Orignal Article

Fine needle aspiration for cytology: A diagnostic tool for breast lesions in low resources areas.

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Abstract:

Background: Fine needle aspiration for cytology (FNAC) is a well-established technique for the diagnosis of masses all over the body and the breast is not an exception. However, recent controversial reports were published on its accuracy in breast masses. With this background, this study was conducted to determine the sensitivity and specificity of the FNAC compared to the standard histopathological technique.

Materials & Methods: This cross-sectional, descriptive hospital based study enrolled 117 female patients with breast masses. All patients underwent fine needle aspiration for cytology, surgical biopsy and histopathological examination.

Results: The patients' age ranged between 15–78 years old with a mean age of 44 years. In this series, the breast masses cytological diagnosis was reported as benign lesions in 96 patients (82.1%), suspicious lesions in three (2.6%) and malignant lesions in 18 (15.4%). The histological report of the masses confirmed the diagnosis of malignant lesions in 84.6% and benign lesions in 15.4%. FNAC technique had 95% sensitivity, and 97.9% specificity.

Conclusions: Fine needle aspiration for cytology of breast lesions is a sensitive, specific, rapid, affordable and safe procedure yielding sufficient information for the diagnosis of breast masses particularly in low-resources communities.

Introduction:

Breast cancer is the most commonly diagnosed cancer among women worldwide, and it ranks second to lung cancer as the leading cause of cancer deaths.[1] It is associated with high morbidity and mortality especially in developing countries.[2] Many diagnostic tools are available for the diagnosis of breast lesions and fine needle aspiration for cytology (FNAC) is one of them. It is an important component of the 'triple approach' assessment of beast lesions.[3,4]

FNAC for breast lesions was first used in the 1930s by Martin & Ellis and later by Stewart at Memorial Hospital,[5, 6] followed in the late 1940s and early 1950s by Adair & Godwin.[7, 8] However, it was not used extensively until several reports of large series on the use of FNAC for breast lesions which showed high accuracy of the procedure were published.[9,10,11] Nonetheless, recently contradicting reports on its accuracy in breast lesions diagnosis were reported.[12,13] In low-resources countries, FNAC may be an important tool for the diagnosis of breast lesions as other diagnostic tools may be expensive and not available. Hence the present study was set

up to determine the sensitivity and specificity of this technique for the diagnosis of breast lesions.

Materials and Methods:

The FNAC smears were obtained from 117 female patients with palpable breast lumps presented to a cytopathology clinic in Khartoum State within a period of one year. Then all patients underwent surgical excision with histopathological examination. The results of the two techniques were then compared.

The palpable lumps were aspirated using 20 ml disposable syringe with 22 to 27 gauges, with 1 inch needle size. A 25-gauge needle was used first and if the yield was not satisfactory then a wider needle 23 gauge was used. A 27 gauge needle was used when excessive bleeding from the lesions was encountered.

Half of the smears were immediately fixed by 95% ethanol and then stained using Pap stain, and the remaining smears were allowed to air dry and stained using Diff Quick staining techniques. The stained smears were reported by an expert pathologist.

Cytological smears were stained using Pap staining procedure as follows: smears were fixed in 95% ethanol, then dehydrated in descending grades of ethanol for 2 minutes for each one, till distilled water. For nuclear staining, Gill Hematoxylin was used for 5 minutes, rinsed in distilled water and differentiated in 1% aqueous hydrochloric acid for 10 seconds, and immediately rinsed in distilled water. Thereafter, smear were stained blue in alkaline water, for 4 seconds, and dehydrated in ascending ethanol concentration i.e. 70% and 95% for a minute for each. For cytoplasmic staining, the smears were stained using Orange G 6 solution for 2 minutes, then rinsed in 95% ethanol and stained with Eosin Azure 50 for 3 minutes. Finally smears were dehydrated in 95% ethanol through absolute alcohol, cleared in xylene and mounted in DPX mounting media.

The main cytomorphological features used for categorization included: cellularity of smears, cohesiveness, nuclear to cytoplasmic ratio, intactness of cell membrane, size of the nuclei, pleomorphism, shape of the nuclei, condensation of chromatin and prominence of nucleoli. In addition to that, the presence or absence of each of the following was also considered: bare nuclei, myoepithelial cells, inflammatory cells, necrotic material and tumor diathesis.

Statistical Analysis:

Data were managed using Statistical Package for the Social Sciences computer programme (SPSS version 16.). Pearson Chi Square test was used to test association between variables.

Ethical Considerations:

Ethical approval was obtained from the Ethics Committee, Faculty of Medical Laboratory Sciences, University of Khartoum. Written consent was obtained from each individual enrolled on this study.

Results:

FNAC materials were obtained from 117 female patients, age ranged between 15 and 78 years, with a mean age of 44 years. The FNA smears showed evidence of benign lesions in 96 (82.1%), suspicious lesions in 3 (2.6%) and 18 (15.4%) were reported as malignant breast lesions. (Table 1, Figs.1,2)

The surgical biopsies histopathological examinations showed the following; 99 (84.6%) were benign neoplasms and 18 (15.4%) were malignant neoplasm. (Table 2)

The study showed one patient in the cytology benign group had malignancy in histopathology report. The three suspicious cases diagnosed cytologically proved to have malignancy in one and benign in two in the histopathology reports. All the patients whose smears showed malignant changes proved to have malignant disease in histopathological reports.

In this series, the FNAC cytology technique had 95% sensitivity, and 97.9% specificity.

Table 1. Comparison between FNAC and Histopathology results

Cytology	Histology		Total
	Malignant	Benign	
Benign	1	95	96 (82.05%)
Suspicious	1	2	3 (2.56%)
Malignant	18	0	18 (15.38%)
Total	20	97	117 (100%)

Table 2. Histopathological findings and age distribution of the studied population

Age Group	Histopathology		Total
	Malignant	Benign	
0 to 10	0	0	0
11 to 20	0	3	3
21 to 30	0	13	13
31 to 40	4	27	31
41 to 50	8	24	32
51 to 60	2	18	20
61 to 70	3	11	14
≥71	1	3	4
Total	18	99	117

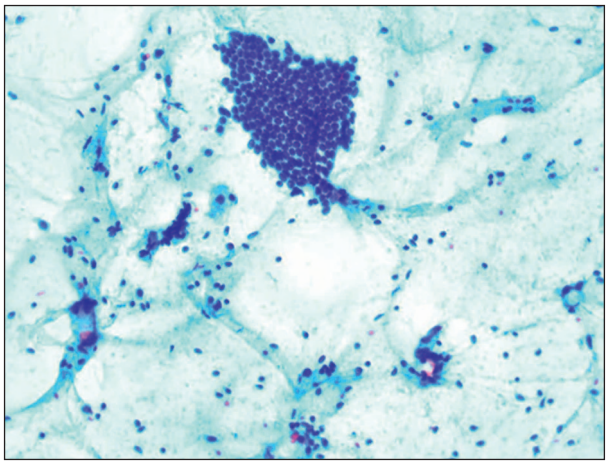

Fig. 1. Photomicrography of cytological smear of fibroadenoma showing monolayer sheets of ductal cells and numerous naked bipolar nuclei of myoepithelial cells scattered throughout the smear (Pap Stain X10).

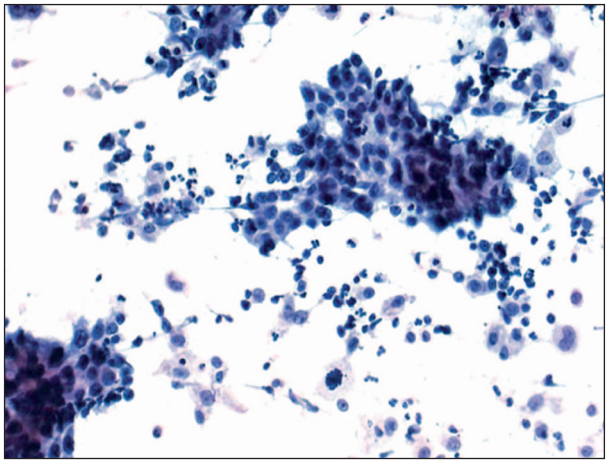

Fig. 2. Photomicrography of cytological smear of an invasive ductal carcinoma showing nuclear pleomorphism, nuclear membrane irregularity, nucleoli, and mitotic figure, Background with cell debris, necrosis, and inflammatory cells (H&E X10).

Discussion:

FNAC of breast lumps is an accepted and established method for determining the nature of breast lumps with a high degree of accuracy. Application of FNAC for the diagnosis of palpable breast masses was first introduced by Martin & Ellis in 1930 and since then, it has been established as an important tool in the evaluation of breast lesions. (11) However, recently there were some conflicting reports on its accuracy.[12,13]

In recent years, the use of FNA in the diagnosis

of breast lesions has declined in many health service providers. This is attributed to the fact that the grade and sub-type of breast cancer need to be determined pre-operatively to accurately plan the treatment. However, with adequate cytological smears and expert cytologist, it is possible to determine the breast tumours grade and sub-type. Nevertheless, some lesions do pose difficulties for accurate cytodiagnosis.

In many low-resources communities, histopathological service may not be available and FNAC will be the only diagnostic tool for breast lesions. For this reason, we aimed in this study to determine the accuracy of the FNA as diagnostic tool for rapid diagnosis of the breast lesions by determining the utility of FNA in the diagnosis of the breast lesions together with the sensitivity and specificity of the method by comparing it to the gold standard method: the histopathological examination.

It is interesting to note that in the present study, the FNAC technique had a high accuracy level as only one smear which was described as benign proved to be a ductal carcinoma in situ (DCIS) on histopathological sections. The cytological features of the smear comprised a hypercellular smear, sheets of cohesive epithelial cells, branching antler – horn of epithelial, and numerous bipolar nuclei scattered within the background. After reviewing histopathology section small population of pleomorphic cells admixed with a dominant population showed features of fibroadenoma. This finding is in line with that reported by Dejmek and colleagues on the rarity of breast carcinoma on top of fibroadenoma.[5]

In the present study, all patients with malignancy diagnosed cytologically were confirmed by histopathological examination and thus supporting the high accuracy of the FNAC technique in the diagnosis of malignant breast lesions. This is in agreement with other studies conducted by Qin and associates, Mohammed and colleagues and Tiwari. [6,12,13]

The term suspicious for malignancy is used to describe the FNAC smears that showed cells with some malignant features but do not have all the criteria of malignancy or an aspirate with only scanty number of abnormal cells. In the present study, three patients had suspicious malignant cytological smears, one of them proved to have invasive ductal carcinoma breast lesion while the other two had fibrocystic changes with atypia on histopathological sections.

In the present study, the diagnostic category of suspicious for malignancy was documented in 2.6% of cases. The literature showed that, the suspicious for malignancy category ranged between 4% and 17.7% and the figure reported in this study is in line with previous reports.[9, 14,15]

In conclusion, this study showed that, FNAC of breast lesions is a sensitive, specific, rapid, economical and safe procedure in the studied population. It can yield sufficient information to enable the diagnosis of breast lesion in areas of low resources and lacking breast screening programs. Patients with clinical suspicion of malignancy and have suspicious or negative cytology should undergo excisional surgical biopsy to establish a proper diagnosis. FNAC also allows an informed pre-operative discussions and treatment options planning with the patient.

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