

Mucinous Carcinoma of Breast: Clinicopathological and Immunohistochemical Analysis

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Abstract

Introduction: Mucinous carcinoma (MC) is a rare form of breast cancer. It accounts for 1 to 7% of the cases and characterized by the presence of extracellular mucin (ECM). Mucinous breast carcinoma (MC) is a special type of breast cancer that presents with a large amount of extracellular mucin. MC comprises approximately 4% of all invasive breast cancers. This type of tumor has a better prognosis and higher incidence in peri- and postmenopausal patients. Pathologically, there are two main subtypes of MC: pure and mixed.

Aims and Objectives: To study the Clinicopathological and Immunohistochemical features of Mucinous Carcinoma Breast.

Materials and Methods: We present our 2-year study in the Department of Pathology, Patna Medical College & Hospital, Patna, Bihar, India on mucinous carcinoma of breast. Patients diagnosed with Pure MC and Mixed MC according to WHO classifications of tumors of breast 2012 were studied. Specimens were routinely processed and stained with Hematoxylin and eosin.

Results: In the present study, we identified 40 patients 37 female and 03 male patient with mixed and pure mucinous breast carcinoma. The patient age ranged from 30 to 78 years with mean age at presentation was 55.9 years.

Conclusion: Majority of the Pure MC did not show evidence of secondary deposit, whereas 50% cases of Mixed MC show secondary deposit. Most of cases of pure mucinous and mixed mucinous showed hormone receptor positivity.

Keywords: Mucinous, pure, mixed carcinoma, breast carcinoma.

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Introduction

The incidence of breast cancer is increasing globally. It is the leading cause of cancer death among females in India. The age adjusted incidence is 25.8 per 1, 00,000 population. Invasive carcinoma not otherwise specified (IDC-NOS) and lobular

carcinoma are the most common histological subtypes. Mucinous carcinoma (MC) is an uncommon histological subtype and accounts for 1 to 7% of all breast carcinomas. It is characterized by the presence of extracellular mucin (ECM)

material. In comparison to most common subtypes, MC has better prognosis. Depending on the amount of ECM, MC is classified into pure mucinous carcinoma (PMC) and mixed mucinous carcinomas (MMC). PMC has mucinous component of > 90%, usually confined to stage I and II, positive for hormonal receptors and less chance of metastasis in comparison to IDC. [1, 2, 3, 4]

Breast cancer is the second leading cause of death in Indian women. It has different histologic types that reflect not only histologic features but also clinical and biological aspects.

Mucinous breast carcinoma is a rare I type of breast cancer, presenting with a large amount of extracellular mucin [5]it is divided into 2 main subtypes, the pure type and the mixed type [6]. The distinction between these subtypes is based upon the quantification of cellularity. The mucoid component varies between 30% to over 90% of the tumor.

An explicit percentage necessary to diagnose mucinous carcinoma is currently not clearly settled. Most pathologists agree that a diagnosis of pure mucinous breast carcinoma should be reserved for tumors with at least 90% mucinous component. The pure type consists almost exclusively of tumor tissue with extracellular mucin production, while the mixed subtype also contains an invasive ductal epithelial component without mucin [7]

PMC may be subtyped into a hypocellular variant (PMC-A), showing a tubular, cribriform, cord-like, micropapillary or papillary growth pattern, and a hypercellular variant (PMC-B), growing in solid nests [8]. Conventionally, PMC exhibits a metastasis rate of less than 15% [9] and has a better prognosis than invasive breast carcinoma of no special type [10].

Pure mucinous breast carcinoma is an uncommon histologic type of mammary tumor, representing 2% of all breast's malignant neoplasms. It has a better prognosis than invasive breast carcinoma of no special type. Some mucinous breast carcinomas (mainly mixed type) are associated with lobular or ductal neoplasia (in situ or invasive), and some have neuroendocrine differentiation. [11]

Material and Methods:

A two-year period from April 2019 to April 2021 retrospective study in the Department of Pathology, Patna Medical College & Hospital, Patna, Bihar, India

Methodology

Retrospective review of our own data base of patients diagnosed with breast carcinoma were reviewed and the demographical data and clinicopathological data of Mucinous carcinoma of Breast were analyzed according to WHO classification of tumors of breast 2012 were studied [12].

Results:

In the present study, we identified 40 patients 37 female and 03 male patient with mixed and pure mucinous breast carcinoma. The patient age ranged from 30 to 78 years with mean age at presentation was 55.9 years. All the patients had a palpable mass in their breast. All 37 female patients underwent modified radical mastectomy (Table 1 & 2). The tumor size varied greatly from 2 to 11 cm in diameter (size was T1 in 8 patients, T2 in 13 patients, T3 in 9 patients. No distant metastases were identified. 7 cases were stage I, 9 were stage II and 12 were stage III (Table 3).

Immunohistochemistry with ER, PR and Her 2NEu was done in all cases of present study. Synaptophysin and chromogranin were used in cases showing neuroendocrine differentiation for confirmation. (Table 4)

Table 1: Gender distribution of cases

	Pure MC	Mixed MC
Male	2 (5.0%)	1 (2.5%)
Female	12 (30%)	25 (62.5%)
Total	40	

Table 2: Age distribution of cases

Age	No of cases	
	Pure MC	Mixed MC
10-19	-	-
20-29	-	-
30-39	3	5
40-49	3	2
50-59	2	10
60-69	5	8
70-79		2
TOTAL	13	27

Table 3: Clinicopathological Characteristics

	PURE MC (No of cases)	Mixed MC (No of cases)
T1 (<2 cm)	3	5
T2 (2-5 cm)	6	7
T3 (>5 cm)	1	8
T4 (Extension to chest wall / skin)	-	-
Nodal status positive	4	9
pNo	8	7
pN1	2	9
pN2	2	8
pN3	-	4
Stage (TNM)		
I	5	2
II	2	7
III	4	8
IV	0	0

Table 4: Hormone receptor status of Mucinous carcinomas

	ER (No of cases)		PR (No of cases)		Her 2neu (No of cases)	
	Positive	Negative	Positive	Negative	Positive	Negative
Pure MC	5	11	7	9	9	5
Mixed MC	10	9	7	12	4	8

Discussion:

The Clinicopathological features and hormone receptor status was studied in all

the 25 cases of mucinous carcinoma of present study.

In the present study mean age of pure mucinous carcinoma is 54.2 and mixed mucinous carcinoma is 51.6 which is in

concordance with the studies of Erhan *et al.* [13] and Renade *et al.* [14]

The mean tumor size for pure mucinous carcinoma in our study is 4.75cm and for mixed is 3.1 cm, both which come under T2. This is in par with the tumor size of studies of Renade *et al.* [14] Erhan *et al.* [13] and lie *et al.* [7] all of which presented with T2. The lesser size at presentation of mucinous carcinoma and hence the stage is associated with good prognosis.

Cytological diagnosis of MC is challenging. From the observation of our study and on review of the literature, the key cytological features of PMC were mucinophages, SRC, and MVF with paucicellular, bland looking cells in the background of mucinous material. In contrast, MMC will have tumor cells with mild to moderate pleomorphism with cells in sheets and clusters. SRC, mucinophages, and MVF were rarely observed. [15-17]

The presence of mucin is a favorable prognostic factor. It forms a container for the tumor cells and decreases the mobility of tumor cells leading to less metastasis. It has also been documented that MCs with high expression of MUC2 are having less lymphovascular invasion and lymph node metastasis. [18] Bae *et al* [19] observed that nodal status and adjuvant therapy are better prognostic markers.

ER PR positivity for pure type is 83% and Her2neu is 66% in the present study which is in par with the studies of Renade *et al.* and Bon pan *et al.* [20] Mixed type showed ER75%, PR 100% and Her2neu 50%. These values correlated with studies of Erhan *et al.* and Bon pan *et al.* Higher percentage positivity with hormone receptors is seen in our study which indicates good prognosis for mucinous carcinoma.

Conclusion:

Majority of the Pure MC did not show evidence of secondary deposit, whereas

50% cases of Mixed MC show secondary deposit. Most of cases of pure mucinous and mixed mucinous showed hormone receptor positivity. Pure mucinous carcinoma accounted largest group and are seen at a younger age when compared to mixed mucinous carcinoma. Almost all the cases presented in stage p T2.

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