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## Breast Imaging

# Diagnosis and imaging characteristics of a juvenile fibroadenoma in a 2-year-old patient: a case report

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## ABSTRACT

Fibroadenomas are abundantly reported in the literature with several papers documenting the natural progression and clinical outcomes of thousands of cases. Juvenile fibroadenomas (also called cellular fibroadenomas) are frequently characterized by rapid growth, often described as 5-10 cm in size. They constitute approximately 7%-8% of fibroadenomas. They often measure greater than 5 cm. Pathologically, they show similar features to fibroadenomas but can resemble phyllodes. There have been few documented cases of breast masses in early childhood. Furthermore, there are scant radiology publications focused on the imaging features of juvenile fibroadenomas in patients younger than 5 years old. Our patient presented at 2 years of age with a unilateral right breast mass. Two ultrasound examinations were completed over a period of 5 months, and a magnetic resonance imaging was performed prior to surgical intervention. Eventual surgical excision yielded a final pathologic diagnosis of juvenile fibroadenoma. In this report, we will discuss the imaging and pathology of juvenile fibroadenomas, and we will address important differential considerations both from a pathologic and radiologic standpoint.

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## Introduction

Breast masses in the pediatric population are uncommon. When a child presents with a breast mass, the most frequent etiologies include the following (not in order of frequency): juvenile

fibroadenoma, cystosarcoma phyllodes, complicated or simple cyst, fibrocystic change, duct ectasia, juvenile papillomatosis, and papilloma. In the appropriate clinical setting, abscesses, hematomas, and fat necrosis may also be seen. Breast malignancy in the pediatric age group is rare, with only 0.2 per 100,000 females aged 15-19 and 1.6 per 100,000 females aged 20-24 with

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invasive malignancy. Under the age of 14, malignancy is exceedingly rare [1]. It is also important to differentiate an actual lesion from a normal breast bud, which has both cosmetic and clinical implications [2].

There have been numerous case reports of breast masses in the pediatric and adolescent population. Fibroadenomas make up approximately 68% of breast masses in adolescents, with juvenile fibroadenomas occurring most often in late adolescence [1]. Juvenile fibroadenomas are defined as fibroadenomas presenting in the age range of 11-18 years (about 4% of fibroadenomas), and they have pathologic features of prominent cellularity of the stroma with epithelial hyperplasia [3].

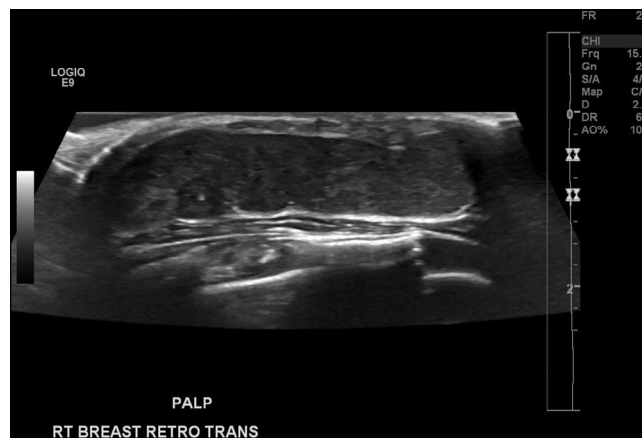
Imaging of these lesions in early childhood is most commonly accomplished with ultrasound. Mammography has been shown to be unnecessary and not recommended in the pediatric age group [4]. In our case a magnetic resonance imaging (MRI) was also performed, which demonstrated a thin capsule encompassing the mass; however, MRI is not specific for differentiating fibroadenomas from differentials such as phyllodes and papillomas, mandating a tissue diagnosis. The imaging features of juvenile fibroadenomas, while nonspecific, are representative of the histopathologic process. The biopsy performed was a 14-gauge core needle biopsy and was not sufficient for diagnosis. The imaging features may explain the reason for insufficient tissue recovered during an initial core needle biopsy in this case. Surgical excision is commonly the treatment of choice in lesions measuring >2 cm in diameter [4], and this mass is no exception.

## Case report

We present a case of a 2-year-old female who was first taken by her parents to an outside institution for evaluation of an enlarging nonpainful right breast mass. This was noticed by her parents as a slight asymmetric prominence of her right breast tissue. The patient's past medical history is notable for 1-week hospitalization as a neonate for pulmonary edema. She had a full-term birth without additional medical problems. She was not on any medications. Her family history is significant for polycystic ovarian syndrome (PCOS) in her mother and asthma in her father. She had no family history of breast cancer or breast-related issues. She lived with her biological parents, who are nonsmokers. Her developmental progression had been normal.

She was initially seen by her primary care provider who noted that the right breast tissue was asymmetric; however, no discrete mass was felt. During this visit, the right breast mass was described as a "nickel-sized bud." Palpation of the left breast demonstrated a normal breast bud. No imaging was performed at that time. A full laboratory evaluation was also performed for precocious puberty and was normal. No imaging was performed at the time of initial presentation.

She was monitored for 5 months by her clinician and imaged shortly before her return visit. Ultrasound showed an oval circumscribed parallel hypoechoic mass with posterior acoustic enhancement and internal vascularity (Fig. 1). The mass measured 42 × 33 × 11 mm. No distinct separation could be seen between the mass and the normal right breast bud. A normal



**Fig. 1 – First ultrasound evaluation. Right breast ultrasound shows the palpable abnormality in the retroareolar region. Static image demonstrates a circumscribed oval hypoechoic parallel mass with posterior enhancement. No distinct separate breast bud could be seen. The mass measured 42 × 33 × 11 mm.**

left breast bud was seen during this examination (images not included). Her clinical visit described the right chest now with an oblong bumpy mass, extending into the axilla, which her clinician described as a change from prior physical examination. Despite the ultrasound and changes on physical examination, the findings were still thought to possibly represent an asymmetric normal breast bud. Given the extreme young age of the patient and concern for the repercussions of intervention on the developing breast bud, another 6-month follow-up was scheduled.

The patient and family returned for the next follow-up visit, which was ultimately 11 months after the initial clinical examination. At the time of this examination, both physical and imaging characteristics of the mass had changed. Her clinician described the mass as a "mobile nodule 25 mm in diameter under the right nipple," which had not significantly changed per report; however, now there was a bluish tint to the overlying skin. Sonographically, the size remained grossly unchanged measuring 43 × 26 × 11 mm; however, the mass now appeared as mixed cystic and solid with internal septations (Fig. 2). No vascularity was demonstrated in the septations.

An MRI was then performed approximately 1 month later for further evaluation and in preparation for surgery. Multiplanar contrast-enhanced MRI was performed on a 1.5 GE scanner utilizing a combination of breath hold and respiratory triggering. T1, T2, STIR, diffusion-weighted and in-phase/out-of-phase sequences were acquired. Fat-saturation was performed as well as narrowed field of view over the right breast.

On precontrast axial T1 images, the mass showed separate hyperintense and isointense components (Fig. 3A, 3B and Fig. 4). The nonfat suppressed T1 axial images showed isointense signal throughout (Fig. 5). After the administration of IV contrast, the mass showed heterogeneous internal enhancement with nonenhancing internal septations (Fig. 4). Subtraction images and maximum intensity projection (constructed on a separate workstation using Aquarius-Net software) were also performed (Fig. 6) and allowed better visualization of the

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