Original Article

A Comparison Between Cytological and Histopathological Grading System in Cases of Breast Malignancy

Alpeshpuri P. Goswami, Jignesh V. Gondaliya* and Shaila N. Shah

Department of Pathology, Govt. Medical College and Sir T Hospital, Bhavnagar-364001 Gujarat, India.

ABSTRACT

Background: Treatment of breast malignancies depend on its types and grades. Classification of breast lesion is usually based on the histological appearance of tissue in the tumor. Like histopathology, the diagnostic cytology is also a useful tool for the oncologistand surgeons. It is possible to grade breast cancer on fine-needle aspirates.

Material and Methods: A prospective study of FNAC of breast lesions was carried out along with its histopathological correlation.Malignant breast lesion diagnosed on FNAC were graded using Robinson's grading system and correlated with Elstons modified Bloom Richardson histological grading system.

Results: The sensitivity, specificity and accuracy of the fine needle aspiration cytology to diagnose breast malignancy were 84.84%, 100.00% and 93.75% respectively. Out of 17 cases of Robinson gradeing on FNAC, 12 (70.59%) cases were well correlated with Bloom-Richardson histological grade.

Conclusion: Cytological grading is simple, less time consuming and with rare exceptions correlates precisely with the histological grade. It helps to know prognostic evaluation of breast carcinoma along with diagnosis.

Keywords: FNAC, Breast Cancer, Cytopathology, Histopathology

Introduction

The trend towards conservative surgery and individualized treatment has increased the importance of close correlation of clinical, radiological, and pathological findings. Approximately two-thirds of screen-detected cancers are given a definitive cancer diagnosis by Fine Needle Aspiration Cytology (FNAC) as part of triple diagnosis [1]

Treatment of breast malignancies depend on its types and grades. Classification of breast lesion is usually based on the histological appearance of tissue in the tumor. Like histopathology, the diagnostic cytology is also a useful tool for the oncologist and surgeons. [1] It is possible to grade breast cancer on fine-needle aspirates and that the cytological grade corresponds well with the histological grade.[2] Prognostic factors in breast lesion include axillary lymph node status, histological grade, estrogen receptor status and cell proliferation index.[3] As neoadjuvant chemotherapy is gaining popularity as primary modality of medical treatment of breast cancer, much attention is being focussed on grading of breast cancer on fine-needle aspiration cytology (FNAC) smears.[2]

As per the recommendations of the Bethesda conference, the classification of FNA will fall into one of the five categories. They are benign, atypical / indeterminate, suspicious, malignant and unsatisfactory smears. The National Cancer Institute, Bethesda has recommended that tumor grading on FNA material should be incorporated in FNA reports for prognostification. Also, importance was laid on the cytological grading system which would correspond closely to the grading system used in the histological material but the most reliable method for cytological grading that closely reflects the most widely used histological grading system is yet to be determined.[15]

Robinson's grading system of breast carcinoma in cytology is simple, quick and correlates well with histological grading and typing. Cytology grading may be helpful to decide level of resection.[4,5] Together with lymph node status, it may help to determine the prognosis.[4]

Material and Methods

A prospective study of FNAC of breast lesions was carried out along with its histopathological correlation. This study was carried out after permission from institutional review board and ethical committee at the Department of Pathology, Govt. Medical College, Bhavnagar, Gujarat. In this study, patients referred to cytopathology section with palpable breast masses were selected. Total 75 breast aspirates were done and all cases were followed by histopathological examination either by biopsy or surgical resection of mass. Malignant breast lesion diagnosed on FNAC were graded using Robinson's grading system and

correlated it with Elstons modified Bloom Richardson histological grading system.

Results

In our study, we have studied 75 cases of breast lesions. As shown in table no.3, 02 cases were diagnosed as acute mastitis cytologically and 01 was confirmed by histopathologically with 01 case was diagnosed as fibroadenoma. So, there was 50% correlation in diagnosis.

There were 03 cases of chronic mastitis and 03 cases granulomatous mastitis. Out of them 06 cases were confirmed histopathologically. There was 100% correlation. There were 04 cases of fibrocystic disease diagnosed by FNAC. Out of these, 02 were confirmed histopathologically, 01 diagnosed as chronic mastitis and 01 case was malignant. So, there was 50% correlation for correct diagnosis whereas 01 was false negative for malignancy.

28 cases were diagnosed as fibroadenoma by FNAC. Out of them, 23 cases were confirmed as fibroadenoma histopathologically. 01 cases were diagnosed as fibrocystic disease and 02 cases were diagnosed as benign breast lesion. 02 cases were diagnosed as malignancy. So, there was 82.14% correlation in diagnosis.

There were one cases of gynaecomastia diagnosed by FNAC. It was confirmed histopathologically. So, there was 100% correlation in diagnosis.

There were 20 cases of malignancy diagnosed by FNAC and all of them confirmed histopathologically. So, there was 100% correlation in diagnosis. There were 03 cases diagnosed as suspicious for malignancy by FNAC. They were diagnosed as malignancy by histopathological examination.

There were 52 cases of benign lesions, out of them 47 cases (90.38%) were confirmed histopathologically whereas 05 cases (09.62%) were diagnosed as malignancy. So, 05 cases were false negative for malignancy. There were 20 cases diagnosed as malignant lesions cytologically. They all were confirmed malignant histopathologically. 03 cases of suspicious for malignancy were diagnosed as malignant histopathologically. 05 case of benign breast lesion in FNAC were diagnosed as malignant in histopathological examination. In this study there were no false positive malignant case in FNAC examination.

Table no.6 showing cyto-histological correlation of total 17 cases by grading system. Out of 17 cases, 12(70.59%) cases were correlated between the Robinson cytological grade and Bloom-Richardson histological grade. We found that 3 cases were under graded in grade I category and 2 over graded in grade II category by Robinson grading systems by FNAC.

Discussion

FNAC is a simple, safe, inexpensive and fairly reliable investigating procedure. Sensitivity of 84.84%, Specificity of 100% and accuracy rate of 93.75% has been reported in present study. For the staining, the haematoxylin and eosin was chosen because of its familiarity and easily interpretable cytomorphology.

Table 1: Histological grading of breast carcinoma (Elston modified Bloom and Richardson grading system)[6]

CRITERIA	SCORE		
	1	2	3
Tubule formation	Tubular formation in > 75 % of the tumor	Tubular formation in 10 to 75 % of the tumor	bular formation in < 10 % of the tumor
Nuclear Pleomorphism	Nuclei with minimal variation in size and shape	Nuclei with moderate variation in size and shape	Nuclei with marked variation in size and shape
Mitotic count per 10 high power fields	0-5/hpf	6-10/hpf	>11/hpf
Grade 1= score 3- 5, Grade 2= score 6-7, Grade 3= score 8-9.			

Table-2: Robinson cytological grading system [7,8]

CRTERIA	SCORE		
	1	2	3
1.Cell dissociation	Cells mostly in clusters	Mixture of single cells and clusters	Mostly single cells
2. Cell size	1-2 times size of RBC	3-4 time size of RBC	>= 5 times size of RBC
3.Cell uniformity	Monomorphic	Mildly pleomorphic	Pleomorphic

CRTERIA	SCORE		
	1	2	3
4. Nucleoli	Indistinct	Noticeable	Prominent or Pleomorphic
5.Nuclear margins	Smooth	Slightly irregular/folds and grooves	Buds and clefts
6. Chromatin	Vesicular	Granular	Clumped and cleared
Grade I= Score 06 – 11, Grade II=Score 12 – 14, Grade III=Score 15 – 18.			

Table 3: showing the cyto-histopathological correlation of all the cases (75 cases).

Cytological diagnosis and no. of cases	Histopathological diagnosis										
	AM (1)	CM (04)	GM (03)	FCD(05)	FA (25)	AD (03)	DA (01)	OTHER (04)	GY (01)	MALIG (28)	Percentage of correlation of diagnosis
Acute mastitis (2)	01					01					50%
Chronic mastitis (3)		03									100%
Granulomat-ous mastitis(03)			03								100%
Fibrocystic disease(04)		01		02						01	50%
Fibroadeno-ma (28)				01	23			02		02	82.14%
Adenosis (00)						00					-
Duct ectasia (00)							00				-
Other Benign breast lesion (11)				02	02	02	01	02		02	-
Gynaecoma-stia (01)									01		100%
Malignancy (20)										20	100%
Suspicious (03)										03	100%

AM: Acute mastitis, CM: Chronic mastitis, GM: Granulomatous mastitis, FCD: Fibrocystic disease, FA: Fibroadenoma, AD: Adenosis, DA: Duct ectasia, GY:gynaecomastia, MALIG: Malignancy

Table 4: Showing summary of cytological and histopathological correlation of the breast lesions.

Cytological diagnosis	No.	(%)	Histopathological diagnosis	No.	Correlation (%)
Benign	52	69.33%	Benign	47	90.38%
			Malignant	05	9.62%
Malignant	20	26.66%	Benign	-	
			Malignant	20	100%
Suspicious	03	04%	Benign	-	
			Malignant	03	100%

Table 5: Sensitivity, specificity and accuracy of FNAC for the diagnosis of malignancy.

Value	Formula	Percentage
Sensitivity	TP(28)/TP(28)+FN(05)x100	84.84%
Specificity	TN(47)/TN(47)+FP(00)x100	100%
Accuracy	TP(28)+TN(47)/TP(28)+FP(00)+TN (47)+FN (05) x 100	93.75%

TP: True positive, TN: True negative, FP: False positive, FN: False negative.

Table 6: Comparison of cytological grade - Robinson and histological Bloom-Richardson grading systems (17 cases).

Cytology Robinson Grade	Histological Bloom-Richardson Grade			Diagnosis correlation (%)
	I	II	II	
I (10)	07	03	-	70%
II (07)	-	05	02	71.42%
III (00)	-	-	-	00
Total	**07**	**08**	**02**	**70.59%**

Table 7: Comparison of Robinson cytological grade with Bloom-Richardson histological grade.

Histopathology		Present Study			Jyoti et al (2008)[13]			Meena et al (2006)[14]			Chhabra et al (2005)[8]			
		Histopatho			Histopatho			Histopatho			Histopatho			
		I	II	III	I	II	III	I	II	III	I	II	III	
Cytology	I	07	03	00	18	12	00	19	03	00	11	06	01	
	II	00	05	02	02	14	03	04	32	04	05	21	05	
	III	00	00	00	00	01	00	00	01	08	01	03	07	
Total		17			50			71			60			

The false positive rate to diagnose malignancy by FNAC during present study was 00%. So it is quite similar to that of other studies like Pandit et al[9](00%). The false negative rate was 3.57% during present study. The sensitivity of present study was 84.84%, which was correlated well with study Arjun singh et al[12](84.6%). Compare to study of Mahajan NA et al[10] (96.77%) and Bukhari et al[11] (98%) sensitivity in our study was low. This could be due to sampling errors or interpretation error as this study conducted in teaching institute where trainee doctors involved in collection of samples.

The term accuracy (validity) refer to what extent the test accurately measures which it purposed to measure. The accuracy of various studies ranges from 90 to 100%. The accuracy of present study was 93.75%, which was correlated well with the other studies. So, it can be concluded that the combination of FNAC gave a remarkable diagnostic accuracy of around 95% and thus proving their value in the rapid diagnosis of breast lesions by FNAC.

The specificity of FNAC in diagnosis of malignant breast lesion of various studies range from 98 to 100%. The specificity of present study was 100%, which is correlated with other studies. The accuracy of various studies range from 90 to 100%. The accuracy of present study was 93.75%, which was correlated well with other studies.

In this study, there was correlation of 70.59% between the Robinson cytological grade and Bloom-Richardson histological grade. 05 out of 17 cases were not correlated. In 05 out of 17 cases, grading was different in FNAC and histopathology. Cyto-histopathological grading correlation in Jyoti et al[13], Meena et al[14] and Chhabra et al[8] were 64%, 83.1% and 65% respectively.

Conclusion

The sensitivity, specificity and accuracy of the fine needle aspiration cytology to diagnose breast malignancy were 84.84%, 100.00% and 93.75% respectively. These findings were in agreement with the results carried out by the other workers.

Cytological grading is simple, less time consuming and with rare exceptions could correlates precisely with the histological grade. It allows prognostic evaluation of breast carcinoma along with diagnosis. Hence we recommends that cytological nuclear grade should appear in FNAC reports of breast carcinoma, so that an appropriate decision regarding the preoperative neoadjuvant therapy can be taken.

References

1. Orell SR, Sterrett GF. Fine Needle Aspiration Cytology. 5th ed. New York: Churchill Livingstone; 2012

2. Pal S, Gupta ML. Correlation between cytological and histological grading of breast cancer and its role in prognosis. J Cytol 2016;33:182-6

3. Khan N, Afroz N, Rana F, Khan MA. Role of cytologic grading in prognostication of invasive breast carcinoma. J Cytol. 2009;26:65–8.

4. Robinson IA, McKee G, Nicholson A, D'Arey J, Jackson PA, Cook MG, et al. Prognostic value of cytological grading of fine-needle aspirates from breast carcinomas. Lancet 1994;343:947-49.

5. Ohri A, Jetly D, Shukla K, Bansal R. Cytological grading of breast neoplasia and its correlation with histological grading. Indian J Pathol Microbiol 2006;49:208-13.

6. Elston CW, Ellis IO. Pathological prognostic factors in breast cancer. I. The value of histological grade in breast cancer

: experience from a large study with long-term follow-up. Histopathology 1991;19(5):403-410.

7. Robles-Frias A, Gonzalez-Campora R, Martinez-Parra D, Robles-Frias M, Vazquez-Cerezuda T, Otal-Salaverri C, et al. Robinson cytologic grading of invasive ductal breast carcinoma. Correlation with histologic grading and regional lymph node metastasis. Acta Cytol 2005;49:149-53

8. Chhabra S, Singh PK, Agarwal A, Bhagolival A, Singh SN. Cytological grading of breast carcinoma – A multivariate regression analysis. Journal of Cytology 2005;22:62-5.

9. Pandit AA, Parekh HJ. Cytologic grading of breast carcinoma. Comparison of four grading systems. Journal of Cytology 2000;17:39-44.

10. Mahajan NA, Bhale CP, Mulay SS. Fine needle aspiration cytology of breast lesions and correlation with histopathology- A 2 year study. Int J Health Sci & Res 2013;3(2):55-65

11. Bukhari MH, Arshad M, Jamal S, Niazia S, Bashir S, Bakhshi IM et al. Use of fine needle aspiration cytology

in the evaluation of breast lumps. Pathology Research International. 2011;01:1-10.

12. Singh A, Haritwal A and Murali BM. Pattern Of breast Lumps and Diagnostic Accuracy Of Fine Needle Aspiration Cytology; A Hospital Based Study from Pondicherry, India. The Internet Journal of Pathology.2011;11(2):1-14.

13. Phukan JP, Sinha A, Deka JP. Cytological grading of breast carcinoma on fine needle aspirates and its relation with histological grading. South Asian J Cancer 2015;4:32-4

14. Meena SP, Hemrajani DK, Joshi N. A comparative and evaluative study of cytological and histological grading system profile in malignant neoplasm of breast – an important prognostic factor. Indian J Pathol Microbiol 2006;49:199-202.

15. Das AK, Kapila K, Dinda AK, Verma K. Comparative evaluation of grading of breast carcinomas in fine needle aspirates by two methods. Indian J Med Res 2003;118:247-50.

*Corresponding author:
Dr. Jigneshkumar Vallabhbhai Gondaliya, s/o vallabhbhai, 796-797, Haridarshan Society, Singanpore Road, Singanpore, Surat-364001.INDIA
Email: gondaliyajv31@yahoo.in