

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Bilateral diffuse tumorous pseudoangiomatous stromal hyperplasia treated with bilateral mastectomy in a 40-year-old woman

Su Yeon Ko, MD, Myeong Ju Koh, MD*

Department of Radiology, Jeju National University School of Medicine, 15, Aran 13-gil, Jeju, Korea

ARTICLE INFO

Article history:

Received 7 August 2018

Revised 28 August 2018

Accepted 4 September 2018

Available online 25 September 2018

Keywords:

Pseudoangiomatous stromal hyperplasia

Mammography

Ultrasonography

ABSTRACT

Pseudoangiomatous stromal hyperplasia (PASH) is a rare benign breast disease characterized by breast stromal proliferation mimicking low grade angiosarcoma. PASH is frequently detected as an incidental component coexisting with other breast lesions. However, it can also present as a single localized mass and is typically unilateral. Mammographic and sonographic findings are nonspecific and indistinguishable from those of benign lesions. We report an unusual case of PASH presenting with diffuse enlargement of the bilateral breasts in a 40-year-old woman treated with bilateral mastectomy.

© 2018 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license.

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Pseudoangiomatous stromal hyperplasia (PASH) is a benign mesenchymal proliferative lesion of the breast that was first described by Vuitch et al., in 1986. PASH can affect patients in any age group, although it is more common in premenopausal women. The clinical presentation of PASH ranges from the frequently encountered microscopic focus to a discrete mass. A microscopic focus is a relatively common incidental finding in breast specimens from various benign or malignant lesions [1]. PASH can manifest as a well demarcated mass (referred to as tumorous PASH), and most of these cases present as a single unilateral mass [2]. Tumorous PASH can also present as diffuse massive enlargement of the breast; however, this

presentation is extremely rare [2,3]. We herein report a case of PASH presenting as diffuse bilateral breast enlargement requiring bilateral mastectomy.

Case report

A 40-year-old woman presented with progressive bilateral breast enlargement for approximately 1 year. She denied any family history of breast diseases, and did not take oral contraceptives or hormonal medications. Physical examination revealed marked enlargement of both breasts with massive bilateral palpable masses accompanied by breast tenderness. Mammography revealed marked enlargement of both breasts

Competing Interests: The authors have declared that no competing interests exist.

* Corresponding author.

E-mail address: bewatar@gmail.com (M.J. Koh).

<https://doi.org/10.1016/j.radcr.2018.09.001>

1930-0433/© 2018 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

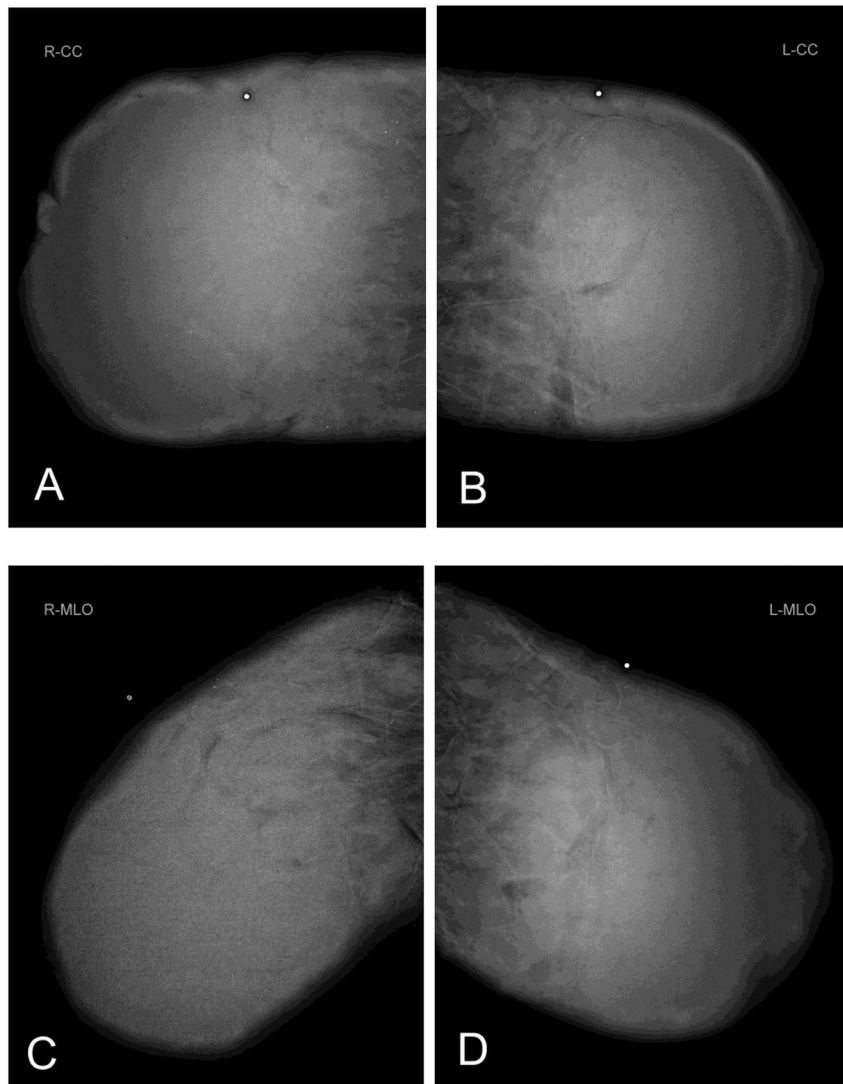


Fig. 1 – Bilateral craniocaudal view (CC) (A and B) and mediolateral oblique view (MLO) (C and D) mammographic images. Mammography shows significantly enlarged bilateral breasts with increased breast density and without a discrete mass. Global asymmetry of the bilateral breasts as well as skin thickening are shown.

with a background of extremely dense glandular parenchyma (Fig. 1). Because the abnormality was extremely large and affected most of the breast, the border of the lesion was poorly defined and covered by the adjacent parenchyma. Breast ultrasonography (US) performed using a linear transducer with a frequency of 8-15 MHz detected a heterogenous, hypoechoic, and circumscribed mass measuring approximately 16 cm at the largest diameter in each breast. Color Doppler US detected blood flow within the mass (Fig. 2). The mass was categorized as Breast Imaging Reporting And Data System (BI-RADS) 4a, and 14-gauge core needle biopsies (5×) of the right breast were performed, leading to a diagnosis of fibrocystic disease (FCD). Differential diagnoses based on imaging studies and clinical presentation included PASH, low-grade angiosarcoma, and phyllodes tumor. A bilateral mastectomy was performed because of the extent of the lesions and pain symptoms. Tumor weight was 3700 g on the right and 3300 g on the left. Macroscopic examination of mastectomy specimens showed

diffusely enlarged breasts with fibrotic changes and multifocal myxoid and/or mucinous lesions bilaterally (Fig. 3). Microscopic examination of surgical specimens led to the diagnosis of PASH. Immunohistochemical studies revealed diffuse positivity for CD34, and focal positivity for smooth muscle actin and desmin, supporting the diagnosis of PASH. The postoperative period was uneventful, and the patient has been followed-up for 1 year postsurgically.

Discussion

PASH is a benign breast lesion characterized histologically by a complex network of slit-like spaces lined by endothelial-like spindle cells against a background of stromal hyperplasia simulating blood vessels [4]. The term “pseudoangiomatous” in PASH refers to the histologic appearance of the slit-like spaces,

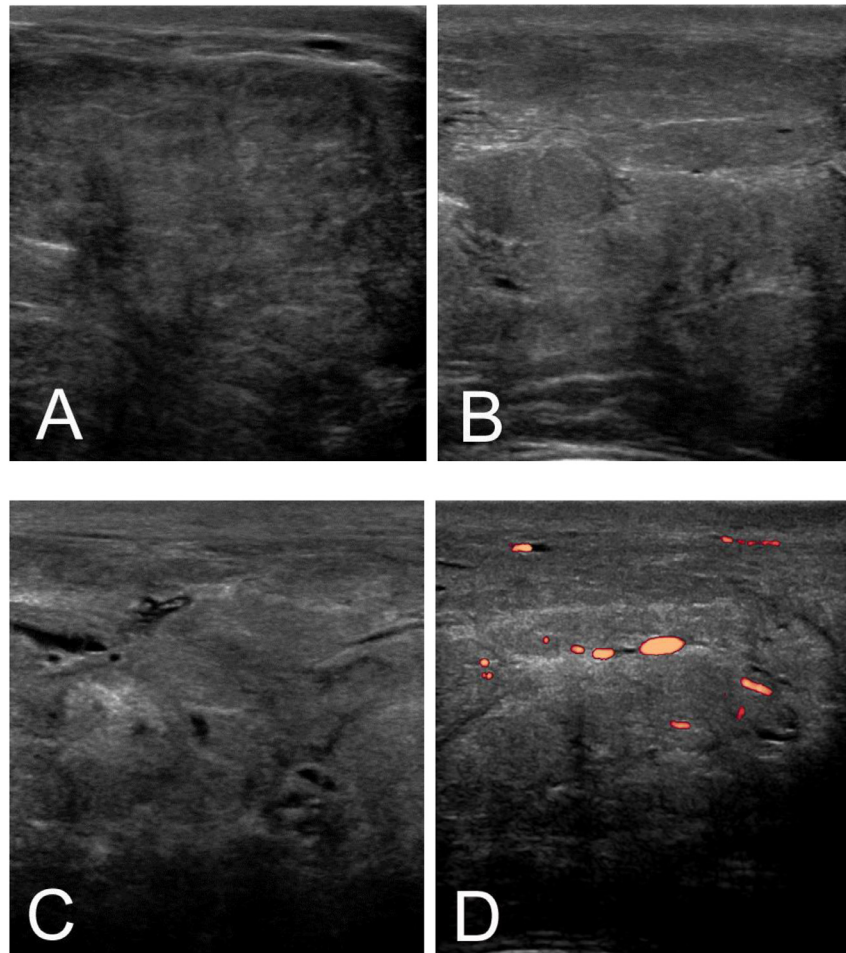


Fig. 2 – Ultrasonography of the right (A) and left (B) breasts shows an underlying well-circumscribed mass with heterogeneous parenchymal echo-texture due to interspaced heterogeneous tissues as well as overlying skin thickening. (C, D) Interspersed cystic channels are shown, and the color flow indicates hyperemic changes within the mass.

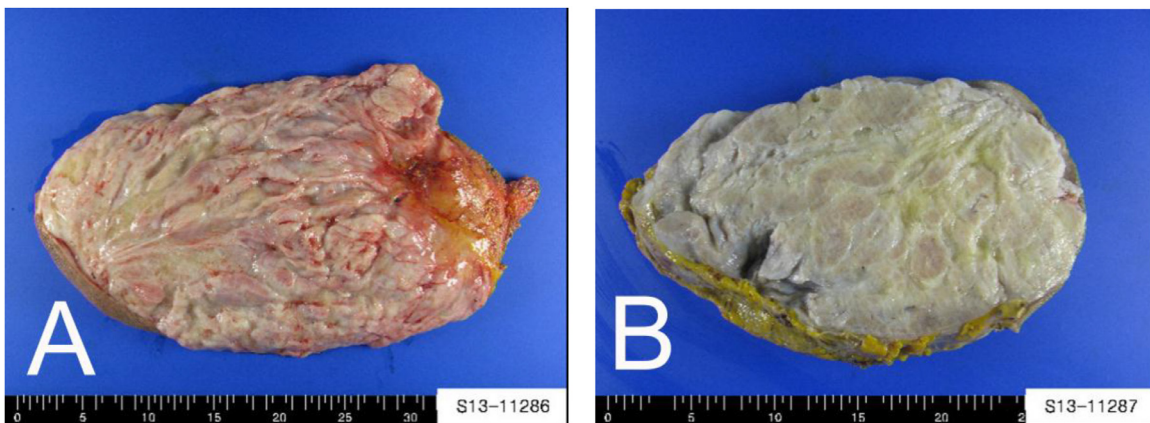


Fig. 3 – Cross section of the right (A) and left (B) breasts. The cut surface of the well-circumscribed mass consists of multiple, tan-pinkish, firm, and sharply demarcated nodules of different sizes throughout both breasts.

which resemble blood vessels. Most of the previously reported cases of PASH presented as a single dominant mass. Here, we describe a rare case of diffuse bilateral tumorous PASH with simultaneous involvement of both breasts. Approximately 200 cases of tumorous PASH and less than 20 cases of diffuse PASH are reported in the literature.

Although the etiology of PASH is poorly understood, it is thought to be associated with an exaggerated response of myofibroblasts to hormonal stimuli [5–7]. This hypothesis is supported by the fact that PASH occurs predominantly in premenopausal women [1,8]. PASH has been reported in postmenopausal women who undergo hormonal replacement therapy and in men with gynecomastia [9,10]. These findings suggest that sex hormones are an etiological factor in the development of PASH.

On histopathologic analysis, PASH may be misdiagnosed as low-grade angiosarcoma, which is also characterized by anastomosing slit-like channels. In PASH, endothelial spindle cells form vessel-like slits within the stroma, whereas in low-grade angiosarcoma, the slit-like spaces contain red blood cells with invasion of adjacent tissues [1,11]. Immunohistochemical analysis is useful for differentiating between the 2 diseases. In angiosarcoma, immunohistochemical staining of spindle cells is consistently positive for the endothelial markers CD31, CD34, and von Willebrand factor antigen, whereas spindle cells in PASH are consistently positive for myofibroblast markers such as CD34 and smooth muscle actin and negative for endothelial markers.

PASH can accompany other breast pathologies including FCD, fibroadenoma, gynecomastia, and sclerosing lobular hyperplasia as well as normal breast tissue.

PASH has a wide range of clinical presentations including a discrete palpable mass, pain, and breast enlargement, and it can be clinically silent.

Although the mammographic features of PASH are non-specific, the prevalent features include a noncalcified, circumscribed mass or focal asymmetry according to previous studies [6,12]. Sonographically, PASH has no distinct diagnostic features and presents as a mass suggestive of a benign lesion such as a circumscribed, oval, hypoechoic mass [6,13]. PASH has overlapping imaging features with fibroadenomas, hamartomas, and angiosarcomas, and larger lesions can be mistaken for phyllodes [14]. The coexistence of fibrocystic changes results in a heterogenous appearance, and a less commonly reported sonographic feature is a heterogeneous region with hypoechoic central areas [15]. In the present case, fibrocystic changes coexisted with PASH, and FCD was diagnosed at the initial core needle biopsy. These features may have led to a heterogenous echotexture of the bilateral masses in the present case. Internal cystic changes, which are a characteristic feature of PASH, can be detected by US [15].

There are few studies reporting MRI findings in PASH. Johnson et al. described the results of breast MRI in PASH as a diffuse enhancement on fluid-sensitive sequences and scattered cauliflower shaped "clusters" of nonmass-like areas of persistent enhancement [12]. The management of PASH depends on clinical factors such as the size of the lesion and the severity of the symptoms. PASH is preferentially managed by close interval follow-up in the absence of pathologically and radiologically suspicious cancerous or precancerous features.

However, in cases of rapid lesion growth or suspicious radiologic features, surgical excision should be considered [16,17]. The treatment of diffuse tumorous PASH such as the present case depends on clinical factors and is challenging because of the rarity of the presentation. In the present case, progressive bilateral breast enlargement was associated with severe discomfort, and the patient underwent bilateral mastectomy. The recurrence rate after resection ranges from 15%–22%, which could be attributed to residual lesions after incomplete excision or de novo growth of PASH [18]. In summary, we present a rare case of bilateral diffuse tumorous PASH in a 40-year-old woman. PASH needs to be considered in cases of rapid and symmetrical enlargement of both breasts, and radiological awareness of this rare form of PASH is essential for the appropriate management.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.radcr.2018.09.001](https://doi.org/10.1016/j.radcr.2018.09.001).

REFERENCES

- [1] Jones KN, Glazebrook KN, Reynolds C. Pseudoangiomatous stromal hyperplasia: imaging findings with pathologic and clinical correlation. *AJR* 2010;195(4):1036–42.
- [2] Sng KK, Tan SM, Mancner JF, Tay KH. The contrasting presentation and management of pseudoangiomatous stromal hyperplasia of the breast. *Singapore Med J* 2008;49(3):e82–5.
- [3] Ryu EM, Whang IY, Chang ED. Rapidly growing bilateral pseudoangiomatous stromal hyperplasia of the breast. *Korean J Radiol* 2010;11(3):355–8.
- [4] Vuitch MF, Rosen PP, Erlandson RA. Pseudoangiomatous hyperplasia of mammary stroma. *Hum Pathol* 1986;17(2):185–91.
- [5] Bowman E, Oprea G, Okoli J, Gundry K, Rizzo M, Gabram-Mendola S, et al. Pseudoangiomatous stromal hyperplasia (PASH) of the breast: a series of 24 patients. *Breast J* 2012;18(3):242–7.
- [6] Virk RK, Khan A. Pseudoangiomatous stromal hyperplasia: an overview. *Arch Pathol Lab Med* 2010;134(7):1070–4.
- [7] Wieman SM, Landercasper J, Johnson JM, Ellis RL, Wester SM, Lambert PJ, et al. Tumoral pseudoangiomatous stromal hyperplasia of the breast. *Am Surg* 2008;74(12):1211–14.
- [8] Shehata BM, Fishman I, Collings MH, Wang J, Poulik JM, Ricketts RR, et al. Pseudoangiomatous stromal hyperplasia of the breast in pediatric patients: an underrecognized entity. *Pediatr Dev Pathol* 2009;12(6):450–4.
- [9] Anderson C, Ricci A Jr, Pedersen CA, Cartun RW. Immunocytochemical analysis of estrogen and progesterone receptors in benign stromal lesions of the breast. Evidence for hormonal etiology in pseudoangiomatous hyperplasia of mammary stroma. *Am J Surg Pathol* 1991;15(2):145–9.
- [10] Milanezi MF, Saggiaro FP, Zanati SG, Bazan R, Schmitt FC. Pseudoangiomatous hyperplasia of mammary stroma associated with gynecomastia. *J Clin Pathol* 1998;51(3):204–6.
- [11] Dai H, Connor C, Cui W, Gatewood J, Fan F. Bilateral diffuse tumorous pseudoangiomatous stromal hyperplasia: a case of bilateral mastectomy in a 29-year-old woman. *Case Rep Pathol* 2014;2014:250608.

-
- [12] Johnson KS, Bentley RC, Kelly Marcom P, Baker JA. Pseudoangiomatous stromal hyperplasia (PASH) causing massive breast enlargement: MRI findings. *Breast J* 2012;18(6):600–1.
- [13] Choi YJ, Ko EY, Kook S. Diagnosis of pseudoangiomatous stromal hyperplasia of the breast: ultrasonography findings and different biopsy methods. *Yonsei Med J* 2008;49(5):757–64.
- [14] Ferreira M, Albarracin CT, Resetkova E. Pseudoangiomatous stromal hyperplasia tumor: a clinical, radiologic and pathologic study of 26 cases. *Mod Pathol* 2008;21(2):201–7.
- [15] Alikhassi A, Ensani F, Omranipour R, Abdollahi A. Bilateral simultaneous pseudoangiomatous stromal hyperplasia of the breasts and axillae: imaging findings with pathological and clinical correlation. *Case Rep Radiol* 2016;2016:9084820.
- [16] Gresik CM, Godellas C, Aranha GV, Rajan P, Shoup M. Pseudoangiomatous stromal hyperplasia of the breast: a contemporary approach to its clinical and radiologic features and ideal management. *Surgery* 2010;148(4):752–7 discussion 7–8.
- [17] Layon DR, Wang C, Roth S, Brooks AD. Is surgical excision necessary in pseudoangiomatous stromal hyperplasia? *Breast J* 2016;22(5):595–6.
- [18] Almohawes E, Khoumais N, Arafah M. Pseudoangiomatous stromal hyperplasia of the breast: a case report of a 12-year-old girl. *Radiol Case Rep* 2015;10(3):1–4.