

## Ultrasonographic findings of small lesion of hepatic alveolar echinococcosis



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### ABSTRACT

**Objective:** To investigate the features of small lesions of hepatic alveolar echinococcosis paragonimiasis (AE) on conventional ultrasound (US) and contrast-enhanced ultrasound (CEUS) imaging.

**Methods:** This retrospective study was approved by the Institutional Review Board, and the requirement for informed consent was waived. US and CEUS features of seventeen lesions histopathologically proven hepatic AE were retrospectively reviewed. Nine patients with seventeen hepatic AE lesions who were admitted to our hospital between January 2008 and June 2015 were enrolled. All hepatic AE lesions were small ( $\leq 3$  cm). The US and CEUS examinations were performed with a Philips IU22 scanner with a 1–5-MHz convex transducer. After US was completed, the CEUS study was performed. Pulse-inversion harmonic imaging was used for CEUS. A bolus injection of 2.4 mL of a sulfur-hexafluoride-filled microbubble contrast agent (SonoVue) was administered. The features of the lesions by US and CEUS were retrospectively reviewed.

**Results:** In total, all lesions were detected by US and CEUS. The mean size of the lesions was  $1.8 \pm 0.7$  cm (range: 1.0–3.0 cm). Five patients (55.6%, 5/9) had a lesion in the right hepatic lobe; two (22.2%, 2/9) had two lesions in the left hepatic lobe; and two patients (22.2%, 2/9) had four lesions in the right lobe. Seven lesions (41.2%, 7/17) were hypoechoic nodules and ten (58.8%, 10/17) were hyperechoic nodules. Nine lesions (52.3%, 9/17) were of mixed echogenicity type. Ten lesions (58.8%, 10/17) had a regular shape. Nine lesions (52.3%, 9/27) had a sharp margin and six (35.3%, 6/17) had indistinct margins. Four lesions (57.1%, 4/7) with hypoechoic nodule had small dotted calcifications, none was found in hyperechoic nodule. Seven nodules (41.2%, 7/17) showed short striated blood-flow signals surrounding the margin, on color Doppler flow imaging. By CEUS, All the lesions were hypoechoic with mixed content ( ). 12 lesions (70.1%, 12/17) were rim enhanced with irregular piece-like nonenhanced internal areas and showed nonhomogeneous hypo-enhancement during the arterial phase, with mixed echogenicity. The main pathological findings included: (1) (1) coagulative or liquefactive necrosis within the lesion with sporadic distribution of wizened alveolar hydatid cysts; and (2) hyperplasia of granulomatous and fibrous tissue around the lesion.

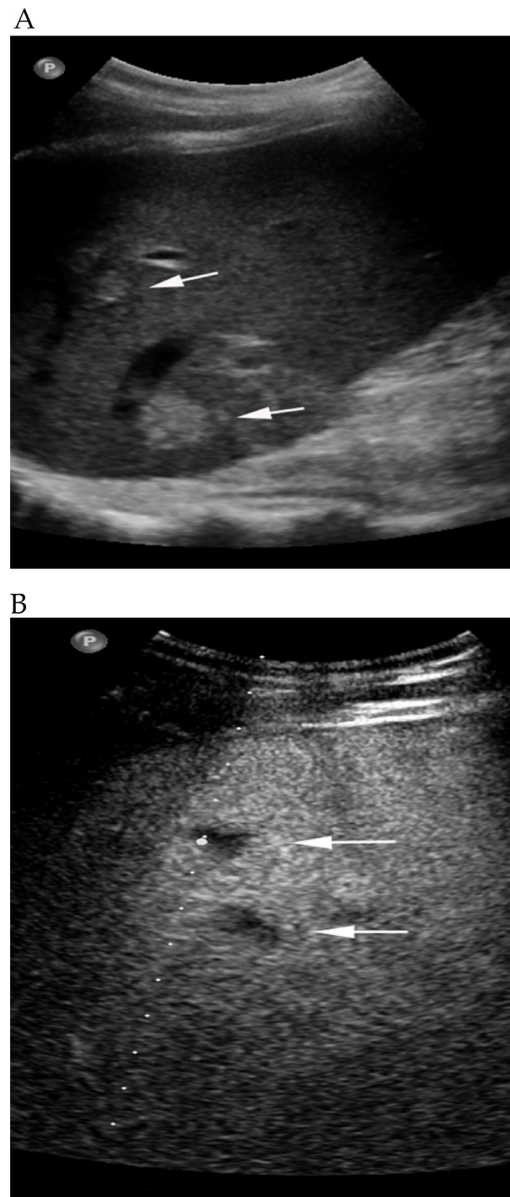
**Conclusion:** Hyperechogenicity, mixed echogenicity type, dotted calcification with hypoechogenicity, sharp margin, rim enhancement and piece-like nonenhanced areas could be seen as the main ultrasonographic features of small lesion of hepatic alveolar echinococcosis.

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### 1. Introduction

Human alveolar echinococcosis (AE), which is caused by the metacestode of the fox tapeworm *Echinococcus multilocularis*, is a near-cosmopolitan zoonosis in the northern hemisphere (McManus et al., 2003; Schipper and Kager, 2004). Up to now,  $\geq 1000$  cases of AE have been reported throughout China and AE

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**Fig. 1.** A 36-year-old man with hepatic AE.

A: Two hyperechoic nodules (arrow) were found in the right hepatic lobe by US examination; B: Two nodules (arrow) in the right hepatic lobe showed nonhomogeneous hypo-enhancement after contrast agent injection in the portal phase by CEUS.

mostly affects Tibetan communities in Sichuan Province (Jiang, 2002, 2005; Wang et al., 2004, 2007). Liver is the primary location of AE in humans as well as in natural intermediate hosts. Local extension of the lesion and metastasis to the lungs and brain may follow. The initial symptoms of AE lesions are usually vague (Moro and Schantz, 2009). AE has no clinical symptoms in the early stage, therefore, patients are always diagnosed with large hepatic masses (>3 cm) after infection and the usual imaging features, such as central necrotic areas and perinecrotic, plaque-like calcifications (Didier et al., 1985; Brunetti et al., 2010; Tao et al., 2011; Ehrhardt et al., 2007). In this study, we focused on imaging features of small hepatic AE lesions ( $\leq 3$  cm) in the early stage by conventional ultrasound (US) and contrast-enhanced ultrasound (CEUS), which differed from the previously reported features of large lesions (>3 cm).

## 2. Materials and methods

### 2.1. Patient data

We retrospectively reviewed the results of US and CEUS examination of nine patients (5 male, 4 female, mean age:  $43 \pm 5.1$  years, range: 36–48 years) with seventeen lesions of hepatic AE who were admitted to our hospital between January 2008 and June 2015. The diameter of the lesions was  $\leq 3$  cm. All the lesions detected by US and CEUS were misdiagnosed preoperatively. All patients were residents of Tibetan communities in China's Sichuan Province, which is an endemic area for AE. All patients underwent serological examination and results were negative. The study was approved by the hospital Ethics Committee. All the patients underwent surgery and the diagnosis was confirmed histologically.

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