Int J Clin Exp Pathol 2015;8(11):15333-15337
www.ijcep.com /ISSN:1936-2625/IJCEP0016697

Case Report

A case of matrix-producing metaplastic carcinoma of the breast exhibiting similarities to pleomorphic adenoma on fine-needle aspiration cytology

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Received September 23, 2015; Accepted October 26, 2015; Epub November 1, 2015; Published November 15, 2015

Abstract: The distinction between matrix-producing metaplastic carcinoma (MPMC) and pleomorphic adenoma (PA) is sometimes unclear in breast pathology, especially on core needle biopsy. Herein, we presented a 66-year-old woman with MPMC of the breast that looked like PA on fine-needle aspiration cytology (FNAC). On FNAC, the appearance of abundant myxoid matrix along with cellular clusters composed of monotonous cellular populations looked like salivary PA, which we were familiar with owing to the frequency in routine pathological practice. Thus, the possibility of breast PA, the counterpart of salivary PA, was considered. However, the tumor location was different from where breast PA frequently occurs, i.e. the retroareolar region. Therefore, we eliminated the possibility of breast PA and avoided the erroneous cytological diagnosis. It is should be kept in mind that MPMC can look like PA on FNAC.

Keywords: Matrix-producing carcinoma, pleomorphic adenoma, breast, fine-needle aspiration cytology

Introduction

In breast pathology, the distinction between matrix-producing metaplastic carcinoma (MPMC) and pleomorphic adenoma (PA) is sometimes unclear especially on core needle biopsy [1]. PA of the breast seemed to be more unfamiliar than MPMC, and cases of PA have been reported as MPMC on core needle biopsy [2, 3]. The absence of myoepithelial cells are confirmed at the large part of breast PA, which is different from its well-known salivary counterpart [1]. This absence suggests that PA is close to low-grade breast carcinoma [1]. Conversely, to the best of our knowledge, there has been no documented case of MPMC misinterpreted as PA.

We present a case of MPMC that looked like PA on fine-needle aspiration cytology (FNAC) for cautionary and educational purposes. We could diagnose this case as MPMC on cytological examination because breast PA frequently occurs in the retroareolar region [1], which is different from the site of the occurrence of this MPMC.

Clinical summary

A 66-year-old woman was detected with a lump in her right breast on mammography. Ultrasonography revealed an irregularly shaped hypo-echoic mass at the corresponding site. Magnetic resonance imaging (MRI) displayed a mass, measuring 15 × 14 × 12 mm, at the same site, which was the boundary of the posterior part of the breast tissue; the mass showed low intensity on T1-weighted images (**Figure 1A**) and high intensity on T2-weighted images (**Figure 1B**), and it was homogeneously enhanced on contrast-enhanced fat-suppressed T1-weighed images (**Figure 1C**). Subsequently, FNAC revealed a large number of atypical cells, suggesting malignancy. Consequently, partial mastectomy was performed; the surgically resected specimen was submitted for pathological examination, and a diagnosis of MPMC was rendered.

Pathological findings

The surgically resected specimen revealed a whitish mass measuring 16 × 15 × 12 mm. The

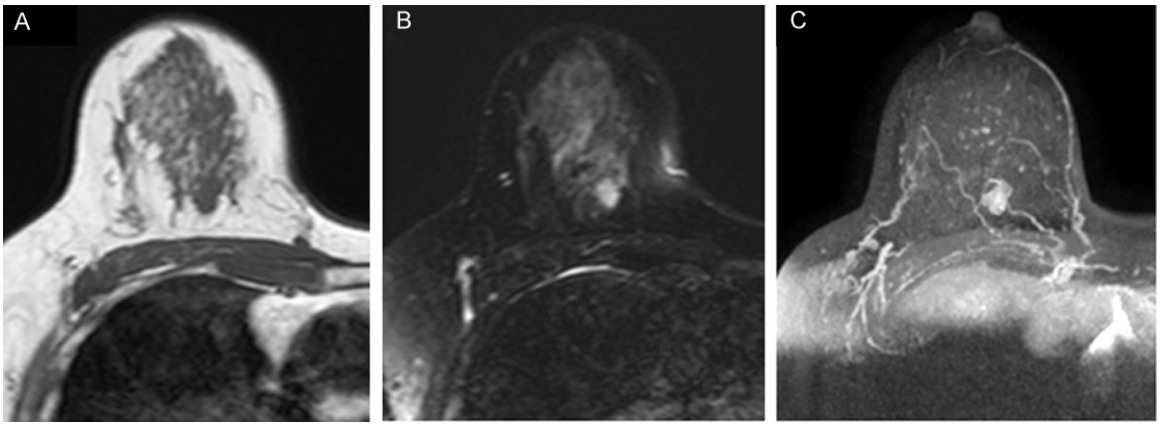

Figure 1. Magnetic resonance imaging findings. A. The mass shows low intensity on a T1-weighted image. B. The mass shows high intensity on a T2-weighted image. C. The mass is homogenously enhanced on a contrast-enhanced fat-suppressed T1-weighed image.

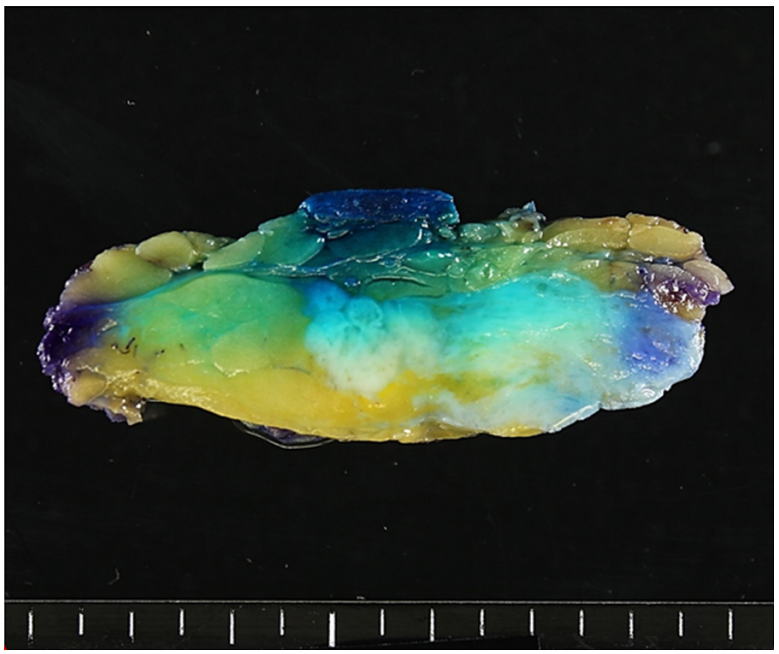

Figure 2. Macroscopic findings. A whitish mass measuring 16 × 15 × 12 mm is present.

mass was well circumscribed, but the margin was irregular (**Figure 2**).

Cytopathological analysis with Papanicolaou staining identified abundant tumor cell clusters intermingled with a myxoid matrix (**Figure 3A**). The clusters were small to medium in size and composed of a monotonous cell population (**Figure 3B**). The tumor cells had enlarged and rounded nuclei with distinct nucleoli; nuclear pleomophism was not observed (**Figure 3C**). On Giemsa staining, metachromasia of the myxoid matrix was observed (**Figure 4A**). As was observed on Papanicolaou staining, tumor cell clusters were intermingled with the myxoid matrix (**Figure 4B**). In some parts, the tumor cells were discohesive and were similar to plasmacytoid cells (**Figure 4C**).

Histopathologically, the tumor was well delineated as a whole, but focally showed irregular margins. Myxoid areas were observed widely (**Figure 5A**). Characteristics of the tumor cells were nearly the same both inside and outside the myxoid area. Tumor cells were composed of monotonous cell population (**Figure 5B**). They had enlarged and rounded nuclei, which were relatively uniform and contained distinct nucleoli. Mitotic figures were approximately 16/10 high-power fields (**Figure 5C**). Lymphovascular invasion and necrosis were not apparent. Upon immunohistochemistry, the tumor cells were diffusely positive for CK5/6, CK7, and S-100 protein (**Figure 5D**); they were negative for ER, PR, and Her2. Surgical margins were free of tumor cells.

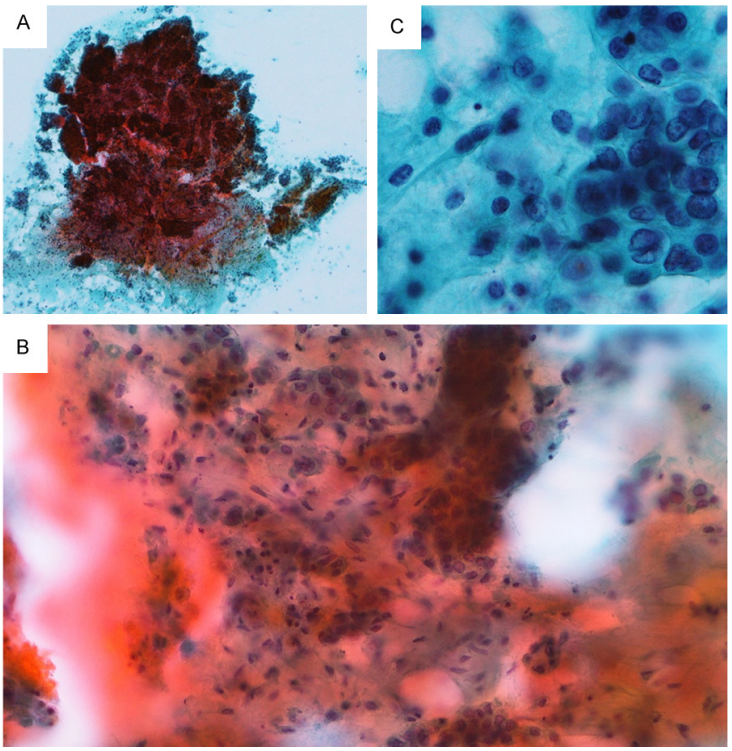

Figure 3. Cytological findings on Papanicolaou staining. A. Abundant tumor cell clusters intermingled with myxoid matrix. B. The clusters are small to medium in size and are composed of a monotonous cell population. C. The tumor cells have enlarged and rounded nuclei with distinct nucleoli; nuclear pleomophism is not observed.

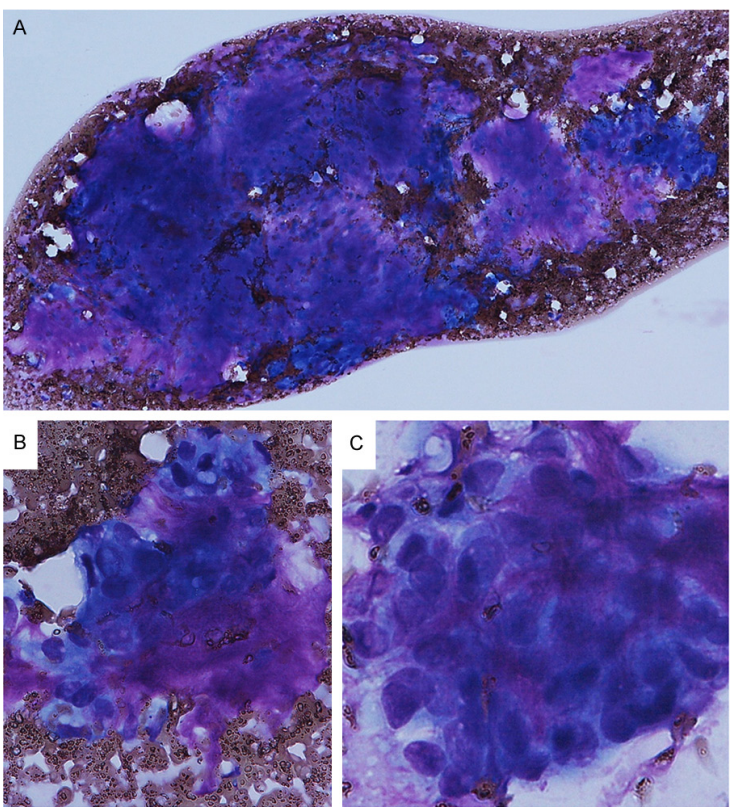

Figure 4. Cytological findings on Giemsa staining. A. Metachromasia of the myxoid matrix is observed. B. Tumor cell clusters are intermingled with the myxoid matrix. C. In some parts, the tumor cells are discohesive and similar to plasmacytoid cells.

Discussion

On FNAC of the breast tumor, the appearance of abundant myxoid matrix along with cellular clusters composed of monotonous cellular population looked like salivary PA [4], because we were familiar with the cytological appearance of relatively common salivary PA during routine pathological practice. By contrast, breast PA is an exceedingly rare tumor [5] and one may not be aware of the characteristics of breast PA. If the presence of breast PA is suspected, it should also be noted that breast PA frequently occurs in the retroareolar region [1]. After recognition of this fact, we could exclude the possibility of breast PA in this case exhibiting a tumor in the deep part of the breast.

Another differential diagnosis that should be considered is mucinous carcinoma. Papanicolaou staining alone might not be able to distinguish this case of MPMC from mucinous carcinoma. However, Giemsa staining was helpful in that metachromasia observed on Giemsa staining is strong evidence of stromal mucin, which is different from epithelial mucin. In mucinous carcinoma, mucin is secreted from carcinoma cells, i.e. epithelial cells, and the mucin does not show metachromasia on Giemsa staining because it is not stromal mucin. In our case, metachromasia on Giemsa staining was very clear and apparent; thus, the possibility of mucinous carcinoma could be ruled out.

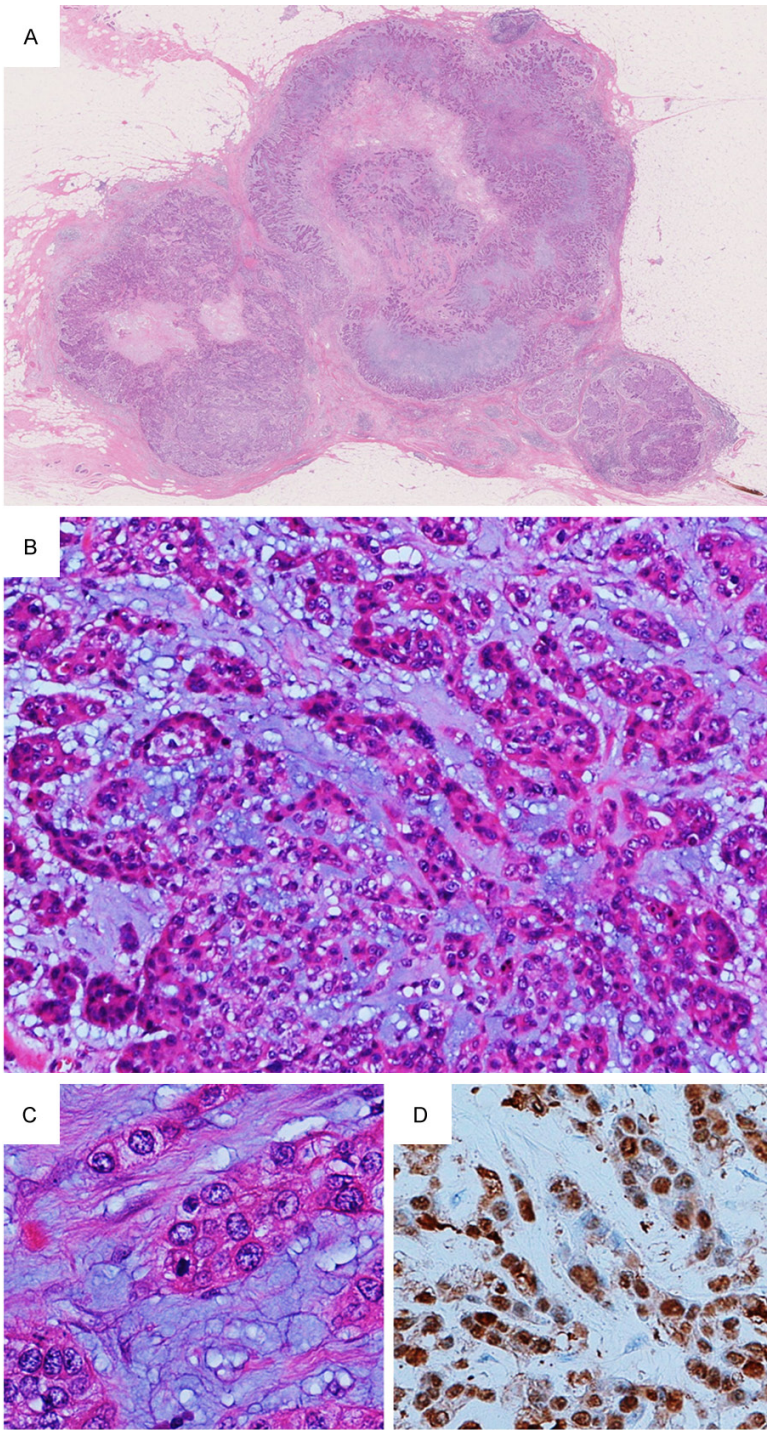

Figure 5. Histopathological findings. A. The tumor is well delineated as a whole, but focally shows irregular margins. Myxoid areas are widely observed. B. Characteristics of the tumor cells are nearly the same both inside and outside the myxoid area. Tumor cells are composed of a monotonous cell population. C. The tumor cells have enlarged and rounded nuclei, which are relatively uniform and contain distinct nucleoli. A mitotic figure is visible at the center of the field. D. The tumor cells were immunopositive for the S-100 protein.

Although several reports of the cytological appearance of MPMC have been documented to date, such an illustrative case as ours has not been encountered. The typical growth pattern of MPMC is ring-like, i.e., peripheral cellular areas with a large chondromyxoid area in the center of the tumor [6]. However, in this case, MPMC grew rather in a solid pattern, i.e. a large central chondromyxoid area was not observed on histological examination Usually, tumor cells and myxoid matrix appearing on FNAC is not enough to speculate about the diagnosis of MPMC, probably because only a part of the ring-like cellular area is sampled and the central chondromyxoid area is not easily sampled. However, in this case, the intermingling of tumor cells and the myxoid matrix without a hard chondroid matrix made it possible to sample a sufficient number of tumor cells and the background myxoid matrix to be able to make the review diagnosis of MPMC on FNAC.

In conclusion, this is a case of MPMC with the abundant appearance of tumor cells and myxoid matrix on FNAC. Because such abundance is not usually observed on cytology of MPMC, it is difficult to distinguish MPMC from PA on the basis of cytological analysis alone. It should be kept in mind that MPMC can look like PA on FNAC.

Disclosure of conflict of interest

None.

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