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Pure Mucinous Carcinoma of the Breast: A Case Report

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Abstract **Case Report**

Mucinous carcinoma of the breast is a rare special histological subtype of invasive breast carcinoma. The pure form is generally characterized by low-grade morphology, hormone receptor positivity, HER2 negativity, and a favorable clinical outcome. We report the case of a 55-year-old postmenopausal woman with no significant personal medical history and a maternal history of breast cancer who presented with recent-onset erythema and progressively worsening pain in the right breast. Clinical examination revealed a firm, mobile mass in the lower outer quadrant with overlying peau d'orange changes. Breast ultrasonography showed a 30 × 22 mm lobulated lesion classified as BI-RADS 4B. Core needle biopsy demonstrated pure mucinous carcinoma, with a mucinous component exceeding 90%, Nottingham grade 1, no lymphovascular or perineural invasion, estrogen and progesterone receptor positivity, HER2 negativity, and a low Ki-67 index, consistent with a luminal A phenotype. Staging investigations showed no distant disease. Following multidisciplinary discussion, breast-conserving surgery with sentinel lymph node assessment was planned, with adjuvant radiotherapy and endocrine therapy to be considered according to the final surgical pathology. This case highlights the clinical, imaging, and pathological features of pure mucinous carcinoma and provides an opportunity to discuss its current management in light of recent literature.

Keywords: Mucinous carcinoma; breast; pure mucinous carcinoma; luminal A; breast-conserving surgery; endocrine therapy.

INTRODUCTION

Mucinous carcinoma is a rare special type of invasive breast carcinoma, accounting for approximately 1%–4% of invasive breast cancers. It occurs predominantly in postmenopausal women and is generally associated with indolent biological behavior and a favorable prognosis. The 2026 sixth edition of the WHO Classification of Breast Tumours retains mucinous carcinoma as a distinct entity and emphasizes the combination of mucinous morphology, low-to-intermediate histological grade, and a favorable biomarker profile in establishing the diagnosis. [1,2]

Mucinous carcinoma is conventionally divided into pure and mixed forms. Pure mucinous carcinoma is defined by extracellular mucin comprising more than 90% of the tumor, whereas mixed tumors contain a substantial non-mucinous invasive carcinoma component. This distinction has clinical relevance because mixed tumors generally behave more like invasive breast carcinoma of no special type, whereas pure tumors are associated with lower rates of nodal involvement and a more favorable outcome. [1–3]

Imaging may suggest the diagnosis but cannot reliably distinguish mucinous carcinoma from benign or other malignant breast lesions. On ultrasound, pure mucinous carcinoma commonly appears as a circumscribed, lobulated, iso- to hypoechoic mass with posterior acoustic enhancement, reflecting its abundant extracellular mucin. Definitive classification requires histopathological assessment, supported when appropriate by immunohistochemistry. [3,4]

We report the case of a 55-year-old woman with pure mucinous carcinoma of the right breast and discuss the main diagnostic and therapeutic considerations in light of contemporary literature.

CASE PRESENTATION

A 55-year-old postmenopausal woman with no significant personal medical history presented with recent-onset erythema of the right breast associated with

intermittent pain that had progressively intensified over approximately one month. Her mother had previously been treated for breast cancer but had not undergone surgery.

Physical examination revealed an approximately 4 cm mass in the lower outer quadrant of the right breast. The lesion was painful, firm, and mobile relative to both the superficial and deep planes. The overlying skin was congestive with peau d'orange changes. There was no nipple discharge. The left breast and regional lymph node areas were clinically unremarkable.

Breast ultrasonography demonstrated a well-circumscribed, rounded and lobulated nodular lesion in the lower outer quadrant of the right breast, measuring 30 × 22 mm. The lesion had mixed echogenicity, ranging from iso- to markedly hypoechoic, with prominent posterior acoustic enhancement and moderate central and septal vascularity. No suspicious axillary lymph nodes were identified. The lesion was classified as BI-RADS 4B.

Core needle biopsy demonstrated pure mucinous carcinoma, with a mucinous component exceeding 90%. The tumor consisted of relatively bland epithelial cell clusters and trabeculae floating within abundant pools of extracellular mucin (Figures 1 and 2). The tumor was Nottingham grade 1, with no lymphovascular or perineural invasion identified.

Immunohistochemical analysis showed positivity for estrogen and progesterone receptors, HER2 negativity, and a low Ki-67 proliferation index. CK7 was positive and CK20 was negative, supporting a breast primary in the appropriate clinicopathological context. Overall, the findings were consistent with a luminal A phenotype.

Clinical staging was cT2N0. Thoracoabdominopelvic CT and bone scintigraphy showed no evidence of visceral or osseous metastatic disease. The tumor was therefore classified as cT2 cN0 cM0, corresponding to an anatomic stage IIA.

The case was discussed at a multidisciplinary tumor board. Breast-conserving surgery with sentinel lymph node assessment was planned. Adjuvant radiotherapy and endocrine therapy for at least 5 years were to be considered according to the definitive surgical pathology and the patient's overall risk profile.

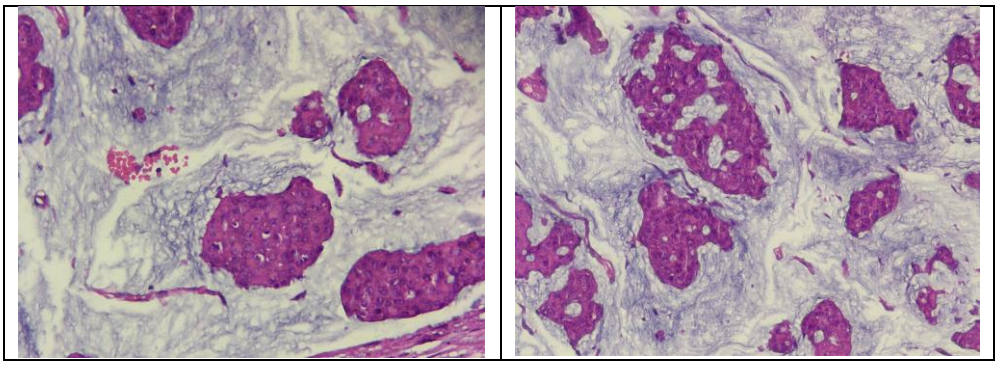

Figure 1: High-power view (×400) showing tumor cells with moderate cytological atypia, irregular nuclei, and occasional nucleoli

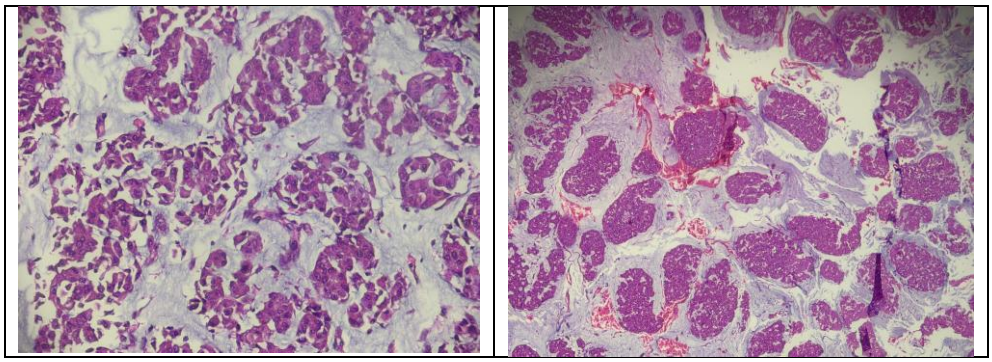

Figure 2: Low- and medium-power views showing carcinoma cells arranged in nests and trabeculae within abundant mucinous stroma

DISCUSSION

Epidemiology and Clinical Presentation

Mucinous carcinoma accounts for a small proportion of breast cancers, with reported frequencies of approximately 1%–4%. It occurs predominantly in postmenopausal women. In the present case, the patient's age and menopausal status were consistent with the usual epidemiological profile. The clinical presentation is most

often a palpable mass, although imaging-detected lesions are also common. Cutaneous inflammatory changes, as observed in our patient, are less characteristic and should not be considered specific for this histological subtype. [3,5]

Imaging Findings

On ultrasound, pure mucinous carcinoma is often a well-circumscribed or lobulated mass with iso- to hypoechoic echogenicity and posterior acoustic enhancement. The imaging appearance may overlap with benign lesions, particularly when the margins are well defined. In our patient, the lobulated morphology, mixed echogenicity, posterior enhancement, and vascularity led to a BI-RADS 4B assessment and prompted tissue diagnosis. These findings are broadly consistent with the radiologic-pathologic characteristics described in recent imaging reviews. [3,4]

Histopathology and Immunohistochemistry

The diagnosis is fundamentally histopathological. Pure mucinous carcinoma is characterized by abundant extracellular mucin surrounding relatively uniform tumor cells, with mucin accounting for more than 90% of the invasive component. In contrast, mixed mucinous carcinoma contains a significant conventional invasive carcinoma component. The distinction is important because the two forms have different biological and prognostic profiles. [1–3]

A relevant diagnostic consideration is the presence of micropapillary architecture in some mucinous carcinomas. Such tumors should not be equated automatically with conventional pure mucinous carcinoma because micropapillary differentiation has been associated with a greater risk of lymph node involvement and less favorable disease-free survival. Careful examination of the definitive surgical specimen is therefore important when assessing tumor architecture and determining prognosis. [6]

Management

Surgical management is generally guided by the same principles applied to other early-stage hormone receptor-positive breast cancers. Breast-conserving surgery is appropriate when technically feasible and oncologically safe, followed by adjuvant radiotherapy according to standard indications. Axillary management should be individualized according to tumor characteristics and contemporary breast cancer guidelines ; in clinically node-negative invasive disease, sentinel lymph node assessment remains commonly performed. [3,7]

The role of chemotherapy is less clear and should be individualized. The generally favorable biology of pure mucinous carcinoma, together with its low proliferative activity and low rate of nodal involvement, means that many patients may not derive a meaningful benefit from cytotoxic chemotherapy. Conversely, chemotherapy should not be dismissed solely on the basis of histological subtype when unfavorable pathological or clinical features are present. Recent retrospective data have also suggested limited chemosensitivity of mucinous carcinoma in the neoadjuvant setting, although the available evidence remains limited by the rarity of the disease. [5,8]

Prognosis

The prognosis of pure mucinous carcinoma is generally favorable compared with invasive breast carcinoma of no special type. Reported outcomes vary among series according to tumor size, nodal status, histological grade, and the proportion of pure versus mixed disease. The favorable outcome observed in many patients is consistent with the low-grade morphology, hormone receptor positivity, and low frequency of nodal involvement characteristic of pure tumors. [3,5]

CONCLUSION

Pure mucinous carcinoma of the breast is an uncommon but well-defined special histological subtype of invasive breast carcinoma. Its diagnosis requires careful integration of morphology, the proportion of extracellular mucin, and immunohistochemical findings. The typical luminal phenotype and favorable biological behavior generally support a conservative therapeutic approach, with endocrine therapy playing an important role in hormone receptor-positive disease. However, the favorable prognosis should not be assumed in every mucin-producing breast carcinoma. Careful assessment for mixed components and other architectural patterns, including micropapillary differentiation, remains essential for accurate risk stratification. Recent updates to the WHO classification and contemporary pathological reviews further emphasize the need for precise morphological diagnosis. [1,2,5,6]

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