Case Report

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Mucinous Breast Carcinoma Presenting as a Coarse and Densely Calcified Mass on Mammography: A Case Report

유방촬영술에서 거친 석회화 종괴로 관찰된 점액 유방암: 증례 보고

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We report herein a 46-year-old woman who presented with mucinous breast carcinoma that appeared as a coarse and densely calcified mass on mammography. The lesion was a 4.6-cm-sized palpable, hyperechoic, calcified mass with posterior shadowing on ultrasonography. This finding is a unique feature of mucinous breast carcinoma and is also observed in unusual breast cancer variants such as metaplastic breast cancer with chondroid differentiation, extraosseous osteosarcoma, and breast chondrosarcoma. The lesion showed a slow-growing pattern throughout the 4-year observation period. Mammography performed 4 years ago revealed faint, grouped microcalcifications; the lesion increased in size over 2 years, presenting as a well-circumscribed, calcified mass, mimicking dystrophic calcification. As several unusual variants of breast cancer, including mucinous carcinoma, may present as coarse and densely calcified masses on mammography, immediate biopsy should be considered when they are observed.

Index terms Breast; Cancer; Adenocarcinoma, Mucinous; Mammography

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INTRODUCTION

Mucinous breast carcinoma is a rare histological subtype of invasive ductal carcinoma (IDC), accounting for 1–7% of all breast carcinomas (1), and it is also known as mucoid, colloid, mucous, or gelatinous tumor carcinoma (2). Mucinous carcinoma is characterized by the presence of extracellular epithelial mucin that surrounds neoplastic

cells (3). Mucinous breast carcinoma has a favorable prognosis and an excellent long-term survival rate (4). This can be explained by the following factors: lower incidence of nodal involvement, favorable histological grade, and high estrogen receptor (ER) and progesterone receptor (PR) expression levels (1). A typical radiologic feature of mucinous carcinoma is a well-circumscribed hyperechoic or isoechoic mass that is rarely accompanied by calcifications (5, 6).

Here, we report about a patient with a rare imaging feature of mucinous breast carcinoma that presented as a slow-growing, well-defined, coarse and densely calcified mass.

CASE REPORT

A 46-year-old woman visited our institute for treatment of a newly diagnosed cancer of the left breast. She had a slow-growing palpable lump for over 2 years. Mammography revealed an irregularly shaped, circumscribed, hyperdense mass containing coarse and dense calcifications in the left lower outer breast.

Mammography performed 4 years ago at a different institute revealed that the lesion began as a grouped microcalcification with a punctate or amorphous pattern, and the calcification increased in both size and density after 2 years. This lesion might have been considered a benign, dystrophic calcification. After 2 years, the patient presented with a palpable lump in the left breast, and mammography revealed a 5.0-cm-sized mass with dense and coarse calcification (Fig. 1A). An ultrasonography revealed an irregular-shaped, circumscribed hyperechoic mass with posterior acoustic shadowing that occurred because of dense calcification. Color Doppler imaging revealed no tumor vascularity (Fig. 1B). Dynamic contrast-enhanced MRI revealed an irregular mass with heterogeneous enhancement in the left lower outer quadrant of the breast on the sagittal scan of a contrast-enhanced, T1-weighted image (T1WI), which showed early, fast, and delayed persistent kinetics. Furthermore, the mass showed markedly high signal intensity on the T2WI (Fig. 1C).

A pathologic diagnosis of mucinous carcinoma was confirmed based on ultrasound-guided core needle biopsy. The patient underwent a breast-conserving surgery, and the mass was histologically diagnosed as a low-grade mucinous carcinoma with the presence of numerous psammomatous calcifications (Fig. 1D). There was no evidence of lymphovascular invasion. Immunohistochemical analysis showed that the mass was a luminal A subtype that was ER positive, PR positive, and human epidermal growth factor receptor-2 negative (Fig. 1E). No lymph node metastasis was observed on axillary lymph node dissection.

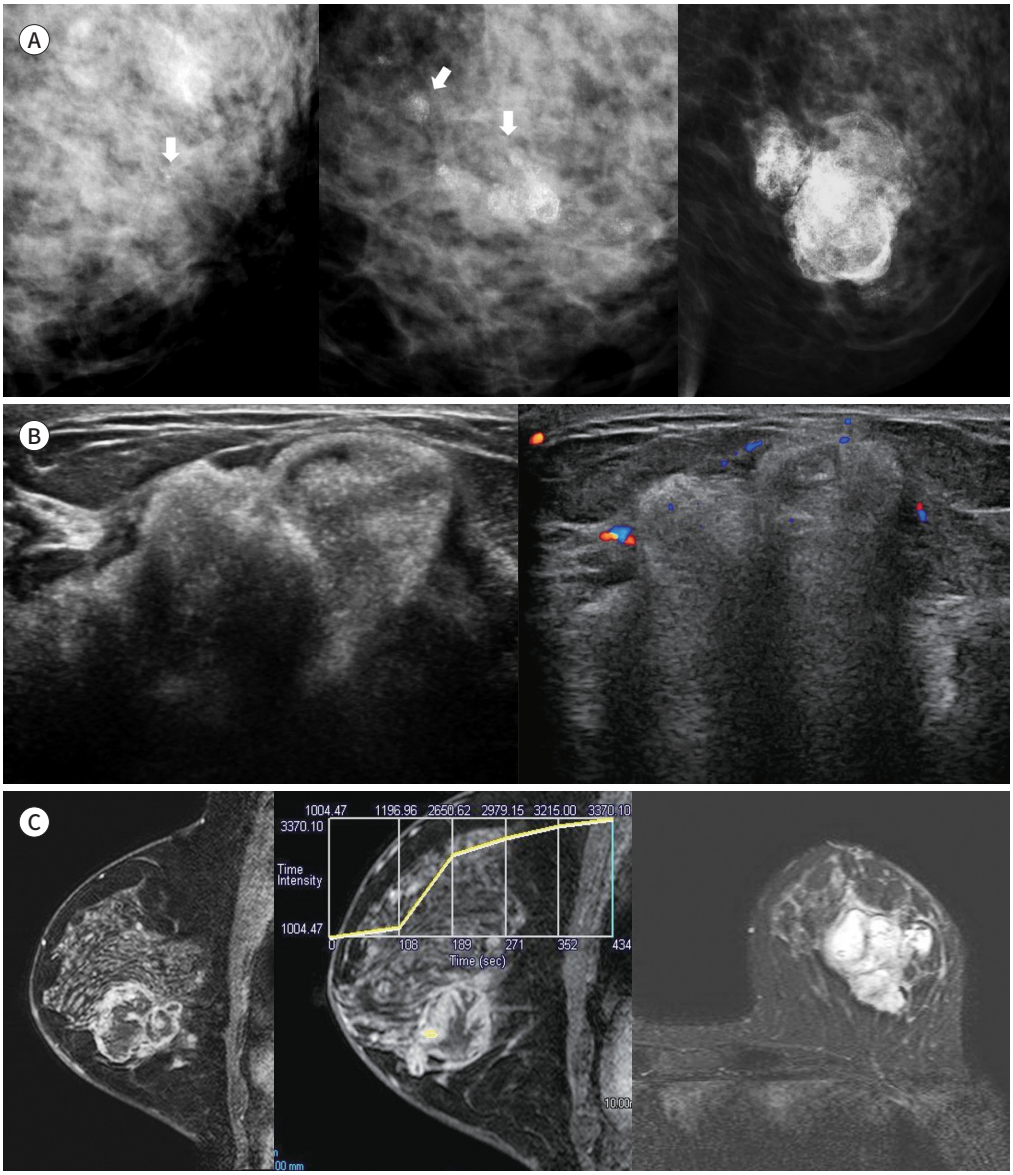
DISCUSSION

According to the literature, the mammographic findings of mucinous carcinoma reflect the percentage of the mucin component. Well-circumscribed margin suggests large volume of mucin, contrary to spiculated margin correlates with small volume of mucin contents. Mammographic microcalcifications have not been considered a characteristic of mucinous carcinoma. There are only a few case reports described the microcalcifications as a cluster of suspicious pleomorphic calcifications. Calcification, especially coarse and dense calcifica-

tion, is rarely observed in cases of mucinous breast carcinoma. Typical ultrasonographic features of the mucinous carcinoma are known as well circumscribed, isoechoic mass with posterior enhancement. And this features can be changed according to the percentage of mucin similar to mammographic findings (5, 6).

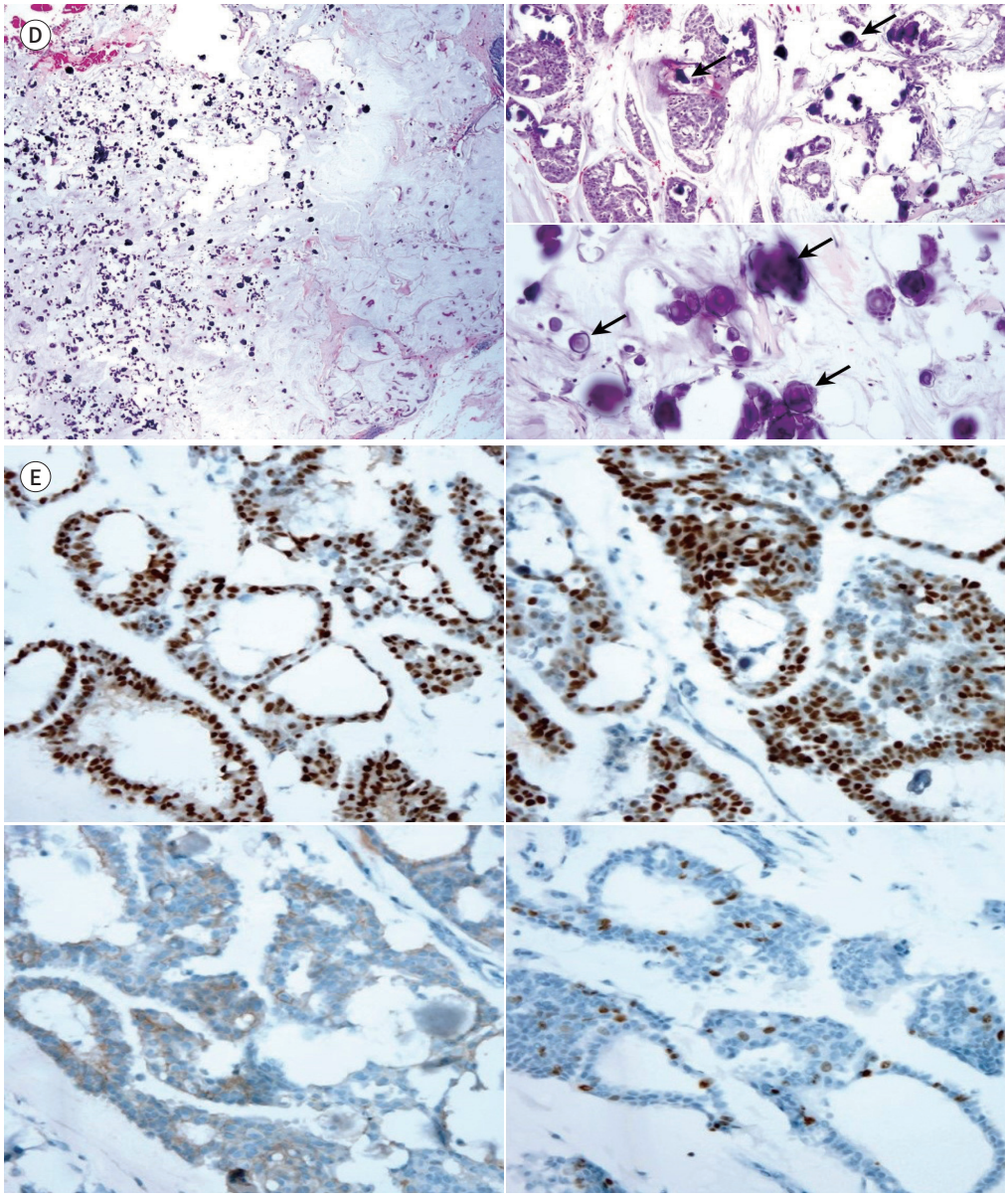
When the mass is coarse and densely calcified, there are several differential diagnoses that

Fig. 1. Imaging and pathologic features of dense calcified mucinous breast carcinoma in 46-year-old women.
A. A mammography 4 years ago shows a grouped amorphous microcalcification in Lt lower breast (arrow, left). A mammography 2 years ago reveals a coarse and densely calcified mass (arrows, middle). Follow-up mammography shows an increase in volume, and the combined calcification has become denser and coarser (right).
B. Ultrasonography shows a circumscribed, hyperechoic mass with dense calcification and posterior acoustic shadowing (left). A color Doppler image shows no vascularity (right).
C. Dynamic contrast-enhanced MRI of the breast shows an irregular, heterogneously enhancing mass (left) with early fast and delayed persistent kinetics (middle). The mass shows high signal intensity on T2-weighted image (right).



must be distinguished. The common benign pathology can be the fat necrosis or involuting fibroadenoma. Although these can reveal slow growing pattern, in our case, morphology of calcification was quite different from the typical benign dystrophic or popcorn like calcification. Metaplastic breast carcinoma with chondroid differentiation, extraosseous osteosarcoma of the breast, and chondrosarcoma of the breast should be considered. Usually, meta-

Fig. 1. Imaging and pathologic features of dense calcified mucinous breast carcinoma in 46-year-old women.
D. Pathologic photomicrograph of surgical specimen in Panel D reveals mucinous carcinoma with numerous calcific nodules and an abundant mucin pool (left, H&E stain, × 40). Psammomatous calcific nodules (arrows) are present in both tumor cell clusters (upper right, H&E stain, × 100) and mucin pool (lower right, H&E stain, × 200).
E. Shown in Panel E are tumor cells of the luminal type A subtype, which are positive for estrogen receptor (upper left, estrogen receptor stain, × 200) and progesterone receptor (upper right, progesterone receptor stain, × 200) and negative for human epidermal growth factor receptor-2 (lower left, human epidermal growth factor receptor 2 stain, × 200) and possess a low Ki-67 labeling index (lower right, Ki-67 stain, × 200).
H&E = hematoxylin and eosin



plastic carcinoma is a rare malignancy that is characterized as an adenocarcinoma that contains mesenchymal and epithelial components. Clinically, it usually has a more progressive behavior and is associated with poorer prognosis than IDC, the not otherwise specified (NOS) type of carcinoma (7). Compared with other metaplastic breast cancers, metaplastic carcinoma with chondroid differentiation can show amorphous or coarse calcifications and has favorable prognosis. On MRI, a metaplastic carcinoma usually shows a high signal intensity on T2WI because of the abundance of necrotic tissue. This feature is also similar to MRI findings expected for mucinous breast carcinoma (8). However, because the mucin component produces a high signal intensity from water on T2WI, mucinous breast carcinoma may show higher signal intensity than metaplastic carcinoma. Breast osteosarcoma may originate from a preexisting breast tumor or from normal breast tissue. On mammography, it is noted as a large mass with a well-defined margin containing coarse or dense calcifications (9). Finally, chondrosarcoma of the breast can also show similar findings, which are a challenge to differentiate from the mucinous carcinoma of the present case using mammographic results exclusively.

In our case, the mass and coarse, dense calcifications were slow-growing. This could be explained by decreased cellular respiration and excess levels of carbon dioxide (CO_2) produced as a result of blood supply deficiencies within the mucin pool. This results in relative increases in alkalinity and calcium salts are insoluble in alkaline solutions (10).

In conclusion, we report about a patient with unique imaging features of mucinous breast carcinoma that presented as a coarse and densely calcified mass. It is important to understand that coarse and densely calcified masses can indicate the presence of malignancies such as mucinous carcinoma, metaplastic carcinoma, extraosseous osteosarcoma, and chondrosarcoma. Careful evaluation of coarse and dense calcifications associated with masses is needed.

Author Contributions

Conceptualization, P.Y.M.; investigation, P.H.Y.; supervision, P.Y.M.; visualization, P.H.Y.; writing—original draft, S.G.W.; and writing—review & editing, S.G.W.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

REFERENCES

1. Tseng HS, Lin C, Chan SE, Chien SY, Kuo SJ, Chen ST, et al. Pure mucinous carcinoma of the breast: clinicopathologic characteristics and long-term outcome among Taiwanese women. *World J Surg Oncol* 2013;11:139
2. Zhang L, Jia N, Han L, Yang L, Xu W, Chen W. Comparative analysis of imaging and pathology features of mucinous carcinoma of the breast. *Clin Breast Cancer* 2015;15:e147-154
3. Pina Insausti LJ, Soga Garcia E. Mucinous breast carcinoma showing as a cluster of suspicious microcalcifications on mammography. *Eur Radiol* 1998;8:1666-1668
4. Ellis IO, Galea M, Broughton N, Locker A, Blamey RW, Elston CW. Pathological prognostic factors in breast cancer. II. Histological type. Relationship with survival in a large study with long-term follow-up. *Histopathology* 1992;20:479-489
5. Cardenosa G, Doudna C, Eklund GW. Mucinous (colloid) breast cancer: clinical and mammographic findings in 10 patients. *AJR Am J Roentgenol* 1994;162:1077-1079
6. Conant EF, Dillon RL, Palazzo J, Ehrlich SM, Feig SA. Imaging findings in mucin-containing carcinomas of

the breast: correlation with pathologic features. *AJR Am J Roentgenol* 1994;163:821-824
7. Song Y, Liu X, Zhang G, Song H, Ren Y, He X, et al. Unique clinicopathological features of metaplastic breast carcinoma compared with invasive ductal carcinoma and poor prognostic indicators. *World J Surg Oncol* 2013;11:129
8. Velasco M, Santamaría G, Ganau S, Farrús B, Zanón G, Romagosa C, et al. MRI of metaplastic carcinoma of the breast. *AJR Am J Roentgenol* 2005;184:1274-1278
9. Rizzi A, Soregaroli A, Zambelli C, Zorzi F, Mutti S, Codignola C, et al. Primary osteosarcoma of the breast: a case report. *Case Rep Oncol Med* 2013;2013:858705
10. Yildirim Erdoğan N, Hüten ON, Bahadir F, Sander E. Diffuse and psammomatous calcification in intestinal type gastric carcinoma: report of two cases with literature review. *Turk J Gastroenterol* 2011;22:414-418

유방촬영술에서 거친 석회화 종괴로 관찰된 점액 유방암: 증례 보고

신기원[1] · 박하영[2*] · 박영미[1]

저자들은 유방촬영술에서 밀도 높고 거친 석회화 종괴로 관찰된 점액 유방암 증례를 보고한다. 병변은 초음파 영상에서 4.6 cm 크기의 고에코성, 후방음영 증강 및 석회화를 동반한 종괴로 관찰되었다. 이러한 영상의학적 소견은 점액암의 비특징적인 소견으로서, 연골형 분화의 화생성 암, 유방의 골외성 골육종, 연골육종 등에서 나타날 수 있는 소견으로 알려져 있다. 이 병변은 4년간 서서히 증가되는 양상으로 관찰되었으며 당시에는 이형성 석회화 양상으로 관찰되었다. 점액암을 포함한 몇 가지의 드문 아형의 유방암이 거친, 밀도 높은 석회화 종괴로 관찰될 수 있으므로, 즉각적인 생검이 고려되어야 할 것이다.

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