

Pediatric Radiology / Radiologie pédiatrique

Imaging of Ovarian Teratomas in Children: A 9-Year Review

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Abstract

Objective: Germ cell tumours are the most common ovarian neoplasms in childhood and, of these, teratomas, whether mature or immature, are the most frequently found. Mature teratoma is a benign tumour, whereas the immature type, although also benign, has a more aggressive course, with a propensity to recurrence. A review of the literature revealed that there are some imaging features that may help to differentiate between these 2 types of teratoma, although no systematic comparison has been made. The objective of this study was to review imaging features of ovarian teratomas in children and to assess differentiating imaging features between the mature and immature types of ovarian teratoma.

Methods: Retrospective analysis of all patients who presented to our institution during a 9-year period (September 1999 to August 2008) with ovarian teratoma as confirmed on histology.

Results: Forty-one patients with pathologically proven ovarian teratoma were found. The patient ages ranged from 4–18 years at presentation (mean [standard deviation] age, 12.4 ± 3.4 years; median age, 13 years). Thirty patients (73.2%) were found to have mature ovarian teratoma, and 11 (26.8%) had immature teratoma. A component of endodermal sinus tumour was found in one of the immature teratomas. On ultrasonography, the appearance of the immature teratomas was purely solid in 3 (27.3%), mixed solid and cystic in 6 (54.5%), and predominantly cystic in 2 (18%). The mature ovarian teratomas demonstrated a predominantly cystic appearance in 22 (73.3%) and a mixed solid and cystic appearance in 8 (26.6%); there were no cases with a pure solid appearance. The prevalence of the more cystic appearance of the mature type showed significant statistical difference when compared with its prevalence in the immature type ($P = .0008$, χ^2 test). Other imaging features, such as size, presence of fat, or calcifications, did not show a significant difference between the 2 types of teratoma.

Conclusions: The predominance of a cystic component and a pure solid component in ovarian teratoma are significant differentiating factors between the mature type and the more aggressive immature type of teratoma.

Abrégé

Objectif: Les tumeurs de cellule germinale représentent les néoplasmes ovariens les plus courants chez l'enfant et, parmi ces néoplasmes, les tératomes, matures ou immatures, sont les plus fréquents. Le tératome mature est une tumeur bénigne tandis que le tératome de type immature, même s'il est également bénin, évolue plus rapidement et tend à être récurrent. Un examen de la documentation a révélé que certaines caractéristiques de l'imagerie peuvent aider à distinguer les deux types de tératomes, bien qu'aucune comparaison systématique n'ait été faite. L'étude visait donc à revoir les caractéristiques de l'imagerie des tératomes ovariens chez l'enfant afin d'évaluer celles qui permettent de distinguer le type mature du type immature de tératome ovarien.

Méthodes: Une analyse rétrospective de toutes les patientes atteintes d'un tératome ovarien, le tout confirmé par un examen histologique, s'étant présentées à notre établissement durant une période de neuf ans (de septembre 1999 à août 2008).

Résultats: Un tératome ovarien a été confirmé pathologiquement chez 41 patientes. L'âge des patientes variait de 4 à 18 ans au moment de leur arrivée (âge moyen [écart type], $12,4 \pm 3,4$ ans; âge médian, 13 ans). Trente patientes (73,2 %) souffraient d'un tératome ovarien mature et 11 (26,8 %) d'un tératome immature. Un composant de tumeur sinusale endocrine a été découvert dans un des tératomes immatures. Dans l'examen ultrasonique, l'apparence des tératomes immatures était purement solide dans trois des cas (27,3 %), mixte (solide et kystique) dans six des cas (54,5 %) et principalement kystique dans deux des cas (18 %). Les tératomes ovariens matures avaient une apparence essentiellement kystique dans vingt-deux des cas (73,3 %) et une apparence mixte (solide et kystique) dans huit des cas (26,6 %). Aucun tératome ovarien mature d'apparence purement solide n'a été découvert. La prévalence d'une apparence plus kystique dans le type mature a révélé une différence importante sur le plan statistique comparativement à sa prévalence dans le type immature (essai $P = 0,0008$, χ^2). D'autres

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caractéristiques d'imagerie, comme la taille, la présence de tissu adipeux ou la calcification, n'ont révélé aucune différence importante entre les deux types de tératomes.

Conclusions: La prédominance d'un composant kystique et celle d'un composant purement solide dans le tératome ovarien constituent des facteurs importants de différenciation entre le type mature et le type immature, plus agressif, du tératome.

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Key Words: Ovary; Teratoma, mature; Teratoma, immature; Pediatrics

Germ cell tumours are the most common ovarian neoplasms in childhood and adolescence and, of these, the teratomas, whether mature or immature, are the most frequently found [1]. Teratomas are often composed of multiple embryologic layers, which arise from multipotent cells, and are divided into both mature and immature forms [2]. A mature teratoma is a benign tumour, whereas the immature type, although also benign, has a more aggressive course, with a propensity to recurrence. Although ovarian tumours, including ovarian teratomas, have been thoroughly investigated in adults [3–10], there is little in the literature regarding their presentation in the pediatric age group, particularly in the imaging literature.

The purpose of our study was to review the imaging findings of ovarian teratomas in children and to correlate them with clinical, surgical, and pathology findings. We also intended to find any differentiating imaging features between the mature and immature types of ovarian teratoma.

Materials and Methods

The study was approved by the research ethics board of our institution. This was a retrospective analysis of all pediatric patients who presented to our institution during the 9-year period from September 1999 to August 2008 with ovarian teratoma as confirmed on histology. The inclusion criteria were all pediatric female patients aged from the first day of life to 18 years old who presented to our hospital with ovarian masses that eventually proved on histopathology to be ovarian teratomas. We excluded those girls with ovarian masses that had not been resected, even if they had typical imaging features of ovarian teratoma. The medical records of these patients were reviewed, and data were collected regarding patient's age at presentation, presenting symptoms, complications at presentation, operative report, pathology findings, and follow-up after therapy, particularly with regard to tumour recurrence.

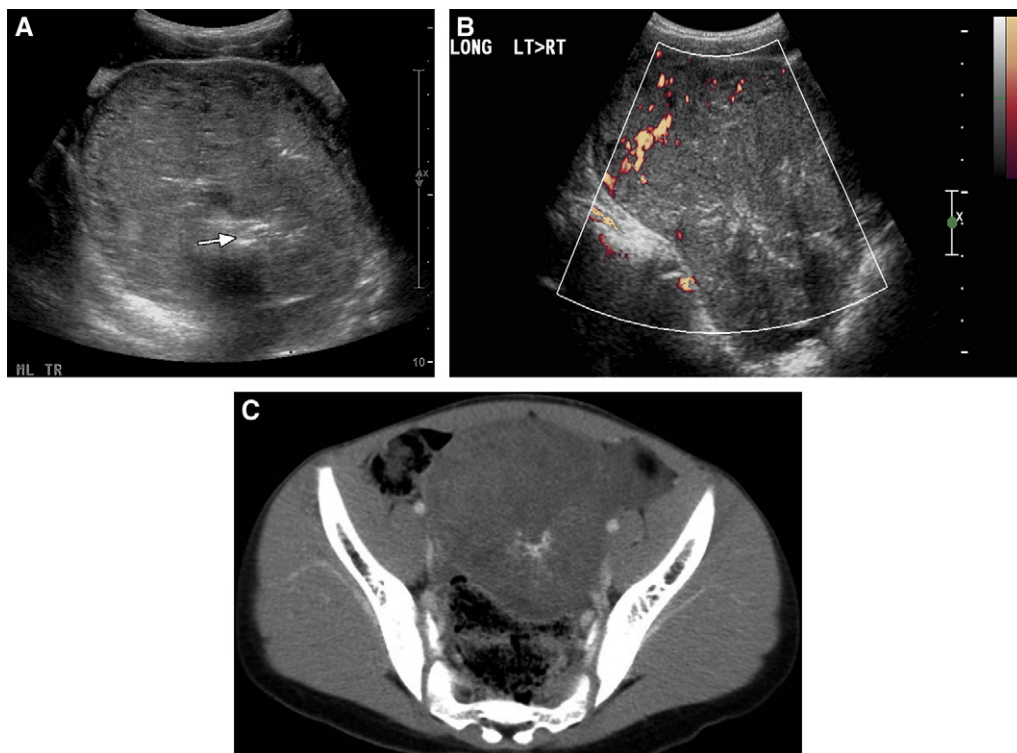


Figure 1. Immature ovarian teratoma in a 12-year-old girl with lower abdominal mass. (A) Transverse US scan of the pelvis shows a well-defined adnexal solid mass with linear echogenic areas (arrow) suggestive of calcification. (B) Colour Doppler US interrogation reveals vascularity of the adnexal mass. (C) Axial enhanced CT image shows a solid pelvic mass of predominantly low attenuation with linear calcification.

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