A case of a giant pseudoangiomatous stromal hyperplasia of the breast: magnetic resonance imaging findings

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Abstract

Pseudoangiomatous stromal hyperplasia (PASH) of the breast is a benign myofibroblastic process. We present the case of a 17-year-old girl who underwent diagnostic work-up due to an enlargement of her left breast. She was submitted to ultrasounds and magnetic resonance imaging (MRI) which depicted a 14 cm lesion in her left breast. The patient was later operated and histology revealed PASH. Although PASH may range from 0.6-12 cm, a few lesions over 12 cm have been described, the largest being 20 cm. Large series present mammographic and ultrasonographic features of PASH in the literature, but little has been reported on the MR characteristics of PASH up to today. Signal on the T1-weighted image (T1WI) and T2-weighted image (T2WI) may vary. Curves generated from dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) studies are mainly type I or less frequently type II. There are no reports about diffusion-weighted imaging and corresponding apparent diffusion coefficient (ADC) values for PASH in the literature. ADC values in our case lie within the range of values reported for other benign breast lesions. The presence of slit-like spaces within the lesion on MR imaging along with DCE-MRI type I curve and ADC values consistent with a benign lesion may favour the diagnosis of PASH. Tissue biopsy is necessary, however, for the final diagnosis. This case report will further contribute to the understanding of MR imaging features of PASH, especially in cases where mammography is not indicated.

Case Report

A 17-year-old adolescent girl, complaining for an enlargement of her left breast presented for diagnostic work-up. She mentioned that eight months ago she had palpated a tiny nodule near the nipple of her left breast which thereafter rapidly increased in size. She had an unremarkable previous personal and family history, with reported menarche at 14 years and a normal menstrual cycle.

Physical examination revealed an overall enlarged breast, with diffuse tenderness and firmness on palpation. There was no evidence of thickening of the breast skin, nor evidence of nipple retraction. The patient was initially examined with breast ultrasound with a high frequency (8-10 MHz) linear array head, which showed an intensely edematous left breast, without any evidence of distinct focal lesions, while the breast parenchyma exhibited diffuse inhomogeneity. She was advised to stay on antibiotics for fifteen days and have a follow-up ultrasound after 1 month. On the follow-up ultrasound scan there was a mild decrease of the diffuse parenchymal inhomogeneity. At that time there was also evidence of a poorly delineated focal lesion, with imaging features which were thought to rather represent a giant juvenile fibroadenoma. Further imaging with magnetic resonance imaging (MRI) was deemed necessary, as imaging with mammography was considered inappropriate, due to the patient’s age. MRI was performed with a 1.5T MR-scanner and a dedicated breast coil. The examination protocol consisted of T1-weighted image (T1WI), T2-weighted image (T2WI), short-tau inversion recovery (STIR) images in the sagittal and axial planes, as well as dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) after the administration of gadolinium with contrast uptake measurement. Diffusion weighted imaging with apparent diffusion coefficient (ADC) map images and ADC measurements of the lesion were also obtained.

MRI depicted a 14 cm lesion in the lateral part of the left breast, with smooth borders and compression of the surrounding normal breast parenchyma. On the T1 weighted images the lesion was isointense to muscle (Figure 1). On the STIR images the lesion exhibited a heterogeneous hyperintensity, while within the lesion there was evidence of multiple slit-like foci of high intensity (Figure 2). After gadolinium administration there was avid enhancement of the lesion (Figure 3), with the presence of dilated feeding vessels (Figure 4). Dynamic MR imaging after contrast administration revealed a slow persistent (type I) enhancement consistent with a benign lesion (Figure 5). ADC map measurements with diffusion images acquired with b value of 2055 sec/mm² were 1.34±4.3×10⁻³ mm²/sec on ROII and 1.38±7.4×10⁻³ mm²/sec on ROII. Values were in favor of a benign lesion (Figure 6). There was no evidence of enlarged lymph nodes in the left axilla.

The patient was finally operated and gross pathology revealed a well-defined lesion measuring 14 cm in its largest diameter having a smooth surface, with some surrounding fibro-fatty tissue. The cut surface of the lesion exhibited a firm nodular outlook of a whitish colour and elastic consistency, with presence...
of slit-like spaces within the lesion. Histology showed breast parenchyma with fibrous matrix, pores and acinar units with the presence of extensive lesions of nodular pseudoangiomatous stromal hyperplasia.

Discussion

The spectrum of appearance of PASH may range from solitary microscopic findings to a clinically and mammographically evident breast mass. Referring to the literature, not many cases of PASH have been reported, presenting as a palpable or mammographically detectable breast mass.1,5,9 Presentation as an axillary mass has also been reported.10 The massive enlargement of the lesion may be hardly differentiated from phyllodes tumor.6,11,12

All imaging modalities have no specific features to characterize PASH and distinguish it from other pathologic entities.11,15 In asymptomatic patients it usually presents as a breast imaging-reporting and data system (BI-RADS) type 3 lesion, suggesting a probably benign lesion. Mammography reveals a round or oval non-calcified mass, with well circumscribed margins, usually ranging from 1-10 cm, but it can also present as an asymmetric appearance of the gland whose size or density increases over time.16,17

On ultrasound PASH has no characteristic appearance, including both its margins and echogenicity. It usually presents as a round or oval solid mass, mainly hypoechoic and rarely hyperechoic with a central hypoechoic area. The presence of acoustic shadow is not very often.16,17

Large series reporting mammographic and ultrasound imaging characteristics do exist16,17 but little is reported in the literature about the MR imaging features of PASH.8,14,15,18-22 The signal of the lesion reported in the literature may vary on T1WI and T2WI, as well as contrast uptake and resulting dynamic curves, which are usually type I and less frequently type II. The MR imaging features are summarized in Table 1. The presence of high signal slit-like spaces on T2WI and STIR was also found in our case and previously described for the first time by Teh et al.4 This imaging feature may, if evident, be helpful for the diagnosis, as it represents the slit-like spaces found on pathologic examination. On the other hand our case did not exhibit cystic lesions as mentioned by others. Our case exhibited a type I curve on DCE-MRI, consistent with a benign lesion, as most of the previously reported cases. However up to now there have been no reports about the behaviour of PASH in diffusion-weighted imaging (DWI) and ADC map values in the lit-

![Figure 1. Axial T1 WI. The lesion is isointense to muscle and well defined with normal breast parenchyma pushed at the periphery of the lesion. There is evidence of some hypointense lines within the lesion.](image1)

![Figure 2. Sagittal STIR image: the lesion is inhomogeneously iso-/hyperintense, while the linear slit-like spaces are markedly hyperintense.](image2)

![Figure 3. Sagittal T1W, contrast-enhanced image with fat suppression (7min after IV contrast infusion): The lesion exhibits a fairly homogenous contrast uptake. The internal lines do not enhance.](image3)

![Figure 4. Axial T1W, contrast enhanced image with maximum intensity projection (MIP) algorithm: There is evidence of engorged feeding vessels.](image4)

![Figure 5. On dynamic contrast-enhanced scan, the lesion shows a type I curve, consistent with the presence of a benign lesion.](image5)

![Figure 6. Apparent diffusion coefficient (ADC) map with ADC measurements. The values are consistent with a benign lesion.](image6)
| Study           | Number of cases | T1-weighted image | T2-weighted image | T1-weighted image after IV gadolinium infusion | Dynamic curve | Diffusion-weighted imaging/apparent diffusion coefficient map |
|-----------------|-----------------|-------------------|-------------------|-----------------------------------------------|---------------|-------------------------------------------------------------|
| Kirkpatrick UJ et al. (2000) | 1 Case | Mixed signal pattern: isointense areas interspersed with hypointense islands | Mainly hyperintense with hypointense nodular areas Low signal capsule | Mainly isointense with hypointense (non-enhancing) islands Anterior cyst within the mass with an enhancing wall | NA | NA |
| Salvador R et al. (2004) | 1 Case | NA | NA | Type I | | |
| Okoshi K et al. (2006) | 1 Case | Hyperintense lesions with hypointense surrounding septa | NA | Type I | | |
| Baskin H et al. (2007) | 1 Case | Isointense | Heterogeneously hyperintense | Diffuse prominent enhancement | Type I | NA |
| Teh HS et al. (2007) | 1 Case | Isointense | Internal hyperintense linear reticular strands and scattered cystic spaces. | NA | Type I | NA |
| Navas Cañete, A et al. (2007) | 1 Case | Hypointense to muscle on T2WI. | Homogeneous uptake | Type I | | |
| Navas Cañete, A et al. (2007) | 1 Case | Hypointense | Hypointense | Heterogeneous enhancement in periphery and in central part | Type II | NA |
| Prasad SN et al. (2008) | 1 Case | Mainly hyperintense with hypointense septa, Well defined lesion | Inhomogeneously hypointense | Inhomogeneous enhancement, corresponding to small cystic lesions and hypointense septa Delayed scan: only septa do not enhance. | Type I | NA |
| Ryu EM et al. (2010) | 1 Case | Nodular areas iso/hyper intense to muscle and between them isointense to muscle spaces. | The nodular areas are hypointense and the spaces between them are hyperintense | Nodular enhancement, with between spaces (septa) remaining non-enhancing | NA | NA |
| Jones KN et al. (2010) | 7 Cases | NA | NA | Focal or segmental clumped, non mass-like areas, of enhancement | Type I or Type II | NA |

NA, not answered.
Case Report

PASH.8 So the presence of slit-like spaces on times have multiple interdigitating septa but the rare case of a lipid-poor hamartoma. Giant nodular pseudoangiomatous stromal hyperplasia (PASH) of the breast presenting as a rapidly growing tumour. Chir Ital 2009;61:369-73.

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