Periductal Stromal Tumor of the Breast with Synchronous Bilateral Breast Cancer

SO YEON KI[1], HYO SOON LIM[1], JI SHIN LEE[2], SEO YEON PARK[1], NAM YEOL YIM[1], SUK HEE HEO[1], MIN HO PARK[3], JIN SEONG CHO[3] and SUN HYOUNG SHIN[3]

Departments of [1]Radiology, [2]Pathology and [3]Surgery, Chonnam National University Medical School, Chonnam National University Hwasun Hospital, Hwasun-gun, Jeollanam-do, Republic of Korea

Abstract. *We report on a case of low-grade periductal stromal tumor of the breast with synchronous bilateral breast carcinoma. A 45-year-old woman came to our Hospital because of a palpable mass of the right breast. An approximately 5-cm mass was palpated in the upper right breast. The mammographic and sonographic findings of the palpable mass suggested the possibility of hamartoma. A 1.3-cm, irregular mass with microcalcifications was also detected in the upper outer quadrant of the right breast and a 1.3-cm irregular mass was detected in the upper outer quadrant of the left breast. Core-needle biopsy revealed bilateral breast carcinoma. The patient underwent bilateral breast-conserving surgery, including the excision of the large palpable mass in the right breast. The palpable mass in the right breast was confirmed as low-grade periductal stromal tumor and there were bilateral invasive ductal carcinomas in both upper outer breast quadrants. After surgery, the patient received adjuvant chemotherapy. At 16 months of follow-up, no recurrence was observed.*

Periductal stromal tumors, previously called periductal stromal sarcomas, are exceedingly rare tumors classified as fibroepithelial tumors, and include fibroadenoma, phyllodes tumor, and mammary hamartoma. According to the fourth edition of the WHO classification, periductal stromal tumor is an entity that histologically overlaps with phyllodes tumor, the main difference being the absence of leaf-like processes. Because of its extreme rarity, the radiological and clinical features are not well known. We report a case of low-grade periductal stromal tumor with synchronous bilateral breast carcinoma in a 45-year-old woman. To our knowledge, this is the first case of low-grade periductal stromal tumor of the breast with synchronous bilateral breast carcinoma reported in the English-language literature.

Correspondence to: Hyo Soon Lim, MD, Department of Radiology, Chonnam National University Medical School, Chonnam National University Hwasun Hospital, #322 Seoyang-ro, Hwasun-eup, Hwasun-gun, Jeollanam-do, 519-763, Korea. Tel: +82 613797112, Fax: +82 613797133, e-mail: nico1220@dreamwiz.com

Key Words: Periductal stromal tumor, breast cancer, bilateral breast cancer.

Case Report

A 45-year-old woman came to our Hospital because of a palpable mass of the right breast. She had no personal or family history of breast carcinoma. On physical examination, an approximately 5-cm mass was palpated in the upper right breast. No axillary lymphadenopathy was palpable. No skin changes or nipple retraction were found.

Bilateral mammogram showed a 5-cm fat-containing mixed-density, oval mass with circumscribed margins in the 12 o'clock direction of the right breast. Incidentally, there was a cluster of microcalcifications in the upper outer quadrant of the right breast and a 1.5-cm irregular mass in the upper outer quadrant of the left breast (Figure 1). Subsequent magnified view and ultrasound were performed. The magnified view of the upper outer quadrant of the right breast showed clustered fine pleomorphic microcalcifications. On sonographic examination, an approximately 5-cm, oval, heterogeneous mass, composed of a variable mixture of isoechoic fatty or lobular elements and hyperechoic fibrous elements was detected in the 12-o'clock position of the right breast (Figure 2). The mammographic and sonographic findings of the palpable mass suggested the possibility of hamartoma. A 1.3-cm, irregular indistinct hypoechoic mass with microcalcifications was also detected in the upper outer quadrant of the right breast and a 1.3-cm irregular hypoechoic mass was detected in the upper outer quadrant of the left breast on sonographic examination. An ultrasound-guided core-needle biopsy was carried-out for masses in upper outer quadrants of both breasts. Core-needle biopsy revealed an invasive ductal carcinoma in the left breast and ductal carcinoma *in situ* in the right breast. Breast magnetic resonance imaging (MRI) was performed for preoperative staging. Three distinct lesions were seen on breast MRI. MRI showed a 5-cm oval-shaped, smooth, fat-containing mass in the

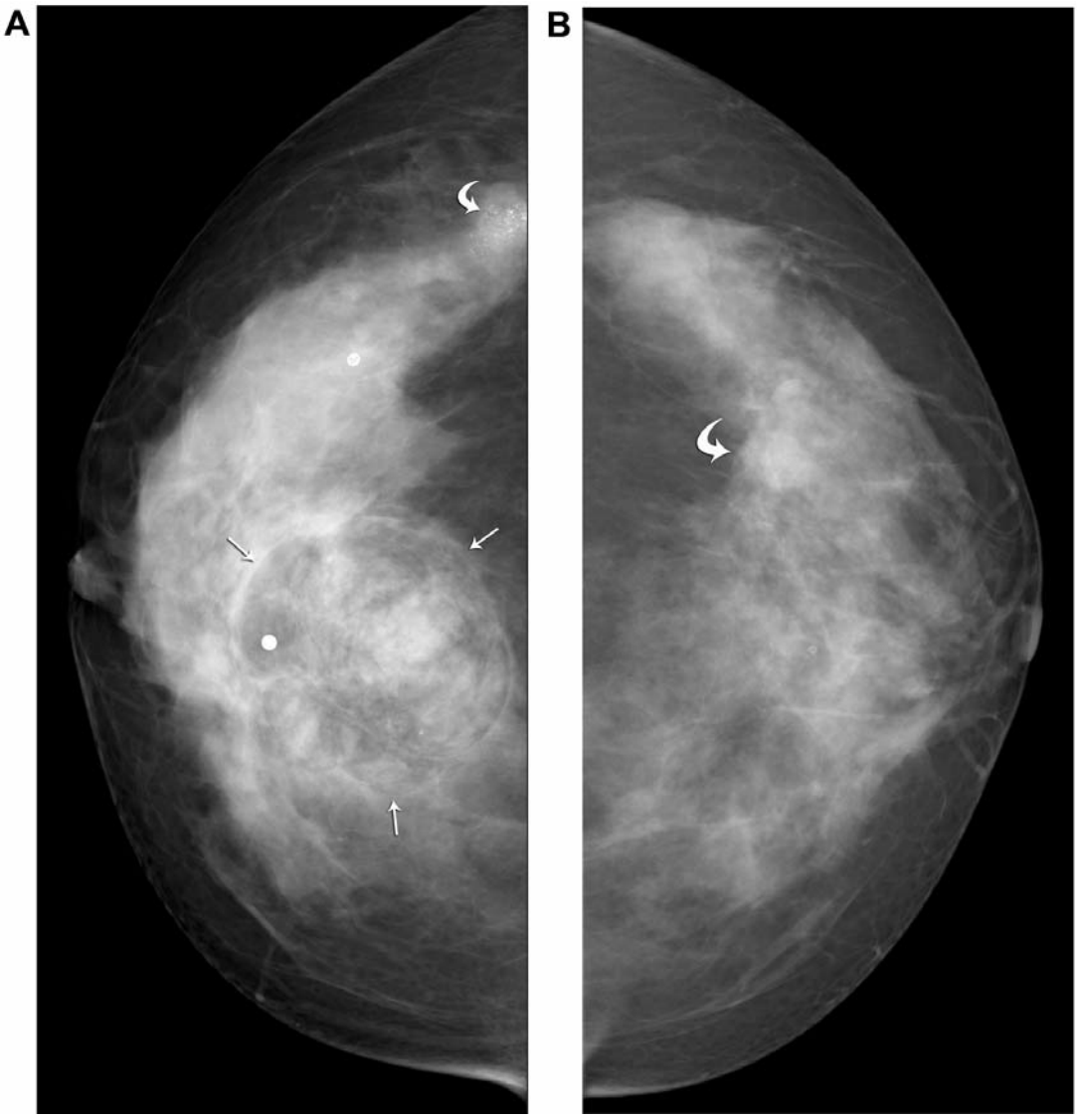

Figure 1. *Craniocaudal mammograms of the right (A) and left (B) breast showing a 5-cm fat-containing mixed-density, oval mass with water density capsule (arrows) in the 12 o'clock direction of the right breast. Incidentally, there is a cluster of microcalcifications (curved arrow in A) in the upper outer quadrant of the right breast and a 1.5-cm irregular mass (curved arrow in B) in upper outer quadrant of the left breast.*

right upper breast quadrant, which showed heterogeneous enhancement after administration of gadolinium and irregular, homogeneously enhancing masses in upper outer quadrants of both breasts, corresponding to biopsy-proven malignancies (Figure 3).

The patient underwent bilateral breast-conserving surgery, including the excision of the large palpable mass in right upper breast quadrant. The gross surgical specimen showed a 4.5×4×3.5 cm whitish-yellow colored, firm mass with relatively well-defined borders in the right upper central breast. A 1.5×1.2×1 cm ill-defined, tan tumor with white to pale-yellow flecks was seen in the upper outer quadrant of the right breast and a 1.5×1.4×1 cm white to yellow colored hard mass was seen in the upper outer quadrant of the left breast. Microscopic sections showed a circumscribed, multinodular mass, composed of a predominantly spindle cell proliferation forming cuffs around multiple open tubules and ducts devoid of phyllodes pattern. The stromal cells showed extensive nuclear pleomorphism, multinucleation, hyperchromasia, and moderate mitotic activity. Interlobular benign adipose tissue islands were seen infiltrated by spindle-shaped tumor cells. On immunohistochemistry, the spindle cells were positive for

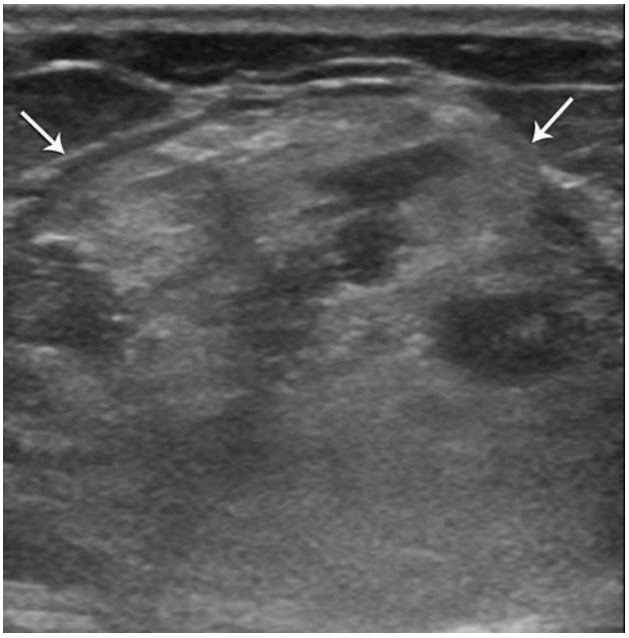

Figure 2. *Ultrasound images showing an approximately 5-cm, oval circumscribed mass with internal heterogeneous echogenicity in the 12 o'clock direction of the right breast.*

vimentin and cluster of differentiation 34 (CD34). Assays for pancytokeratin, CD10, CD117, estrogen and progesterone receptors and human epidermal growth factor receptor 2 (HER2) were negative. The proliferative activity measured by Ki-67 was approximately 10% (Figure 4). The palpable mass in the right breast was confirmed as low-grade periductal stromal tumor and there were bilateral invasive ductal carcinomas in both upper outer breast quadrants. After surgery, adjuvant chemotherapy, radiation therapy, and hormone therapy were planned. 6 cycles of CMF (cyclophosphamide, methotrexate, and fluorouracil)-based adjuvant chemotherapy was performed. The patient refused radiation and hormone therapy. At 16 months of follow-up, no recurrence was observed.

Discussion

Periductal stromal sarcoma is an extremely rare biphasic tumor variant characterized by low-grade sarcomatous spindle cells surrounding rounded tubules and infiltrating the surrounding adipose tissue (1). In the fourth edition of the WHO classification of tumors of the breast, the neutral term "tumor" is used instead of periductal stromal "sarcoma". The overlap of morphology with phyllodes tumor suggests that it may be best regarded as a variant of phyllodes tumor (2). In contrast to fibroadenomas and phyllodes tumors that appear to originate from the intralobular stroma, the distribution of the proliferation in periductal stromal tumor suggests an origin from the periductal stroma. The main difference between periductal stromal tumor and phyllodes tumor is the specific pericanalicular growth pattern, which surrounds and entraps the intact lobules without formation of broad papillae or leaf-like structures (3).

The histological criteria for diagnosis of periductal stromal tumor laid down by the Armed Forces Institute of Pathology (AFIP) include: (a) a predominantly sarcomatous spindle cell stromal proliferation of variable cellularity and atypia around individual open tubules and ducts devoid of a phyllodes pattern; (b) one or more often multiple nodules that may have coalesced or may be separated by adipose tissue; (c) stromal mitotic activity of three or greater in 10 high-power fields; and (d) infiltration into surrounding mammary fibroadipose tissue (1). The histological grading depends on atypia and mitotic activity, thus ranging from being low-grade to high-grade periductal stromal tumor (1).

Progression to classic phyllodes tumor has been documented, suggesting that it may be part of the same spectrum of disease. The disease most commonly affects peri-menopausal and post-menopausal women (1). Similarly to phyllodes tumor, periductal stromal tumors have potential to develop specific soft tissue sarcomas, and even metastatic potential, at least in cases harboring more aggressive sarcomatous patterns, and also have tendency for local recurrence when incompletely excised (4, 5). Although resection with adequate margins is generally considered sufficient, a close follow-up is needed (6).

Because of its extreme rarity, the radiological and clinical features of periductal stromal tumor are not well-known. In one case report, ultrasonography and mammography showed an infiltrative, poorly-circumscribed tumor mass without calcifications, measuring up to 24 cm in largest diameter (7).

Mammary hamartomas are an uncommon benign tumor, widely known to its typical mammographic features such as circumscribed fibro-fatty mass (8). On ultrasound, most mammary hamartomas have circumscribed margins, an oval shape, and heterogeneous internal echogenicity (9). These findings are very similar to those of our case, which could lead to misdiagnosis. In our case, interlobular benign adipose tissue islands infiltrated by spindle-shaped tumor cells on histopathology could explain the fatty density within the mass on mammography.

Breast carcinoma is designated as bilateral when a primary carcinoma develops in each breast. Although reported time intervals vary, bilateral breast carcinoma is generally considered to be synchronous when a contralateral breast carcinoma is diagnosed within three months of initial diagnosis. The prevalence of synchronous bilateral breast cancer is approximately 1% of all breast carcinomas. The presence of carcinoma *in situ* or differences in histological type and grade between the tumors is evidence of bilateral

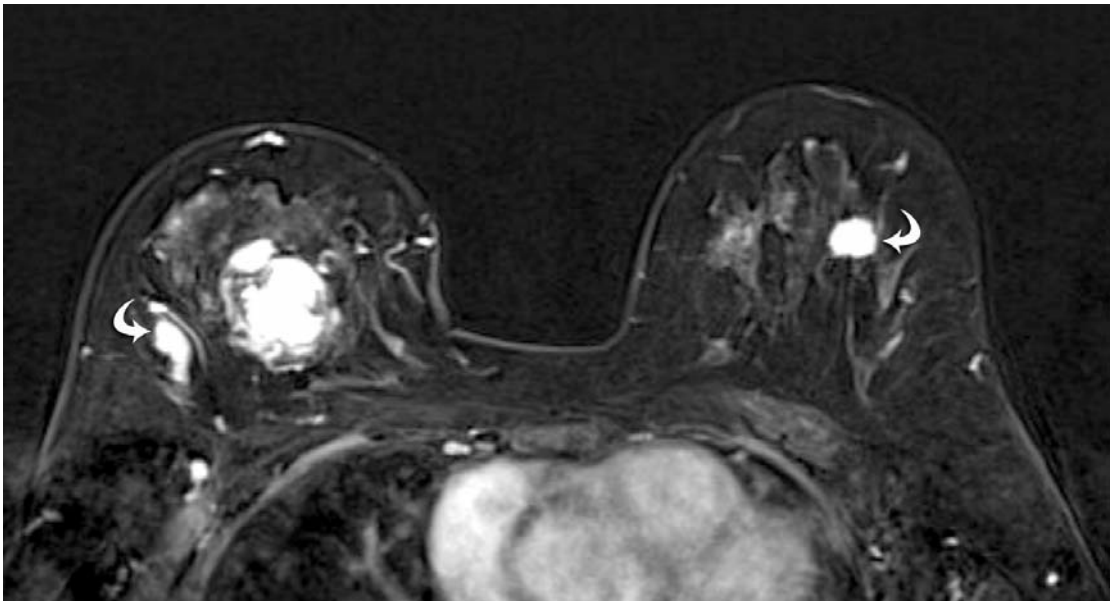

Figure 3. *Early phase image of dynamic enhancement magnetic resonance imaging shows a 5-cm oval, smooth, heterogeneously enhancing mass in the upper quadrant of the right breast and synchronous bilateral breast carcinoma (curved arrows) in upper outer quadrant of both breasts.*

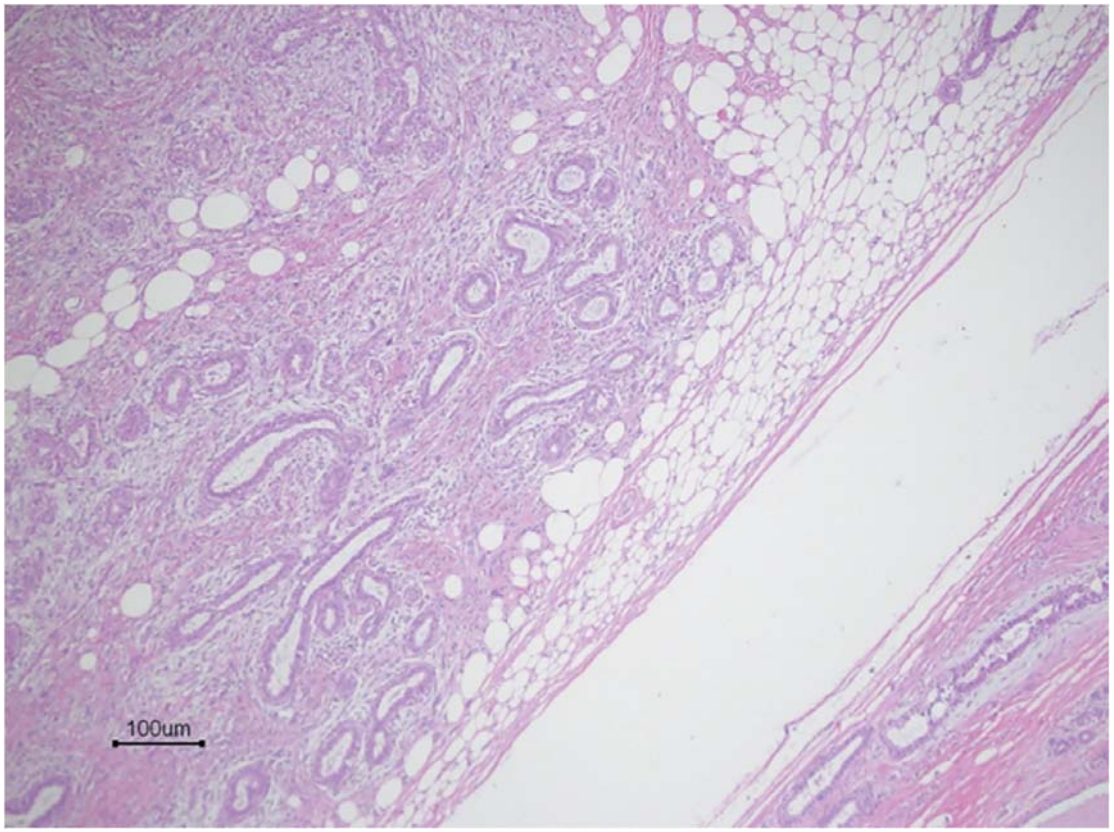

Figure 4. *Microscopic examination showed a circumscribed, multinodular mass, composed of a predominantly spindle cell proliferation forming cuffs around multiple open tubules and ducts devoid of phyllodes pattern.*

breast carcinoma (10). In the present case, both breast carcinomas exhibited different histology and had ductal carcinoma *in situ*.

In summary, we report on a case of low-grade periductal stromal tumor of the breast with radiological findings mimicking hamartoma on mammogrphy and sonography, with synchronous bilateral breast cancer. To our knowledge this is the first case of periductal stromal tumor of the breast with synchronous bilateral breast carcinoma reported in the English language literature.

References

1 Burga AM and Tavassoli FA: Periductal stromal tumor: a rare lesion with low-grade sarcomatous behavior. Am J Surg Pathol *27*: 343-348, 2003.

2 Tan PH, Tse G, Lee A, Simpson JF and Hanby AM: Fibroepithelial tumours. *In*: WHO Classification of Tumours of the Breast, Fourth Edition. Lakhani SR, Ellis IO, Schnitt SJ, Tan PH and van de Vijver MJ (eds.). Lyon: IARC, pp. 145-146, 2012.

3 Tomita T, Ren Y, Davis M and Tawfik O: Phyllodes tumor of borderline malignancy: seven year follow up with immunohistochemical study. Pathol Int *55*: 585-589, 2005.

4 Chaney AW, Pollack A, McNeese MD, Zagars GK, Pisters PW, Pollock RE and Hunt KK: Primary treatment of cystosarcoma phyllodes of the breast. Cancer *89*: 1502-1511, 2000.

5 Norris HJ and Taylor HB: Relationship of histologic features to behavior of cystosarcoma phyllodes: analysis of 94 cases. Cancer *20*: 2090-2099, 1967.

6 Rao AC, Geetha V and Khurana A: Periductal stromal sarcoma of breast with lipoblast-like cells: a case report with review of literature. Indian J Pathol Microbiol *51*: 252-254, 2008.

7 Tomas D, Janković D, Marusić Z, Franceschi A, Mijić A and Kruslin B: Low-grade periductal stromal sarcoma of the breast with myxoid features: immunohistochemistry. Pathol Int *59*: 588-591, 2009.

8 Helvie MA, Adler DD, Rebner M and Oberman HA: Breast hamartomas: variable mammographic appearance. Radiology *170*: 417-421, 1989.

9 Chao TC, Chao HH and Chen MF: Sonographic features of breast hamartomas. J Ultrasound Med *26*: 447-452, 2007.

10 Chaudary MA, Millis RR, Hoskins EO, Halder M, Bulbrook RD, Cuzick J and Hayward JL: Bilateral primary breast cancer: a prospective study of disease incidence. Br J Surg *71*: 711-714, 1984.

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