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Case Report

Undifferentiated embryonal sarcoma of the liver: A rare hepatic tumor and its related characteristic radiological features

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ABSTRACT

The undifferentiated embryonal sarcoma of the liver is a rare tumor with a poor prognosis, with improved outcomes being reported with more recently multimodality treatments. We report a case of a 6-year-old girl with an incidentally diagnosed and histologically proven localized undifferentiated embryonal sarcoma of the liver. The divergence between solid appearance at US and cystic-like appearance on CT/MRI, which has been attributed to the presence of myxoid component frequently described with this tumor, was crucial for the diagnosis and subsequent treatment.

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Introduction

The undifferentiated embryonal sarcoma of the liver (UES) is a rare tumor, occurring mainly in pediatric age. It may be confused with other types of mesenchymal and cystic liver tumors because of similarities in radiological, clinical and histological appearance. About 200 cases have been described in the literature. Radiological imaging features might be helpful in suggesting the correct diagnosis. An imaging-guided percu-

taneous biopsy is part of the diagnosis, despite nondiagnostic results can occur.

We present an illustrative case of UES with a review of the literature, focusing on the radiological features.

Case report

An otherwise healthy 6-year-old female patient was referred to the hospital for further evaluation of a liver lesion inciden-

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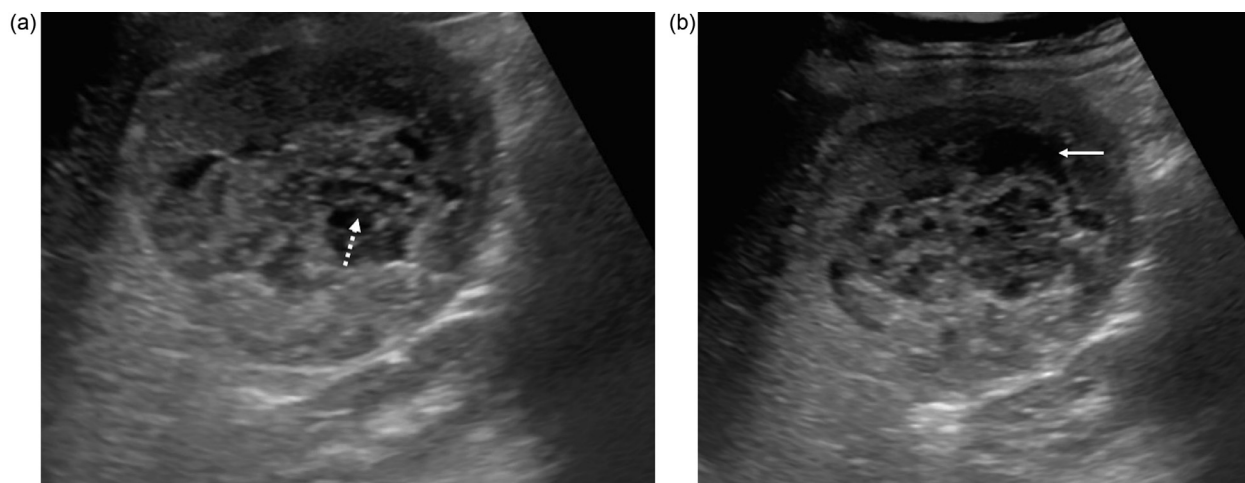


Fig 1 – (a, b) US images show a large, well-demarcated, heterogenous and predominantly hyperechoic lesion with solid components and thick echogenic septa.

tally discovered on a routine ultrasound performed in the setting of recurrent urinary tract infection.

There were no significant findings on physical examination, laboratory studies revealed no signs of cholestasis and the serum AFP level was normal (3410 UI/ML).

Ultrasound performed on arrival at our institution confirmed a $8.2 \times 7.3 \times 7.3$ cm complex hypoechoic mass with solid isoechoic components and thick and irregular septations in the right hepatic lobe, therefore concerning for a malignant etiology (Fig. 1). Color Doppler showed no significant signs of vascularization.

CT revealed a large well-circumscribed hypodense partially exophytic lesion in the right hepatic lobe, measuring $8.2 \times 7.3 \times 7.3$ cm. The lesion demonstrated peripheral areas of spontaneous high attenuation values suggesting hemorrhagic and necrotic debris and on dynamic contrast enhanced imaging was predominantly hypovascular, with minimal patchy enhancement at delayed phases. The perihepatic fat planes were preserved (Fig. 2).

MRI demonstrated a heterogeneous predominant low signal intensity mass alternating with some areas of hyperintensity on T1-WI, and predominantly hyperintense on T2-WI. There was no significant enhancement on postgadolinium dynamic sequences. There was a hypointense rim on T1-WI and T2-WI, as well as linear areas of hypointensity on both types of pulse sequences suggesting the presence of internal septations (Fig. 3).

Percutaneous needle biopsy was nondiagnostic. Given the clinical and imagiological suspicion of UES, surgical excision with laparoscopic right hepatectomy was performed. There was no evidence of local or distant metastasis.

Immunohistochemical examination of the specimen confirmed the diagnosis of UES of liver by revealing a poorly differentiated neoplasm, with large necrotic areas, and solid areas with small cells with a high nucleus-to-cytoplasm ratio, marked pleomorphism, and inconspicuous nucleoli. Focally there were hyaline globules (PAS-D positive and alpha-fetoprotein negative; Fig. 4). At the periphery, the neoplasia was surrounded by a hamartomatous lesion, with myxoid

stroma, pleomorphic cells, and dilated branching bile ducts (Fig. 5).

Adjuvant treatment was carried out with Vincristine, Dactinomycin, and Ifosfamide during 5 months. The patient was in good health without local recurrence or metastasis during 18 months of follow-up.

Discussion

UES of the Liver was first described by Stocker and Ishak in 1978 to report a group of mesenchymal tumors in the liver that did not show evidence of differentiation [1]. It is a highly aggressive neoplasm and the third most common hepatic malignant tumor in children, after hepatoblastoma and hepatocellular carcinoma [2,3].

Although patients identified with UES ranged in age from 4 months to 63 years, this tumor occurs almost exclusively in the pediatric population (about 88% occur in children less than 15 years of age) and the average age of presentation is approximately 6-10 years old [1,4-6].

UES comprises approximately 0.2% of all pediatric liver malignancies, with a majority of publications referring equal predominance in both genders [5,7].

Affected pediatric patients present clinically with an abdominal mass with or without abdominal pain/discomfort and fever; the lesion may also be detected incidentally on routine examination in an asymptomatic child [1,2,4,8]. Acute presentation with tumor hemorrhage and rupture was reported less frequently [1,9,3].

There are no serum markers for UES, but leukocytosis and anemia may be present [1,3-5,10]. Lungs, pleura, and peritoneum are the most common location for metastases [1,3-5,10].

The association of UES with mesenchymal hamartoma and the potential for mesenchymal hamartoma to undergo malignant transformation was recently proposed in few studies, based on the overlapping clinicopathological features, and cy-

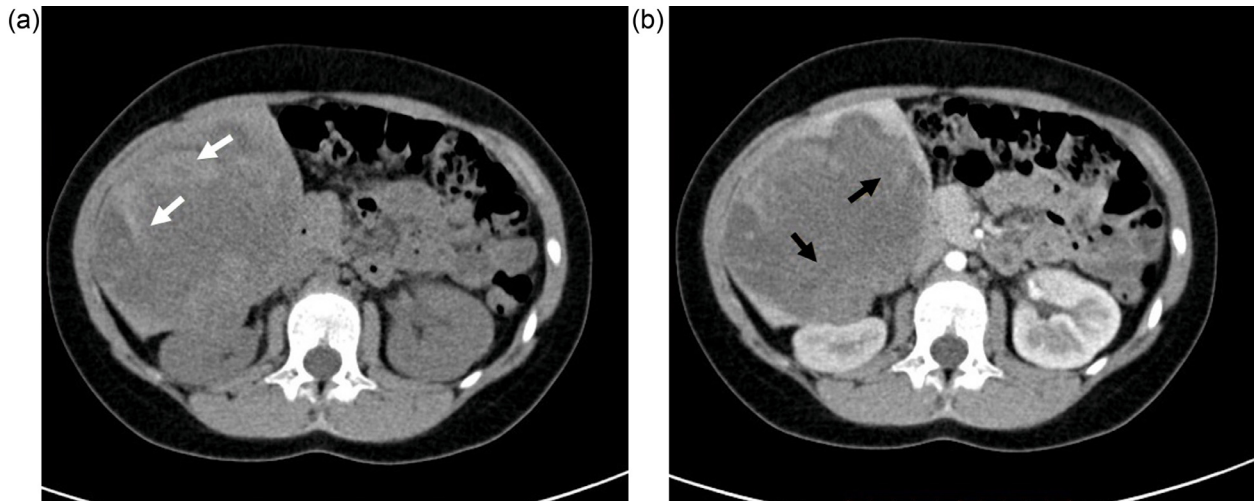


Fig. 2 – Precontrast axial (a) and venous phase (b) CT reveal a large predominantly hypodense lesion in the right hepatic lobe with areas of high attenuation (white arrows). The mass is predominantly hypoenhancing with small enhancing foci (black arrows).

togenetic aberration in the region of chromosome 19q13 found in these entities. Some suggest they represent a spectrum of tumors ranging from benign to malignant lesions with a poor prognosis [11–13]. More studies are needed to understand factors which have the potential to influence malignant transformation and the relation between these entities.

Regarding imaging features, the differential diagnosis of UES includes an abscess, mesenchymal hamartoma of the liver, hydatid cyst, cystic degeneration in hepatoblastoma, or hepatocellular carcinoma and cystic metastasis [7].

UES is composed of primitive, undifferentiated spindle cells, with numerous mitotic figures and myxoid stroma [2]. In gross appearance, UES usually presents as a solitary, spherical and well-defined mass, usually larger than 10 cm at the time of diagnosis, most commonly found in the right hepatic lobe and consisting of both solid and cystic components [2]. A pseudocapsule composed of compressed liver parenchyma may be present [3,7].

A discrepancy between the US and CT/MRI appearance is consistently described in the literature, referring to predominantly solid appearance of UES at US and cystic-like appearance on CT/MRI [1,2,4,7,8]. This appearance is believed to reflect the high water content of the prominent myxoid stroma, which has a misleading appearance resembling a predominantly cystic lesion on CT [1,2,4,7]. The ultrasonographic appearance of UES is variable and corresponds to the spectrum of pathologic features [1,5,7,8].

US may reveal a predominantly solid lesion typically iso- to hyperechoic relative to normal liver with internal septations and anechoic areas or, less often, a predominant anechoic lesion [1,2,4,7,8]. Anechoic areas within the collection represent foci of necrosis, old hemorrhage, or cystic myxoid degeneration [1,2,4,7,8]. The solid appearance at US reflects on the amount of solid component at macroscopic examination [1,2,7,8,10,14].

CT typically demonstrates a large, well-defined solitary mass which is predominantly hypodense with a few internal septations and papillary projections at periphery [1,2,4,7,8,14]. This hypodense appearance may mimic a cystic nature [1,2,4,7,8,14]. Central foci of high attenuation representing acute hemorrhage may also be present [4]. The presence of serpiginous vessels within the tumor has been recently reported in literature as an important finding for the diagnosis [4]. A dense, enhancing peripheral rim may be observed, which corresponds to the pseudocapsule observed at macroscopy. Calcifications have been rarely described [1,2,3,7,8].

On MRI, UES has high signal on T2-WI and low signal on T1-WI. Additionally, hyperintense spots on T1-WI and hypointensity on T2-WI can be seen suggesting intratumoral hemorrhage [2,4,7]. When present, pseudocapsule and septations have a low signal intensity on both T1- and T2-WI [1,2,4,7,10,14].

Postcontrast CT and MR images show slight progressive enhancement [1,2,4,7,8,14]. The enhancement pattern at delayed phases after contrast administration rules out the purely cystic nature of the lesion [1,4,8,14].

As emphasized in the literature, the major finding for diagnosis is a discrepancy between the US and CT/MRI features [1,4,7,8,14].

UES is often a challenging diagnosis for clinicians and radiologists, emphasizing the significant role of image-guided percutaneous biopsy. Nondiagnostic US-guided biopsies can occur [15].

Because of potential for tumor rupture, some authors suggest that prophylactic embolization of the feeding artery is recommended in case of higher possibility of tumor rupture [9].

Treatment modalities include surgery, chemotherapy, and liver transplantation [16].

Surgical resection of the primary tumor has been considered the mainstay of the treatment [16]. The use of chemother-

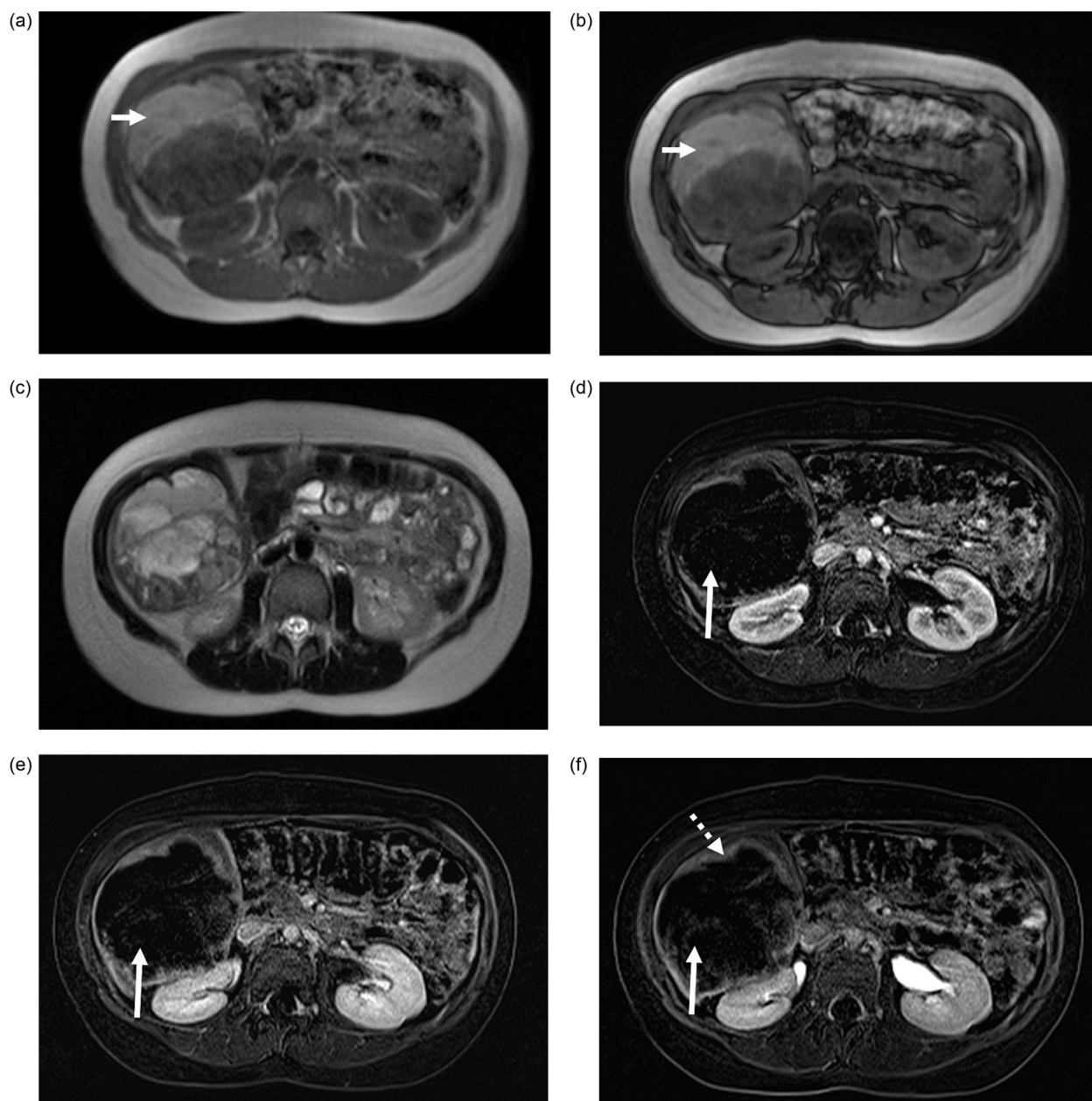


Fig. 3 – In-(a) and opposed-phase (b) GRE T1WI, HASTE T2WI (c). The lesion show a predominantly hypointense signal on T1-WI (a, b) and high signal intensity on T2-WI. Subtraction phase-contrast MR obtained at 1 (d), 5 (e), and 10 (f) minutes reveal a predominant hypoenhanced mass with areas of enhancement predominantly septal.

apy in the adjuvant setting has not been totally established, although recently published studies suggest that a multimodal treatment including surgery and chemotherapy (consisting of varying combinations of Vincristine, Cyclophosphamide, Dactinomycin, Doxorubicin, and Ifosfamide) results in longer survival [16].

Patients with initially unresectable disease are frequently managed with neoadjuvant chemotherapy followed by surgery or with liver transplantation [16]. Other treatment options are under clinical evaluation [16].

Over the years, with advances in treatment strategies, there was an improvement in the survival rate [16]. Data from a 20-year follow-up study were presented, reporting survival

rates of 20 years from diagnosis (ranging from 2.4 to 20 years) [17].

Teaching Point

1. UES is the third most common hepatic malignant tumor in children, accounting for 0.2% of all pediatric liver malignancies, with peak incidence between 6 and 10 years, and classically appears as a large and well-defined solitary mass in the right lobe, often with areas of necrosis, hemor-

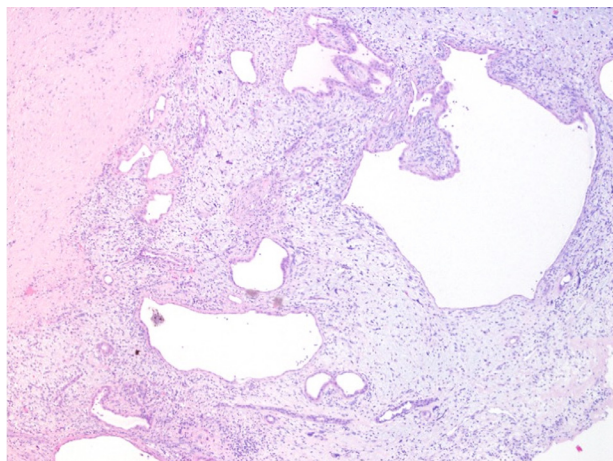


Fig. 4 – UES of the liver: PAS-D hyaline globules within the tumor.

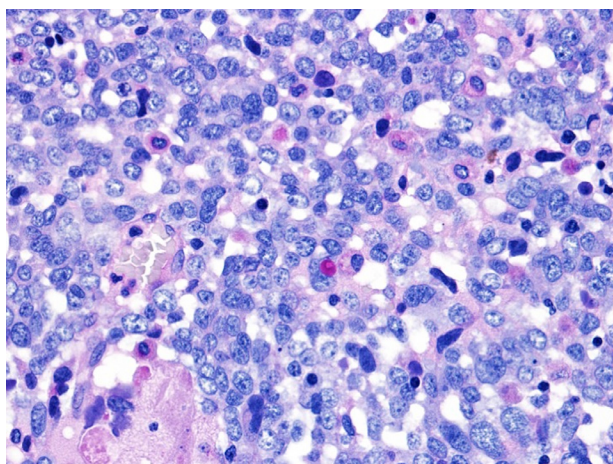


Fig. 5 – UES of the liver: hamartomatous lesion at the periphery of the neoplasia, with myxoid stroma and dilated biliary ducts.

rhage and cystic myxoid changes, accompanying a normal AFP.

- The divergence between solid appearance at US and cystic-like appearance on CT/MRI has been attributed to the presence of myxoid component and is a distinctive finding of UES.

Declaration of Competing Interest

The authors have no conflicts of interest.

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