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## Case Report

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# Ductal Carcinoma *in situ* with Multicystic Changes in a Patient with Interstitial Mammoplasty via Paraffin Injection: MRI and Pathological Findings

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Direct injection of foreign material, such as liquid paraffin and silicone, into the breast can induce a foreign body granulomatous reaction and fibrosis, resulting in hard, nodular breast masses and architectural distortion that can mimic neoplasm. Conventional methods, including physical examination, mammography, and ultrasonography are of little use to differentiate between foreign body-induced mastopathy and breast cancer. In patients with foreign body injection such as breast augmentation, dynamic contrast enhanced MR imaging is an excellent imaging modality. Here, the authors report the MR imaging and pathological findings of ductal carcinoma *in situ* (DCIS) with multicystic changes in a 41-year-old woman with a previous history of interstitial mammoplasty by paraffin injection.

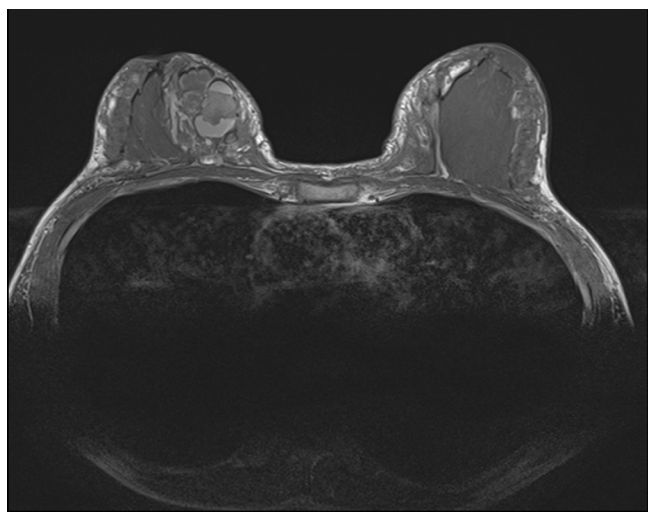
**Keywords:** DCIS; Breast augmentation via Paraffin; Magnetic resonance imaging (MRI)

## INTRODUCTION

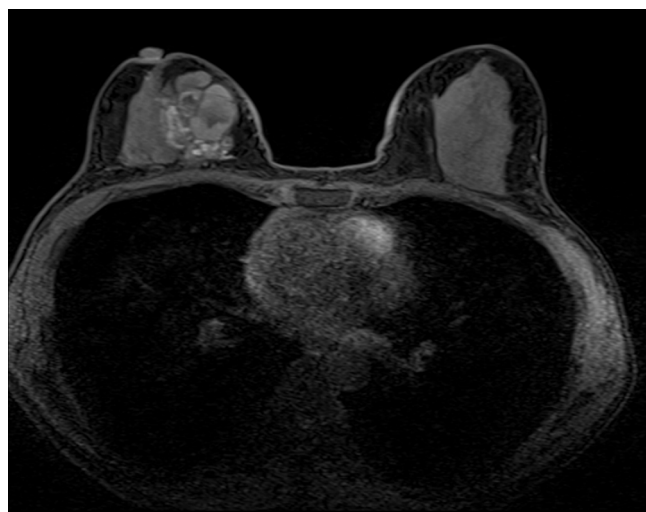
In patients with foreign body injection into the breasts, conventional methods including physical examination, mammography, and ultrasonography are of little use to differentiate between foreign body-induced mastopathy and breast cancer (1). Dynamic contrast-enhanced MR imaging is an excellent imaging modality in such cases (2-4). In this case report, we present a 41-year-old woman with ductal carcinoma *in situ* (DCIS) with multicystic changes in the right breast and previous interstitial mammoplasty due to paraffin injection in both breasts. We used MR imaging as our diagnostic tool.

## CASE REPORT

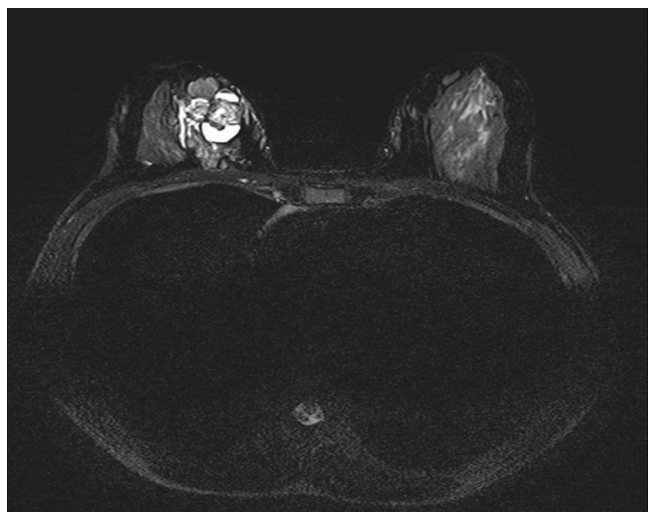
A 41-year-old woman was referred to our hospital with a palpable right breast mass, which she had felt for 6 months. She had a history of free paraffin injection in



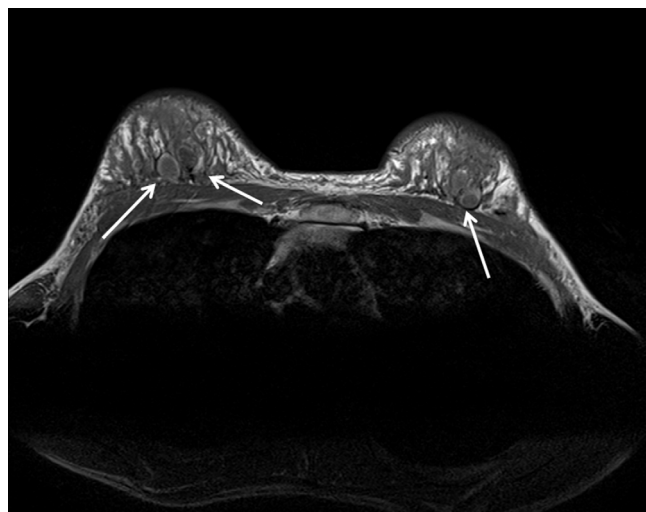
a



b



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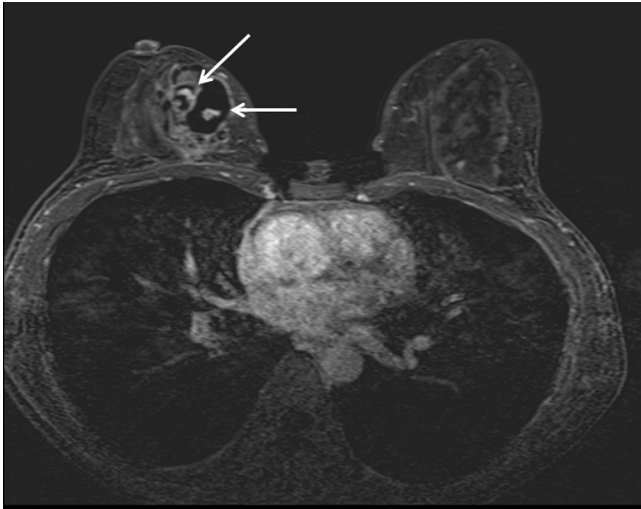


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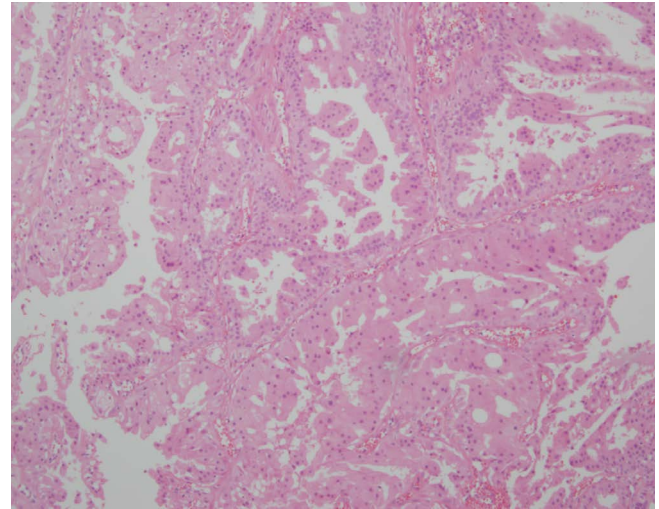


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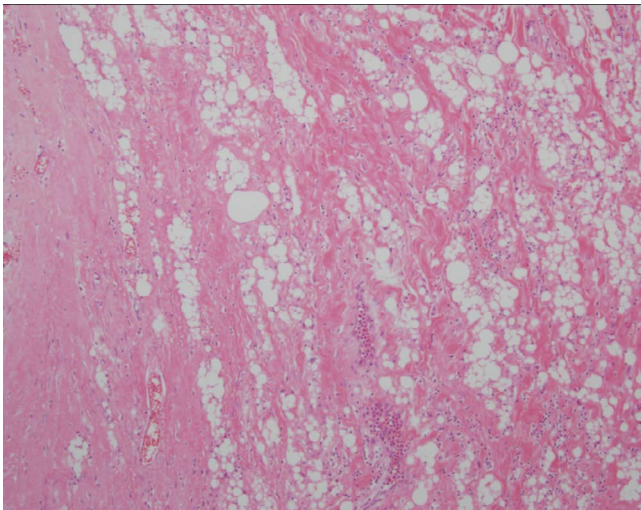
**Fig. 1.** A 41-year-old woman with DCIS and a previous interstitial mammoplasty via paraffin injection. (a) Axial pre-contrast enhanced T1-weighted, (b) fat-suppressed T1-weighted, (c) T2-weighted MR images of the right breast showing an approximate 4.0 × 4.9 cm sized, multicystic mass. Multifocal, well-circumscribed nodular lesions were observed (arrows) in the subcutaneous layer of both breasts on (d) axial pre-contrast enhanced T1-weighted, and (e) fat-suppressed T1-weighted images.



f



g



h

**Fig. 1.** (f) Well-enhancing mural nodules and septa are seen on an axial post-contrast enhanced T1-weighted fat-suppressed MR image of the right breast. (g) Photomicrograph of the histopathological specimen showing ductal carcinoma *in situ*, with a micropapillary pattern and epithelial projection into the duct lumen, lacking a fibrovascular core (Hematoxylin & Eosin staining,  $\times 100$ ; total extent of DCIS on pathology, roughly  $2.5 \times 2.4$  cm). (h) Photomicrograph of the histopathological specimen showing lipogranuloma (Hematoxylin & Eosin staining,  $\times 100$ ).

both breasts five years previously. Physical examination revealed an approximate 5-cm-sized, hard, mobile mass in the right breast without axillary lymphadenopathy. Due to the difficulty in localization of the palpable mass from artifacts of paraffinomas on conventional US, the patient underwent MRI of both breasts using a 3-Tesla MRI system (Skyra; Siemens, Erlangen, Germany) and a dedicated breast coil. On pre-contrast enhanced axial T1-weighted (Fig. 1a), fat suppressed T1-weighted (Fig. 1b), and T2-weighted (Fig. 1c) MR images, an approximate  $4.0 \times 4.9 \times 4.2$  cm sized, multicystic mass was noted in the right breast in the 3-6 o'clock region. In addition, multifocal, non-enhancing, well-circumscribed lesions were observed in the subcutaneous layer of both breasts, suggesting injected foreign bodies (Fig. 1d, e). A post-contrast enhanced T1-weighted MR image

showed a multicystic mass containing several enhancing mural nodules and septa (Fig. 1f). These enhancing nodules showed a type III enhancement kinetic curve, suggesting moderate concern for malignancy. The patient underwent a modified radical mastectomy, sentinel lymph node dissection, and reconstruction with an autologous tissue flap. The pathological diagnosis was ductal carcinoma *in situ* (DCIS) with lipogranuloma (Fig. 1g, h), without lymph node metastasis. Several nodular, enhancing portions within the multicystic mass on contrast enhancement MRI correlated with DCIS upon pathological findings. Regarding the pathology, multifocal nodular DCIS components were observed and the summation of these was approximately  $2.5 \times 2.4$  cm in extent.



## DISCUSSION

Breast augmentation using liquid paraffin was used in the early 1900s until the introduction of silicon in 1964 by Cronin and Gerow (5). However, these methods were quickly abandoned due to the serious complications associated with the procedure, including local granulomatous reactions, material-induced mastitis, foreign body reactions, fibrosis, migration of the material, or induction of autoimmune reactions (1). Mammographic findings of paraffinoma include parenchymal distortion, streaky opacities, dystrophic parenchymal calcification around paraffin droplets, and multiple masses (6). Ultrasonography reveals multiple cystic masses in breast parenchyma, axilla, and pectoral muscle (7). Thus, concern about the interference of injected material with physical examination, mammography, and ultrasonography has been raised.

A diagnosis of breast cancer in this setting can be aided by MR imaging (2-4). Distinct MR features of paraffinoma have been reported. Khong et al. (8), hypothesized that paraffinomas have two components: a plaque-like fibrous component that shows intermediate intensity on T1-weighted imaging and hypointensity on T2-weighted images, and a liquid paraffin component that shows hypointensity on both T1- and T2-weighted images. Erguvan-Dogan et al. (7), reported two cases of paraffinomas with a latency period shorter than three years, appearing as low-intensity structures on T1- and high-intensity on T2- and fat-suppressed T2-weighted images, with no enhancement by gadopentetate dimeglumine.

Breast cancer has typical malignant morphological and kinetic features: irregular shape, irregular margins, ductal or segmental distribution, heterogeneous or internal rim, and type 2 or 3 enhancement kinetic patterns (1, 3). DCIS is well-known for its nonmass enhancement with a segmental distribution and early rapid uptake with a plateau curve enhancement on MRI. However, with equal frequency, DCIS can also appear as mass lesions with homogeneous or heterogeneous internal enhancement, but rarely with rim enhancement (9, 10).

Our patient had received interstitial mammoplasty via paraffin injection and presented with a palpable mass in the right breast. Due to the known inability to distinguish a foreign body-induced mass from breast cancer by conventional methods, we used contrast-enhanced MR imaging. In the setting of injected breast enhancement, a MR finding of a multicystic mass alone can be difficult to differentiate as a foreign body-induced inflammatory mass

or a malignant condition. However, our patient presented with several enhancing nodules and septa between the cysts, which helped the diagnosis of carcinoma.

In conclusion, MRI plays an important role in the detection of breast cancer in patients with injected breast enhancement and management of DCIS with multicystic change.

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