Mucinous Breast Cancer: a Review Study of 5 Year Experience from a Hospital-Based Series of Cases

Adrian DUMITRUa; Alexandru PROCOPa; Andreea ILIESIUb; Mircea TAMPAb; Luminita MITRACHEa; Mariana COSTACHEb; Maria SAJINb; Anca LAZAROIUb; Monica CIRSTOIUb

a Department of Pathology, Emergency University Hospital, Bucharest, Romania
b Department of Pathology, Emergency University Hospital, “Carol Davila” University of Medicine and Pharmacy, Bucharest, Romania
c Department of Obstetrics-Gynecology, Emergency University Hospital, Bucharest, Romania
d Department of Dermatology, “Victor Babes” Hospital for Infectious and Lung Diseases, Bucharest, Romania

ABSTRACT

Background: Mucinous carcinoma (also known as colloid carcinoma) is a particular type of breast cancer characterized by the presence of extracellular mucin and is linked with a more favorable prognosis than invasive breast carcinoma of no special type. Mucinous carcinoma of the breast is an uncommon form of breast tumor, often presenting as a lobulated, moderately well circumscribed mass on mammography, sonography, and MRI imaging. It accounts for 1 to 7% of all breast cancers. Pure mucinous breast carcinomas are rare and account for about 2% of all primary breast carcinomas. Metastatic disease happens at a lower rate than in other types of invasive carcinoma.

Methods: We present our 5 year experience with this particular pathology in a retrospective review study.

Results: We identified 25 patients with mixed and pure mucinous breast cancer, the tumor size varied greatly from 2 to 19 cm in diameter. A subset of mixed mucinous carcinomas (8 cases) showed neuroendocrine differentiation or other associated premalignant lesions.

Conclusion: Mucinous carcinoma of the breast is a rare entity with a favorable prognosis due to low incidence of lymph node metastases. Pure mucinous breast carcinoma has an even rare.

Keywords: breast, mucinous carcinoma, neuroendocrine differentiation

Address for correspondence:
Anca Lazaroiu, Department of Pathology, Emergency University Hospital, 169 Splaiul Independentei, 5th District, Bucharest, Romania.
E-mail: eldarlight@yahoo.com.

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INTRODUCTION

Breast cancer is the first leading malignancy in Romanian women. It has different histologic types that reflect not only histologic features but also clinical and biological aspects. Mucinous breast carcinoma is a special type of breast cancer, presenting with a large amount of extracellular mucin. It is divided into 2 main subtypes, the pure type and the mixed type (1). 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 (3). 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. Pure mucinous breast carcinoma is an uncommon histologic type of mammary tumor, representing 2% of all breast malignant neoplasms (2). It has a better prognosis than invasive breast carcinoma of no special type (3,4).

Some mucinous breast carcinomas (mainly mixed type) are associated with lobular or ductal neoplasia (in situ or invasive) and some have neuroendocrine differentiation (5). Mucinous breast carcinoma associated with lobular neoplasia components seems to be a biologically distinct subset that frequently shows decreased cell to cell adhesion, loss of cell polarity molecules and lack of neuroendocrine differentiation.

The purpose of this paper is to show the last 5-year experience of the Department of Pathology of the Emergency University Hospital of Bucharest regarding mucinous breast carcinoma with its histological and immunohistochemical particularities.

METHODS

A 5-year period (January 2010 - September 2014) retrospective review of our own database of patients diagnosed with breast cancer was performed. The medical records of 25 patients with invasive mucinous breast cancer who underwent surgery were reviewed. The data collection and processing were made through Microsoft Office Excel 2010. We evaluated demographic (age at diagnosis), clinical data, surgical treatment and pathological findings.

RESULTS

We identified 25 patients with mixed and pure mucinous breast cancer. All patients were postmenopausal women at the time of diagnosis. The mean age at presentation was 62.3 (range 47–83) years. 23 (92%) patients had a palpable mass in their breast and the remaining 8% of the patients were diagnosed after mammographic examination. The laterality of the lesions was left-sided in 15 (60%) patients and right-sided in 10 (40%) patients. 21 patients underwent modified radical mastectomy; 4 underwent breast-conserving therapy. All patients underwent axillary node dissection.

The tumor size varied greatly from 2 to 19 cm in diameter (size was T1 in 3 patients, T2 in 16 patients, T3 in 5 patients and T4 in one case). 5 patients had lymph node metastases. No distant metastases were identified. 4 cases were stage I, 9 were stage II and 12 were stage III.

All these clinical features are summarized in Table 1. On gross examination, the majority of specimens were well circumscribed, bosselated and had a relatively soft consistency due to sparse fibrous stroma and on cut section showed mucoid material separated by delicate septae and characteristic gelatinous and glistering appearance. In 4 cases the nipple was retracted and in one patient the tumor had direct skin extension and showed marked ulceration and focal areas of necrosis (Figure 1).

On microscopic examination we identified 22 cases of mixed type mucinous breast cancer accompanied by an intraductal or invasive component (ductal or lobular) noted generally at the periphery of the lesion. In situ component had a papillary, micropapillary or cribriform pattern. In some cases, in situ carcinoma showed prominent extracellular mucin production. We also diagnosed 3 cases of “pure” mucinous breast carcinoma (hypocellular/paucicellular variant - Figure 2).

The microscopic features were small clusters or individual uniform epithelial cells with mild to moderate nuclear atypia, prominent nuclei, vesicular nucleoli and moderate amount...
MUCINOUS BREAST CANCER: A REVIEW STUDY OF 5 YEAR EXPERIENCE FROM A HOSPITAL-BASED SERIES OF CASES

Deli cate bands of fibrovascular connective tissue were often present within the mucus lakes. The cell clusters floating in the mucus may be solid, micropapillary or form secondary lumina. 2 cases of „pure“ mucinous carcinoma had dystrophic calcifications and rare psammomato us-type calcifications. One case of mixed mucinous breast carcinoma with invasive lobular neoplasia showed a great amount of discohesive cells, some with signet-ring features. In the same case we noted marked tumoral angiogenesis (Figure 3), with lymphatic, vascular and perineural invasion.

A subset of mixed mucinous carcinomas (8 cases) showed neuroendocrine differentiation defined by cytoplasmic argyrophilia or immunoreactivity to markers such as synaptophysin (Figure 4), chromogranin and neuronal specific enolase.

In 5 cases we noticed metastases in the axillary lymph nodes, none of which from patients with „pure“ mucinous breast carcinoma.

DISCUSSION

Mucinous carcinoma of the breast is rarely seen in clinical practice, comprising approximately 4% (range 1% to 7%) of all invasive breast cancers (2, 4, 5). This type of tumor has better prognosis (90% survival at 10 years) and higher incidence in perimenopausal and postmenopausal age groups (6). The incidence of mucinous breast cancer in women under 35 years of age is less than 1% (4).

Mucinous breast cancer is a slow-growing neoplasm; with an estimated growth rate of one third of invasive breast cancer no special type. This malignancy also shows fewer axillary lymph node metastases. Conventional, pure mucinous carcinomas exhibit a rate of metastasis of less than 15% (9). Although an exact percentage necessary to diagnose mucinous carcinoma is not clearly established, currently most agree a diagnosis of a pure mucoid, paucicellular carcinoma should be reserved for tumors with at least 90% mucinous component. It is important to clearly distinguish pure mucinous carcinomas from “mixed” mucinous carcinomas, the latter containing a mixture of mucinous and non-mucinous components because the prognosis of pure mucinous carcinoma seems to be better.

The overall survival rate of patients with mucinous carcinoma varies little from age-matched individuals within the general population.
Current studies (8) have shown that a subset of patients diagnosed with mucinous carcinoma do not manifest such favorable outcomes. Some authors suggested that specific subtypes of pure mucinous carcinoma – those with a micropapillary pattern – demonstrate significantly worse prognosis. In the study of Barbashina et al (8), more than half of the patients with this particular type of pattern were found to have vascular invasion and synchronous axillary lymph nodes (8,9).

Tumor size in the staging system may not be a significant factor because mucin comprises the majority of the tumor volume (11).

A subset of mucinous breast carcinomas shows neuroendocrine differentiation as defined by cytoplasmic argyrophilia or immunoreactivity to markers such as synaptophysin, chromogranin and neuronal specific enolase (10,11). Although in one study neuroendocrine differentiation was associated with a favorable histology and a good outcome (12) others did not find this association (13,14).

Mucinous breast carcinoma associated with a lobular component appears to be a biologically distinct subset that frequently shows decreased cell to cell adhesion, loss of cell polarity molecules and lack of neuroendocrine differentiation. Also in this subset of tumors, the neoplastic cells with signet-ring features are most likely to be found.

Albeit rare, calcifications seen in conjunction with mucinous tumors frequently correspond to the invasive ductal component of the cancer in a mixed mucinous tumor (7).

The primary protocol of treatment in patients suffering from mucinous breast carcinoma is surgery with post-operative adjuvant treatment: radiotherapy, chemotherapy, endocrine therapy. Adjuvant endocrine therapy is indicated for hormone responsive tumors (9). Almost all mucinous carcinomas are estrogen- and/or progesterone-receptor positive, which means that hormonal therapy is likely to be an effective treatment (15). Mammographic screenings enable early stage cancer detection, which leaves the possibility of introducing breast-conserving treatment.

CONCLUSION

Mucinous carcinoma of the breast is a rare entity with a favorable prognosis due to low incidence of lymph node metastases. Pure mucinous breast carcinoma has an even lower incidence, small tumor size, benign lesion-like features, low axillary lymph node metastases, low grade, low recurrence rate and higher survival rate.

Larger data samples with longer follow-up are necessary to achieve an improved understanding of this particular tumor.

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