



# Nodular fasciitis of the breast: two cases with a review of imaging findings



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## ABSTRACT

Nodular fasciitis of the breast is a rare, benign, proliferative disease characterized by sudden onset and rapid growth. It can clinically and radiologically mimic breast cancer. We present imaging findings from two cases of nodular fasciitis that initially manifested as palpable masses. Sonographically, they appeared as irregular, not-circumscribed hypoechoic nodules. The diagnosis of nodular fasciitis was made by US-guided core needle biopsies. US-guided vacuum-assisted excision was subsequently performed in the first case, while the second resolved via spontaneous regression.

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## 1. Introduction

Nodular fasciitis is a benign fibroblastic proliferation that is characterized by sudden onset and rapid growth. The lesions are generally solitary and small, commonly arising in the superficial or deep fascia of the upper extremities or in the head and neck area [1]. To the best of our knowledge, only a few cases of nodular fasciitis of the breast have been reported, and thus, there is a limited description of the associated radiologic findings [2–8]. We report two cases of nodular fasciitis of the breast with emphasis on their imaging characteristics and a review of the existing literature.

## 2. Case report

### 2.1. Case 1

A 43-year-old woman presented with a painful mass in the right upper outer breast that had been present for 1 week. She underwent mammography and ultrasonography (US). Mammography showed a focal asymmetry that was approximately 7 mm in size just below the subcutaneous fat layer in the right upper outer quadrant of the breast (Fig. 1A, B). US examination using an ultrasound scanner (iU-22; Philips Medical System, Bothwell, WA, USA) equipped with high-

frequency linear-array transducers revealed an irregular, markedly hypoechoic nodule measuring 6×4×6 mm, which had a somewhat angular margin and echogenic halo (Fig. 1C). The lesion was nearly surrounded by subcutaneous fat tissue with attachment on the anterior mammary fascia. Magnetic resonance imaging (MRI) with dynamic contrast enhancement was performed with a 3.0-T system (Achieva; Philips Healthcare, Best, the Netherlands), which demonstrated an oval nodule with an irregular margin that was hyperintense on T2-weighted imaging and hypointense on T1-weighted imaging. Dynamic contrast-enhanced MR images (Fig. 1D) showed rapid early enhancement and persistent enhancement pattern on the time–signal intensity curve (Fig. 1E).

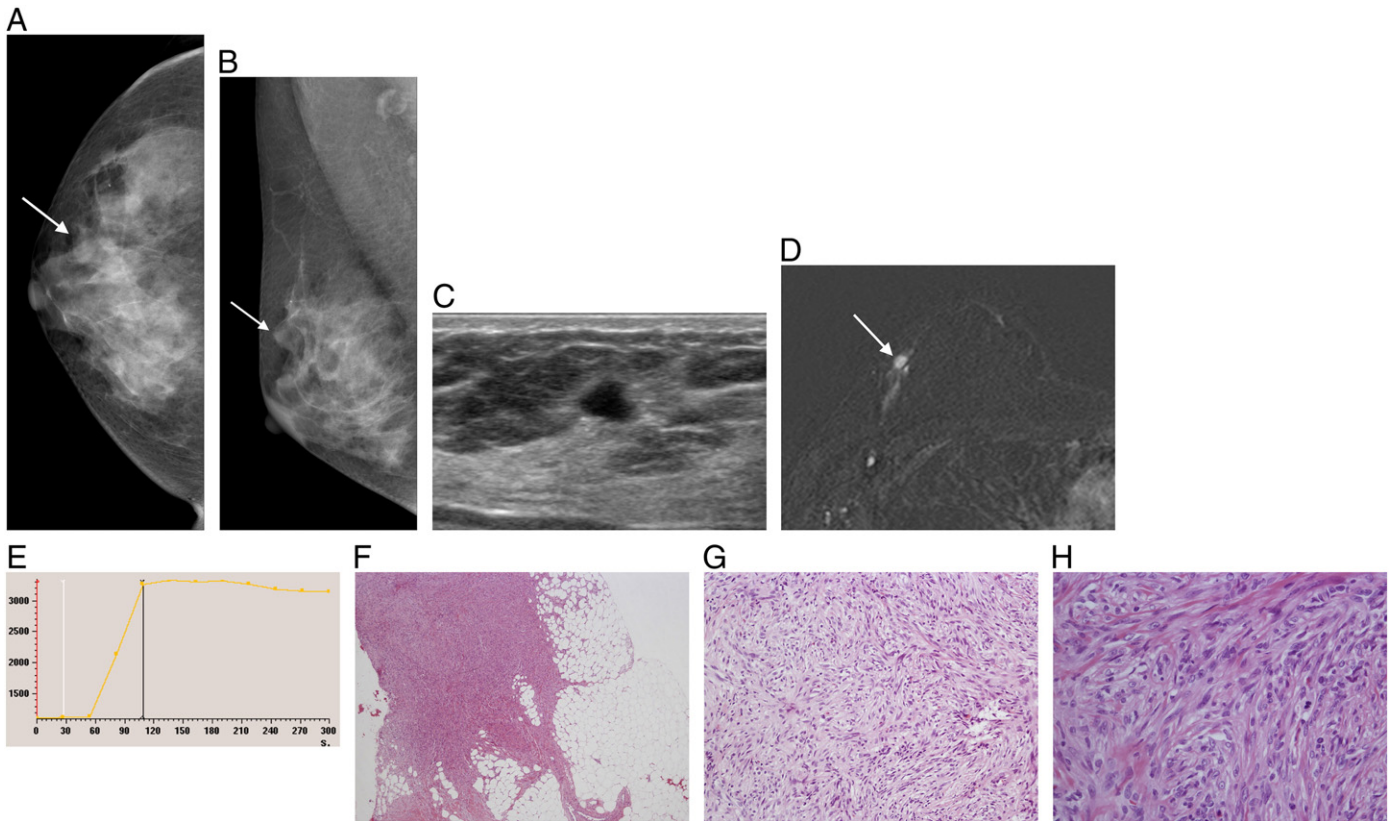
Based on the findings obtained using multiple imaging modalities, the lesion was assessed as Breast Imaging–Reporting and Data System (BI-RADS) category 4-A. US-guided core needle biopsy was performed and histopathology revealed nodular fasciitis. We considered this result to be concordant with the features seen on imaging. US-guided vacuum-assisted excision was subsequently performed at the request of the patient. Histopathologically, the lesion was composed of spindle cells with vascular proliferation and lymphocytic infiltration in a myxoid stroma, which was again compatible with a diagnosis of nodular fasciitis (Fig. 1F, G, H).

### 2.2. Case 2

A 32-year-old woman was admitted to the hospital with a painful mass in her left breast of 10 days' duration. She had no history of trauma. Physical examination revealed a firm and fixed mass in the 2-

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**Fig. 1.** A 43-year-old woman with nodular fasciitis. (A, B) Mammograms of the right breast show a focal asymmetry approximately 7 mm in size just below the subcutaneous fat layer in the right upper outer breast. (C) US imaging shows an irregularly shaped, markedly hypoechoic nodule with an angular margin and an echogenic halo surrounded by subcutaneous fat tissue and attached to the superficial mammary fascia. (D) Subtraction MR imaging shows an oval, smooth enhancing nodule. (E) The kinetic curve shows rapid early enhancement with a washout pattern. (F) Microscopic examination shows an ill-demarcated lesion infiltrating the surrounding fatty tissue [hematoxylin and eosin (H&E) staining,  $\times 20$ ]. (G) The lesion was composed of spindle cells with vascular proliferation and lymphocytic infiltration within the myxoid stroma (H&E,  $\times 200$ ). (H) The spindle cells were bland, and some collagen deposition was noted. Mitosis was observed (H&E,  $\times 400$ ).

o'clock direction of her left breast. Mammography showed a faint focal asymmetry in the superficial layer of left upper outer quadrant (Fig. 2A, B). US exam showed a  $5 \times 3 \times 7$ -mm oval hypoechoic nodule with indistinct margins that was connected to a thin tortuous tubular hypoechoic structure in the subcutaneous fat layer. The whole lesion was measured to be about  $5 \times 5 \times 20$  mm in size and was surrounded by a fuzzy hyperechoic halo. In addition, the surrounding fat tissue exhibited increased vascularity, though the lesion itself did not show any intrinsic vascularity on Doppler US examination (Fig. 2C, D). These features were consistent with an inflammatory lesion such as an epidermal inclusion cyst with surrounding inflammation, Mondor's disease (thrombophlebitis), or parasitic infection. As the lesion itself did not exhibit any suspicious findings, it was assessed as BI-RADS category 3. Given the palpability of the lesion, US-guided core needle biopsy was performed. Histopathologic examination showed benign proliferation of fibroblasts without pleomorphism arranged in bundles that intersected at various angles with mixed myxoid and dense fibrotic stroma, which was suggestive of nodular fasciitis. Conservative management with follow-up US in 6 months was recommended. The patient was initially lost to follow-up, but was seen again 2 years later at which time US examination revealed no abnormalities in her left breast. Repeat mammography was not performed due to her young age.

### 3. Discussion

Nodular fasciitis is a benign proliferation of fibroblasts and myofibroblasts that is usually found in the soft tissue of the upper extremities of young to middle-aged persons. Other sites of manifestation include the trunk, head and neck, and lower extrem-

ities. Nodular fasciitis has been reported to affect males and females equally. It typically presents as a rapidly growing mass with associated tenderness [2,9,10]. In the literature, the radiologic findings of nodular fasciitis have been described mainly in terms of MRI and vary according to histological subtype. Typical features include low or iso-signal intensity relative to skeletal muscle on T1-weighted imaging and high signal intensity on T2-weighted imaging with enhancement after contrast injection [9–11]. A few descriptions of features observed on US in cases of nodular fasciitis of the head and neck and upper arm have been reported. Most cases in head and neck or upper arm have been described as well-defined, oval or lobulated, iso- or hypoechoic lesions, and have been regarded as benign in nature [12,13].

Nodular fasciitis of the breast is very rare. There have been a few descriptions of radiologic findings of nodular fasciitis of the breast, though these have not described the lesions according to the BI-RADS lexicons. The mammographic and US findings in previous reports of nodular fasciitis of the breast are summarized in Table 1. Nodular fasciitis of the breast usually presents with features that are suspicious for malignancy. On mammography, most cases appear as hyperdense masses with suspicious findings such as spiculation, distortion, poorly defined margins, or stellate lesions [2,3,5,7,8]. Only five reports [2–4,7,8] to date have described US images in cases of nodular fasciitis of the breast, and all lesions showed hypoechogenicity with malignant features such as irregular margins and a taller-than-wide shape. MR findings have been described in only one paper by Iwatani et al. [2], which noted a high-contrast enhancing lesion without description of the dynamic contrast enhancement pattern. Consequently, unlike nodular fasciitis of the extremities or trunk, nodular fasciitis of the breast typically exhibits radiologic findings that mimic breast cancer.

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