



## Breast Cancer Adjacent to Nodular Fasciitis: A Case Report

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### Abstract

Nodular fasciitis is a benign proliferative lesion that is generally found in the soft tissue of the upper extremity and trunk. It has rarely been reported in the breast and that of the breast is indistinguishable from breast cancer. A 77-year-old woman visited our department to biopsy the swelled axillary lymph node. Contemporary, a breast tumor was found in her left breast. Mammography showed a high density mass with microlobulated margin. On ultrasonography, there was an irregular hypoechoic mass which was adjacent to a heterogeneous hyperechoic lesion. Needle biopsied tissues showed a proliferation of spindle-shaped cells and suggested nodular fasciitis. On Magnetic Resonance Imaging (MRI), a lobulated mass was detected in the left breast. The mass showed iso signal intensity (SI) to mammary gland on T1-weighted images, while it showed intermingled high and low SI on T2-weighted images. Dynamic contrast-enhanced MRI showed rapid early enhancement followed by wash-out, but persistent enhancement was partly shown. Surgical excision of the breast tumor was performed in the present case. Pathologically, there was an invasive ductal carcinoma adjacent to nodular fasciitis. By immunohistochemistry, these tumor cells showed diffusely positive for estrogen and progesterone receptors and negative for human epidermal growth factor receptor 2 (HER2). We propose that estrogen-related changes regarding mammary gland proliferation might play an important role in the etiopathogenesis of nodular fasciitis.

### Keywords

Nodular fasciitis, Breast MRI, Breast cancer

### List of Abbreviations

MRI: magnetic resonance imaging, SI: Signal intensity, HER2: human epidermal growth factor receptor 2, H.E: Eosin & Hematoxylin.

### Introduction

Nodular fasciitis is a benign proliferation of myo fibroblasts usually found in the soft tissue of the upper extremities or the lower extremities, the head and thorax [1,2]. It has rarely been reported in the breast and has been advocated that indistinguishable from

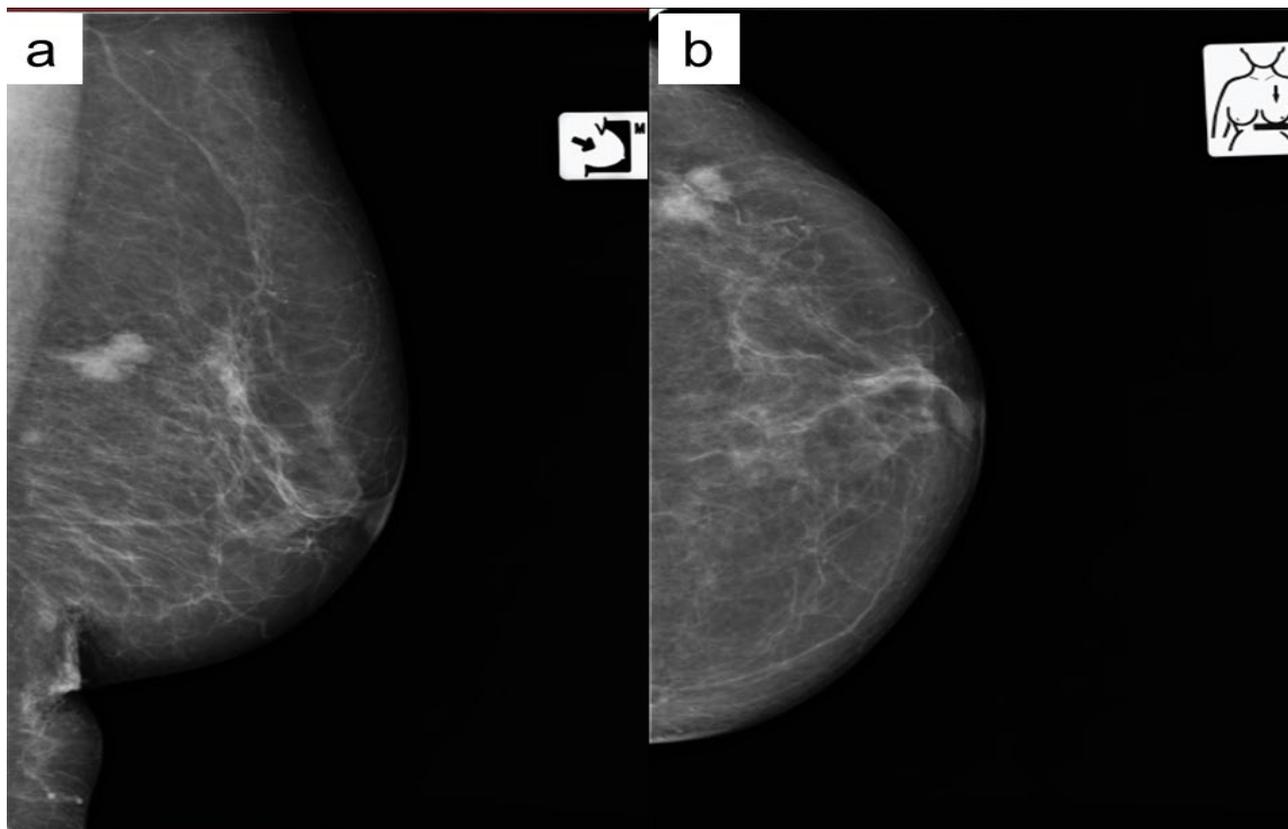
breast cancer. The history of trauma is elicited in approximately 5-15 percent of patients [2]. Herein we report a patient with breast cancer adjacent to nodular fasciitis in the breast.

A 77-year-old woman visited our department to biopsy the axillary lymph node, because malignant lymphoma was clinically suggested. Her left breast had been bruised and a breast tumor was palpable in the left lateral lesion. Mammography showed a high density mass with microlobulated margin in the retromammary space (Figure 1a and Figure 1b). On ultrasonography, there was an irregular hypoechoic mass (15×9 mm in size) with an adjacent heterogeneous hyperechoic lesion (8×8 mm in size) (Figure 2a). Increased peri-tumoral vascular flow and hardness of the tumor measured by elastography suggested an invasive breast cancer which invaded the adipose tissues (Figure 2b and Figure 2c). Needle biopsied tissues showed a proliferation of spindle-shaped cells without cellular atypia and suggested nodular fasciitis (Figure 3a). On magnetic resonance imaging (MRI), a lobulated mass was detected (15×15×14mm in size) in the left breast. The mass showed iso signal intensity (SI) to mammary gland on T1-weighted images, while it showed intermingled high and low SI on T2-weighted images (Figure 4a and Figure 4b). Dynamic contrast-enhanced MRI showed rapid early enhancement followed by wash-out, but steady persistent enhancement was partly shown (Figure 4c and Figure 4d). Although no malignant finding was shown in the tissue samples obtained by needle biopsy, malignant breast tumor including breast cancer was suggested by these imaging findings. Therefore, surgical excision of the breast tumor and axillary lymph node biopsy were performed. Pathologically, there was an invasive ductal carcinoma adjacent to nodular fasciitis (Figure 3b). Malignant epithelial cells proliferated mainly in the ducts arranged in solid-sheets, and focally invaded the adipose tissue (Figure 5a). The tumor cells also proliferated in the central part of the nodular fasciitis (Figure 5b). By immunohistochemistry, these tumor cells showed diffusely positive for estrogen and progesterone receptors and negative for human epidermal growth factor receptor 2 (HER2). No additional treatment but palliative care for advanced malignant lymphoma was administrated in the present case. She died after six months following surgery due to disease progression of malignant lymphoma.

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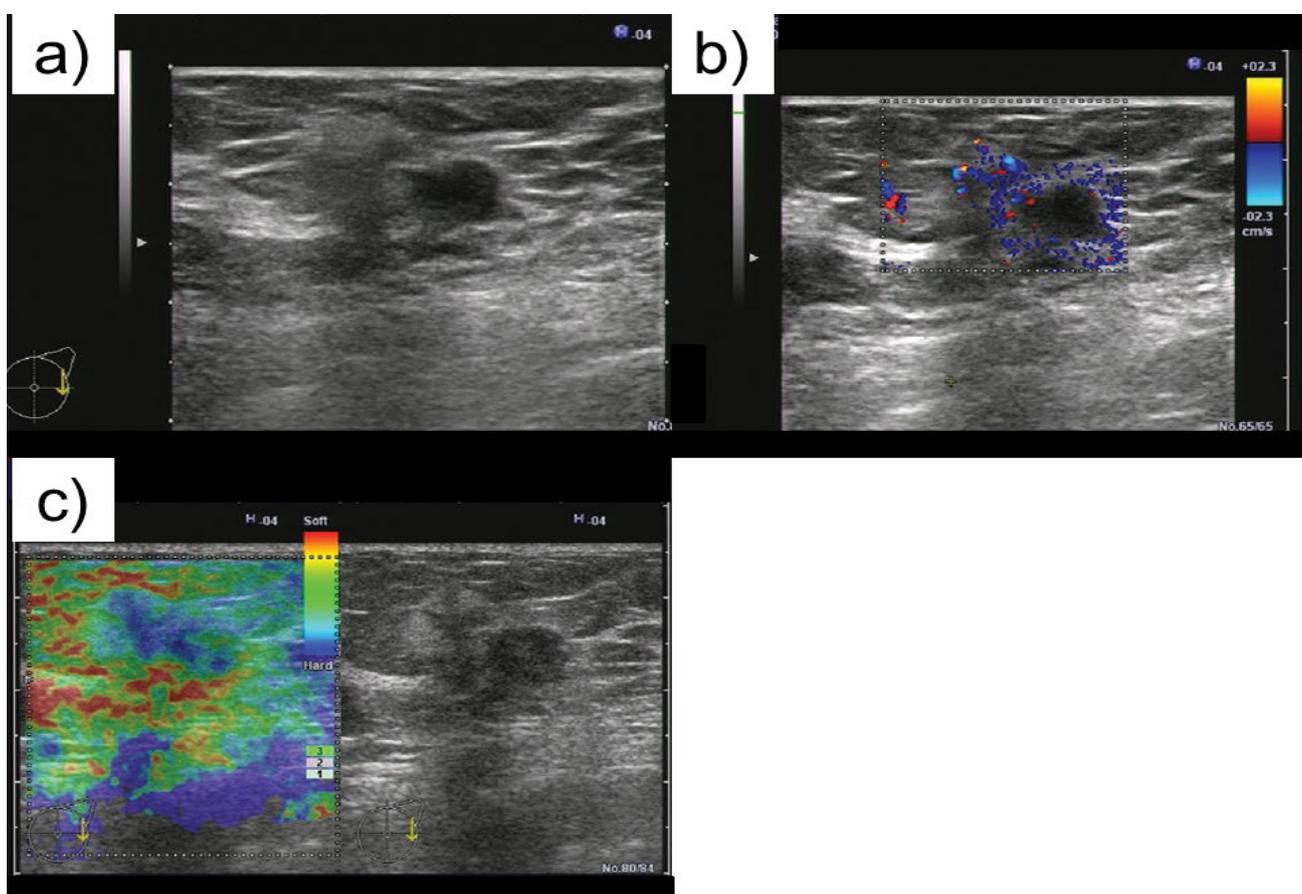
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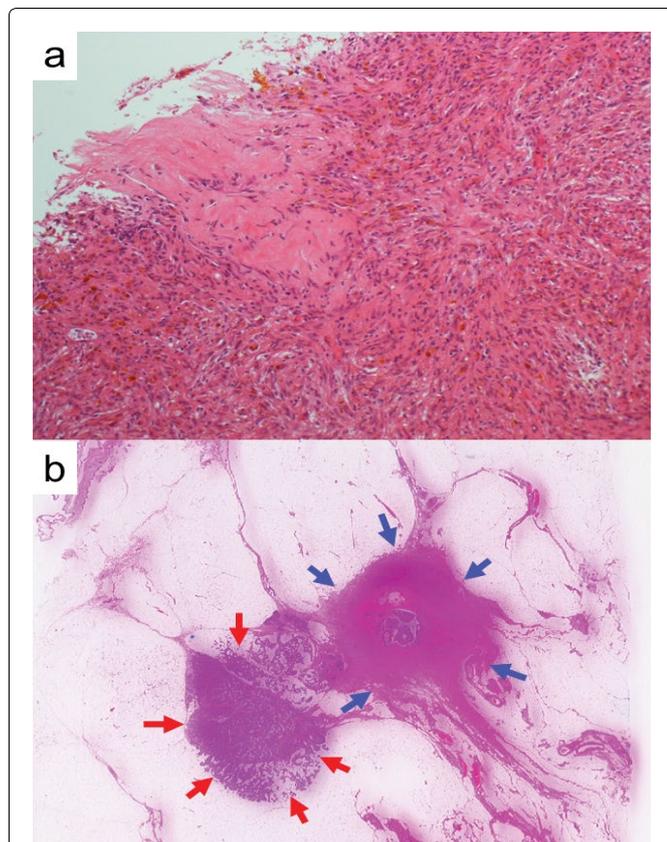
**Figure 1:** Mammography

Mammography showed a high density mass with microlobulated margin in the retromammary space (a: Mediolateral oblique view, b: Craniocaudal view).



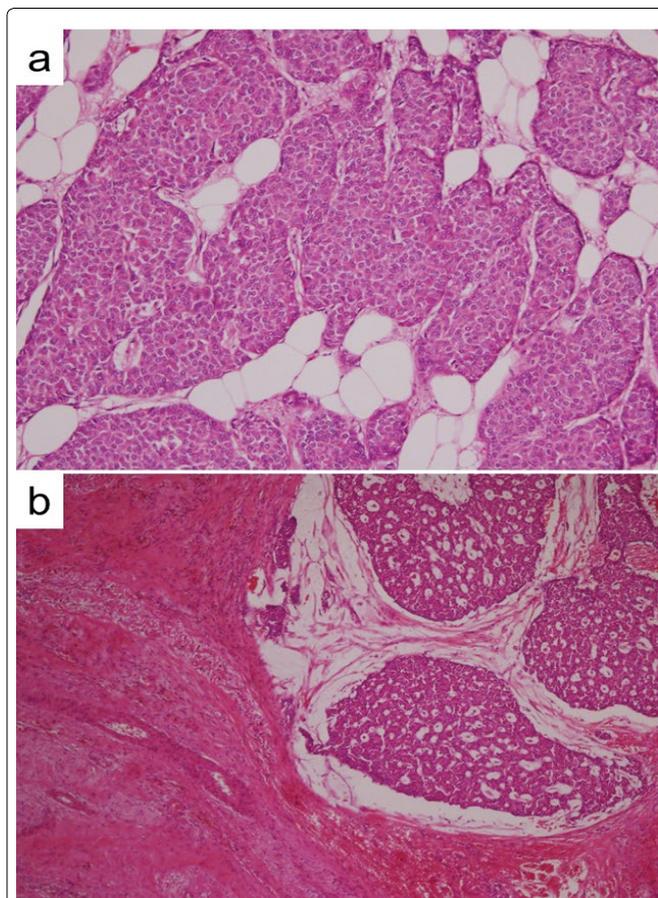
**Figure 2:** Ultrasonography

a: On ultrasonography, there was an irregular hypoechoic mass (15×9 mm in size) with an adjacent heterogeneous hyperechoic lesion (8×8 mm in size). b, c: Increased peri-tumoral vascular flow and hardness of the tumor measured by elastography suggested an invasive breast cancer which invaded the adipose tissue (b: Color Doppler mode, c: Elastography).



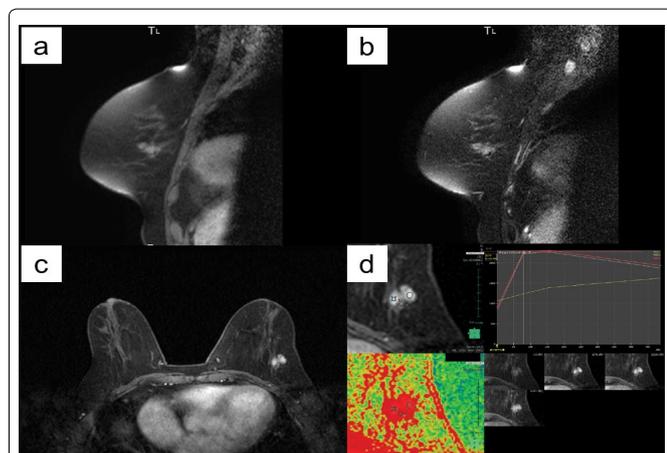
**Figure 3:** Needle biopsied tissues and resected tumor

**a:** Needle biopsied tissues showed proliferation of spindle-shaped cells without cellular atypia and suggested nodular fasciitis [Eosin & Hematoxylin (H.E.) stain  $\times 100$ ]. **b:** Pathologically, there was an invasive ductal carcinoma adjacent to nodular fasciitis [H.E. stain  $\times 5$ ; red arrows show carcinoma, blue arrows show nodular fasciitis].



**Figure 5:** Histological findings of carcinoma and nodular fasciitis

**a:** Malignant epithelial cells proliferated mainly in the ducts arranged in solid-sheets, and focally invaded the adipose tissue (H.E. stain  $\times 100$ ). The tumor cells also proliferated in the central part of the nodular fasciitis (H.E. stain  $\times 40$ ).



**Figure 4:** Breast magnetic resonance imaging

The mass shows iso signal intensity (SI) to mammary gland on T1-weighted images, while it showed intermingled high and low SI on T2-weighted images (**a**: T1-weighted images, **b**: T2-weighted images). Dynamic contrast-enhanced MRI showed rapid early enhancement followed by wash-out, but steady persistent enhancement was partly shown [**c**: T1-weighted dynamic images (early phase), **d**: diffusion weighted images with dynamic curves].

## Discussion

Nodular fasciitis in the breast is very rare and only 25 cases have been reported worldwide to date (Table 1) [3-25]. The median age of the patients was 41 years (range 15-84 years) and the majorities of them were female. The median tumor size was 1.5 cm (range 0.5-5.6 cm), it seems not so large. Mammography and ultrasonography tend to reveal malignant tumor, thus immediate excision was performed in the most cases. Unexpectedly, invasive ductal carcinoma was complicated with nodular fasciitis in the present case. Regrettably,

we had taken tissue samples only from the hypoechoic mass, so we should also have taken them from the hyperechoic lesion. Based on the correlation of pathological and ultrasonographic findings, the hyperechoic lesion reflected the invasive cancer while the hypoechoic lesion reflected the nodular fasciitis. Eventually, surgical excision was performed and then we diagnosed invasive ductal carcinoma adjacent to nodular fasciitis in the breast. To our knowledge, this is the first report of nodular fasciitis in the breast adjacent to breast cancer.

Histologically, nodular fasciitis is characterized by plump, immature spindle fibroblasts and myofibroblasts arranged in short irregular bundles [26]. Its benign nature has been well described in the literature, and it has been recently categorized as one of the benign mesenchymal tumors of the breast by the World Health Organization [27]. The histological differential diagnosis includes spindle-shaped cell tumors such as fibromatosis, myofibroblastoma, solitary fibrous tumor, phyllodes tumor, spindle cell carcinoma, fibrous histiocytoma, and various types of soft-tissue sarcomas. Nodular fasciitis can be discriminate from them based on cellularity, nuclear features, collagen content, and growth pattern [18]. Excisional, core needle, or vacuum-assisted biopsy is useful for histological diagnosis, and spontaneous regression and disappearance of the tumor was observed in the 5 cases (Case #4, #13, #23, #24, and #25 on Table 1) [6,15,24,25]. In addition, local recurrence following surgical excision rarely occurred (Case #13, #17 on Table 1) [15,18]. These characteristics of nodular fasciitis in the breast suggest that accurate histological diagnosis could avoid overtreatment. Although contrast-enhanced MRI could be helpful to discriminate nodular fasciitis from malignancy, only a few reports described MRI imaging in the breast [20,25]. Rapid early and persistent, or high contrast enhancement was shown on dynamic contrast-enhanced MRI. The present case showed rapid early enhancement followed by wash-out, concomitant partly persistent enhancement. We composed diffusion-weighted image with dynamic contrast-enhanced MRI, and it might be helpful to distinguish nodular fasciitis from breast cancer. By immunohistochemistry, these

**Table 1:** Reported cases of nodular fasciitis in the breast

No.	Author	Year	Sex	Age	Size (cm)	Mammography	Ultrasonography	Treatment
1	Baba et al. [3]	1978	Female	59	-	-	-	Excised
2	Fritsches and Muller [4]	1983	-	36	3.0	Unspecified	Unspecified	Excised
3	Törngren et al. [5]	1991	Female	52	1.5	Unspecified	Unspecified	Excised
4	Stanley et al. [6]	1993	-	-	1.5	Unspecified	Unspecified	Observed
5	Benson et al. [7]	1994	-	44	1.5	Unspecified	Unspecified	Excised
6	Black et al. [8]	1994	Female	84	3.4	High density mass with micro-lobulated margin	-	Excised
7	Green et al. [9]	1997	-	61	2.5	Unspecified	Unspecified	Excised
8	Kontogeorgos et al. [10]	1998	-	-	-	-	-	-
9	B Mary and A. Maly [11]	2001	Female	15	2.0	Unspecified	Unspecified	Excised
10	Dahlstorm et al. [12]	2001	Female	38	1.2	High density mass with indistinct margin	Hypoechoic lesion with a smooth margin	Excised
11	Polat et al. [13]	2002	Female	66	-	High dense mass with circumscribed mass	Hypoechoic lesion	Excised
12	Tulbah et al. [14]	2003	Female	18	-	Not performed	Not performed	Excised
13	Brown and Carty [15]	2005	Female	65	5.5	High density mass with micro-lobulated margin	Unspecified	Observed
14	Porter et al. [16]	2006	Female	75	-	High density mass with micro-lobulated margin	-	-
15	Porter et al. [16]	2006	Female	52	-	-	Hypoechoic round lesion with circumscribed margin	-
16	Hayashi et al. [17]	2007	Female	41	1.5	High density mass with spiculation	Hypoechoic lesion with irregular margin	Excised
17	Squillaci et al. [18]	2007	Male	40	3.5	High density mass with spiculation	Hypoechoic lesion with irregular margin	Excised
18	Ozben et al. [19]	2009	Female	18	0.8	Not performed	Hypoechoic lesion	Excised
19	Iwatani et al. [20]	2012	Female	25	0.5	High density mass with distortion	Hypoechoic lesion with irregular margin	Excised
20	Paker et al. [21]	2013	Male	17	1.5	Not performed	Not performed	Excised
21	Son et al. [22]	2013	Female	41	1.1	High density mass with indistinct margin	Hypoechoic lesion with irregular margin	Excised
22	Yamamoto et al. [23]	2014	Female	35	1.3	Unspecified	Hypoechoic lesion with irregular margin	Excised
23	Samardzic et al. [24]	2014	Female	68	5.6	Equal density mass with ill-defined margin	Multiloculated complex cystic mass	Observed
24	Rhee et al. [25]	2014	Female	43	0.6	Focal asymmetry density	Hypoechoic lesion with irregular margin	Observed
25	Rhee et al. [25]	2014	Female	32	2.0	Focal asymmetry density	Hypoechoic round lesion with indistinct margin	Observed

tumor cells showed diffusely positive for estrogen and progesterone receptors and negative for human epidermal growth factor receptor 2 (HER2). We propose that estrogen-related changes regarding mammary gland proliferation might play an important role in the etiopathogenesis of nodular fasciitis.

## Conclusion

In conclusion, we presented a case of breast carcinoma adjacent to nodular fasciitis. We propose that estrogen-related changes regarding mammary gland proliferation might play an important role in the etiopathogenesis of nodular fasciitis.

## Consent

Written informed consent was obtained from the nearest relative of the patient for publication of this Case report and any accompanying images. The patient had agreed to publish this case report as well, but we could not obtain her signature due to disease progression. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

## Competing Interests

The authors declare that they have no competing interests.

## Authors' Contributions

RT and AI acquired the data and drafted the manuscript. MA, KT and SH participated in the design of the work. RNM evaluated the radiological images and revised the manuscript critically. SM evaluated the pathological findings. SN and YA supervised the design of the work. All authors read and approved the final manuscript.

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