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The Accuracy of FNAC for Diagnosis of Breast Carcinoma in Gezira State, Central Sudan

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Abstract:

Background*:* Breast cancer is a leading cause of death in many countries worldwide and breast lesions remain a common diagnostic dilemma. Fine-needle aspiration cytology (FNAC) has been suggested as the most important, first line, minimally invasive procedure in the management of patients with breast lesions.

Objective*:* The aim of this study is to assess the diagnostic efficacy of breast FNAC in patients with breast lesions compared with that of the definitive histological diagnasis.

Materials and Methods*:* This is a hospital-based retrospective study of 112 breast FNAC samples were carried out at Cancer Institute in Medani Gezira state.

FNAC findings were correlated with data from histopathology records to determine the sensitivity and specificity of FNAC.

Results: Age group of the patients ranged from 26 to 80 years with mean of 42 years. Among the study subjects (112 case), ductal carcinoma is the common hitological finding 83/88 (94%). According to the cytology, 79% were malignant, 4% were benign and 2% were suspicious. Histological correlation was done in 68 cases. The overall diagnostic accuracy of FNAC was 92.3%, with sensitivity and specificity of 89.2% and 66.5% respectively.

Conclusion: FNAC of breast is asimple, cost effective and less traumatic method for diagnosing breast cancer. It is highly sensitive and accurate, and can reduce the needs for open biopsies. It is recommended that FNAC should be used as a first line method for determining the nature of breast lumps.

Key words: Fine-needle aspiration cytology, breast cancer, efficacy.

Introduction:

Breast cancer is the most common type of cancer in women, at the age of 40–50 years. It is the second leading cause of cancer deaths, about 250,000 women die of this disease every year [(1).] The incidence of malignant neoplasia of the breast is on the rise. The statistical significance coupled with decreased morbidity and mortality associated with early detection of malignant tumours has prompted expensive screening programmes in the field of health care [(2)]. The apparent significant increase in the incidence is most probably attributable to an increase in screened cases and to increased awareness among women [(3)]. Self examination, clinical assessment, mammography and fine needle aspiration cytology are proven pillars of screening programmes in different parts of the world. [(4-6)]

Fine needle aspiration cytology (FNAC) has been used as an initial investigative procedure for breast lesions. It is a rapid and non invasive procedure that has been increasingly used as an alternate to excision biopsy of palpable breast lesions [(7-9)]. Increasing interest in the pre-operative prediction of breast cancer's aggressiveness lead to the development of cytological grading system for FNAC, and to their application

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to both air-dried, Romanowsky and alcohol fixed Papanicolau stained material. This grading system utilizes C1-C5 categories as recommended by the National Health Service (NHS) breast screening programme in the United Kingdom. [10, 11]

Fine needle aspiration cytology is generally considered as a rapid, reliable, less traumatic and safe diagnostic tool to differentiate non–neoplastic from neoplastic breast lesions. This procedure is technically easy to apply in small breast lesions [12, 13]. FNAC is most accurate when experienced cytologists are available and when immediate assessment by professionals is performed for the evaluation of material adequacy, so that additional aspirations can be performed when needed. [14]

Reviewing the literature in Sudan, so far no study was published regarding FNAC for breast cancer, however only one work had been done in 2008 included 490 patients with breast disease (unpublished data). The purpose of this study is to determine the utility and diagnostic accuracy of FNAC in patients with breast lesions compared with that of the definitive histological diagnosis.

Materials and Methods:

This is a retrospective hospital-based study done in National Institute of Cancer in Gezira state. The study included 112 subjects coming to the out–patient department with palpable breast lesions between January 2007 to January 2008 the information was retrieved from records of NCI. The patients included in the study were 2 males and 110 females, their age ranged from 26 to 80 years with mean of 42 years. Demographic data including age, sex and clinical presentation were obtained from request forms. FNAC was performed for all patients with informed consent.

The breast mass was fixed with one hand and has been aspirate with a 21-gauge needle connected to a 10-cc syringe from the closest part of mass to skin. 3-5 slides were fixed with 95% ethanol prepared for each sample. The smears were prepared and routinely processed for cytological examination according to standard practice. The smears were stained with haematoxylin and eosin (H&E). Each smear was numbered, labelled properly, mounted and examined under the microscope.

Results of FNAC were reported according to the diagnostic categories from C1–C5 as recommended by NHS breast screening programmes [10]. The findings of FNAC were correlated with the histopathology results. We calculated positive and negative predictive values, sensitivity, specificity and accuracy of results as follows:

TP (**True Positive**): positive cytological diagnosis that was positive in pathologic study.
FP (**False Positive**): positive cytological diagnosis that was negative in pathologic study.
TN (**True Negative**): negative cytological diagnosis that was negative in pathologic study.
FN (**False Negative**): negative cytological diagnosis that was positive in pathologic study.

$$\text{Sensitivity} = \frac{TP}{FN + TP} : \text{Cytological sensitivity in malignancy}$$

$$\text{Specificity} = \frac{TN}{TN + FP} : \text{Cytological specificity in malignancy}$$

$$\text{Accuracy} = \frac{TP + TN}{TP + TN + FP + FN} : \text{FNA diagnosis}$$

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Results:

A total of 112 cases of FNAC of breast were obtained which constituted 16% of total FNACs in the Institute of Cancer during one year period. Patient's population consisted of 2 males and 110 females, ranging in age from 26 to 80 years with mean age of 42 years. FNAC diagnosis of the presented patients and the risk factor are shown in Table 1.

Table 2 shows the number and percentage of FNAC and open biopsy among patients presented at the institute. The results showed high accuracy and sensitivity (92.3% and 89.2% respectively). Number of true positive results was high (68 out of 74) and relevant to the percentage (91.1%) among the study group. The cross tabulation of both FNAC and biopsy together showed high percentage (65%) of malignant cells with characteristics of ductal carcinoma followed by suspicious and benign cells. During the time of the study, patients were followed up and the outcome was known. Full cure occurred in about 66/112 (58.9%), recurrence in 9/112 (8.0%), progression in about 25/112 (22.3%) with a mortality of 12/112 (10.7%).

Discussion:

Fine needle aspiration cytology (FNAC) of the breast is a rapid, relatively atraumatic and accurate method for the diagnosis of breast disease [10]. The application of FNAC for the diagnosis of palpable breast masses was first introduced by Martin and Ellis in 1930 and since then, it has been established as an important tool in the evaluation of breast lesions. [15]

The real challenge for FNA cytologist is in their ability to translate cytological patterns into histological ones that have diagnostic meaning [16]. Early diagnosis of cancer is crucial, a delay in the diagnosis of breast cancer is unfortunately common because of economic and social reasons in our society, with a poor impact on the management of such patients, it is therefore, important that a reliable cost effective and easy to perform investigation like FNAC should be done in such circumstances. [17]

Table 1: Clinical presentation and risk factors of study cases

Characteristics		Frequency (%)
Presentation	Breast lump	103 (92.0)
	Nipple discharge	2 (1.8)
	Breast pain	3 (2.7)
	Others (skin ulceration, breast abscess and ascites)	4 (3.5)
	Total	**112 (100)**
Risk factors	Estrogen exposure	35 (31.3)
	Previous breast disease	10 (8.9)
	Cancer in other breast	4 (3.6)
	Others (cancer in other parts of the body, radiation, and smoking)	13 (11.6)
	No risk	47 (41.9)
	Total	**109 (97.3)**

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Table 2: FNAC results and open biopsy (histology) among study subjects

Characteristics		No	(%)
Cytology results	Malignant	89	79.5
	Benign	5	4.5
	Suspicious	2	1.7
	A typical cells	1	0.9
	Not done	15	13.4
	Total	**112**	**100**
Histology results	Ductal carcinoma	83	74
	Lobular carcinoma	5	4
	Not done	24	21
	Total	**112**	**100**
Statistics	True positive	68	91.1
	False negative	-	0
	Sensitivity		89.2
	Specificity		66.5
	Accuracy		92.3

A definite diagnosis sometimes cannot be made by FNAC either due to inherent limitations of cytological examination or by inability to obtain adequate material for diagnosis.

A definite diagnosis of malignancy in this study was made in 89 of 112 (79.5%) aspirates, whereas 5 (4.5%) were found benign and 2 (1.7%) were found to be suspicious of malignancy. These findings were in contrast to a study conducted on 382 aspirates, with 98 (25.6%) diagnosed to be malignant and 4 (1%) were found to be suspicious for malignancy [(14)]. We sought to consider the sample size difference which may be the reason behind discrepancy. This study documents the fact that malignant lesions of breast are common lesions. This increased incidence of malignant lesions indicates adecrease in awareness of patients. In such lesions the close follow up of our study subjects reported high percentage of recurrence and mortality rate. It was also observed in our study that with increasing size of the tumour, the accuracy of picking up the malignant lesion in higher and cytological grades also increased. This result was in accordance with study done by Bajwa and Zulficar. [(18)]

In this study, sensitivity and specificity of breast FNAC in diagnosis of breast lesions was 89.2 and 66.5% respectively, which was quite comparable to the findings of the other studies. [(19-21)]

It is concluded that in this era of economic constraints, low allocation of health budgets in developing countries, lack of screening programmes and increasing cost of diagnostic procedures, alot of patients present late for medical care. It is therefore recommended that FNAC should be used as a routine diagnostic procedure and for screening service.

Palpable breast lesions can definitely be diagnosed by a combination of physical examination and FNAC which when performed by a dedicated cytopathologist should be an integral part of a breast screening service.

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Conclusion:

FNAC of breast is asimple, cost effective and less traumatic method for diagnosing breast cancer. It is highly sensitive and accurate, and can reduce the needs for open biopsies. It is recommended that FNAC should be used as a first line method for determining the nature of breast lumps.

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