Fibroadenoma of the breast is a common benign disease, occurring mainly in females younger than 30 years of age. Infant fibroadenoma is extremely rare. Here, we report on a 16-month-old female with a 6 month history of unilateral progressive breast enlargement. Upon clinical evaluation, a palpable mass was observed in the upper and outer quarter of the right breast. The single tumor was solid and well circumscribed. Various clinical examinations were performed, including determination of hormone levels, ultrasound, mammography, magnetic resonance imaging, as well as the collection of a fine needle aspiration. The results showed that the sex hormones were present at normal levels. The size of the tumor was approximately 3 cm. Enlarged lymph nodes were not detected in the axillary region or any other regions. The tumor was removed surgically and fibroadenoma was diagnosed post-operatively. The patient was followed up for 38 months and no tumor recurrence was observed.

**Key words:** breast pathology – breast surgery – fibroadenoma – infant mastectomy

**INTRODUCTION**

The human breast is composed of fat tissue embedded with glandular tissue and a supporting fibrous tissue, also referred to as the stroma. Normal breast development starts during embryogenesis with the formation of the mammary ridge. In newborns, breast tissue can be enlarged during a short period after birth due to exposure to maternal estrogen. However, this is a transient situation and will reverse until the onset of puberty.

Enlarged infant breast masses are rare. Diagnosis and proper treatment are important, but there is little knowledge on this subject. Fibroadenoma of the breast is the second most common tumor after breast cancer in young female adults, but is rarely observed in infancy. As a benign tumor, fibroadenoma is composed of both stromal and epithelial elements of the breast. It can be diagnosed by a clinical approach of physical examination, ultrasound mammography, fine needle aspiration (FNA) and core needle biopsy. Surgical resection is the common therapeutic approach.

**CLINICAL ASSESSMENT**

The patient was a 16-month-old female with a 6 month history of unilateral progressive breast enlargement caused by a solid swelling. The infant’s grandmother had a history of breast cancer. The infant was born by uncomplicated vaginal delivery and had otherwise been in good condition. There was no history of hormone therapy in the mother during pregnancy or during the breastfeeding period. Breastfeeding was carried out until 12 months of age. At presentation, a 3 cm solid tissue mass was palpable in the upper and outer quarter of right breast. The tumor was solid and well circumscribed.
Progesterone, testosterone and luteinizing hormone-releasing hormone (LHRH) levels were slightly decreased. Promoting prolactin-releasing hormone (PRL), estradiol (ESTRDL), follicle-stimulating hormone-releasing hormone (FSH-RF) levels were normal.

Ultrasound imaging revealed a solid tissue mass of about $3 \times 3 \times 3$ cm as demonstrated in Fig. 1. This analysis showed an irregular solidity in the tissue and lower echo than in the surrounding tissue. Circulation in this area was determined to be low.

Mammography revealed a spherical solid tissue mass, with high density and a well-defined border, without any microcalcification (Fig. 2). Swollen lymph nodes were not found in right axillary.

Magnetic resonance imaging (MRI) analysis revealed a triangular lesion with smooth borders. As shown in Fig. 3, T1-weighted signal (A) was similar to the muscle signal (top) and T2-weighted imaging (B) had a slightly higher signal than that of the fat tissue and water. The MRI images indicated a non-uniform tissue, having some areas with low signal. There were neither enlarged lymph nodes detected in the axillary regions, nor were there any found elsewhere in the body. There were no signs of metastasis in the lungs or the liver.

In the FNA, a large number of benign tumor cells were observed agglutinating and forming clusters. The primary diagnosis was fibroadenoma and cystosarcoma. The patient underwent surgical resection of the tissue mass under general anesthesia. The tumor was well encapsulated and macroscopic evaluation of the tumor revealed a rough and uniform surface (Figs 4 and 5).

Histology revealed an obvious fibroadenoma morphology. The estrogen receptor (ER) and the progesterone receptor (PR) status by immunohistochemistry analysis indicated that approximately 90% of the cells expressed ER (Fig. 6) and

![Figure 1. Ultrasound image of the tumor.](image1)

![Figure 2. Mammography image of the tumor.](image2)

![Figure 3. MRI image of the tumor. (A) T1WI; (B) T2WI.](image3)
10% showed PR expression (Fig. 7). The patient was clinically followed up for 38 months (until October 2009) and no tumor recurrence was observed.

CONCLUSION

To date, no case reports exist of infant fibroadenoma occurring in China. Only two other papers have reported on this abnormality in Korea and Spain (1,2). In females beyond the neonatal period, premature thelarche and precocious puberty are the most likely causes of early breast enlargement (3). Juvenile mammary fibroadenoma may be related to local mammary tissue reacting to a rise in the estrogen level or to the expression of higher levels of estrogen receptors (4). However, mechanisms that trigger onset of infant breast fibroadenoma are not clear.

Normal breast development starts with the formation of the mammary ridge during embryogenesis. Infant mammary hyperplasia normally fades away within 3 to 6 months after birth. Afterwards, breast tissue remains in a static state until the onset of puberty. Breast development occurs under the influence of several physiologic factors, such as progesterone, estrogen, adrenal and pituitary hormones, thyroxine and insulin. The normal undeveloped breast is composed of glandular tissue and a supporting fibrous tissue known as the stroma. The glandular tissue produces milk and is composed
of alveoli. Groups of alveoli form lobules, which drain into ducts, and the ducts then drain into the nipple. Breast development proceeds over 3–5 years and involves increased fat deposition, formation of new ducts by branching and elongation of existing ducts and the formation of lobular units (5).

Fibroadenoma is a benign tumor composed of both stroma and epithelial elements of the breast. Fibroadenoma that occurs in the infant is more cellular in nature than cases of adult fibroadenoma (6). According to the patient’s history, the right breast had been larger since birth compared with the left one and a mass could be palpated at the age of 1 year. The tumor was formed during fetal development and expanded progressively under the control of hormonal stimuli, including maternal estrogen delivered through breastfeeding.

Palpable breast masses in pediatric patients are uncommon, and it is important to differentiate benign lesions from malignant ones to pursue the proper course of treatment. The diagnosis of breast mass in adults can be made through physical examination, mammography and MRI, cytology and core needle biopsy. The goal of any technique that seeks to image the breast is to extend the capability of physical examination to provide more information about subtle abnormalities. Ultrasound is a very useful tool in examining benign breast diseases, especially in distinguishing solid from cystic masses (7). Mammography is clearly the most sensitive and specific test that can routinely be used to complement the physical examination of the breast. It is used either as a diagnostic modality that seeks to answer specific questions about the health of the breast or as a screening test to identify any abnormality within the breast. Mammography also is a common means by which experts may distinguish benign lesions from malignant tumors by observing microcalcification and mass modality (6). MRI is not a common examination for breast cancer patients. But in this case the patient is a female infant and it was not sure whether ultrasound and mammography results were trustworthy in terms of malignancy, MRI provides better detail of the breast over mammography and ultrasound imaging and can be a valuable adjunct to other imaging techniques, particularly for small lesions in dense or augmented breasts. Moreover, MRI is also an appropriate technique used to detect recurrences (8).

In the current case, since the MRI showed that the mass is separated and does not develop from the nipple bud, we performed surgery to resect the tumor. FNA is highly specific in the diagnosis of breast masses as they are specifically targeted by the extraction method for ex vivo analysis. The final cosmetic result is important when planning the surgical excision process. Therefore, it is necessary to perform pre-operative cytology of the mass to clearly define the amount of tissue involved and necessary for removal (9).

Using the methods mentioned above, it is easy to differentiate fibroadenoma from other breast diseases, such as gynecomastia, blood nipple discharge, intraductal papilloma, mastitis and breast abscesses. However, fibroadenoma must be distinguished from malignant tumors, such as secretory breast cancer and cystosarcoma, which occurs in female adolescents. Secretary breast cancer (juvenile breast carcinoma) is a rare type of breast cancer first reported in pediatric patients in 1966. Incidences in pediatric and adult patients are similar and prognosis is favorable in both groups, but distant metastases have been reported (10,11). Cystosarcoma comprises epithelia and stroma that has been invaded by stromal cells. This type of epithelial hyperplasia is usually benign. Heteromorphism occurs in the stromal cells (12). We should pay attention to the fact that a large number of carcinoma and cystosarcoma have been misdiagnosed as fibroadenoma prior to operation.

There is a lack of case reports referring to the diagnosis and treatment of infant breast tumor in the current literature. Valuable information can be supplied by a detailed history of the disease, careful physical examination, radiological examinations and FNA in juvenile patients. Core needle biopsy is not a proper method for children. In the current case, the tumor was a solid, well-encapsulated mass with a defined border. However, we could not completely exclude the possibility of cystosarcoma. Because malignant tumors are rare in children, and in our opinion the tumor was more likely to be a benign lesion, a non-surgical post-operative treatment approach with careful screening and close follow-up was considered. In different countries, different approaches exist regarding the treatment of fibroadenoma. However, the great majority of patients in the USA are treated by excisional biopsy to remove the tumor and establish the diagnosis. In Europe, a typical fibroadenoma is frequently left untreated when the tumor is encountered in the breast of young women (6). West et al. reported on 74 children and adolescents who presented with palpable breast masses between 1980 and 1993. Twenty-two fibroadenomas were identified and 19 cases were surgically resected because the mass had a diameter >5 cm and were painful (13). In this present case, the child had a history of breast cancer in her family, and the tumor displayed remarkably rapid growth. Moreover, the FNA revealed the presence of clustering abnormal cells. We could not exclude the possibility of breast malignancy. All of these elements led us to perform surgery in order to make an accurate diagnosis and to treat the patient accordingly.

For treatment planning purposes, we attempted to remove all of the tumors while preserving as much of the normal tissue, the nipple and the areolar region in order to increase the chance that the mammary bud will develop normally during adolescence. Moreover, the esthetic result and its psychological implications were considered. The child underwent appropriate surgery as planned. The tumor was properly removed by an incision near the areola and the tumor was excised completely with the intact capsule. By using a small incision near the areola, the patient is expected to have no apparent scar. The excision was performed without any complications. The pathological examination confirmed the fibroadenoma diagnosis.
Conflict of interest statement

None declared.

References