e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(1); 1678-1683

Original Research Article

Significance of Masood Scoring System in Classification of Proliferative Breast Diseases on FNAC

Kishore Kumar. CH[1], Lakshmi C V[2], Sreedevi.P[3], Mani Kumari K N M[4], Papa Ratnam K[5]

[1]Assistant Professor, Department of Pathology, Andhra Medical College, Visakhapatnam
[2]Professor & HOD, Department of Pathology, Andhra Medical College
[3]Associate Professor, Department of Pathology, Rangaraya Medical College
[4]Assistant Professor, Department of Pathology, Andhra Medical College
[5]Professor & HOD, Govt Medical College, Paderu

Received: 25-10-2023 / Revised: 23-11-2023 / Accepted: 26-12-2023
Corresponding Author: Dr. Mani Kumari K N M
Conflict of interest: Nil

Abstract:

Introduction: The categorization of breast lesions is valuable in identifying women at an increased risk for the subsequent development of breast cancer. On fine needle aspiration cytology these lesions are usually categorized into proliferative breast disease without atypia and proliferative breast disease with atypia as it is not possible to exactly delineate various histological entities. FNAC of breast is a highly sensitive and specific modality to distinguish benign and malignant lesions. However, it is important to distinguish PBD with atypia from cases of PBD without atypia due to differences in prognosis and management. Risk of development of carcinoma is 1.5 – 2 times, 4 -5 times and 8 -10 times for PBD without atypia, PBD with atypia and in situ carcinoma respectively. One approach to resolve the diagnostic difficulties posed by PBD on FNAC has been to apply an objective scoring system. The scoring system proposed by Masood et al., is the most widely tested of the various scoring systems, although not all authors have found it to be useful. This study was undertaken to test the usefulness of the scoring system proposed by Masood et al versus cytomorphological diagnoses in cases with proliferative breast disease.

Aims and Objectives: To analyze the cytomorphological features of proliferative breast diseases in conjunction with cytologic scoring system proposed by Masood et al., and correlating with histopathology. Application of scoring in a step wise manner on atypical aspirates as this can help in selection of cases suitable for biopsy.

Materials and Methods: It is a prospective study undertaken during the period - October 2020 to September 2022. All smears were stained with Papanicolaou stain, H&E & MGG. Only cases having papanicolaou stained FNAC smears as well as histologic confirmation on biopsy or lumpectomy were included in the study.

Results: All patients included in study were females within the age range of 15 to 65 years. We analyzed the various categories of breast lesions cytomorphologically and evaluated them according to Masood scoring and the Modified Masood scoring system put forth by Mridha et al.

Conclusion: Overall Concordance Is Better When Cytomorphology Alone Is Correlated With Histopathology.

Introduction

Masood scoring system is based on 6 cytomorphological features. A score of 1 - 4 was given for each of the following parameters [1].

Table 1: Scoring System by Masood et al.

Score	Cellular arrangement	Myoepithelial cells	Cellular pleomorphism	Anisonucleosis	Nucleoli	Clumped chromatin
1	Monolayer	Many	Absent	Absent	Absent	Absent
2	Nuclear over-riding	Moderate	Mild	Mild	Rare micronu-cleoli	Rare
3	Overriding and clustering	Few	Moderate	Moderate	Frequent mi-cronucleoli	Occasional
4	Loss of cohe-sion	Absent	Conspicuous	Conspicuous	Predominant macronucleoli	Frequent

Total score: NPBD-6-10, PBD-11-14, PBDA-15-18, Carcinoma in situ & invasive carcinoma-19-24.categorisation Based on the cytomorphological features and total score, breast lesions are classified into 4 categories [1].

S.No.	Category	Total Score
1.	Non-proliferative breast disease	6 – 10
2.	Proliferative breast disease without atypia	11 – 14
3.	Proliferative breast disease with atypia	15 – 18
4.	Carcinoma	19 – 24

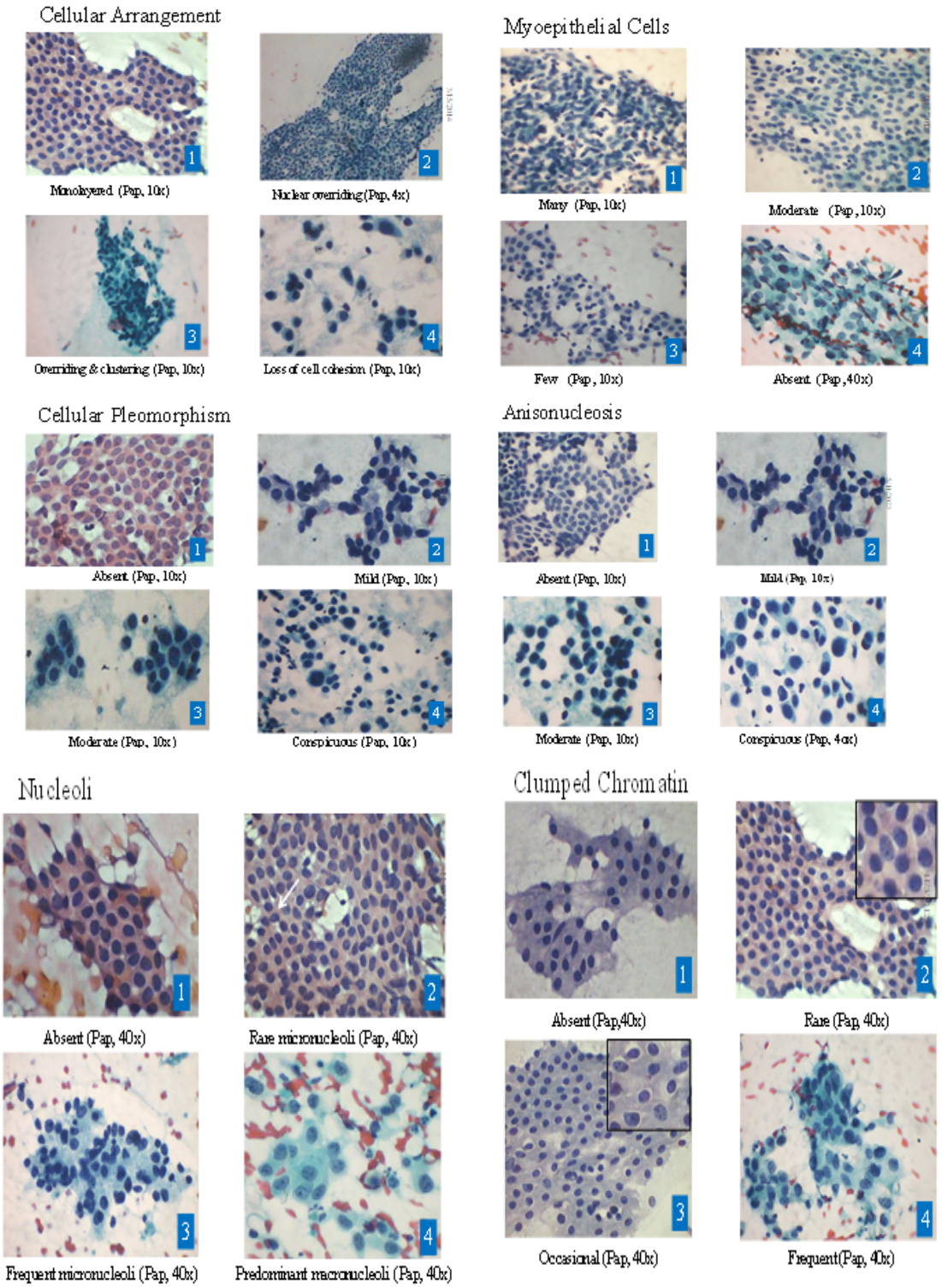

Figure 1: categorization of breast lesions

Materials and Methods

The prospective study of 40 FNAC cases having histopathology confirmation on biopsy, during the period - October 2020 to September 2022 at the Department of Pathology, Government General Hospital, Rangaraya Medical College, Kakinada. All aspirates had been performed as outpatient procedure without imaging or mammographic guidance. Smears were stained with Papanicolaou stain, H&E & MGG. Only papanicolaou stained FNAC smears as well as histologic confirmation on biopsy or lumpectomy were included in the study. We followed the University of Rochester cytopathology laboratory technique for pap staining[12].

Observations and Results

Patients included in this study were females within the age range of 15 to 65 years. We analyzed the various categories of breast lesions cytomorphologically and evaluated them according to Masood scoring and the Modified Masood scoring system put forth by Mridha et al.

The Masood scoring system and the Modified Masood scoring system are as follows.

Table 2:

Category	Masood scoring	Modified Masood scoring
NPBD	6-10	6-9
PBD	11-14	10-14
PBDA	15-18	15-18
Carcinoma	19-24	19-24

Patients with NPBD were in the 4th decade mainly, while in PBD category, cases were mainly in the 2nd and 3rd decade of life (20/40 cases). Patients in the carcinoma group were in the 4th to 6th decades mainly. (12/40 cases). Using the Masood scoring system and the MMS, the cases we encountered are as follows-

Table 3:

Total cases n=40	Masood scoring	Modified Masood scoring
NPBD	8(20%)	6(15%)
PBD	18 (45%)	20(50%)
PBDA	2(5%)	2 (5%)
Carcinoma	12 (30%)	12 (30%)

Two of the cases which had a score of 10 according to MSS fell into the category of PBD on modifying the cut off value from 10 to 9.On HPE one of these cases turned out to be a proliferative breast disease without atypia and the other was a fibroadenoma. There was a discordance between the cytomorphological diagnosis and histopathology for these two cases with MSS whilst the concordance increased with the MMSS.

Table 4: Cases Showing Discrepancy After evaluation With MMSS

	Non-proliferative breast disease	PBD without atypia	PBD with atypia	Carcinoma
Total no. of cases (n)	6	20	2	12
Correlated with histopathology	4	18	1	12
Discrepancy	2	2	1	0

Table 5: Details of the Cases Showing Discordance between Cytomorphology and Histopathology

Cytomorphological diagnosis	Diagnosis according to MMSS	Histological diagnosis
Fibroadenoma with adenosis (1930/12)	Non-proliferative breast disease MMSS=8	Fibroadenoma
Fibrocystic disease with mild atypia (1226/12)	Non-proliferative breast disease MMSS=8	Fibrocystic disease with adjacent breast tissue showing hyperplasia & ADH
Fibroadenoma with adenosis (2687/11)	PBD without atypia MMSS=12	Fibroadenoma with epithelial hyperplasia & ADH
Fibroadenoma (3907/11)	PBD without atypia MMSS=12	PBD with areas of duct cell carcinoma
PBD with foci of malignancy(2113/12)	PBD with atypia MMSS=15	Fibroadenoma

Discussion

The cytology smears of these cases were analyzed and the scoring system put forth by Masood et al and the Modified Masood scoring System proposed by Mridha et al, were applied to evaluate them. Cytomorphology of the 40 cases included 7 cases of benign breast disease, 19 cases of fibroadenomas, 2cases of PBD with atypia and 12 cases of carcinoma. Correlating with histopathology, we found an overall concordance rate of 92.5%. When correlating the individual categories, we found 100% concordance in the

benign breast disease category. Discordance was seen in 2/ 19 cases (10.5%) in the fibroadenoma group and in one out of the two cases in the (50%) PBD with atypia group. When Masood scoring was applied and correlated with histopathology, we got an overall concordance rate of 82.5%.

In the individual groups, 5/8 cases correlated with histopathology, giving a concordance rate 62.5% in the NPBD category. In the PBD category 2/18 cases did not correlate. Both these cases showed features of atypia on histopathology, thus giving a concordance rate of 88.8%. Concordance was 50% and 100% in the PBDA and carcinoma categories respectively. When Modified Masood scoring was applied to these 40 cases we found that the overall concordance was 87.5%. Within the individual categories, concordance rates of 66%, 90%, 50% & 100% were obtained in the NPBD, PBD, PBDA & carcinoma categories respectively. Correlating the cytomorphology with the scoring system and histopathology we found that overall concordance was better when correlating cytomorphology with histopathology. Mridha et al modified the scoring system by decreasing the cut off value of 10 to 9 in the NPBD category, as they found that this increased the overall concordance between histological diagnosis and diagnosis by scoring system from 69.35% to 75.8% [1].

Our study included 6 cases of NPBD, 20 cases of PBD without atypia, 2 cases of PBD with atypia, and 12 cases of carcinoma, on evaluating with the MMSS. While applying the Masood scoring system, we had a concordance rate of 82.5% (33/40) between the cytomorphology and histopathology. Out of the 40 cases, 35 correlated with histopathology when MMSS was applied, showing a concordance rate of 87.5%.

Table 7: showing the overall concordance rates with cytomorphology, MSS & MMSS

Category	Our study			Mridha et al study (MMSS)
	Cytomorphology	MSS	MMSS	
Overall concordance	92.5%	82.5%	87.5%	75.8%
NPBD	100%	62.5%	66 %	85 %
PBD	89.5 %	88 %	90 %	97 %
PBDA	50 %	50 %	50 %	30 %
Carcinomas	100 %	100 %	100 %	100 %

5 cases showed discrepancy when the MMSS findings were correlated with histopathology which included 2 in the non-proliferative breast disease category, 2 in PBD without atypia category and 1 in the group of PBD with atypia. No discrepancy was seen in the carcinomas group.

Our study was correlated with study conducted by Mridha et al at AIIMS; New Delhi. They analyzed 62 cases over a period of 10 yrs, from 1992 January to 2002 December. Among the 62 cases, 37 cases were PBD without atypia, 13 were cases of PBD with atypia and 12 were carcinomas. There were no cases in the NPBD category (The cases which were reported as Fibroadenomas and fibroadenoma with atypia fell into the PBD category after evaluating with the MMSS.)

Out of their 62 cases, 53 correlated with histopathology (85%) and 9 cases showed discrepancy. The cases which showed discordance included -1 in PBD without atypia category and 8 cases in the category of PBD with atypia.

No discrepancy was noted in case of carcinomas.

In our study in the NPBD category (group-1) - one case diagnosed as fibroadenoma with adenosis with an MMS of 8, turned out to be a fibroadenoma on histopathology, which falls into the category of PBD (MMS =10-14). The second case which was reported as fibrocystic disease with mild atypia (MMS=8) was diagnosed on histopathology as fibrocystic disease with the adjacent breast tissue showing hyperplasia & ADH. This should be in the PBDA category with an MMS range of 15-18.

In their study Mridha et al did not encounter any cases in this category.

In PBD (group-2) – we encountered two discrepant cases.

One case which was diagnosed as fibroadenoma (MMS= 12) on cytology, turned out to be PBD with areas of duct cell carcinoma in situ (PBDA-MMS =15-18) on histopathology.

The other case, diagnosed as fibroadenoma with adenosis (PBD- MMS=12) turned out to be a fibroadenoma with epithelial hyperplasia & ADH (PBDA-MMS=15-18). The discrepancy in these two categories could be attributed to sampling error- in that the needle had not touched the focus with atypical changes while performing FNAC. In their study, Mridha et al encountered 37 cases in this category .Among these only one case showed discrepancy between cytology and histopathology. This case fell into the PBDA category on histopathology though the MMS score was in the PBD range. This could also probably be due to sampling error.

In PBD A (group 3): (n=2) The two cases in this category occurred in patients in their 4th decade of

life. Similar findings were reported by Mridha et al, Myers at al and Kordek et al in their studies. [1]

In this category, the one discrepant case which was diagnosed as PBD with foci of malignancy on cytology, turned out to be a fibroadenoma on histopathology. The discordance in our case could probably be explained by the cytological atypia such as mild nuclear enlargement, crowding, overlapping, and distinct nucleoli in ductal and lobular epithelium that may be seen during the secretory phase of the menstrual cycle. Such situations could lead to diagnostic errors [15]. In this category, Mridha et al encountered a total of 13 cases. On histopathological examination, only four cases showed correlation. Among the nine discrepant cases, one fell into the category of carcinoma and eight turned out to be fibroadenomas i.e. lesions in the PBD category.

All these eight cases occurred in women in their 4th decade of life. A review of literature by them showed that fibroadenomas with atypia are found to be common in older age individuals. This could probably explain the high degree of discordance seen in this category of cases in their study.

In the carcinoma group (group-4) there were no discrepant cases either in our study or in the study conducted by Mridha et al. Nandini, Rekha and Manjunath from JSS University Mysore, evaluated the scoring system in cytological diagnosis and management of breast lesions.

In their study over a two year period, they evaluated 100 cases and applied the Masood scoring system with further modifications. They reduced the score of NPBD category from the original 6-10 range to 6-8 and included all the cases with 9-14 score in the PBD category. They claimed that this improved the diagnostic accuracy of various groups when correlated histopathologically [29]

Summary

Fine needle aspiration cytology is a well-established modality for the investigation of palpable breast lumps as well as non-palpable breast lesions detected on mammography [1]. The risk is 1.5- 2 fold in women with proliferative lesions without atypia, 4-5 fold in women with proliferative lesions with atypia, and 8-10 fold in women with carcinoma in situ. Histologic criteria that allow the distinction of these various proliferative lesions are established [1].

A number of articles that have been published on the cytology of PBD, taking cytological and nuclear features into consideration, such as those of Masood et al., Sneige et al, Frost, Thomas et al, Pandhey and Dzuira et al,. Of these, we have studied the criteria put forth by Masood et al. and modified by Mridha et al [29].

We have found that the 6 cytological parameters proposed by Masood et al, are useful for cytological scoring of breast lesions. Besides cytological and architectural findings, many workers found that the six parameters of Masood scoring have helped in diagnosis of these cases [29]. It is important to identify the PBDA group, as it most often leads to malignancy. There are cytological features which overlap between PBD without atypia, PBD with atypia and low-grade carcinoma of breast leading to diagnostic difficulties [29].

However in patients given an atypical diagnosis on FNAC, frozen section and surgical margin examination may be performed [1]. Use of scoring system can reduce the number of atypical reports and hence limit unnecessary procedures performed on patients [1].

Conclusion

Overall concordance is better when cytomorphology alone is correlated with histopathology. Overall concordance and discordance rates with MMSS were similar to that obtained in other studies. Concordance rates were better in PBD when evaluated with MMSS. No significant difference was seen in the other three categories.

Concordance rates were not significant in the PBDA category in both the studies and with both the scoring systems. MMSS is useful only in identifying PBD from PBDA. Though modifying the score for categorizing NPBD and PBD helped increase accuracy, discrepancies can still occur if the lesions are small or due to sampling errors, which is major limitation with FNA cytology.

This can be minimized by evaluating radiologically directed needle aspirations as they help localize lesions better. Our study includes only limited number of palpable breast lesions encountered over a period of 2yrs. Further studies on a large population of cases are needed to evaluate the efficacy of the Modified Masood Scoring System.

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