ORIGINAL ARTICLE

To evaluate the accuracy of FNAC in palpable breast lumps at Breast Clinic of Abbasi Shaheed Hospital, Karachi

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Abstract

Objective: To evaluate the accuracy of FNAC in palpable breast lumps at breast clinic of Abbasi Shaheed Hospital, Karachi.

Study design: This was a prospective study.

Setting and Duration: Abbasi Shaheed Hospital, Karachi Medical and Dental College from Jan 2002 to Dec 2002.

Methodology: Consecutive 60 female patients with palpable breast lumps were studied. They included 21 malignant and 37 benign lesions.

Result: A comparison with histopathology shows sensitivity of 91.3%, specificity and positive predictive value of 100%. Diagnostic accuracy was 96.5% with no false positive and 2 false negative results.

Conclusion: Fine Needle Aspiration Cytology can be used as a diagnostic procedure in combination with clinical and radiological assessment to evaluate the breast masses and routine biopsy can be reserved to the lesions where Fine Needle Aspiration Cytology is not conclusive.

Key Words: Breast Mass, Needle Biopsy, Breast Neoplasm

Introduction

Breast, a sign of womenhood and fertility has been a subject for clinicians from the time medicine is being practiced. Breast diseases are the most common ailment from which women suffer throughout the world. About 30% of women suffer from breast disease in their life time[1]. It is the most common cancer in women in USA and probably all over the world. Its incidence is highest in North America and lowest in Africa and Asia[2].

Approximately 400,000 women in the world die of breast cancer each year in USA alone. It is the second leading cause of cancer related mortality, responsible for about 13,000 death annually[3]. The dramatic increase in cancer of breast made it imperative for all clinicians to develop a better understanding of this disease.

Medical history related to diseases of breast dates back to 3000 BC. Several cases of women with breast tumors were described by Edwin Smith Surgical Papyrus, originating in the advanced civilization of Egypt during the ages of pyramids (3000 – 2500 BC)[4]. Theses included tumors that were hard and cool to touch as well as abscesses and inflammations that were warm. It is probable that malignant tumors of the female breast were the first human cancers discovered and differentiated form other non-malignant diseases.

Methodology

This comparative cross sectional study was conducted At Breast Clinic of Abbasi Shaheed Hospital (ASH), Karachi Medical and Dental College (KMDC). ASH is third largest hospital in this city, the breast clinic sees patients presenting with breast lumps, diffuse nodularity, breast pain , nipple discharge and nipple inversion. All female patients with palpable abnormalities were subjected to FNAC. After taking history, and doing clinical examination, FNAC was done and

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compared with the histopathology report after excision or incision biopsy. Data was collected on prescribed proforma. FNAC was performed by either of the three Professor, Assistant Professor and Senior Registrar.

We included in the study, the first consecutive 60 female patients visiting breast clinic of ASH with palpable lump breast, either solitary or multiple, unilateral or bilateral.

Patients with no discrete palpable hump, diffuse nodularity, inflammatory conditions, breast cyst, those who already had FNAC, any other malignancy and male patient were excluded in the study.

A thorough clinical examination was carried out and record maintained on a prescribed proforma before initiation of procedure.

In our technique, after taking consent and carefully explaining the procedure to the patient, skin was cleaned with pyodine and spirit. After wearing sterilized gloves, the lump was gently immobilized between index finger and thumb, and needle attached to syringe was gently introduced into the lump. No local anesthetic was used, suction was applied to the syringe; as soon as material began to enter the hub of needle, the syringe was allowed to the normal pressure.

As a general rule, the needle was passed several times in the lesion. Suction was released before withdrawl of needle from the lesion. 1 ml of air was used to force the cellular material in the needle on to the glass slide. The material was spread by other slide working at an angle of 45 and smear was prepared and slide was immediately fixed in 95% alcohol, the other slide was air-dried.

The patients were asked to apply gentle pressure at the site of aspiration for few minutes to stop minor bleeding. A simple dressing (saniplast) was applied, and patients were allowed to go home.

4 to 6 slides were prepared and labelled carefully. All specimens were submitted to lab, without clinical history or results of other investigations like mammography etc. The only data provided to pathologist were the patient's name, age and site of aspiration.

Clinicians performed all aspirations, technologist screened smears and pathologist made final interpretation. To assess the accuracy of method, follow-up was available by doing histopathology and results were compared.

Few patients did not turn back hence they were excluded from the study.

The reports in which sample was inadequate also posed a problem because due to financial constraints some patients did not agree for repeat FNAC.

When FNA report was false negative i.e. report was negative in contrast to clinical findings open biopsy was recommended, hence burden of two procedures on patient.

Few patients refused for excision, biopsy especially of clinically benign lesions.

Few worth-mentioning conditions which posed diagnostic difficulty on FNAC specially metaplastic carcinoma[5], which is very rare breast neoplasm that is often confused with benign and other malignant entities on both clinical and conventional histopathological basis.

Simultaneously, Atypical Apocrine Adenosis[6] which can mimic carcinoma in histopathology and cytopathology. One should be cautious when reviewing apocrine cell in cytology giving their atypical features especially their single dispersed nature.

Other conditions woth-mentioning are Tubular Carcinoma[7], diagnosing this uncommon condition, cautious attitude towards the diagnosis from FNAC sample is necessary. If atypia is present detailed tissue exam is mandatory, In -Situ Carcinoma[8] diagnosis on histopathology either lobular, tubular or intraductal, are difficult to interpret cytologically due to small regular cells that become trapped in connective tissue.

Organizing hematomas were also required careful evaluation on FNAC. Robin[9] cited a case in which FNA diagnosis was unequivocally positive hence biopsy was recommended which proved to be an organizing hematoma.

Localizing lesion, specially in young patients with nodular breast was difficult to aspirate properly because sometimes needle does not extend into the lesion and may give false negative report. Site of lesion, its depth particularly in pendulous breast may be a limiting factor in the same way in an old lady with a scar like lesion that is most likely to be a radical scar by mammography, one may fail to obtain cell by FNAC.

Care was taken when passing the needle tangentially. Caution was also taken when passing needle anteriorly especially in thin patients. While drawing the needle out of the lesion after aspiration, suction was released slowly otherwise aspirate would have sucked in the needle and difficult to expel.

Results

The results of cytology (Figure 1) were reported as Benign, Suspicious, Malignant and Unsatisfactory.

Benign diagnoses were determined by FNA in 34 patients. In this group histological diagnosis was benign in 32 and malignant in 02 patients. Of the 02 patients with false negative cytologies, the histological diagnoses were ductal and lobular carcinoma.

"Suspicious" FNA diagnoses were reported in 02 patients. All patients with suspicious cytologic specimens underwent excision biopsy. Histologic examination revealed benign processes in both patients. Diagnoses in the patients with benign surgical biopsy specimens were giant fibroadenoma and duct ectasia.

Twenty one (21) cases were diagnosed as definite mammary carcinoma by FNA cytology. All these patients were confirmed having carcinoma on histopathology hence there was no false positive results. Most (18) of those patients had ductal carcinoma, other diagnoses were lobular,

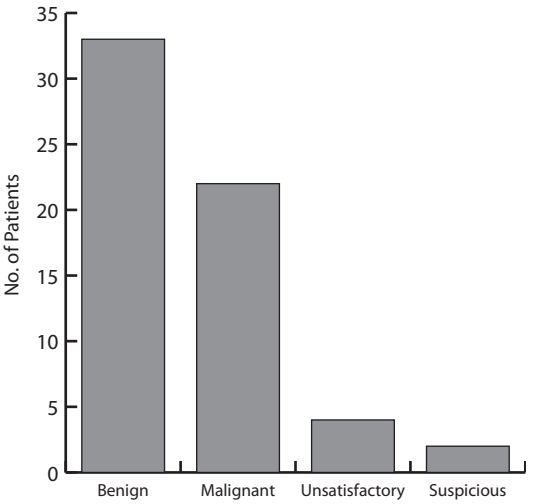

Figure 1: *Graphic representation of FNAC Results (n=60)*

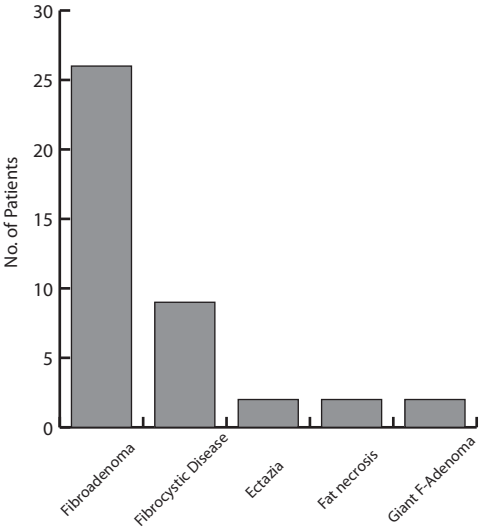

Figure 2: *Histopathological Diagnosis (Benign) (n=37)*

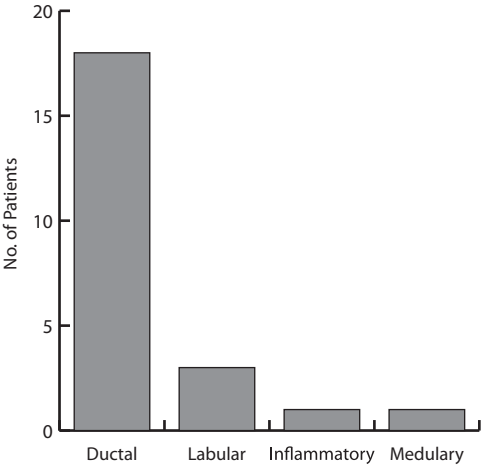

Figure 3: *Histopathological Diagnosis (Malignant) (n=23)*

medullary and inflammatory carcinoma.

Pathologist declared 03 smears as unsatisfactory. Excision biopsy showed benign process, the diagnoses in these cases were fat necrosis, fibrocystic disease and fibro adenoma.

Histopathology showed 37 benign and 23 malignant lesions out of 60. Benign diagnosis (Figure 2) were fibroadenoma 26, fibrocystic disease 08, ectasia 01, fat necrosis 01 and one giant fibro adenoma. Malignant diagnosis (Figure 3) showed ductal 23, lobular 03, inflammatory 01 and one medullary carcinoma.

A comparison of our study with other national (Table 1) and international (Table 2) studies showed more or less the same observations.

It is customary to evaluate the precision of laboratory diagnosis in terms of sensitivity and specificity, (Table 3) which may also be expressed as predictive values. Each of these terms is predicted on the simple case of two possible cytological results, positive and negative, and two possible clinical conditions, disease present or disease absent. It is quite evident that in order to improve the quality of reporting on cytology, one must decide whether to place diagnoses of probable or suspicious into the disease absent or disease present categories. It has been the general practice to regard cytologic diagnosis of suspicious and probable cancer as positive results. This will obviously lead to having a false positive result in the analysis because the intent of the terms probable and suspicious indicates that one is not certain whether malignancy is present or not.

Table 1: *Comparison with national studies*

Name	Hospital	Place	Year	Sensitivity	Specificity
Assadullah[10]	D.H.Q	Abbotabad	1993	76.47%	100%
Khalid Malik[11]	JPMC	Karachi	1992	100%	86.70%
Nadira[12]	CMH	Rawalpindi	1993	96.40%	95.50%
Shah SH[13]	A.K.U	Karachi	1996	89.20%	86.10%
Rozina[14]	F.J.M.C	Lahore	1998	80%	100%
Sajjad MK[15]	Lady Reading	Pishawer	1999	88.88%	100%
Nazar H[16]	C.M.H	Gujrawala	2000	97.56%	95.65%
Ghazanfar (Thyroid)[17]	K.E.M.C	Lahore	2000	90.80%	95.10%
Present Study	A.S.H & K.M.D.C	Karachi	2002	91.30%	100%

Discussion

Fine needle aspiration cytoloy is a simple procedure that can be performed in the outpatient department, and it is almost as accurate as frozen section or open biopsy. The technique was well documented in the United States about 50 years ago although it was used most extensively in Europe[18].

The prevalent current standard approach to FNA cytology of the breast is detailed by Stone and Cady[19]. They stated that the cytopathologist report may indicate four types of results; that the specimen is "1- acellular or inadequate 2- normal, 3- atypical or suspicious or 4 -positive for carcinoma." They believed that there are

Table 2: *Comparison with other series of breast aspiration cytology[13]*

	Kline	Pilotti	Bell	Zajdela	Wollenberg	Barrows	Hammond	Ulanow	Present
	1979	1982	1983	1975	1985	1986	1987	1984	Study
Total Cases	3545	4834	1680	2772	321	1283	678	449	60
Controlled Cases	1084	1173	584	2772	184	1283	159	318	60
True Positive	349	534	244	1745	113	689	59	118	23
True Negative	735	639	340	1027	71	594	61	128	37
False Positive	60	11	112	45	45	55	1	16	0
False Negative	39	172	42	152	12	120	4	28	2
Sensitivity	89.9	75.3	85.3	92	90.4	85.2	94	87	91.3
Specificity	92.4	98.3	75.2	95.8	61.2	91.5	98	88.9	100
+ve Pred. Value*	85.3	98	68.5	97.5	71.5	92.6	98	92.1	100
Efficiency	91.6	86.3	79.1	93.4	76.3	88	96	87.8	96.5

**Positive Predictive Value*

Table 3: *Statistical Analysis Showing Sensitivity And Specificity*

False positive rate	100 – Specificity 100 – 100 = 0%	
False negative rate	100 – Sensitivity 100 – 91.3 = 8.7%	
Sensitivity	TP/TP + FN 21(21 + 2)* 100 = 91.3%	*100 Percent
Specificity	TN/TN + FP 2/(2 + 0)* 100 = 100%	*100 Percent
Diagnostic Accuracy	TP + TN/TP + TN + FP +FN (21 + 34)/(21 + 34 + 0 + 2)* 100 = 96.5%	*100 Percent

FP = False Positive, FN = False Negative, TP = True Positive, TN = True Negative

a small percentage of false positives in any series and for that reason FNA cytology should not be relied on when making therapeutic decisions.

Terence T[20] et al has presented a stratified approach. The major difference of opinion was in intermediate zone of uncertainty between benign and malignant. They divided the results into suspicious and probable instead of suspicious; an atypical and "probable" carcinoma had a certainty of carcinoma of 90% or greater. They objected Stone and Candy[19] who state that any sample that is acellular is not clinically useful. Terence said that it might be true in some circumstances, but a clinical example would illustrate one of the situations in which an acellular specimen.

Lofgren et al[21] showed that FNAC of areas of micro calcification gave a higher percentage of inadequate samples than aspiration of non-palpable speculated or circumscribed tumor.

In palse postive, the role of FNAC in management of breast disease is still being in question[25] owing to false positive and inadequate aspiration and because of the similar cytological findings with some benign and malignant lesion. Several publications about FNAC show false positive diagnoses ranging form 1% to 4%[22] of all aspirations performed. Even studies of several thousand aspirations by experienced doctors, false positive results have been found. It is important to know that these results can influence treatment.

However, Jazuk in 1989 reported only one of their aspirates as falsely malignant cytologically and advised special care in cases with any clinico-pathological discordance, as with any other investigative technique.

The other major concern of a false positive diagnosis is unwarranted mastectomy. For this reason, some investigators reserve the fine needle aspiration biopsy diagnosis only for advanced breast malignancy to be treated by radiotherapy[23], whereas others, such as Russ and Winchester[24], recommend preliminary open biopsy in all cases of positive cytologic diagnosis before undertaking definitive operation. Norton et al[25] had written that what constitutes correct use of the technique was as yet unanswered satisfactorily. Abele et al[26] had proposed graded implementation of fine needle aspiration biopsy to build confidence in the procedure.

In false negative, another major problem with FNAC is false negative results which make management decisions more difficult. Yiagou C presented at least three possible explanations for this. Firstly, lesions detected by screening tend to be very small and, therefore, can be missed during aspiration. Secondly, many tumors contain both benign and malignant areas and it is possible that some of the aspirates were taken from a benign area. Thirdly, interpretation of the slides can sometimes be difficult, especially in cases of DCIS and invasive cancers of a special type, e.g. tubular and lobular carcinomas, which can give a false negative cytology result. However, it is necessary to understand that while false negatives are a constant concern; they are more common in some settings than in others. A surgical biopsy of a highly suspicious lesion on palpation or mammography should be obtained, and some forms of carcinoma are more likely to be poorly sampled by or missed by FNA. The false negative rate reported at many centers is attributable largely to sampling error.

Necrosis and frank infection within a tumor mass most frequently led the pathologist to a false negative diagnosis.

Walters TK[27] advised to surgeon considering a conservative policy towards benign breast

lumps based on FNAC should carry out a prospective audit of their results since both biopsy technique and cytology are operator dependant. It is possible that optimal results may only be obtained in specialist breast clinics seeing large numbers of such patients. Such a policy should include prolonged follow up with repeat biopsy.

A comparison was made between the results of FNA and histopathology (H/P) of the lesion in 60 cases with different analytical data for malignant lesions diagnosed by H/P, FNA could detect 21 out of 23 malignant tumors (91%) and 2 were graded as suspicious of malignancy (3.3%), two malignant lesions remained undiagnosed (Table 4). The pathologists declared them unsatisfactory for diagnosis and requested true cut biopsy or open biopsy. Due to our thorough conservative approach there was no false diagnosis.

For 37 lesions labeled as benign by H/P, FNA could diagnose 32 (86.5%) lesions, while 3 (2.7%) were labeled unsatisfactory for diagnosis and two were labeled as suspicious. In these 37 cases FANC could diagnose 26 fibroadenoma, fibrocystic disease in eight and traumatic fat necrosis, ectasia and giant fibro adenoma in other remaining cases (Table 5).

In this study the analysis of cytological reports have shown that for most of lesions ,the pathologist could make a correct diagnosis except for the lesion with acellular smear. There were 21 true positive and 2 false negative in malignant group of lesions, whereas in benign diseases there were 32 true positive, 03 unsatisfactory and 02 suspicious.

The analysis of various analytical data regarding efficacy and reliability of FNAC has shown a sensitivity of 91.3%, specificity of 100% and diagnostic accuracy of 96.5%, positive predictive value of 100% and negative predictive value of 91.3% . There were 0% false positive and 08.7% false negative.

The results are more or less similar with other such studies comparing FNA with H/P.

Table 4: *Comparison of FNAC with H/P for Diagnosis of Malignancies*

Disease	FNA	H/P
Ductal Ca	17	18
Lobular	02	03
Medullary	01	01
Inflammatory	01	01
Total	21	23

Table 5: *Comparison of FNAC and H/Path Diagnosis of Benign Breast Disease*

Disease	FNA	H/P
Fibroadenoma	25	26
Fibrocystic Disease	07	08
Giant Fibroadenoma	0	01
Traumatic Fat Necrosis	0	01
Duct Ectasia	0	01
Total	32	37

Usually the percentage of benign diseases is 80% and that of malignant is 20%. A recent study in Pakistan shows breast cancer only in 6.9%[28]. A recent study by Yousuf[29] in Rawalpindi, also observed 21% cancer in their study. As our Hospital (ASH) is situated in center of the city and we are running a breast clinic so the percentage of cancer was higher (38.3%) probably due to above facts and also that we have excluded some benign condition such as abscess and cysts from our study.

Keeping in mind the above discussion, we can say that cytology is reliable but it should be used in breast lesions as a part of full triple assessment by clinical examination, radiology and cytology in cases of palpable lesion; and double assessment by radiology and cytology for impalpable tumor.

Conclusion

A biopsy is essential for definitive diagnosis. In combination with proper and careful clinical examination, FNAC of clinically palpable lump can be adopted as a procedure for pre-operative tissue diagnosis and routine open biopsy should be reserved for lesions with inconclusive aspirate.

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