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Prenatal imaging of congenital hepatic tumors: a report of three cases

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ABSTRACT

The generalization of screening pregnancy ultrasound (US) studies has increased the detection of congenital tumors, including hepatic masses. In these cases, prenatal MRI is often used as a complementary imaging study. We present three cases of congenital hepatic tumors—two hemangiomas and one hamartoma—detected *in utero* and followed up in our institution. The retrospective analysis of their US and MRI prenatal imaging findings shows significant overlapping, indicating that the characterization of congenital hepatic tumors based exclusively on imaging findings is challenging.

1. Introduction

Congenital tumors represent only 1.5–2% of all pediatric tumors, with a prevalence of 1:12.500–27.500 live births [1,2]. Hepatic tumors comprise about 5% of all congenital neoplasms. Excluding metastases, principally from leukemia and neuroblastoma, the three main types of primary congenital hepatic tumors are, in decreasing order of frequency: hemangioma, mesenchymal hamartoma and hepatoblastoma [3,4]. Both hemangioma and hamartoma are considered benign, but extensive lesions can be life threatening [5] whereas hepatoblastoma is the most frequent congenital malignant liver neoplasm [2,3,6–8].

The generalized use of routine ultrasound (US) pregnancy screening has increased the rate of detection of hepatic tumors *in utero* [1,2]. In these cases, additional MRI is often performed. However, the real utility of prenatal imaging findings for characterizing the type of tumor is not clearly established. In this article, we review three congenital hepatic tumors detected *in utero* in our institution—two hemangiomas and one mesenchymal hamartoma—, describe their prenatal imaging findings and correlate them with the final diagnosis, obtained by pathology records and/or postnatal imaging. Moreover, we discuss the limits of prenatal imaging in the characterization of these lesions and review the recent literature.

2. Methods and materials

A retrospective review of all cases of congenital tumors diagnosed and followed in our institution over the last 15 years was done. Primary hepatic tumors with prenatal US and MRI ($n=3$) and a final diagnosis were retained for this article. Complementary MRIs were performed at a maximum of 7 days following the US exam. MRI exams were performed in a 1.5 Tesla unit (Magnetom Symphony or Aera, Siemens Medical Solutions, Erlangen, Germany) with a phased-array body coil. Standard protocol included T2-half-Fourier single-shot turbo spin-echo, T2-steady-state free precession imaging and T1-ultra-fast gradient echo sequences in axial, coronal, and sagittal fetal planes. The average time for examination was 30 min. Exams were performed without sedation or iv contrast administration. US images were available and the suspected US diagnosis known when MRI studies were performed.

The description of the detected lesion at US and MRI included the size, volume, anatomic location and extension, and identification of the suspected organ of origin of the tumor. The morphology of the lesion—mostly solid or cystic, homogeneous, or heterogeneous—as well as its characteristics of echogenicity, signal intensity (SI), and grade of vascularity were described. The effects of the lesion on the adjacent organs and the possible adverse prognostic factors were evaluated. The prenatal suggested diagnosis based on imaging findings were compared with the final diagnosis, obtained from pathology records and/or postnatal follow-up imaging findings.

3. Description of cases

3.1. Case 1

A US at the 33rd gestational week (GW) in a 32-year-old patient (gravid 1, para 0) revealed a large solid mass arising from the left hepatic lobe of the fetus (Fig. 1a). The tumor was well defined and heterogeneous and showed a prominent high vascularity at the US Doppler

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exam. Although a light fetal cardiomegaly was observed, no signs of fetal cardiac failure were detected at this time. Fetal MRI confirmed a well-delineated, heterogeneous hepatic mass, originating from the edge of the left hepatic lobe. The tumor presented mostly high SI in T2-W images and low SI in T1-W Magnetic Resonance images. Multiple intratumoral, flow-void, tubular structures were observed (Fig. 1b) and an extremely dilated left hepatic vein detected (Fig. 1c). The mass caused significant displacement of the stomach and spleen but without evidence of tumoral invasion. The right hepatic lobe was normal, and no other fetal anomalies were observed. Congenital hemangioma was retained as the most possible diagnosis.

A control US exam at the 35th GW detected signs of fetal cardiac failure, and urgent cesarean section was decided. The APGAR score (Appearance, Pulse, Grimace, Activity, Respiration) of the baby girl was 9/10/10. Neonatal US confirmed a large hypervascular left hepatic mass. As observed at the MRI exam, the left hepatic vein (Fig. 1d) was

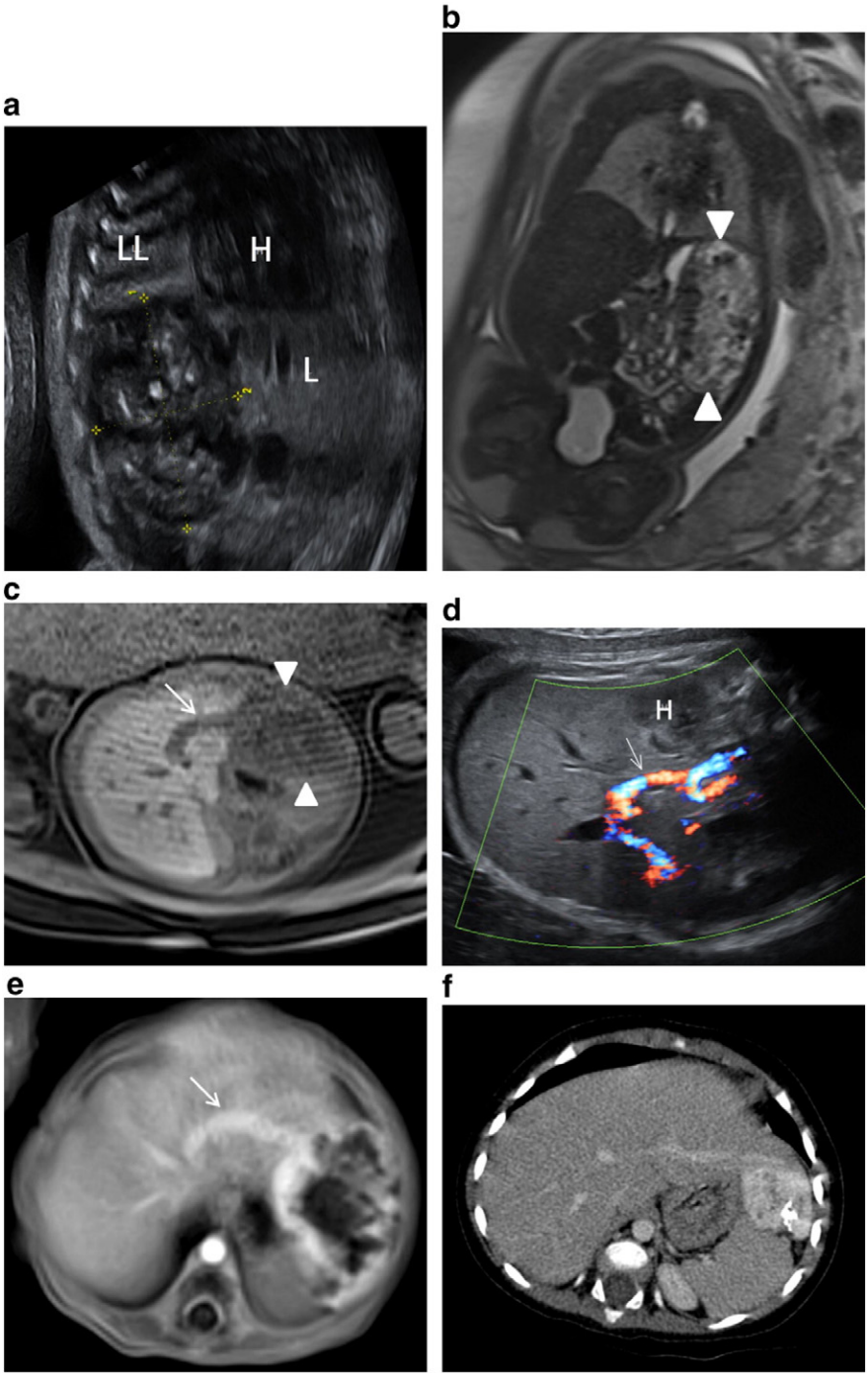

Fig. 1. (Case1, female fetus).– The left sagittal (a) US image performed at the 33rd gestation week (GW) shows a voluminous, solid and heterogeneous left hepatic mass (LL: left lung; H: heart; L: liver). Yellow marks are placed at the borders of the lesion. Coronal (b) T2-W fetal MR image at the 33rd GW shows the inhomogeneous tumor, arising from the lateral edge of the left hepatic lobe. Note the numerous tubular forming flow voids vascular structures. Axial T1 W (c) at the 33rd GW and transverse US abdominal images at the 35th GW (d) clearly evidence the extremely enlarged left hepatic vein (white arrows). Note that the images have been turned in order to improve the recognition of the fetal organs. Postnatal T1-W MR image after iv administration of contrast at day 4 (e) shows the marked early peripheral enhancement of the lesion in the arterial phase and confirms the enlarged left hepatic vein as the venous drainage of the lesion (white arrow). Contrast-enhanced abdominal computed tomography shows the development of calcifications and the significant regression of the tumor at the age of 18 months (f).