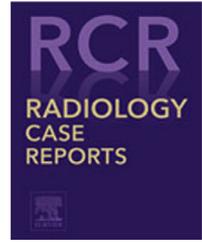


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Case Report

Radiological images of an advanced invasive carcinoma with mucinous aspects: A case report ☆☆☆★

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ABSTRACT

Mucinous carcinoma of the breast, also known as colloid carcinoma, is an uncommon type of differentiated adenocarcinoma, representing only 2% of all invasive breast carcinomas. It usually occurs in women ≥ 60 years of age. Mucinous carcinoma is characterized by clusters of epithelial tumour cells suspended in pools of extracellular mucin and is further divided in 2 subgroups, pure and mixed. Compared to invasive ductal carcinoma, mucinous carcinoma has a better prognosis, being characterized by a lower incidence of nodal involvement and a more favorable histological grade, with low proliferative activity and high expression of hormone receptors. Overall 10-year survival is estimated to be more than 90%. We present a case of a 57-year-old female patient who presented a palpable mass in the right breast for at

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least 2 years. On examination the whole breast appeared swollen, congestive and painless to palpation. Breast ultrasound, breast MRI and tru-cut biopsy were performed and suggested an advanced infiltrated carcinoma with mucinous aspects. Immunohistochemistry study demonstrated ER positivity (95%), PR low (5%), HER-2-Neu negativity (score 0) and proliferative index (Ki67) of 20%, determining a Luminal B-like (HER 2-negative) subtype. The patient was then candidate to mastectomy surgery and breast reconstruction with DIEP flap. Axillary lymph-nodes were sampled surgically.

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Introduction

Mucinous carcinoma of the breast is a relatively rare histologic subtype of invasive ductal carcinoma, accounting for about 2% of all breast carcinomas [1]. According to the latest WHO classification of tumors of the breast, mucinous carcinoma is classified as a special type of breast cancer [2]. It usually occurs in postmenopausal patients, around the seventh decade of life.

Two subtypes are described, mixed and pure, the latter characterised by a mucinous component of more than 90% with clusters of epithelial tumour cells of low to intermediate nuclear grade, suspended in pools of extracellular mucin. The distinction between the 2 lies mostly in the rate of lymph node metastasis, the most important prognostic factor for disease-free survival, which is lower in the mixed type [3]. Clinically, it is characterized by the presence of a palpable nodule, rarely accompanied by other symptoms [4].

We present a case of a patient with locally advanced mucinous carcinoma of the breast which, despite being diagnosed very late, had an excellent medical and surgical outcome.

Case report

A 57-year-old female patient with no relevant medical or family history presented to our Breast-Radiology clinic, due to the finding of a palpable mass in the right breast that she reported having for at least 2 years with slow growth over time. The breast appeared swollen, congestive, with overlying skin stretched and painless to palpation. The patient didn't report any constitutional symptoms.

A mammogram could not be performed due to significant breast swelling and inability to apply mammographic compression.

Ultrasonography demonstrated a large complex cystic and solid mass almost entirely replacing the right breast. Color doppler evaluation showed vascular signal in the solid components (Figs. 1-2). The lesion was classified as BI-RADS 5.

A histopathological study was then indicated and performed at our Hospital: 5 tissue samples were taken with a 13G needle and included in formalin; a second sample of fluid material was concomitantly taken and analyzed by cytological examination. The pathologic study reported an infiltrat-

ing carcinoma with mucinous aspects. Immunohistochemistry study demonstrated ER positivity (95%), PR low (5%), HER-2-Neu negativity and proliferative index (Ki67) of 20%, determining a Luminal B-like HER2-negative subtype.

A breast MRI was therefore performed to define the tumour staging (Figs. 4-10). The examination confirmed a large cystic and solid mass with heterogeneous enhancement almost entirely replacing the right breast, in close contiguity with the pectoralis muscle.

In the lower outer quadrant of the left breast was documented an enhancing round mass with noncircumscribed margins and persistent delayed-phase peripheral enhancement, hypointense on T2-weighted sequences. The ultrasound second look subsequently performed, documented a hypoechoic oval mass, with circumscribed margins measuring approximately 9 mm (Fig. 3).

Operative findings

The surgery took place in 2 different operative phases. The first stage consisted of a demolition procedure where a complete right mastectomy was performed. The removed tissue was then sent to the Pathological Anatomy Unit to proceed with an extemporaneous histological examination (EHE). Subsequently, the resection margins were enlarged up to the pectoralis major muscle (Figs. 12-13), where the deepest portion of the neoplasm made contact with it. A sample of muscle tissue was simultaneously subjected to EHE and found to be free of neoplastic foci. A definitive histological examination (DHE) was performed on sentinel lymph-node (SLN) and a few additional axillary nodes, detecting isolated tumour cells (ITC) but resulting free of neoplastic infiltration (Fig. 15). The definitive staging showed a different immunohistochemical profile (ER positivity (90%), PR positivity (95%), HER-2-Neu negativity and proliferative index (Ki67) of 25%), changing the subtype to luminal A-like (Fig. 14). The neoplasm was therefore classified as mixed type of mucinous carcinoma, T3N0i+ stage. The second part of the operation consisted in the reconstruction of the right breast by using a DIEP (Deep Inferior Epigastric Perforator) flap. Simultaneously symmetrization of the left breast was performed by removing glandular tissue located in the lower quadrants, including the nodular formation documented on MRI, which was histologically analysed and determined as a fibroadenoma (Fig. 16).

The postoperative course was exempt from complications.

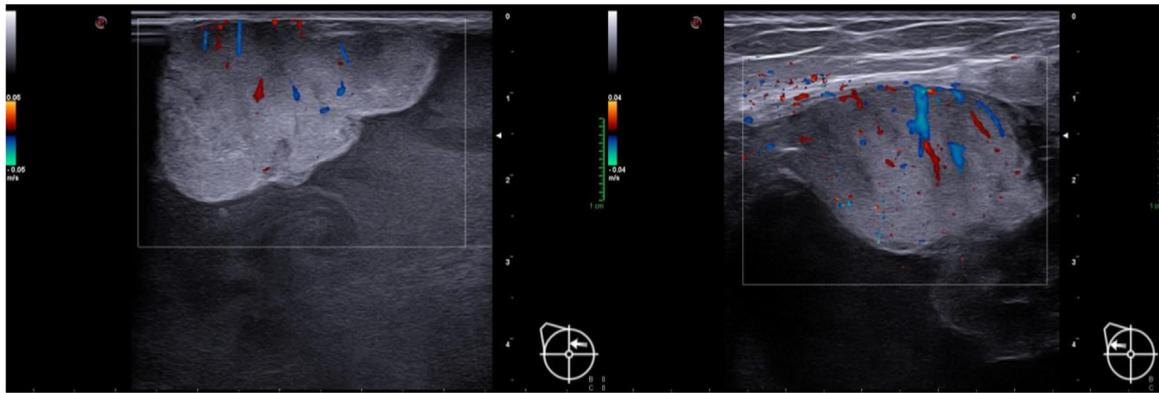


Fig. 1-2 – Solid component projecting into cystic component. Color-doppler module displays its rich vascularization.



Fig. 3 – Hypoechoic oval mass with circumscribed margins documented in the lower outer quadrant of the left breast.

Discussion

Mucinous breast carcinoma is an uncommon type of carcinoma that usually occurs in postmenopausal patients with a median age of 70 years [2]. It is a slow-growing histopathological entity, with an estimated growth rate of one-third compared to invasive ductal carcinoma [5–7]. Mucinous carcinoma of the breast is divided into 2 subtypes, the pure type and mixed type [8]. The pure type is characterised by a mucinous component of more than 90% with clusters of epithelial tumour cells of low to intermediate nuclear grade, suspended in pools of extracellular mucin, while the mixed form is characterized by the coexistence of nonmucinous components as common invasive ductal NST or lobular carcinoma with mucus-producing tumor cells [9,10]. Mucinous breast cancer is characterized by a good prognosis with a low recurrence rate compared with invasive ductal carcinoma [11,12] because of its different features such as lower incidence of nodal involvement, favorable histological grade, and higher estrogen receptor (ER) and progesterone receptor (PR) expression [3,13].

The radiological appearance of mucinous carcinoma also depends on its mucinous component percentage. Generally,

the pure form appears on mammography as an oval, circumscribed mass, whereas in the case of the mixed form, the margins may be more irregular and noncircumscribed [1,14].

On ultrasound examination, mucinous carcinoma tends to appear isoechoic with mixed solid and cystic components. Mixed forms, however, may also appear hypoechoic [1,15].

Because of the high mucosal component, colloid carcinoma displays high signal intensity T2-weighted sequences on MRI. Compared with other infiltrating tumors, however, lower signal intensity in diffusion sequences and increased ADC values are observed [16,17]. In postcontrast sequences, owing a heterogeneous composition, it displays a slow initial and persistent delayed enhancement kinetics and it could be easily mistaken for a benign lesion [1].

Although lymph node involvement is infrequent (it is observed in 12%-14% of cases), Sentinel Lymph Node Biopsy is commonly performed in clinical practice, and adjuvant therapy is also often administered after conservative surgery [18].

While uncommon, complications such as pseudomyxoma peritonei and mucinous embolism may be observed in some patients [19].

As mentioned earlier, it is rare to observe mucinous carcinoma in clinical practice, and the same therapeutic

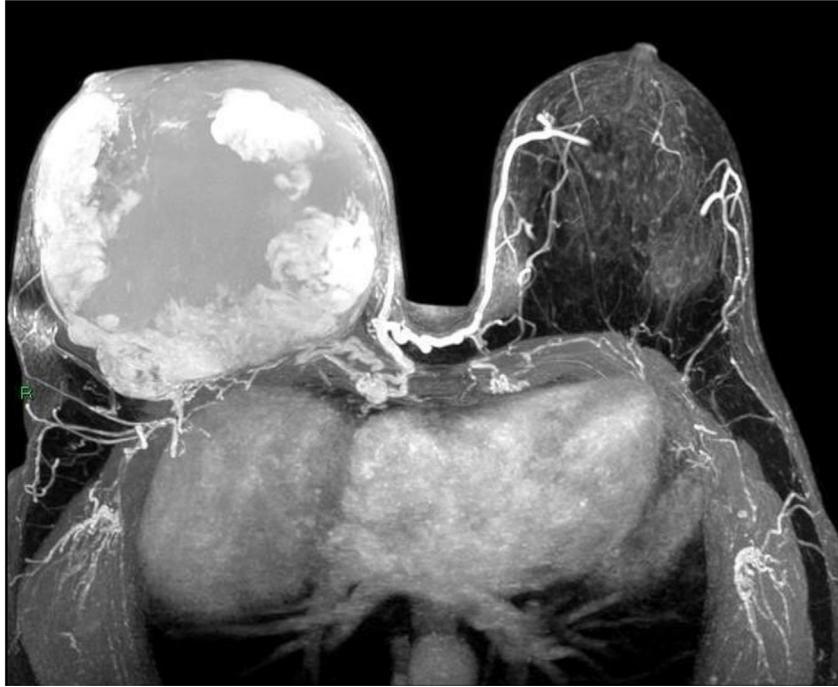


Fig. 4 – MIP reconstruction showing a complete replacement of the right breast with large cystic and solid mass.



Fig. 5 – T1-weighted sequence displaying the solid component in close contiguity with the pectoralis muscle. Fluid component shows intermediate signal intensity.



Fig. 6-7 - T1 postcontrast sequence with fat suppression and subtraction showing the solid component with heterogeneous enhancement.



Fig. 8-9 - T2-weighted sequence and STIR sequence emphasizing the intermediate to high T2 signal of the fluid component.



Fig. 10-11 – Nodule in the lower outer quadrant of the left breast. (10) T2-weighted sequence showing the hypointensity of the nodule. (11) T1-weighted postcontrast sequence with fat suppression showing the persistent delayed enhancement kinetics of the nodule.

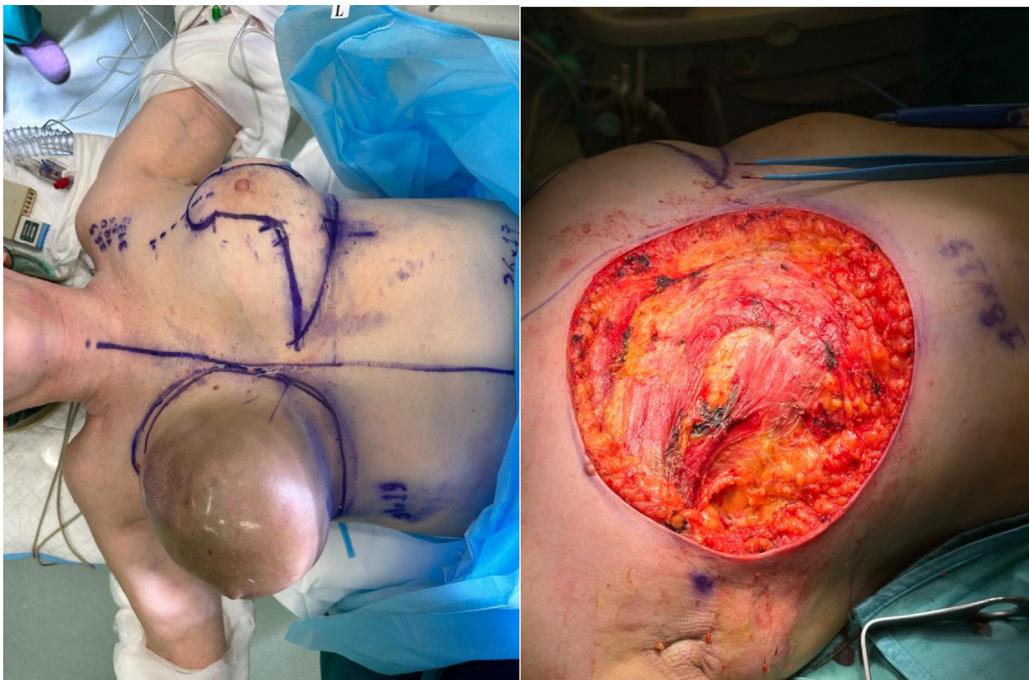


Fig. 12-13 – Complete right mastectomy and preoperative drawing for left breast symmetrization.

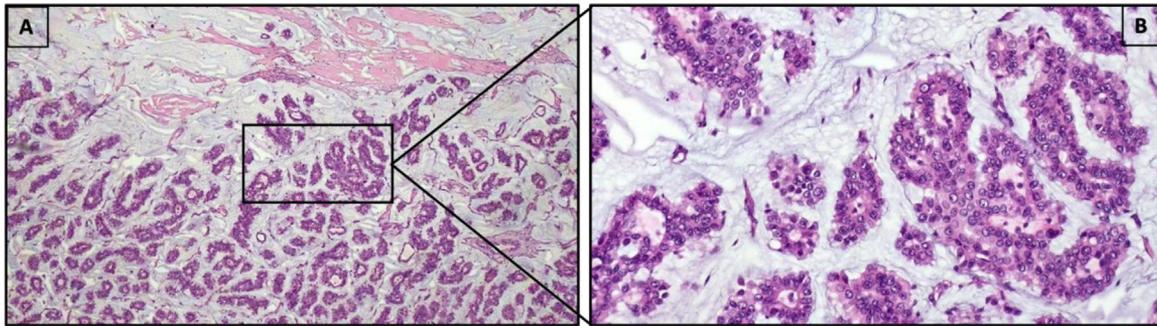


Fig. 14 – Panel A and B Representative field of the resected neoplastic nodule, showing mixed type mucinous carcinoma. (HE, original magnification 5x).

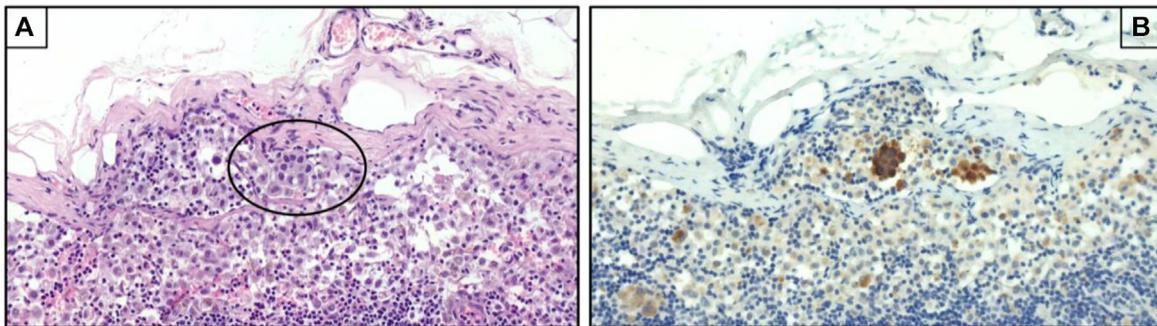


Fig. 15 – Panel A and B Isolated tumor cells in sentinel node (ITC) (A) HE, original magnification 20x; (B) pan-cytokeratin immunostaining, original magnification 20x).

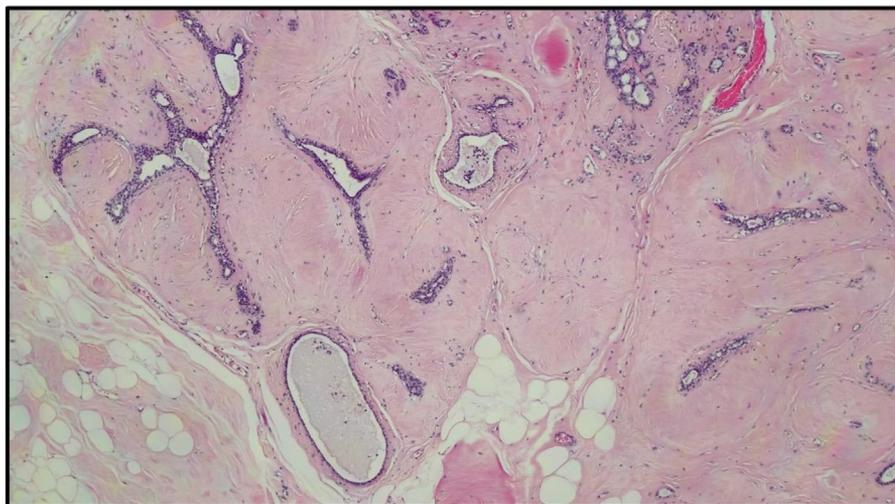


Fig. 16 – A representative image of fibroadenoma in left mammary resection specimen (HE, original magnification 5x).

protocol is not always applied. The main treatment remains conservative surgery, which, in cases of mixed subtype, is combined with adjuvant chemotherapy. Possible radiation treatment depends on the extent of the tumor but, even when performed, it has not substantially changed the overall survival of patients with mucinous carcinoma [20].

Conclusion

Mucinous carcinoma of the breast, also known as colloid carcinoma, is an uncommon slow-growing histopathological entity, accounting for only 2% of all invasive breast carcinomas. It is characterized by a better prognosis than invasive duc-

tal cancer. Although mucinous carcinoma can be diagnosed late due to its benign imaging characteristics, it has shown a favourable prognosis, exhibiting a rare tendency to metastasize. In our case, the patient had waited 2 and a half years before attending a breast examination. Despite the late diagnosis, the tumour was defined as low-grade and showed only isolated tumor cells in the sentinel lymph-node, a prognostic factor [21] that positively influenced the patient's prognosis and the postoperative course.

Patient consent

The authors declare that this report does not contain any personal information that could lead to the identification of the patient. Informed consent was obtained from the patient.

Ethics approval and consent to participate

Not applicable.

Availability of data and material

Not applicable.

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