimally and the cytopathologist know how to interpret the findings. When employed correctly, fine-needle aspiration biopsy is a practical diagnostic procedure in the general practice of surgery.

This work has been based on 15 years experience with more than 6,000 needle aspiration biopsies of the breast

We recommend definitive surgical treatment in all patients with the unequivocal diagnosis of carcinoma by fine-needle aspiration biopsy (Figure 1). We recommend open biopsy for any aspirate interpreted as suspicious. A breast lesion diagnosed as benign by aspiration biopsy that does not correlate with the clinical findings also must undergo open biopsy. Patients with benign aspirates and strong clinical evidence of benign disease should be examined at appropriate intervals.

Summary

This work has been based on 15 years experience with more than 6,000 needle aspiration biopsies of the breast. Fine-needle aspiration biopsy was used in place of open breast biopsy for definitive operation in breast cancer. Our experience with 2,623 aspiration biopsies has been reviewed. There was a total of 323 cancers, of which 257 (80 percent) were unequivocally diagnosed by fine-needle aspiration biopsy. Definitive operation was performed in 244 of these patients (95 percent) without open biopsy. Thirteen had an excisional biopsy before definitive operation at the request of the referring physician. The sensitivity was 80 percent and the specificity was 98 percent. There were no false-positive diagnoses. The positive predictive value was 100 percent. False-negative diagnoses were made in 9 percent of the patients, half of whom had nonpalpable carcinomas. Our experience shows that fine-needle aspiration biopsy is accurate in the diagnosis of breast cancer, and when the finding is positive, it can be used for definitive breast operation, eliminating the need for open biopsy. A management algorithm has also been presented herein.

Cytological Findings on Aspiration Biopsy

Reference	Biopsies	Positive/Suspicious	%		
Deschenes et a!	1,478	109/118	92	9	8
Kline	3,740	349/389	90	37	10
Koivuniemi Schondorf	1.270	171/192	91	17	9
Zajdela et al	2,519	301/307	98	3	2
Zajicek et al	2,772	1,593/1,736	96	63	4

Fine-needle aspiration biopsy: statistics from large series

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