CASE REPORT

Giant pseudoangiomatous stromal hyperplasia presenting in the breast of a prepubertal child

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SUMMARY

Large benign lesions of the breasts are rare in children. We present a case of a 35 cm mass, weighing 2.7 kg in a 13-year-old girl with small developing breasts. Despite the enormity of the lesion, the patient managed to keep it concealed from her parents for 8 months. While initially suspicious of sarcoma a diagnosis of pseudoangiomatous stromal hyperplasia was suggested radiologically and confirmed histologically. Excision with reduction mammoplasty was performed, care taken not to disrupt the remaining breast tissue to facilitate future breast development. 18 months on, the cosmetic appearance of the breasts is good, with healthy underlying breast tissue developing. To the best of our knowledge this case is the largest documented breast tumour of this type in a patient of this age and illustrates the challenge of treating such tumours in the developing breast.

BACKGROUND

Giant benign lesions of the breast in the young are rare, with the literature sparse on the surgical management of such tumours in children. To date this is the largest tumour of its kind reported in a child. This case illustrates the diagnostic and surgical challenges encountered due to the enormity of the tumour within a female breast early in its development.

CASE PRESENTATION

A fit and healthy 13-year-old girl presented to the breast clinic with a very large left-sided breast mass. This had developed over the course of 8 months, and was first noticed by the patient at the time of her initial breast tissue development. The last 8 weeks had seen a drastic increase in size of the tumour. On examination early breast development was evident on the right, however, on the left there was an enormous rugby ball sized mass arising from the breast measuring 35 cm×20 cm (figure 1). The overlying skin had a regular vascular pattern and on palpation there was no oedema or fixity to the underlying chest wall, with no obvious breast tissue to be felt.

INVESTIGATIONS

All blood tests were normal, and chest X-ray showed no underlying chest or bony abnormalities. An ultrasound performed in clinic confirmed a very large vascular and well-defined lobulated mass (figure 2). Ultrasound examination deep to the nipple where the developing breast tissue should

Figure 1 A photo of the patient as she presented to the surgical clinic.

have been, showed that the huge tumour had engulfed the normal breast tissue on both sides in a 'U' shape, and the normal tissue was compressed into a 1 cm thick diaphragm running superoinferiorly. The right breast showed normal developing glandular tissue with some simple cysts. Core biopsies of the left-sided mass showed usual type epithelial hyperplasia and cellular stroma. Bland spindle cells were seen dissecting into this collagenous stroma, with no mitotic activity. On immunostaining, the spindle cells were positive for CD34 and negative for AE1/AE3, CD68, CD31, factor VIII, ERG, desmin, S100, CD99, oestrogen and progesterone receptors. A diagnosis of pseudoangiomatous stromal hyperplasia (PASH), a benign myofibroblastic stromal tumour, was established.

DIFFERENTIAL DIAGNOSIS

In light of the rapid growth, skin changes and the vascular nature of this tumour on ultrasound, the most important differential diagnosis to consider was that of an angiosarcoma. Angiosarcomas are aggressive tumours accounting for less than 0.05% of primary tumours in the breast and typically present in women aged between 20 and 40.¹ More commonly angiosarcomas develop following local radiotherapy for treatment of breast cancer.² Histologically PASH is a pseudoangiomatous lesion and so must be distinguished from true vascular lesions, most importantly from angiosarcoma. Distinction is made based on clinical, radiological and pathological features. Angiosarcomas are infiltrative and destructive. Radiologically they do not present as encapsulated, well-defined lesions. Pathologically the distinctive features are lack of true vessels and no cytological pleomorphism in

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Figure 2 Ultrasound showing some echogenic glandular tissue in the left subareolar region with two lobules of the pseudoangiomatous stromal hyperplasia lesion either side.

PASH. The lining cells in PASH are not endothelial in origin; on immunostaining they show variable CD34 expression and are negative for other endothelial markers (eg CD31, factor VIII, ERG).³ Angiosarcoma, however, would be expected to have positive expression of CD34, CD31, ERG and factor VIII.⁴

Other diagnoses that can be considered in this scenario are juvenile fibroadenoma and phyllodes tumour, especially on needle core biopsy where identification of epithelial component as part of the lesion is required for diagnosis. This distinction could be difficult as PASH could be associated with prominent hyperplastic ductal elements. More cellular areas of PASH could represent a differential diagnosis with myofibroblastoma. Myofibroblastomas usually appear uniformly cellular throughout and lack any epithelial elements. PASH, when epithelial elements are present, surrounds lobules and ducts and even cellular lesions will have typical paucicellular areas. Another potential consideration could be fibrotic areas of low-grade fibromyxoid sarcoma which immunophenotypically is characterised by MUC4 expression as a result of rearrangement of the FUS gene.⁵

TREATMENT

After discussions at breast magnetodynamic therapy meetings, it was decided that because of the size of the tumour and the resulting physical and psychological effects on the patient, surgical excision, rather than formal mastectomy would be the most appropriate management option. The dilemma was how much salvageable breast tissue would remain, and to what extent surgery would disrupt this and the normal development of the breast. Both the patient and her family were made aware of these issues and subsequently opted for surgery.

On admission for surgery it was clear that the tumour was continuing to grow rapidly such that areas of pressure necrosis had appeared in the stretched skin anteriorly. Surgery revealed a very large bilobed, well-encapsulated mass with large perforating vessels. The tumour was dissected off the skin and the thin breast tissue underlying the nipple-areolar complex (NAC). The two lobes measuring 22×20×5 cm and 17×13×5 cm with a total weight of 2.7 kg were removed (**figure 3**). Perforating vessels were ligated and a reduction mammoplasty approach was performed with excision of the largely redundant and poorly vascularised inferior skin. The remaining diaphragm of breast tissue was a thin stretched out sheet of fibro fatty tissue but

Figure 3 Intraoperative photo of the tumour, excised in its entirety.

appeared to be vascularised. The NAC was relocated on its inferior and superior pedicle prior to closure and appeared viable at the end. A drain stayed in situ for 2 days prior to removal, and the patient was discharged on day 3.

OUTCOME AND FOLLOW-UP

In total, 2.7 kg of a bilobed encapsulated tumour was resected from the breast with solid homogeneous pale nodular appearance throughout. All the representative areas examined contained PASH with the same immunoprofile as previously described. One hundred per cent of the tumour consisted of PASH with no other significant pathological history (**figures 4 and 5**).

The patient was followed up in clinic fortnightly for the first couple of months and despite an initial small discharging sinus on the vertical scar which healed early on, the patient underwent an uneventful postoperative recovery. At 18 months she remains well, the left breast and nipple looking healthy (**figure 6**). Breast tissue has shown development which was evidenced by ultrasound.

DISCUSSION

PASH was first described in 1986 by Vuitch *et al*⁶ in which nine cases were reported. It can have a variable clinical presentation ranging from an incidental finding producing nodular mobile

Figure 4 Pseudoangiomatous stromal hyperplasia with anastomosing slit-like pseudovascular spaces lined by myofibroblasts in the dense collagenous stroma (×100, H&E staining).

Figure 5 Pseudoangiomatous stromal hyperplasia with CD31 negative myofibroblasts lining the slit-like spaces (×100).

fibroadenoma-like nodules to diffuse or tumorous masses which can present as a slow-growing mass.⁷ In this case well-defined palpable lesions were characterised histologically with the features we now recognise as being diagnostic for the condition. Anastomosing network of long thin bland spindle cells traversing dense collagenous stroma were evident, simulating empty vascular channels, and not invading the normal breast parenchyma. These features distinguish PASH from angiosarcoma, thus the term 'pseudoangiomatous'. PASH tumours tend to have a typical immunophenotype characteristic of myofibroblasts. Spindle cells are normally positive for vimentin CD34, BCL2, CD99 and smooth muscle actin but negative for CD31 and factor VIII. This helped confirm our diagnosis, however, unlike most PASH tumours this case was not hormone receptor positive.⁸

PASH tumours are commonly mistaken for fibroadenomas or phyllodes tumours on ultrasound, so radiology alone is rarely diagnostic. Typical appearances are those of a well-circumscribed hypoechoic benign looking mass.^{9 10} Triple assessment is therefore essential for diagnosis, with a core biopsy as standard. Fine-needle aspiration alone is of little value as cytology rarely provides a diagnosis.

From review of the literature we believe that this case is the largest tumour of its kind in a child. Baker *et al* presented the

Figure 6 A photo of the patient 18 months after the operation showing normal breast development.

case of a 10-year-old girl with PASH measuring 1.2×1×0.7 cm. Excisional biopsy was deemed too high a risk for causing damage to the breast bud due to the inability to distinguish it from the tumour, therefore, an incisional biopsy was the treatment of choice.¹¹ PASH lesions are not known to metastasise, however, local recurrences have been described; rates ranging from 0% to 22% and largely attributed to incomplete excision or presence of unknown multifocal lesions.^{3 12–14} PASH is not thought to be a premalignant condition and does not confer any increased risk for malignancy as evidenced by a large retrospective case series of 579 cases of biopsy-proven PASHs.¹⁵ Since the benign clinical course of these tumours complete capsule excision via breast conservative surgery is the accepted practice.

Teh *et al* documented one of the largest PASH tumours in a child. This was an 18 cm tumour within an almost fully developed breast of a 15-year-old girl. This patient underwent surgical excision and reduction mammoplasty with a good cosmetic outcome.¹⁶

The case presented has highlighted a very rare clinical scenario made increasingly complex by the age of the patient. When deciding on the surgical removal of any breast mass in children, one must pay particular attention to the preservation of breast tissue and thus its future development. As was the case in this patient, surgery is the only feasible option given the sheer size of the tumour, therefore meticulous dissection and minimal disruption of the small amount of breast tissue is paramount. Reduction mammoplasty was deemed necessary to improve the cosmetic outcome, and thus restore some normality to the shape of the breast. Particular features of this case were the fact that the patient was able to conceal a near 3 kg tumour while attending school. She is currently happy with the cosmetic result and follow-up has clearly shown that enough normal breast tissue had been preserved to enable breast development.

Learning points

- ▶ Pseudoangiomatous stromal hyperplasia is a rare tumour of the developing breast, with pathological features which may simulate a sarcoma; most importantly it must be distinguished from angiosarcoma.
- ▶ Growth can be dramatic, as evidenced by this 3 kg tumour, yet young patients can conceal such tumours and present quite late for psychological reasons.
- ▶ Surgical excision of large benign tumours in the developing breast must be meticulous as disruption to breast tissue must be minimised while trying to achieve good cosmesis.
- ▶ These complex cases should only be treated in specialist breast or plastic surgery units familiar with oncoplastic breast surgery techniques.

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