

Original Article

Comparison of Cytological Grading and Histological Grading in Breast Carcinoma

Dr. Ritu Gogia¹, Dr. Anand Kumar Verma²

¹ Formerly Post Graduate Resident, ² Associate Professor

Name of Institute / College: Employees State Insurance Postgraduate Institute of Medical Sciences and Research (ESIPGIMS) and ESI Model Hospital, Basaidarapur, New Delhi

Corresponding Author: Dr. Anand Kumar Verma

Abstract

Introduction: Grading of breast carcinomas is very important for their management. This grading can be done both on the cytology smears and histopathology slides. This study was done to evaluate the correlation between cytological grading and histopathological grading.

Methods: This is a retrospective study of 266 breast carcinoma cases. The cytological grading was done by Robinson's Method while histopathological grading was done by modified Bloom Richardson Method. Concordance was calculated and Kappa statistics was done to measure the strength of agreement.

Observations: The concordance between grade I, grade II and grade III was 50%, 75% and 88% respectively. Kappa statistics for grade I, II, III was 0.30, 0.44 and 0.51 respectively.

Conclusion: The cytological grading can be used for management of breast carcinoma where the histopathology material is not available.

Key Words : Breast carcinoma, Fine needle aspiration cytology (FNAC), Robinson grading, Bloom-Richardson's grading

Introduction

Breast cancer is one of the commonest causes of death in many developed countries in middle aged women, and is becoming frequent in developing countries as well. Therapy for breast cancer is based on several prognostic and predictive factors which are obtained by postoperative histological, immunohistochemical or biochemical investigations of tumour tissue. Numerous prognostic factors for breast carcinoma have been evaluated which include: Histologic grades, Oestrogens and Progesterone receptor status, DNA ploidy status, S Phase fraction and Her-2 / neu oncogene expression. Histologic grade provides a strong predictor of outcome in patients with invasive breast cancer¹. In the recent years, attempts have been made to determine various prognostic parameters on Fine Needle Aspiration Cytology (FNAC) material for the management of a case. It provides an opportunity for tumour grading based on their nuclear features². The National Cancer Institute, Bethesda, sponsored conference had also recommended that tumour grading on FNAC material should be incorporated in FNAC reports for prognostication. It was also emphasised that cytological grading system on FNAC specimen should correspond to the grading system used in the histologic material.³ This cytological grading can be very useful in patients who are not good candidates for surgery due to comorbid conditions, old age or requiring neo- adjuvant therapy.

Aims and Objectives

The aims and objectives of this study were to compare the cytological grading in aspiration cytology smears and histological grading of the breast carcinoma.

Materials and Methods

This was a retrospective study done from February 2009 till January 2018 at Employees State Insurance Postgraduate Institute of Medical Sciences (ESIPGIMSR) and ESI Model Hospital, Basaidarapur, New Delhi. A total of 266 cases of carcinoma breast where both the cytology and histopathology was done were included in the study.

Cytological grading of malignant cases was done according to Robinson et al, 1994.^{2,3} (Table 1)

Table 1: Cytological Grading

Criterion	Score 1	Score 2	Score 3
Cell dissociation	Mostly clusters	Single cells /clusters	Mostly single cells
Nuclear size	1-2 times of RBC	3-4 times of RBC	5 times of RBC or more
Cell uniformity	Monomorphic	Mild pleomorphic	Pleomorphic
Nucleoli	Indistinct/small	Noticeable	Abnormal
Nuclear margin	Smooth	Slightly irregular/grooves	Buds and clefts
Chromatin pattern	Vesicular	Granular	Clumping and clearing

Score 6-11 Grade I, Score 12-14 Grade II, Score 15-18 Grade III.

Histopathological grading was done using Nottingham modification of Bloom Richardson system^{4,5}, which also incorporates the evaluation of mitotic activity. In this grades were obtained by adding scores for tubule formation, nuclear pleomorphism and mitotic counts each of which is given 1-3 points. (Table 2).

Table 2: Histological Grading

Parameters	1 point	2 points	3 points
Tubule formation	>75% of tumor	10-75% of tumor	<10% of tumor
Nuclear pleomorphism	Minimal variation in size /shape	Mod variation in size /shape	Marked variation in size /shape
Mitotic counts (Nikon microscope)	0-5	6-10	>11

Grade I : 3-5 points; Grade II: 6-7 points; Grade III : 8-9 points

Concordance and Kappa (k) coefficient was calculated for each grade to compare the agreement of cytological and histological grading.

Observations and Results

In 266 cytological malignant lesions diagnosed as carcinoma, histologic material was also available. The cytological grading and incidence of various cytological parameters is shown in Table 3.

Table 3: Cytological grading and various grading parameters

Grading Criteria		Cytological Grading		
		Grade I(n= 38)	Grade II(n=142)	Grade III(n=76)
Nuclear size	1-2 x RBCS	38(100)	29(19.1)	
	3-4 x RBCS		123(80.9)	38(50)
	>5 x RBCS			38(50)
Cell Uniformity	Monomorphic	10(26.3)		
	Mild pleomorphic	28(73.7)	10(6.6)	
	Pleomorphic		142(93.4)	76(100)
Nucleoli	Indistinct		38(25)	
	Noticeable	38(100)	114(75)	29(38.0)
	Abnormal			37(62.0)
Nuclear margin	Smooth	28(73.7)	10(7.0)	
	Slightly irregular	10(26.3)	142(93.0)	67(88.0)
	Buds & clefts			9(12.0)
Chromatin	Vesicular	19(50)		
	Granular	19(50)	76(50)	
	Clumped/clearing		76(50)	76(100)
Cell dissociation	Mostly clusters	38(100)	67(44.0)	38(50)
	Single cells& clusters		85(56.0)	29(38.2)
	Mostly single cells			9(11.8)

Figures in parenthesis show percentage

100% of cytological Grade I carcinomas cells had nuclear size 1-2 times of RBC whereas 80.9% of cytological Grade II tumor cells had nuclear size 3-4 times of RBC. 50% of cytological Grade III tumour cells had nuclear size >5 times of RBC.

73.7% diagnosed as cytological Grade I had smooth nuclear margin .In remaining cases nuclear margin was slightly irregular. 93% of the cytological Grade II had slightly irregular nuclear margins. Nuclear margins of 12% of the cytological Grade III case showed buds and clefts whereas remaining showed slightly irregular nuclear margin.

50% tumours of Grade I had granular chromatin and remaining vesicular.. Granularity was typically fine and evenly distributed. 50% showed clumping/ clearing in Grade II while all cases showed it in Grade III. All cases revealed some degree of pleomorphism.

Comparison of Cytological grading with Histological Grading:

Cytological grading showed an absolute concordance of 75.2% with the histological grade. Concordance was higher in higher grades being 75% and 88% for grades II and III respectively.

Table 4: Cytological grading vs. Histological grading

Robinson Cytological Grade	Histological Grades				Concordance
	I	II	III	Total	
I	19	19	0	38	50%
2	10	114	28	152	75%
3	0	9	67	76	88%
Total	29	142	95	266	

Kappa statistics for grade I, II, III was 0.30, 0.44 and 0.51 respectively which indicates fair agreement in Grade I and moderate agreement in remaining groups.

Discussion

Cytological grading of breast carcinoma is feasible and reproducible to provide important information before surgery so that most appropriate treatment modality may be selected.

In this study, cytological nuclear grading was done by Robinson Grading System and histologic grading was done as per Nottingham modification of Bloom Richardson System for all the 266 cases having definitive malignant diagnosis. Robinsons cytological grading showed an absolute concordance with the histological grade in 75.2 of cases. The overall concordance was highest in grade II as compared to grade I and grade III. In a similar comparative analysis, Das et al⁶ reported an absolute concordance with the cytological grade in 71.2% patients. Sinha et al,⁷ in their study observed concordance rate of 73%. These findings suggest that Robinsons method of cytologic grade was a reasonably reliable method of grading breast carcinomas.

Sauer et al,⁸ in their study compared 494 FNAC smears from histologically confirmed grade I breast carcinomas and observed that not all histologic grade I breast carcinomas are cytological grade I. This may be due to the fact that the growth pattern and mitosis are not a part of cytological grading systems, some tumours with a prominent tubular growth pattern and/or few mitosis might have distinct nuclear atypia and still be classified as grade I on histology. In higher grades the cytological diagnosis of malignancy was straight forward and obvious, posing no diagnostic problem at all. Yu et al⁹ also observed discordance due to difficulty in finding mitosis and tubules in cytology smears.

Conclusion

In this long term study, it is concluded that cytological grading has good concordance especially in higher grades and can be helpful in patients where the surgery may not be planned and alternative modality of treatments are used including neo- adjuvant therapy.

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