CASE REPORT

Post-traumatic rapidly enlarging mucinous carcinoma of the breast with intratumoural haemorrhage: MRI appearances with pathological correlation

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ABSTRACT. Pure mucinous carcinoma of the breast is a histological type of invasive carcinoma and generally shows a slow growth pattern. Rapid growth and intratumoural haemorrhage are rare and there have been no reports presenting such a clinical course and associated radiographic findings. We report a case with atypical rapidly enlarging mucinous carcinoma of the breast after trauma, in which MRI closely reflected the histopathological background and was thought to be useful for differential diagnosis from other highly malignant breast tumours.

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Mucinous carcinoma of the breast is one of the more common histological types of breast carcinoma and accounts for 1–7% of all breast carcinomas [1]. Clinically, it usually has a better prognosis than invasive ductal carcinoma and locally aggressive growth is rarely seen.

In this report, we present a case of mucinous carcinoma of the breast that showed clinically rapid growth of the tumour with massive intratumoural haemorrhage after trauma. The MRI findings closely reflected its histopathological background and were useful for differential diagnosis from other highly malignant breast tumours, such as malignant phyllodes tumour, high-grade ductal carcinoma, metaplastic carcinoma and angiosarcoma.

Case report

A 58-year-old female presented with a rapidly enlarging mass and increasing pain in her right breast after knocking her breast against a table. On physical examination, her right breast showed marked swelling and diffuse redness of the skin and therefore mammography could not be performed.

Ultrasonography showed a bulky circumscribed heterogeneous hypoechoic mass in her right breast. MRI was performed with a 1.5 Tesla system (Gyrosan Intera; Philips Medical Systems, the Netherlands) and a four-channel phased array coil. Axial fat-suppressed T_2 weighted image (repetition time (TR)/echo time (TE), 4424/100) showed a 12 cm circumscribed lobular mass in

her right breast tissue (Figure 1a). The inside of the mass showed heterogeneous high-signal intensity with low-signal-intensity septa. A pre-contrast T_1 weighted image with fat suppression in the axial plane (TR/TE/flip angle (FA), 7.7/3.8/10) showed a heterogeneous high-signal intensity area within the mass, which was considered to be a haemorrhage (Figure 1b). On an axial contrast-enhanced T_1 weighted image with fat suppression (TR/TE/FA, 7.7/3.8/10), the mass showed enhancing internal septation (Figure 1c), which corresponded to low-signal intensity on a T_2 weighted image (Figure 1a). This finding was thought to be “enhancing septation” as defined by the breast imaging reporting and data system (BI-RADS) MRI [2]. The kinetic curve of enhancing internal septation showed a slow initial rise and a persistent delayed enhancement pattern (Figure 1d).

On the basis of clinical and MRI findings, the mass was suspected to be a malignant tumour, and the patient underwent surgical excision of the mass. On histological section, the mass was found to be well circumscribed and showed an extremely heterogeneous internal structure with rich mucus and haemorrhage. Microscopically, the mass showed large amounts of extracellular epithelial mucus and surrounding tumour cells, and the large pool of erythrocytes was defined as a mucinous lake (Figure 2a). The mass had internal fibrous septa with rich vessels (Figure 2b). The final pathological diagnosis was mucinous carcinoma of the breast with massive haemorrhage. Currently, 3 years after follow-up from the operation, the patient has no clinical evidence of recurrence or metastasis while continuing hormonal therapy.

All images were obtained after the patient provided informed consent. The consent form included permission to use clinical records and images.

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Figure 1. (a) Axial fat-suppressed T_2 weighted MRI shows a huge circumscribed high signal intensity lobular mass with low signal intensity internal septa (arrow). (b) Pre-contrast axial T_1 weighted MRI shows heterogeneous high signal intensity area within the mass (*), which is considered to be haemorrhage. (c) On contrast-enhanced axial T_1 weighted MRI with fat suppression, the mass shows gradual enhancement of internal septa (arrowhead). (d) Kinetic curve of the mass shows a slow rise at initial phase and persistent enhancement at the delayed phase.

Figure 2. (a) Microscopically, the mass shows large amounts of extracellular epithelial mucus and surrounding tumour cells ($\times 200$). The large amount of erythrocytes were defined as a mucinous lake. (b) Rich vessels in the internal septa ($\times 400$).

Discussion

Mucinous carcinomas of the breast are described in the World Health Organization *Histological Classification of Tumours* as carcinomas that contain "large amounts of extracellular epithelial mucus, sufficient to be visible grossly, and recognisable microscopically surrounding and within tumour cells" [3]. To date, there have been no reports concerning mucinous carcinoma of the breast associated with intratumoural haemorrhage. In our case, we suspect that intratumoural haemorrhage was induced by trauma, and massive haemorrhage spread into a loose mucinous lake. This diffuse haemorrhage resulted in atypical rapid mass enlargement and made the clinical diagnosis difficult.

Clinically, differential diagnoses of rapid growth tumours of the breast include malignant phyllodes tumour, high-grade ductal carcinoma, metaplastic carcinoma and angiosarcoma. All these tumours have high-grade malignant potential and show active tumour cell proliferation. Therefore, these tumours may contain haemorrhage reflecting internal haemorrhagic necrosis [4–6]. On MRI, these tumours usually show heterogeneous non-enhancing areas reflecting haemorrhagic necrosis in the centre of the mass with a thick enhancing wall. The contrast-enhancing pattern on dynamic MRI tends to show rapid wash-in/wash-out as a typical malignant pattern in these breast tumours [4–7].

In our case, the tumour showed a signal intensity of a massive intratumoural haemorrhage on a pre-contrast T_1 weighted image. This area was not enhanced and there was no thick enhancing wall around this area. These MR findings are not typical of intratumoural haemorrhagic necrosis. Moreover, the gradual enhancing pattern was different from typical malignant patterns.

Other MRI findings of this case, such as internal high-signal intensity on T_2 weighted images and the well-circumscribed lobulated shape of the tumour, were typical for mucinous carcinoma of the breast [1, 8]. Furthermore, "enhancing septation" demonstrated on dynamic MRI was reported as a characteristic finding for

mucinous carcinoma in a high-signal intensity breast tumour on T_2 weighted images [8]. In comparison with the histological section, internal enhancement septa correlated well with fibrous septa with rich vessels (Figure 2b).

In this case, MRI closely reflected the histopathological background of mucinous carcinoma with massive intratumoural haemorrhage. Although the rapid growth pattern was an atypical clinical presentation of mucinous carcinoma, it can occur with intratumoural haemorrhage within a loose mucous lake. We propose that MRI is useful for differential diagnosis among haemorrhagic tumours in the breast and can assist in pre-treatment planning and prognostic prediction.

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