European Journal of Radiology 75 (2010) 301–305

Contents lists available at ScienceDirect

European Journal of Radiology

journal homepage: www.elsevier.com/locate/ejrad

Use of foetal MRI in diagnosing hepatic hemangioendotheliomas: A report of four cases

Su-Zhen Dong[a,*], Ming Zhu[a], Yu-Min Zhong[a], Min-Zhi Yin[b]

[a] Department of Radiology, Shanghai Children's Medical Center, 1678 Dongfang Rd., Shanghai 200127, China
[b] Department of Pathology, Shanghai Children's Medical Center, 1678 Dongfang Rd., Shanghai 200127, China

ARTICLE INFO

Article history:
Received 15 July 2009
Accepted 23 April 2010

Keywords:
Foetus
Magnetic resonance imaging
Liver
Hemangioendothelioma

ABSTRACT

Objective: To examine the appearance of foetal hepatic hemangioendotheliomas using prenatal magnetic resonance imaging (MRI) and to conclude whether MRI provides additional information to that obtained with ultrasonography (US).

Materials and methods: Four foetuses with hepatic hemangioendotheliomas were evaluated by US and MRI between 2005 and 2008. MRI was performed on four foetuses at 33 + 4, 37 + 4, 24 and 21 + 6 weeks gestation following US evaluations that demonstrated foetal abdominal tumours. The prenatal US and MRI findings were compared with the postnatal physical examination, enhancement computed tomography (CT) and serial ultrasound examinations, or with the pathology exams, retrospectively.

Results: All four foetuses showed very similar prenatal MRI findings. In each case, the foetal MRI detected an isolated vascular hepatic tumour with low T1 and inhomogeneous high T2 signal intensity. In one case, multiple scalp hemangiomas were detected in the postnatal physical examination, but not with the prenatal US and MRI exams. In the other three cases, the prenatal US and MRI findings were in complete agreement with the postnatal diagnoses.

Conclusion: Prenatal MRI is effective in the assessment of foetal hepatic hemangioendotheliomas. Prenatal MRI may provide a useful adjunct to US in assessing foetal hepatic tumours.

1. Introduction

Hepatic hemangioendotheliomas are benign, vascular tumours that are usually diagnosed during early infancy. Although benign, the tumours may be associated with life threatening complications, such as high output cardiac failure, consumptive coagulopathy, hemolytic anaemia and tumour rupture [1]. *In utero*, these complications may cause foetal hydrops and death. Foetal liver masses include giant hepatic hemangioma, hepatoblastoma and mesenchymal haematoma, and the identification of these masses in prenatal imaging studies can be challenging. Ultrasonography (US) is the primary prenatal imaging modality for evaluating foetal liver masses [2]. However, since US provides limited anatomical information, magnetic resonance imaging (MRI) has provided a useful complementary tool to assess anomalies in foetuses in recent years [3].

Here, we report the findings from examinations of four foetuses with hepatic hemangioendotheliomas. One foetus had a diffuse congenital hemangiomatosis, and three others had large, isolated hepatic hemangioendotheliomas. Both US and MRI were used to demonstrate the prenatal imaging evolution of the lesion. This report demonstrates the importance of foetal MRI for successful pre- and perinatal management.

2. Materials and methods

This study presents four consecutive cases with prenatally diagnosed, foetal hepatic hemangioendotheliomas, who were referred for ultrasound and MRI evaluations between July 2005 and August 2008. Before the examination, all the patients provided their informed consent. In all the cases, the prenatal diagnosis was confirmed by combined findings of postnatal physical examinations, enhancement computed tomography (CT) and serial ultrasound examinations, or pathology.

The prenatal ultrasounds were performed with a Philips iU 22 ultrasound system (Philips, Best, The Netherlands) with a 3–5 MHz curved-array transducer. MRI was performed with a 1.5 T unit (Signa, GE Medical Systems, Milwaukee, USA) and an eight-channel, phased array cardiac coil between 24 and 48 h after the ultrasound exams. The patients were placed in a supine, feet-first position in the magnet to minimize claustrophobia. The imaging sequences included a fast imaging employing steady-state acquisition (FIESTA) sequence (repetition time/echo time,

* Corresponding author. Tel.: +86 21 38626565.
E-mail addresses: dongsuzhen@126.com (S.-Z. Dong), zhuming58@vip.sina.com (M. Zhu), zyumin2002@yahoo.com (Y.-M. Zhong), yinminzhi@126.com (M.-Z. Yin).

0720-048X/$ – see front matter © 2010 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.ejrad.2010.05.037

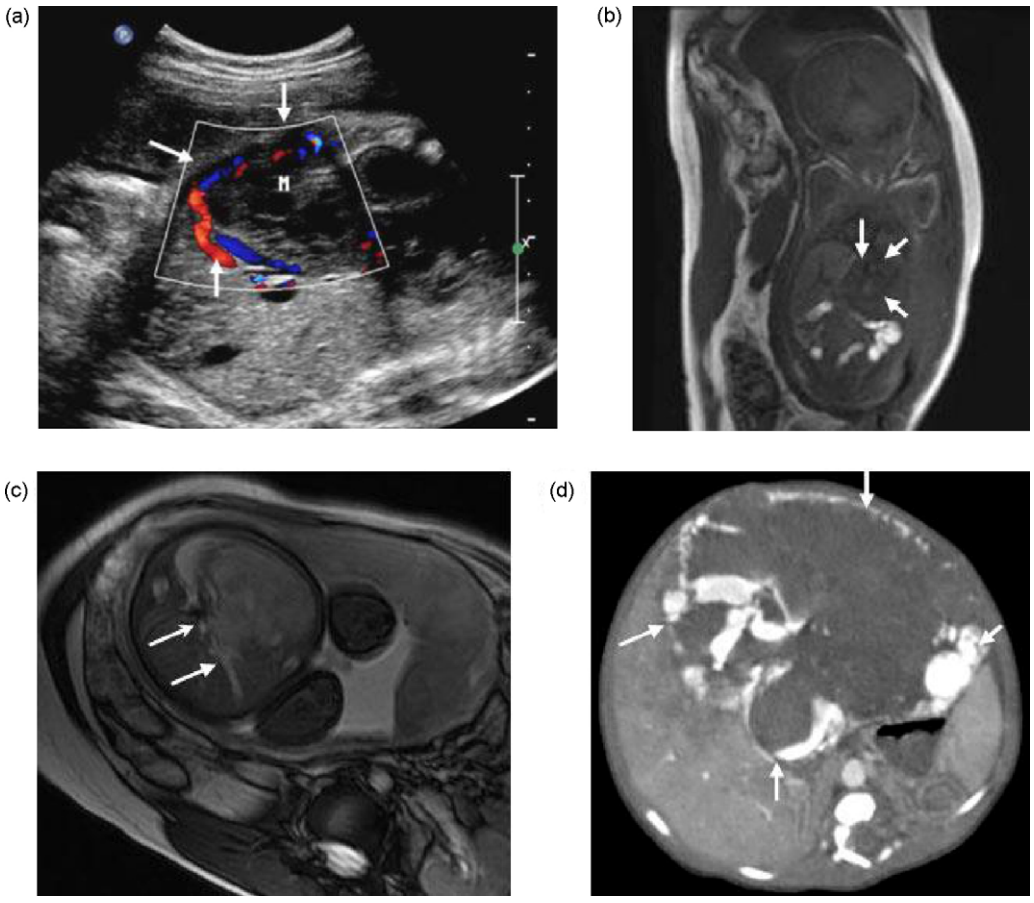

Fig. 1. Foetus with a large hepatic hemangioendothelioma measuring 55 mm in diameter at 33 ± 4 weeks gestation. (a) Left parasagittal sonogram of the foetal abdomen showing a solid, highly vascularized mass with several cystic areas in the left upper abdomen (arrows). (b) A coronal FIRM MR image of the foetus. A giant hepatic mass (arrows) is shown in the left lobe with inhomogeneous low T1 signal intensity. (c) A transverse FIESTA MR image of the foetal abdomen. The enlarged hepatic blood vessels within the liver (lower arrow) and the thin distal abdominal aorta (upper arrow) are visible. (d) Abdominal contrast-enhanced CT scan on the third day after birth shows an enhancement of the mass, which is composed of large vascular channels (arrows).

4.0 ms/1.5 ms; bandwidth, 125.0 kHz; field of view, 36 cm × 36 cm; section thickness, 5–6 mm; spacing, 0.5–1 mm; matrix, 224 × 224), a multiplanar single-shot fast spin-echo (SSFSE) sequence (repetition time/echo time, 1350 ms/90 ms; bandwidth, 20.8 kHz; field of view, 40 cm × 40 cm; section thickness, 5–6 mm; spacing, 0.5–1 mm; matrix, 256 × 192) and a fast inversion recovery motion insensitive (FIRM) sequence (repetition time/echo time, 7.5 ms/4.0 ms; bandwidth, 31.2 kHz; field of view, 35 cm × 26 cm; section thickness, 8–10 mm; spacing, 1 mm; matrix, 256 × 160). The FIESTA and SSFSE sequences provided T2-weighted images with good tissue contrast, and the FIRM sequence provided T1-weighted images. Magnetic resonance (MR) images were acquired in the foetal transverse, coronal and sagital planes with respect to the foetal abdomen. The total acquisition time was approximately 15 s per sequence, and the examination duration averaged approximately 20 min. No sedatives or intravenous gadolinium-based contrast materials were used.

All of the MR images were interpreted by two authors (Dong SZ and Zhu M). The US results were known to the MR imaging radiologist at the time of acquisition and at the time the MR images were interpreted.

3. Results

In three of the foetuses, we detected a large, isolated, hepatic hemangioendothelioma, which was supplied by a single hepatic artery. The fourth case had a small, isolated, hyperechogenic hepatic hemangioendothelioma (13 mm in diameter) that did not develop any perinatal complications. None of the cases showed any symptoms of consumptive thrombocytopenic coagulopathy (Kasabach–Merritt sequence). The following case-by-case presentation demonstrates the varying sonographic and MRI appearances of foetuses with liver hemangioendotheliomas.

Case 1. A 25-year-old woman, gravida 1, underwent a routine growth assessment scan at 33 + 4 weeks gestation. Transabdominal US revealed a solid mass (55 mm diameter) with several cystic areas in the foetal upper left abdomen between the stomach and the liver, which most likely arose from the liver. Duplex and colour Doppler imaging demonstrated a highly vascularized mass (Fig. 1a). Foetal MRI showed a 59 mm × 45 mm × 56 mm tumour with low T1 and inhomogeneous high T2 signal intensity emanating from the left lobe of the liver (Fig. 1b). Transverse MRI through the foetal abdomen showed branching of the enlarged hepatic blood vessels within the liver and the thin distal abdominal aorta (Fig. 1c). The foetal MRI and US evaluations showed no evidence of any other anomalies. The foetal biometry was appropriate for the gestational age, and the amniotic fluid volume and placenta were normal.

The postnatal ultrasound examination showed a giant hypoechoic mass, measuring 87 mm × 70 mm × 89 mm, in the right lobe of the liver with one feeding artery and high blood flow. Upon physical examination, the infant had multiple hemangiomas on the scalp. An enhanced CT examination on the third day after birth demonstrated an 87 mm × 72 mm × 90 mm hypervascular mass emanating from the left lobe of the liver and evidence of arte-