

Study of the Validity of Expanded Masood Cytologic Index for Breast Carcinoma

Dr.Divija.K¹, Dr.N.V.H.Rajesh Krishna², Dr.S.Vijayalakshmi³, Dr.B.H.Poorna Chandra Sekhar⁴,Dr.D.Nagendra Prasad⁵, DR.B.V.Sai Prasad⁶, Dr.A.Venkata Lakshmi⁷, Dr.B.Anuradha⁸

1(Resident, Department of Pathology, Sri Venkateswara Medical College, Tirupati,India.)

2,3.4.5.(Assistant Professor ,Department of Pathology, Sri Venkateswara Medical College, Tirupati,India.)

6(Associate Professor, Department of Pathology, Sri Venkateswara Medical College, Tirupati,India.)

7(Professor, Department of Pathology, Sri Venkateswara Medical College, Tirupati,India.)

8(Professor and Head, Department of Pathology, Sri Venkateswara Medical College, Tirupati,India.)

Corresponding author: Dr.NVH.Rajesh Krishna

Abstract: Carcinoma of the breast is one of the most common malignancy in women leading to cancer death FNAC of breast lesions has an established role in preoperative diagnosis and management of the patient. Expanded Masood cytologic index diagnoses and grades breast carcinoma into three grades which can be usefull so that neoadjuvant chemotherapy can be used judiciously, as neoadjuvant chemotherapy has gained more attention as primary medical treatment of breast carcinoma. The present study aims to evaluate the expanded Masood cytological grading system by comparing it with the Modified Bloom Richardson grading system on histopathology.

Keywords: fnac, breast carcinoma, Masood cytologic index

Date of Submission: 26-07-2019

Date of Acceptance: 12-08-2019

I. Introduction

In the female, palpable breast mass is a common problem, the majority of these are benign except carcinoma of the breast which is the leading cause of morbidity and mortality,^[1] with an estimated 11.6% of new cancer cases diagnosed in 2012 (25% Of cancers).^[2]

To diagnose breast lesions, a triple assessment approach consisting of clinical evaluation, imaging, and cytology are adopted.^[3] FNAC is the most cost-effective, easy, and quick technique of evaluating a lump in the breast. FNAC also assesses the nonpalpable lesions under radiological guidance.^[4]

Since treatment plans are frequently made preoperatively based on FNAC diagnosis and neo-adjuvant therapy has become more popular as primary medical treatment of breast cancer, this necessitates as much prognostic information should be gleaned from cytology specimens as possible by performing grading on aspirate^[5,6]. Evaluation of cytological tumour grade is quick, easy to perform, and correlates well with tissue nuclear grade^[7].

There are several grading methods to evaluate malignant lesions of the breast, but Masood Cytologic Index^[8] facilitates to evaluate and categorize all breast lumps into benign, borderline, and malignant groups. The expansion of MCI has further classified carcinoma cases into three grades.

II. Material and methods

In the present study, FNAC smears of breast lumps which were diagnosed as breast carcinoma are categorized into three grades based on Expanded Masood's Cytologic Index. This Expanded Masood's Cytologic Index was further evaluated by comparing with the gold standard Modified Bloom Richardson histopathological grading system. A cross-sectional observational study was done to evaluate the expanded Masood Cytologic Index for breast carcinoma during the study period from November 2016 to October 2018. A total of 42 breast carcinoma cases received during the study period were included in the study.

FNAC was done under standard aseptic conditions. The aspirates were smeared, fixed, and stained with Haematoxylin & Eosin stain. The smears diagnosed as breast carcinoma were graded according to the Expanded Masood's Cytologic Index. Corresponding formalin fixed mastectomy specimens were processed routinely, and multiple sections, each measuring 3-5 micron thickness were obtained and stained with Hematoxylin and Eosin. Microscopic features were evaluated and graded according to the Modified Bloom Richardson grading system. The Expanded Masood's Cytologic Index is evaluated by comparing with the Modified Bloom Richardson grade. Statistical analysis was done using the chi-square test and SPSS software. A p-value of less

than 0.05 was considered statistically significant. This study has got the approval of the institutional ethics committee

The Masood cytologic grading system^[3,9,10] : A precise and objective cytological scoring system to diagnose and distinguish proliferative breast disease was first proposed by Masood et al. They developed a cytological grading system for evaluating breast lump by assessing aspirates for the cellular arrangement, the degrees of cellular pleomorphism and anisonucleosis, presence of myoepithelial cells and nucleoli, and the status of the chromatin pattern. Masood et al. observed a high degree of concordance between the cytological and histological diagnoses and proposed the Masood's Cytologic Index^[3,9,11].

This system is designed for the distinction of benign and malignant aspirates and results in a score based on an evaluation of cellular arrangement, the degree of pleomorphism, the presence of myoepithelial cells, nuclear abnormalities, nucleoli, and overall chromatin pattern. This assigns a score of 6-24 for the FNAC smears of the breast and score of 19 – 24 corresponds to frank malignancy.^[9, 10]

Table 1: Masood Cytologic Index

| Masood cytologyScore | 1 | 2 | 3 | 4 |
|-----------------------|--------------------|---------------------|---------------------------|----------------------------|
| Cellular arrangement | Monolayered sheets | Nuclear overlapping | Clustering | Loss of cohesion |
| Cellular pleomorphism | Absent | Mild | Moderate | Conspicuous |
| Myoepithelial cells | Many | Moderate | Few | Absent |
| Anisonucleosis | Absent | Mild | Moderate | Conspicuous |
| Nucleoli | Absent | Micro nucleoli | Micro/rare macro nucleoli | Predominant micro nucleoli |
| Chromatin clumping | Absent | Rare | Occasional | Frequent |

Table 2: Masood Grading Score

| | |
|---------|---|
| 6-10 | Non-proliferative breast disease |
| 11-14 | Proliferative breast disease without atypia |
| 15-18 | Proliferative breast disease with atypia |
| 19 – 24 | Cain-situ& invasive carcinoma |

Further, an expansion of MCI was proposed by Rekha TS, Nandini NM, and Murali Dhar, wherein they have classified the carcinoma in situ and invasive cancer group of MCI into three grades, to target the neoadjuvant therapy to appropriate patients.^[9]

Expanded Masood Cytological Index

Table 3: Expanded Masood Cytologic Index

| | |
|-------------|----------------|
| Grade I : | Score 19 – 20 |
| Grade II : | Score 21 – 22 |
| Grade III : | Score 23 -- 24 |

III.Results

FNAC investigated a total of 212 breast lumps during the study period. Among them, 69 cases were diagnosed as breast carcinoma. Out of these 69 cases, modified radical mastectomy specimens were received for histopathological examination in only 42 cases, which were considered in the present study.

Expanded Masood Cytological Index: Applying the Expanded Masood Cytological Index, the FNAC smears of breast carcinoma were classified into three grades.

Table 4: Grading of Breast Carcinoma by Expanded MCI

| Grade | No of Cases | Percentage (%) |
|-------|-------------|----------------|
| I | 21 | 50% |
| II | 19 | 45.23% |
| III | 2 | 4.76% |

Table 5: Grading of Breast Carcinoma According to MBR Grade

| Grade | No of Cases | Percentage (%) |
|-------|-------------|----------------|
| I | 14 | 33.33% |
| II | 27 | 64.28% |
| III | 1 | 2.38% |

Table 6: Correlation of Expanded Masood Cytological Index and Modified Bloom Richardson Histological Grading:

| Grade | Expanded MCI | MBR Grade |
|-------|--------------|-----------|
| I | 21 | 14 |
| II | 19 | 27 |

| | | |
|-------|----|----|
| III | 2 | 1 |
| Total | 42 | 42 |

IV. Discussion

There are various cytological grading systems to assess breast aspirates, which categorize the malignant lesions of the breast into three grades. The advantage of MCI is, this index is applicable to all the aspirates of breast and categorizes them into non-proliferative breast disease, proliferative disease with atypia, proliferative disease without atypia and malignant lesions. The drawback of MCI is that the index did not grade the malignant group further into three grades which can be useful in assessing the prognosis and to plan the treatment strategies that include neoadjuvant chemotherapy. Hence the expansion of MCI was proposed by Rekha TS et al., so this index can be used to categorize all breast lesions and to further grade the malignant lesions.^[9] The expanded MCI was validated by comparing with MBR grading as the cases underwent excision surgery, and specimens were histopathologically examined. MBR grading system taken as the gold standard to validate the expanded MCI.^[9]

In the study done by Rekha TS et al, they estimated the concordance rate between Expanded MCI and MBR grading for individual grades as well as for overall grade.^[9] In their study among the 50 cases under study MBR grading system classified 14% of cases as Grade I carcinoma, 54% of cases as Grade II and remaining 32% as Grade III. The entire Grade I carcinomas were classified as Grade I by the Expanded MCI with a concordance rate of 100%. Similarly, for Grade II, Grade III, the concordance rates were 85% and 81%, respectively.^[9] This shows that the performance of Expanded MCI appears to be almost perfect for early carcinomas and is useful for advanced carcinoma.

In the present study out of the 42 smears, MBR grading system classified 33.33% of cases as Grade I, 64.28% as Grade II and remaining 2.38% as grade III. Among the grade I carcinomas 85.71% cases were classified as Grade I by expanded MCI with 85.71% concordance rate. Similarly, for Grade II tumours and Grade III tumours the concordance rates were 62.96% and 100% respectively.

The overall concordance rate in the present study is 71.42% by comparing the EMCI of FNAC and MBR grading system on histopathology. Rekha and authors in their study observed an overall concordance rate of 86%.^[9]

Table 8: Comparison of Concordance between the studies using EMCI

| | Present Study | Rekha TS, Nandin NM and Murali Dhar Study ⁽⁶⁾ |
|----------------------------|---------------|--|
| Grade I | 85.71% | 100% |
| Grade II | 62.96% | 85% |
| Grade III | 100% | 81% |
| Overall Concordance | 71.42% | 86% |

In a study done by Cherath SK and Chithrabhanu SM, all the breast lumps were categorized into four groups using MCI. In their study, expansion of MCI was not used to categorize the carcinoma cases into three grades. 87 cases diagnosed as carcinoma on cytology by MCI were compared with the histopathology diagnosis; all the cases were diagnosed as malignant in histopathology with a concordance rate of 100%.^[11] The overall diagnostic accuracy of MCI in their study was 97.5 %, with a sensitivity of 94.5% and specificity of 100%. The positive and negative predictive values were 100% and 95.83% respectively.^[11]

In a study done by Nandini NM, Rekha TS and Manjunath GV at a tertiary care hospital in Mysore, among the 100 cases under study 30 cases were diagnosed as carcinoma with a score ranging from 19-24 by applying the MCI; all these cases were in concordance when correlated with the histopathological diagnosis.^[12]

In the present study also all the cases had a score ranging from 19-24 which categorizes all the lesions into carcinoma group of MCI, and all these cases were confirmed to be malignant by histopathology with 100% concordance, which is in concordance with the above studies.

Pearson Chi-Square test is used to test the association between two categorical variables. p-value <0.05 implies significant association. In the present study comparing Expanded MCI with MBR grading system, Pearson Chi-Square test obtained a p-value of 0.021. This implies that there is a significant association between the two grading systems.

Table 8: Comparison of EMCI Concordance Rates with Other Studies

| S.No. | Authors | Concordance Percentage |
|-------|-------------------------------|------------------------|
| 1. | Rekha et al. ^[9] | 86% |
| 2. | Masood et al. ^[13] | 85% |
| 3. | Mridha et al. ^[14] | 86% |
| 4. | Present Study | 71.42% |

V. Conclusion

A simple FNAC based grading system of breast lesions is a useful tool in the prognostication and prediction of the behavior of breast carcinomas. The Expanded Masood's Cytologic Index is a reliable and reproducible system, which can assist the cytologist in classifying all the breast aspirates into various categories from benign to malignant and further grades malignant lesions of the breast efficiently. Thus, this newly proposed grading system helps in prognostication and treatment strategies. Thus it is concluded that assigning a cytological grade in breast carcinoma aspirates done with little effort is reproducible, correlates precisely with histological grade and permits determination of aggressiveness of breast carcinoma. It is a useful parameter to be taken into consideration when selecting a mode of therapy for breast carcinoma and to predict tumour behaviour.

References

- [1]. Arul P, Masilamani S. Application of National Cancer Institute recommended terminology in breast cytology. *J Can Res Ther* 2017;13:91-6.
- [2]. Breast Cancer Estimated Incidence, Mortality and Prevalance Worldwide in 2012. *Globacon 2012 (IARC)*, section of cancer surveillance(13/7/2018)
- [3]. Rekha TS, Nandini NM. Evaluation of Breast Neoplastic Lesions by Different Cytology Grading Methods. *Science Journal of Clinical Medicine. Special Issue: Latest Different Concepts of Gynaecology. Vol. 4, No. 4-1, 2015, pp. 26-30.* doi: 10.11648/j.sjcm.s.2015040401.17
- [4]. Muddegowda PH, Lingegowda JB, Kurpad M, Konapur PG, Shivarudrapa AS, Subramaniam PM. The value of systemic pattern analysis in FNAC of breast lesions: 225 cases with cytohistological evaluation. *J Cytol* 2011;vol 28,issue 1:13-19.
- [5]. Srivastava P, Kumar B, Joshi U, Bano M. To evaluate the applicability of parameters of cytological grading systems on aspirates of breast carcinoma. *J Cytol* 2018;35:15-21.
- [6]. Mouriquand J, GozlanFior M, Villemain D, Bouchet Y, Sage JC, Mermet MA, et al. Value of cytoprognostic classification in breast carcinomas. *J ClinPathol* 1986;39:489-96.
- [7]. Bansal C, Pujani M, Sharma KL, Srivastava AN, Singh US. Grading systems in the cytological diagnosis of breast cancer: A review. *J Can Res Ther* 2014;10:839-45.
- [8]. Masood S, Frykerberg ER, McLellan GL, Scalapino MC, Mitchum DG, Bullard JB. Prospective evaluation of radiologically directed fine needle aspiration biopsy of nonpalpable breast lesions. *Cancer* 1990;66:1490-7.
- [9]. Rekha TS, Nandini NM, Dhar M. Expansion of Masood's cytologic index for breast carcinoma and its validity. *J Cytol* 2013;30:233-6.
- [10]. Ravikumar G, Rout P. Comparison of cytological versus histopathological grading of invasive ductal carcinoma of the breast with correlation of lymphnode status. *Middle East J Cancer* 2015;6:91-6.
- [11]. Cherath SK, Chithrabhanu SM. Evaluation of Masood's and Modified Masood's Scoring Systems in the Cytological Diagnosis of Palpable Breast Lump Aspirates. *Journa of Clinical and Diagnostic Research* 2017 Apr. Vol 11(4);ECO6-EO10.
- [12]. Nandini NM, Rekha TS, Manjunath GV. Evaluation of scoring system in cytological diagnosis and management of breast lesion with review of literature. *Indian Journal of Cancer* 2011;48:240-245.
- [13]. Masood S. Cytomorphology of fibrocystic change, high-risk proliferative breast disease, and premalignant breast lesions. *Clin Lab Med* 2005;25:713-31.
- [14]. Mridha AR, Iyer VK, Kapila K, Verma K. Value of scoring system in classification of proliferative breast disease on fine needle aspiration cytology. *Indian J PatholMicrobiol* 2006;49:334-40.

Dr.NVH.Rajesh Krishna. "Study of the Validity of Expanded Masood Cytologic Index for Breast Carcinoma." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 8, 2019, pp 60-63.