

# Pictorial review of pediatric breast lesions: something we may feel unfamiliar

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## Introduction

- Breast lesions are uncommon in children and adolescents.
- There is a wide spectrum of breast lesions in pediatric patients, while they are different from that in adults and most of them are benign in nature.
- Knowing the possible etiologies of the breast lesions and their features can help radiologists make correct diagnosis and guide the subsequent management and counseling of patients and their family.

## Materials and Method

- A 2-year retrospective review of the radiological investigations including ultrasound (US), CT and MRI performed at two tertiary hospitals from July 2022 to June 2024.
- Cases were extracted from the RIS with keywords 'breast mass' and 'breast lesions', and the pathology reports were reviewed in ePR if biopsy has performed.
- Patient with breast lesions in age less than 18 years old were included, and those without discrete lesions were excluded.

## Results

- Number of cases: 65
- Sex: 59 are female, 6 are male
- Age: 2-18 years old

Nature of lesions	Number of cases (%)
<b>Benign (61.5%)</b>	
Fibroadenoma	9 (13.8%)
Cysts	5 (7.7%)
Gynecomastia	5 (7.7%)
Fibrocystic change	4 (6.2%)
Accessory breast	4 (6.2%)
Ductal ectasia	4 (6.2%)
Abscess	2 (3.1%)
Asymmetrical breast	2 (3.1%)
Intramammary lymph node	1 (1.5%)
Hemangioma	1 (1.5%)
Venous malformation	1 (1.5%)
Pseudoangiomatous stromal hyperplasia	1 (1.5%)
Plexiform neurofibroma	1 (1.5%)
<b>Probably Benign (35.3%)</b>	
<b>Potentially malignant (3.1%)</b>	
Radial scar	1 (1.5%)
Benign phyllodes tumour	1 (1.5%)

# Benign

## Asymmetrical breast

- Normal breast development can be asymmetric, with up to 2-year different in the phase of development.
- US can confirm the presence of breast tissue.

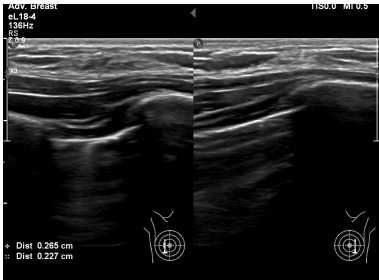


Figure 1: US image from a 5-year-old girl complaining right breast swelling, showing asymmetric development of normal right breast without mass lesions.

## Accessory Breast Tissue

- Arise when there is incomplete regression of the embryologic milk line.
- Most commonly found in axilla.
- May enlarge or become tender in response to hormonal influence.

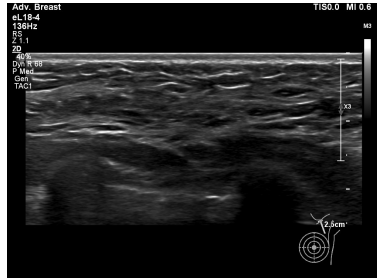


Figure 2: US image from a 17-year-old girl complaining left axillary swelling, showing heterogenous fibroglandular tissue similar to that of normal breast parenchyma.

## Gynecomastia

- Overdevelopment of breast tissue in male.
- Peak age of onset is 13-14 years, and spontaneous involution typically occur within 2 years.
- Can be secondary to syndrome or drugs.



Figure 3: US image from a 13-year-old boy complaining left chest wall swelling, showing heterogenous concentric, retroareolar fibroglandular tissue over left chest wall, in keeping with gynecomastia.

## Fibroadenoma

- Can be multiple in 15-20% of patients.
- Exclusively found in female patients as they are arising from stroma surrounding terminal duct lobular units.

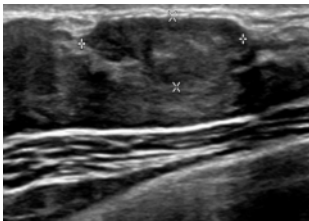


Figure 4: US image from a 16-year-old girl complaining right breast swelling, showing parallel, oval hypoechoic mass with circumscribed margin and mild posterior enhancement, which are typical of fibroadenoma.

## Fibrocystic change

- Benign alteration in the terminal ductal lobular unit of the breast with or without associated fibrosis.

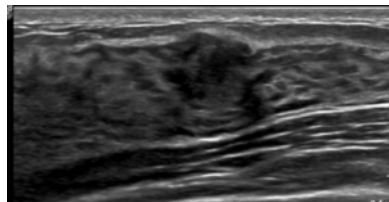


Figure 5: US image from a 14-year-old girl complaining left breast swelling, showing prominent fibroglandular tissue with small internal cystic components. Later biopsy shows fibrocystic change.

## Cysts

- Arise from fluid distention of lobular acini due to either duct obstruction or imbalance of fluid secretion to absorption.



Figure 6: US image from a 16-year-old girl complaining right breast swelling, showing circumscribed anechoic lesion with posterior enhancement, in keeping with cyst.

## Ductal Ectasia

- Dilatation of retroareolar ducts that is associated with periductal inflammation and fibrosis.

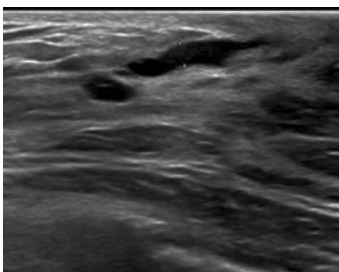


Figure 7: US image from an 18-year-old girl complaining left nipple discharge swelling, showing an anechoic tubular structure, in keeping with ductal ectasia.

## Abscess

- Usually secondary from mastitis.
- US is useful to assess for drainable abscess and guide aspiration.

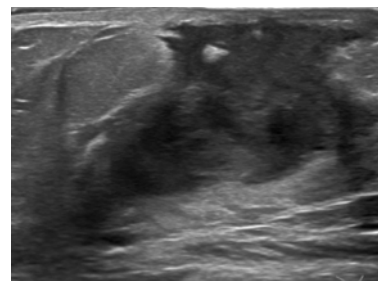


Figure 8: US image from a 14-year-old girl complaining fever and right breast pain, showing hypoechoic complex mass with internal echoes, in keeping with abscess.

## Intramammary lymph node

- Normal intramammary lymph nodes are usually less than 1cm in diameter with cortical thickness less than 3mm.
- Can undergo reactive hypertrophy in response to infection.

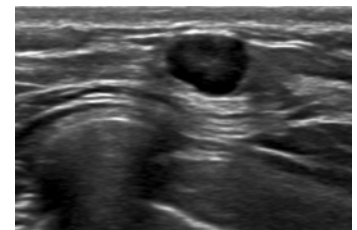
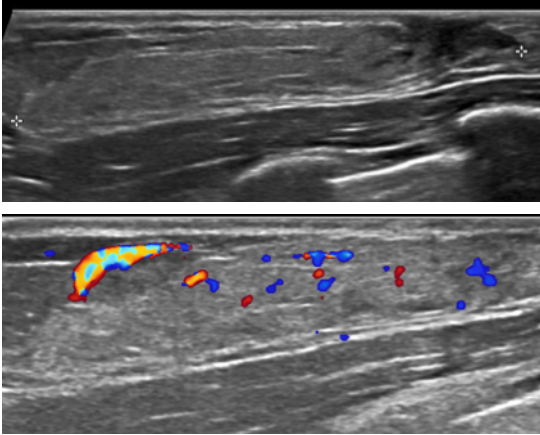


Figure 9: US image from an 18-year-old girl complaining left breast swelling, showing oval structure with hypoechoic cortex and echogenic hilum which are characteristic of a lymph node.

## Infantile hemangioma

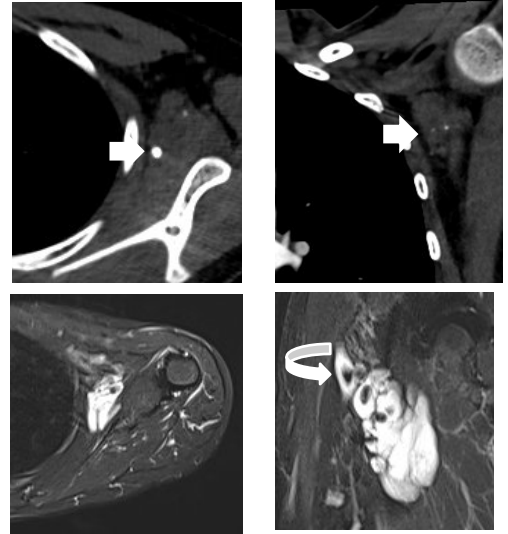
- Benign vascular neoplasm representing multiple vascular channels surrounded by fibrous septa.
- May have associated strawberry-red or bluish discoloration of the overlying skin.
- Typically absent at birth, with rapid growth in the first few weeks and months of life following by spontaneous regression.



Figures 10: US images from a 2-year-old girl with bluish lesion on her left breast, showing oval-shaped hyperechoic solid lesion with prominent internal vascularity, which are compatible with infantile hemangioma.

## Venous malformation

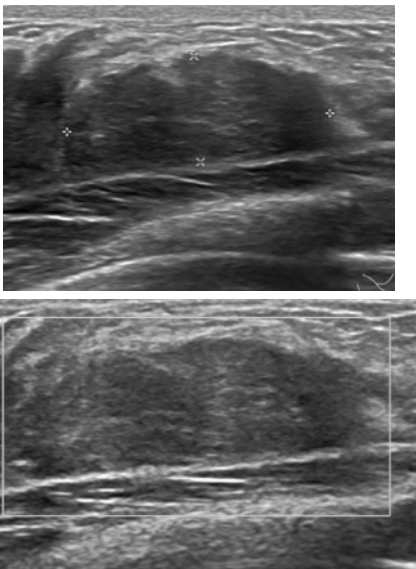
- The most common angiomatous lesions and represent up to 7% of all benign soft-tissue tumors.



Figures 11: 18-year-old girl with left axillary swelling. Axial and coronal contrasted CT images show lobulated lesion in left axillary region with internal hyperdense foci (arrow). Axial and sagittal T2-weighted images show there are intensely T2 hyperintense internal signal with multiple roundish T2 hypointense foci (curved arrow), which are suggestive of phleboliths and overall features are compatible with venous malformation.

## Pseudoangiomatous Stromal Hyperplasia

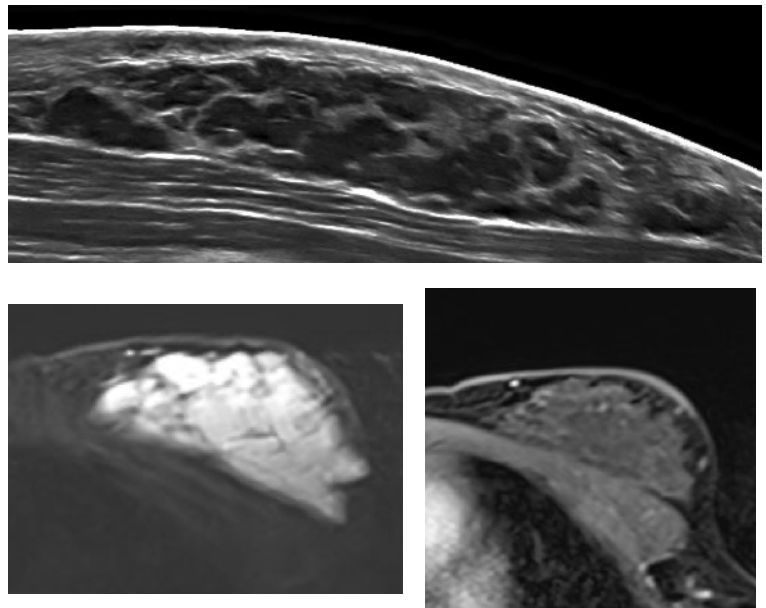
- Hormonally responsive benign proliferation of stromal myofibroblasts.
- Typically found in premenopausal women and may demonstrate rapid growth in adolescents.



Figures 12: US images from a 15-year-old girl with right breast swelling, showing hypoechoic oval mass with circumscribed margin without significant internal vascularity. Later biopsy was performed and showed pseudoangiomatous stromal hyperplasia.

## Plexiform Neurofibroma

- Benign tumor of peripheral nerves (WHO grade I), arising from a proliferation of all neural elements.
- Pathognomonic of neurofibromatosis type 1 (NF1).

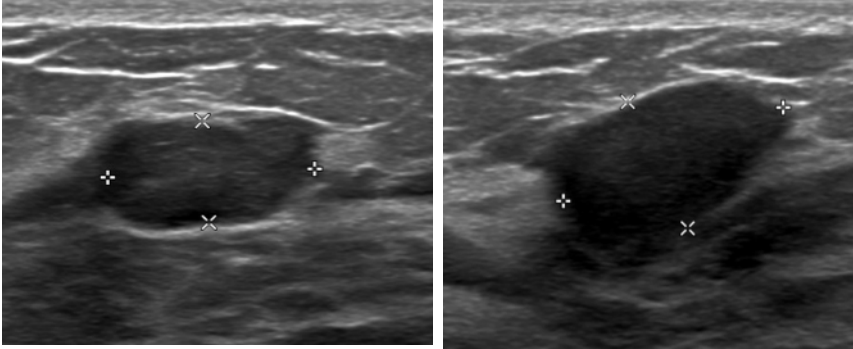


Figures 13: A 8-year-old boy who is genetically confirmed to have NF-1 presenting with left breast swelling. US image shows multilobulated hypoechoic subcutaneous mass. MR images show the lesion to be intensely T2 hyperintense with components of central T2 hypointensities resembling "target sign". Mild contrast enhancement in its septation can also be seen. Later biopsy was performed and confirmed plexiform neurofibroma.

## Probably benign

### Probably benign lesions

- Most of them are parallel, solid, hypoechoic lesions without internal vascularity or suspicious posterior features.
- Biopsy was not recommended in view of low risk of malignancy, and imaging follow up were arranged for these lesions.

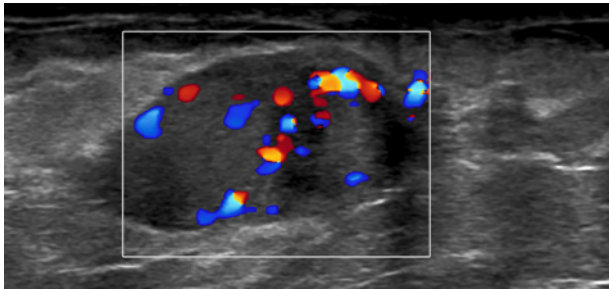
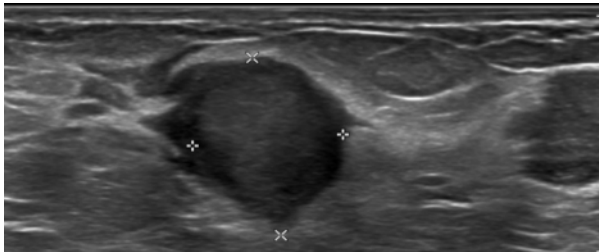


Figures 14: USG images from a 15-year-old girl with right breast swelling, showing two different oval, parallel, hypoechoic, solid lesions without posterior features in right breast lesions. Biopsy was not arranged for this patient in view of its low risk of malignancy and they are stable in size in imaging follow up for 2 years.

## Potentially malignant

### Radial scar

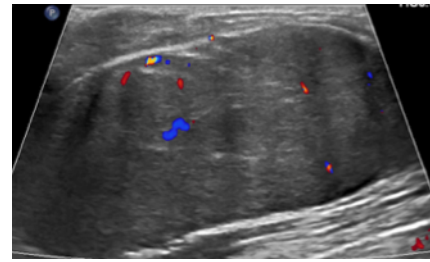
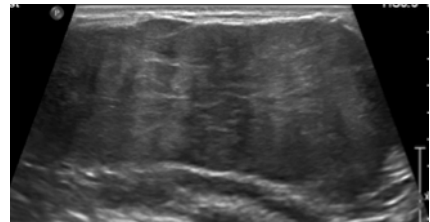
- Rosette-like proliferative breast lesion.
- Idiopathic process with sclerosing ductal hyperplasia.
- Can be associated with atypical ductal hyperplasia and carcinoma.



Figures 15: USG images from a 16-year-old girl with left breast swelling, showing spiculated, anti-parallel, hypoechoic, solid lesion with prominent internal vascularity. Biopsy was arranged and showed radial scar. Surgical resection was done in view of its malignant potential and the specimen histology was consistent with radial scar.

### Phyllodes Tumour

- Fibroepithelial neoplasm composed of cellular stroma containing branching leaflike epithelium-lined cystic spaces.
- Can be graded as benign, borderline or malignant.
- Constitute the most common cause of a primary pediatric breast malignancy.



Figures 16: USG images from a 13-year-old girl with left breast swelling, showing a large oval, parallel, hypoechoic, solid lesion with mild internal vascularity and vague cleftlike anechoic cystic space. Biopsy was arranged and showed benign phyllodes tumour. Surgical resection was done and specimen histology was consistent with benign phyllodes tumour.

### Conclusion

The spectrum of mass-forming breast lesions in pediatric patients is different from that in adults, and the vast majority are benign. Putting emphasis in this can help the radiologist and the clinical team to make the diagnosis, stratify the risk and guide subsequent management and patient counseling. For lesions with suspicion, image-guided biopsy is helpful to get pathological diagnosis.

### Reference

1. Harper LK, Simmons CL, Woodard GA, Solanki MH, Bhatt AA. Pictorial Review of Common and Uncommon Pediatric Breast Lesions. Radiographics. 2023 Jan;43(1):e220117. doi: 10.1148/rg.220117. PMID: 36367821.
2. Kaneda HJ, Mack J, Kasales CJ, Schetter S. Pediatric and adolescent breast masses: a review of pathophysiology, imaging, diagnosis, and treatment. AJR Am J Roentgenol. 2013 Feb;200(2):W204-12. doi: 10.2214/AJR.12.9560. PMID: 23345385