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ORIGINAL ARTICLE

The Importance of Fine Needle Aspiration Cytology and Core Needle Biopsy in The Diagnosis of Palpable Breast Mass in Karbala City

Mohammed Ahmed Alshami¹, Safa Ahmed Aldadah², Jehan Sabah Hasan³ and Raghad Hussein Ali⁴

^{1,2,4} Al-Hussain Medical City, Karbala 56001, Iraq

³ Karbalaa Health Directorate, Karbala 56001, Iraq

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Corresponding author:

Mohammed Ahmed Alshami

Email: mohalshami1969@gmail.com

Karbalaa Health Directorate

Al-Hussain Medical City Karbala

Karbala

Iraq

ABSTRACT

Background: Palpable breast lesion is commonly found in females in different age groups. A variety of diagnostic approaches (as adjunct to triple assessment) have been used to elicit the real pathology before deciding the final management. For many years Fine Needle Aspiration (FNAC) was the most popular way to establish the cytological diagnosis. Core Needle Biopsy (CNB) was then introduced to get more information about histopathological type.

Objectives: Aim of the study is to compare between FNAC and CNB regarding sensitivity and specificity & the possibility of replacing FNAC by CNB.

Methods: This study involves one hundred and eleven female patients complaining of palpable breast mass for the period extending from August 2017 to December 2018 in our breast clinic at Al-Hussein teaching medical city Karbala / Iraq. Fine needle aspiration was done followed by non-ultrasound guided true cut biopsy at the same session followed by Proper surgical treatment. Histopathological and cytological study was done to all samples. The results were analyzed by SPSS program.

Results: The age ranges from 17 to 80 years. Mean age of 47.8 years & standard deviation of 12.15. 61% of the patients are in the age group of 40 to 59 years. Seventy-seven patients (69.4%) were discovered to carry malignant lesions while 34 patients (30.6%) had benign conditions. 94.8% of the malignant lesions were ductal carcinoma & 32.4% of the benign lesions were fibroadenomas. FNAC Sensitivity & Specificity; Positive Predictive & Negative Predictive values are 84.4%, 97.1%, 98.5% & 73.3% respectively. CNB Sensitivity & Specificity; Positive Predictive & Negative Predictive values are 94.8%, 100%, 100% & 89.5% respectively

Conclusion: CNB is more sensitive and more specific than FNAC which cannot be replaced completely by CNB. Both are complementary to each other. The introduction of Ultrasound guidance method for both FNAC & CNB is better to be accomplished to avoid missing malignancies.

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INTRODUCTION

Palpable breast lesion is a common complain of patients presented to breast clinic seeking for management¹. About 16% of females between the age of 40 & 69 years are complaining of breast mass according to one study². A variety of diagnostic tests have been used to elicit the real pathology of breast lesions before doing the final surgical management³. The triple assessment approach (which

includes clinical examination, radiological assessment and fine needle aspiration cytology) is usually used to establish diagnosis but the need for tissue prove makes the use of the core needle biopsy an important tool in the diagnosis and management of breast mass⁴. For many years FNAC was the most popular way to establish cytological diagnosis of breast lesion⁵. Fine needle

aspiration cytology can be regarded as fast and simple but still depends upon the experience of the operator ⁶. Unfortunately FNAC cannot differentiate between carcinoma insitu and invasive carcinoma. These problems limit the acceptance of FNAC as the preferred way of tissue diagnosis ⁷. The decision of management of breast mass is ideally made preoperatively but this cannot be achieved by FNAC alone because it lacks the ability to give the information that can be given by Trucut Biopsy regarding the histopathological type ,grading and receptor status ^{8,9}. In addition, true cut biopsy (as complementary to triple assessment) is preferred nowadays over lumpectomy regarding the scar formation and cost of surgery and morbidity & gives the opportunity to complete the proper surgical treatment in one step ¹⁰. The aim of this study is to compare between FNAC and CNB results (sensitivity and specificity) from same lesions and by same operator.

MATERIALS AND METHODS

One hundred and eleven patients were involved in this study. All of them were female for the period extending from August 2017 to December 2018. All of them were complaining of palpable breast mass of variable size (more than 2 cm) and seeking for advice and management in our breast clinic in Al-Hussein teaching medical city Karbala / Iraq. The youngest patient was 17 & the oldest was 80. Ultrasound examination was done to all patients. Cyst lesions were excluded from this study. Fine needle aspiration was done first (using 21 G needle & by the same histopathologist) followed by non-ultrasound guided true cut biopsy (using 18 G device & done by the same surgeon) at the same session.

Proper surgical treatment was done to the patients with malignant core needle biopsy results after consulting the oncology department. The remaining patients (after taking their permission) were underwent simple lumpectomy (the patients who refused the surgery were excluded from this study). Histopathological and cytological study was done to all samples of the core needle biopsy and lumpectomy and FNAC by the same histopathology department in our hospital. Statistical analysis was done using the SPSS program.

RESULTS

During the period of one year and four months, 111 female patients were included in this study with age range from 17 to 80 years. Mean age of 47.8 years and standard deviation of 12.15, (Table 1).

Table 1. Age of the patients

Minimum age	17 years
Maximum age	80 years
Mean age	47.80 y
Median	48.00 y
Std. Deviation	12.15

The age groups distribution is represented in the following Table 2. It shows that 62.16% of the patients are in the age group of 40 to 59 years.

Table 2. Distribution of patients according to age group

Age group in years	Patient N.	Percent
< 20	1	0.9%
20 - 29	8	7.2%
30 - 39	13	11.7%
40 - 49	44	39.6%
50 - 59	25	22.5%
60 - 69	15	13.5%
70 - 79	4	3.6%
80+	1	0.9%
Total	111	100%

Considering the final results of postoperative histopathological study as a gold standard, 77 patients (69.37%) were discovered to carry malignant lesions while 34 patients (30.63%) had benign conditions (Table 3).

Table 3. Distribution of benign & malignant lesions among the patients

	Number	Percent
malignant	77	69.37%
benign	34	30.63%
Total	111	100%

The distribution of the lesion's histopathology (after final proper surgery) among the patients in this study is displayed in the following Table 4.

Table 4. Final histopathology finding

Histopathology	Number	Percentage of total
Ductal Carcinoma	73	65.8%
Fibroadenoma	11	9.9%
Fat necrosis	8	7.2%
Ductectasia	5	4.5%
Chr. Gran. Mastitis ^a	5	4.5%
Fibrocystic dis. ^b	3	2.7%
Phylloid tumor	2	1.8%
Inflammatory Carcinoma	1	0.9%
Non-Hodgkin Lymphoma	1	0.9%
Lobular Carcinoma	1	0.9%
Intraductal Papillary Ca. ^c	1	0.9%
Total	111	100%

^aChronic granulomatous mastitis, ^bdisease, ^c carcinoma

In this study 73 cases (65.8%) are suffering from mammary ductal carcinoma followed by fibroadenoma in 9.9% followed by other lesions.

The benign lesions distributed as in Table 5. It shows that 32% of benign cases are fibroadenomas followed by fat necrosis (23.5%), ductectasia (14.7%) & chronic granulomatous mastitis (14.7%).

The distribution of benign lesions against age groups is shown in the Table 6 which shows that 41% of benign cases lie in the age group 40- 49 followed by 26.5% of benign cases in the age group 30-39 years.

Table 5. Histopathology of benign lesions

Histopathology	Number	% of benign lesions
Fibroadenoma	11	32.4
Fat necrosis	8	23.5
Ductectasia	5	14.7
Chr. Gran. mastitis	5	14.7
Fibrocystic dis.	3	8.8
Phylloid tumor	2	5.9
Total	34	100.0

Table 6. Benign lesions in age groups

Age group	Fibrocystic dis.	Fat necrosis	Phylloid tumor	Fibroadenoma	Ductectasia	Chronic Gran. Mastitis*	Total	% of benign
< 20	0	0	0	1	0	0	1	2.9
20 - 29	0	3	0	2	0	0	5	14.7
30 - 39	1	2	1	5	0	0	9	26.5
40 - 49	0	3	0	3	3	5	14	41
50 - 59	1	0	1	0	2	0	4	11.8
60 - 69	1	0	0	0	0	0	1	2.9
Total	3	8	2	11	5	5	34	100

*Chronic Granulomatous Mastitis

The frequencies of different malignant lesions are shown in Table 7. Most of the malignancies encountered in this study (94.8% of the malignant cases) are mammary ductal carcinoma followed by other types.

The distribution of malignant lesions against age groups is shown in Table 8. Most of the malignant lesions 39% lie in the age group 40-49years followed by 27.3% in the age group 50-59 years and 18% in the age group 60-69 years.

Table 7. Histopathology of malignant lesions

Lesion	Frequency	% of malignant lesions
Ductal Carcinoma	73	94.8
Inflammatory Ca.	1	1.3
Non-Hodgkin Lymphoma	1	1.3
Lobular Carcinoma	1	1.3
Intraductal Papillary Ca.	1	1.3
Total	77	100.0

Table 8. Malignant lesions in age groups

Age group	Ductal Ca*	Inflammatory Carcinoma	Non-Hodgkin Lymphoma	Lobular Carcinoma	Intraductal Papillary Ca*.	Total	% of malign.
20 - 29	3	0	0	0	0	3	3.9%
30 - 39	4	0	0	0	0	4	5.2%
40 - 49	28	0	0	1	1	30	39.0%
50 - 59	19	1	1	0	0	21	27.3%
60 - 69	14	0	0	0	0	14	18.2%
70 - 79	4	0	0	0	0	4	5.2%
80+	1	0	0	0	0	1	1.3%
Total	73	1	1	1	1	77	100%

*Ca: Carcinoma

The results of Fine Needle Aspiration Cytology test and its Sensitivity & Specificity; Positive Predictive & Negative Predictive values are shown in the Table 9 & 10 below, knowing that the term (negative) that was mentioned in the table means benign or nonmalignant (FNAC or Histopath.) results, while the term (positive) means malignant results. The (postoperative) histopathology results are used as a standard reference in the comparison to calculate these parameters.

Sensitivity & Specificity; Positive Predictive value & Negative Predictive value of the Core Needle Biopsy CNB are listed with Table 11 & 12 below with the same conditions.

Table 9. Fine Needle Aspiration Cytology sensitivity & specificity

		Positive Histop.	Negative Histop.	Total
Positive	Count	65	1	66
	% within Post op. Histopathology	84.4%	2.9%	59.5%
Negative	Count	12	33	45
	% within Post op. Histopathology	15.6%	97.1%	40.5%
Total	Count	77	34	111
	% within Post op. Histopathology	100.0%	100.0%	100.0%

True positive FNAC is 65 cases
 Sensitivity of FNAC is 84.4%
 True negative FNAC is 33 cases
 Specificity of FNAC is 97.1%
 Accuracy 85.2%
 P value 0.000

Table 10. Predictive value of Fine Needle Aspiration Cytology

		Histopathology		
		Positive	Negative	total
Positive	Count	65	1	66
	% within FNA	98.5%	1.5%	100.0%
Negative	Count	12	33	45
	% within FNA	26.7%	73.3%	100.0%
Total	Count	77	34	111
	% within FNA	69.4%	30.6%	100.0%

Positive predictive value of FNAC is 98.5%
 Negative predictive value of FNAC is 73.3%

Table 11. Core Needle Biopsy Sensitivity & Specificity

		Histopathology		
		Positive	Negative	Total
Positive	Count	73	0	73
	% within Post op. Histopathology	94.8%	0.0%	65.8%
Negative	Count	4	34	38
	% within Post op. Histopathology	5.2%	100.0%	34.2%
Total	Count	77	34	111
	% within Post op. Histopathology	100.0%	100.0%	100.0%

True positive CNB is 73 cases
 Sensitivity of CNB is 94.8%
 True negative CNB is 34 cases
 Specificity of CNB is 100%
 Accuracy 96.5%
 P value 0.000

Table 12. Predictive value of Core Needle Biopsy

		Histopathology		
		Positive	Negative	Total
Positive	Count	73	0	73
	% within Core Needle Biopsy	100.0%	0.0%	100.0%
Negative	Count	4	34	38
	% within Core Needle Biopsy	10.5%	89.5%	100.0%
Total	Count	77	34	111
	% within Core Needle Biopsy	69.4%	30.6%	100.0%

Positive predictive value of CNB is 100%
 Negative predictive value of CNB is 89.5%

DISCUSSION

This study involves 111 female patients complaining of palpable breast mass of more than 2 cm. size. The age is ranging from 17 to 80 years (mean age is 47.8). Majority of cases that included in this study lie between 40 & 60 years. This is found also in another study (Shashirekha CA *et al*) & (M. Moschetta, *et al*)¹¹ this may be explained by the fact that most of the patients who accept to do surgery after completing FNAC & CNB (especially those with benign CNB results) lie in this age group.

Depending on the results of post-operative histopathological study, 77 patients out of 111 (69.4%) were found to have malignant lesions most of them (84% of the malignant lesions) are in the age group 40-70 years, 73 of them (94.8% of the malignant lesions) were ductal carcinoma. On the other hand, 34 patients out of 111 (30.6%) came with benign lesions, most of them (82 % of the benign lesions) were found to be in the age group 20-50 years, 11 of them (32.4% of the benign lesions) were fibroadenomas. This result is comparable to the finding of Ganesh Gojanur *et al*¹². The following table shows the statistical interpretation regarding FNAC in this study & in three other similar studies.

Table 13. Comparison of FNAC Statistical results

FNAC	This study	Ganesh Gojan. <i>et al</i> ¹²	Shashirekha CA <i>et al</i> ¹¹	Ajitha M B <i>et al</i> ¹³
Sensitivity	84.4%	90%	84.3%	86.8%
Specificity	97.1%	100%	100%	100%
Positive predictive value	98.5%	100%	100%	100%
Negative predictive value	73.3%	90.9%	84.1%	86.4%

It is noticed that the sensitivity of FNAC in this study is comparable to that in Shashirekha CA *et al* & Ajitha M B *et al*¹³ but less than that in Ganesh Gojanur *et al*. The table below is describing the statistics regarding True cut biopsy results in this study & other studies.

Table 14. Comparison of CNB Statistical results

Core Needle Biopsy	This study	Ganesh Gojan. <i>et al</i> ¹²	Shashirekha CA <i>et al</i> ¹¹	Ajitha M B <i>et al</i> ¹³
Sensitivity	94.8%	94%	97.1%	97.1%
Specificity	100%	98%	100%	100%
Positive predictive value	100%	97.9%	100%	100%
Negative predictive value	89.5%	94.2%	96.8%	97.3%

All the results of the CNB are comparable with that of other studies except the Negative Predictive Value which is less than those in other studies.

The table below shows a comparison between the results of this study & another study that use the ultrasound guidance in performing FNAC & CNB.

Regarding sensitivity and negative predictive value, the results of Moschetta *et al*¹¹ (where the ultrasound guide

method for both FNAC & CNB were adopted) is higher than that in our study.

Table 15. Comparison between Non Ultrasound & Ultrasound guided CNB & FNAC

		This study Non-U.S ²	Moschetta <i>et al</i> ¹⁴ U.S guided
Sensitivity	FNAC	84%	97%
	CNB	94%	97%
Specificity	FNAC	97%	94%
	CNB	100%	96%
Positive predictive value	FNAC	98%	91%
	CNB	100%	97%
Negative predictive value	FNAC	73%	98%
	CNB	89%	96%

*Ultrasound

CONCLUSIONS

Ductal carcinoma of Breast is the most common type of breast malignancy. It can be diagnosed efficiently by the available diagnostic tests (FNAC & CNB). Both give results with high sensitivity & specificity. FNAC is relatively cheap & provides good results although, CNB is more specific and gives more information especially when the lesion is discovered to be clinically locally advanced which means that neo adjuvant chemotherapy should be started pre operatively to downstage the lesion. In such a case, FNAC malignant result is not enough to decide the start of chemotherapy or to choose the proper agent. So, in these cases CNB can replace lumpectomy because it can provide the required information for the oncologist without subjecting the patient for unnecessary surgery.

As CNB is both highly sensitive & highly specific, the final plan of management can be decided by depending on its results. However, this should not always be applied when the triple assessment and especially the FNAC show suspicion, in this condition the negative CNB results should not be regarded as benign conditions and the patients should be informed to undergo further assessment. So it is recommended to combine both FNAC & CNB and to start with FNAC as it will add very little cost but with a lot of benefit in order to avoid missing a malignant lesion.

The result of FNAC & CNB can be improved by more training and by introducing the ultrasound guidance method in utilizing both FNAC & CNB.

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