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Case Report

Yolk sac tumor of the liver in an infant: A case report ☆

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ABSTRACT

Yolk sac tumors can occur in various extragonadal sites, including the hepatobiliary tract, and are often associated with elevated serum alpha-fetoprotein. We report the case of a 14-month-old male infant presenting with abdominal pain and distension. Ultrasound and computed tomography scans of the abdomen revealed contiguous hepatic masses with lobulated contours, containing areas of necrosis. The patient underwent surgical resection, and histological studies confirmed the diagnosis of a yolk sac tumor. The occurrence of a yolk sac tumor in the liver is extremely rare. Ultrasound and cross-sectional imaging can be highly effective in diagnosing these tumors when combined with biopsy procedures to confirm the diagnosis. Although rare, yolk sac tumors of the liver should be considered a differential diagnosis for hepatic masses.

Introduction

Malignant germ cell tumors account for 3% of neoplasms in children, with yolk sac tumors being the most common histological subtype [1]. Yolk sac tumors of the liver (YSTL) are extremely rare extragonadal germ cell tumors. Fewer than 20 cases of primary yolk sac tumors of the liver have been reported [2]. Although rare, this tumor is often misdiagnosed due to the similarities between YSTL, hepatocellular carcinoma (HCC), and hepatoblastoma (HB) [3]. Yolk sac tumors typically develop in infants, young children, and young women [4]. Ultrasound can be very effective in diagnosing yolk sac tumors or germ cell tumors when used in conjunction with other imaging modalities. Imaging is essential for diagnosis, biopsy guidance, treatment, and follow-up of yolk sac tumors of the liver, contributing to optimal patient management [5].

Case report

This case involves a 14-month-old male infant with no significant medical history, who presented with right hypochondrium pain for 1 month, accompanied by abdominal disten-

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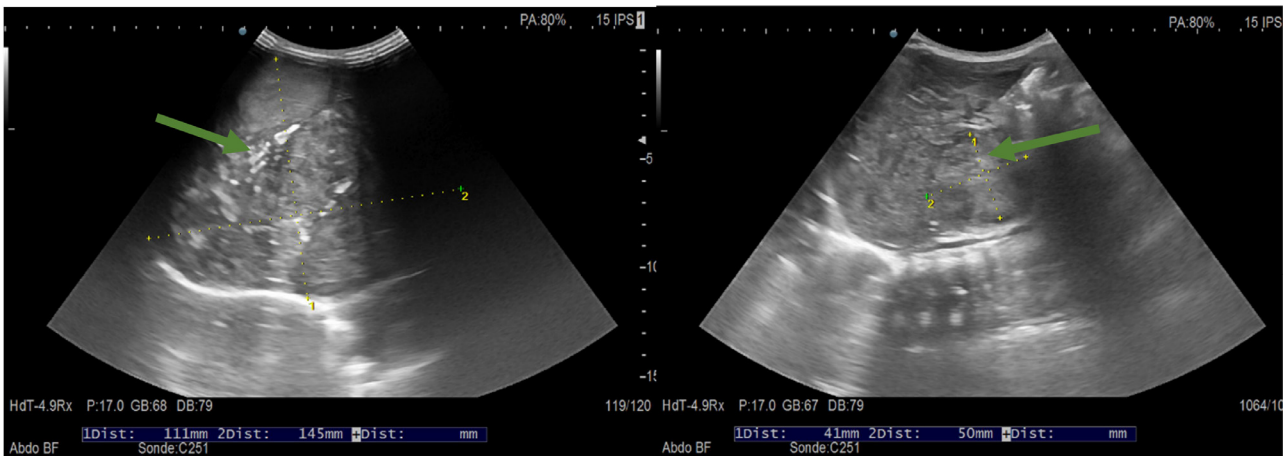

Fig. 1 – Ultrasound section showing voluminous contiguous masses occupying almost the entire liver parenchyma (green arrow), lobulated contours, heterogeneous echo structure.

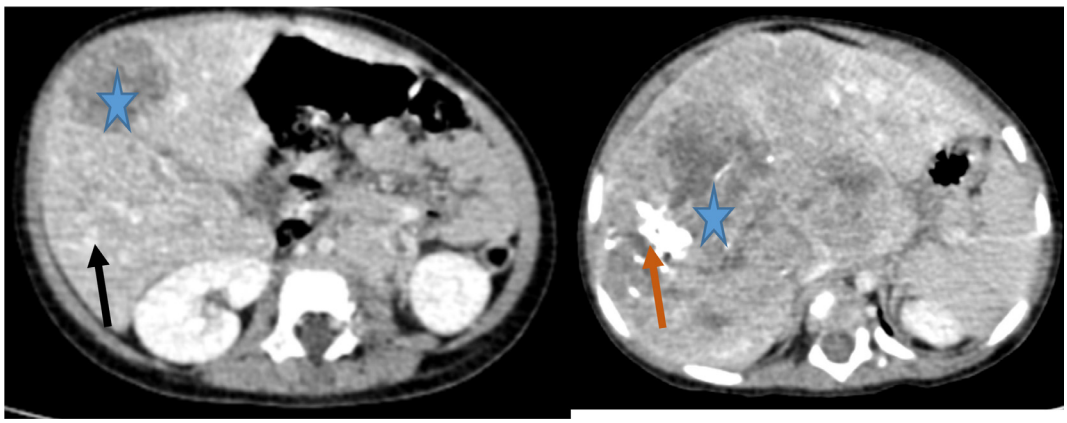

Fig. 2 – Axial section of an abdominal CT scan showing a hepatic mass in the right liver (Blue star), sparing segment VI (black arrow), with lobulated, heterogeneous contours, containing areas of necrosis and calcifications (Brown arrow).

sion. Physical examination revealed a deteriorated general condition, a distended abdomen, and hepatomegaly. An abdominal ultrasound was performed, followed by an abdominal CT scan.

The abdominal ultrasound (Fig. 1) showed large contiguous masses occupying almost the entire hepatic parenchyma, roughly rounded with lobulated contours, and a heterogeneous echostructure that was predominantly tissue-based, containing some necrotic areas and calcifications generating posterior acoustic shadowing. An abdominal CT scan was then requested for better characterization. The abdominal CT revealed a hepatic mass in the right liver, sparing segment VI. This well-defined, tissue-based mass with polylobed contours was isodense and heterogeneous, containing calcifications and necrotic areas, with moderate enhancement after contrast injection (Figs. 2 and 3). The mass was classified as PRETEXT III. Biologically, we found an alpha-fetoprotein (AFP) level >20,000 ng/mL and a BHCG <2.3 mIU/mL. Initially, our case was considered to be hepatoblastoma due to the infant's age, and neoadjuvant chemotherapy was administered with good improvement. Subsequently, the patient underwent a right hepatectomy with histological examination.

Microscopic examination of the various samples showed a polymorphic tumor proliferation composed of microcystic reticular structures, trabeculae, cellular clusters, irregular confluent glands, and papillae with a fibrovascular core. Mitoses were observed, along with hyaline globules and Schiller-Duval bodies (Fig. 4). A wide panel of immunostains was performed, revealing that the tumor was positive for cytokeratin AE1/AE3, glypican 3, alpha-fetoprotein (AFP), and SALL4. The hyaline globules were weakly stained for AFP, while the immunostain for hepatocytes was negative (Figs. 5 and 6).

Unfortunately, the patient's condition deteriorated, and he passed away a few days after surgery.

Discussion

Yolk sac tumors are rare and often classified among germ cell tumors, a heterogeneous group that includes YST, semi-

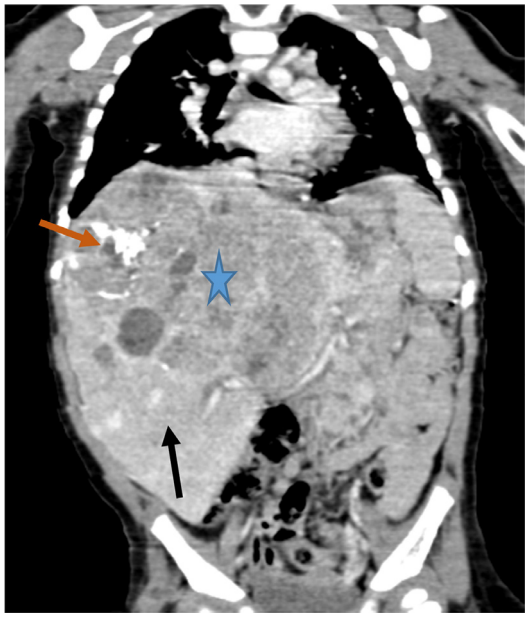

Fig. 3 – Coronal reconstruction of an abdominal CT scan showing a hepatic mass of the right liver (Blue star), sparing segment VI (Black arrow), heterogeneous, with lobulated contours, containing areas of necrosis and calcifications (Brown arrow).

noma, dysgerminoma, embryonal carcinoma, choriocarcinoma, polyembryoma, gonadoblastoma, and teratoma [6]. Although the etiology of YSTs is largely unknown, hypermethylation of the RUNX3 gene promoter and overexpression of GATA-4, a transcription factor regulating yolk sac endoderm differentiation and function, may play a role in their pathogenesis [7–9]. These hypotheses remain to be validated.

Primary hepatic yolk sac tumors are rare, and to date, several case reports have been published [10,11]. There are no specific diagnostic and radiological characteristics for yolk sac tumors, and they may mimic other hepatic lesions [12]. Most published cases describe abdominal enlargement due to hepatomegaly as the first finding, and nearly all show elevated serum AFP levels [5,13], as in the reported case. However, some also exhibit elevations in other tumor markers, such as beta-HCG [5,13].

Imaging must not only confirm the intrahepatic location of the mass but also assess the tumor's operability and identify possible secondary sites. Ultrasound is the first examination to be performed for any abdominal mass in children. Although conventional ultrasound results may be sufficient to diagnose and monitor certain hepatic lesions, this modality does not allow for tumor staging or assessment of treatment response. Cross-sectional imaging remains the reference method for a complete characterization of focal hepatic lesions, as well as for tumor staging and assessment of tumor extension [14]. The ultrasound and CT characteristics of germ cell tumors

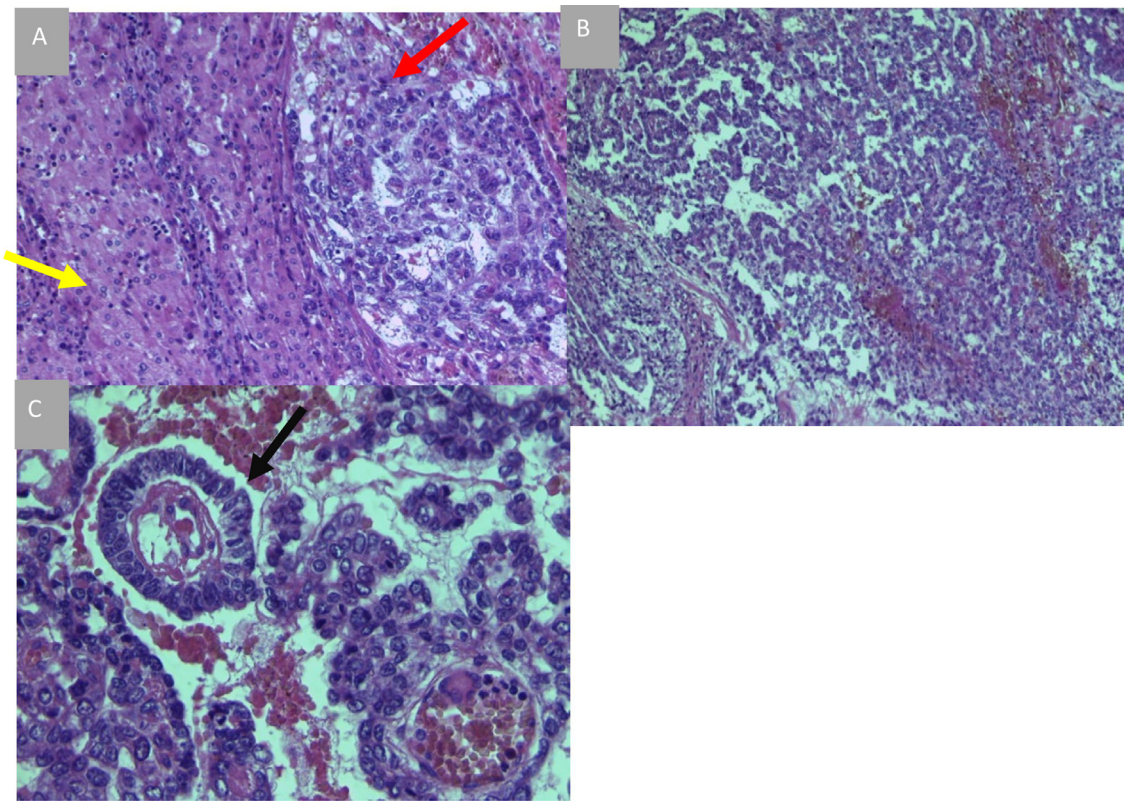

Fig. 4 – Hematoxylin-eosin staining showing the hepatic parenchyma (Yellow arrow) and tumor (Red arrow) at magnification x20 (A), yolk sac tumor with reticulated architecture at magnification x20 (B) and Val Shiller body (Black arrow) at magnification x40 (C).

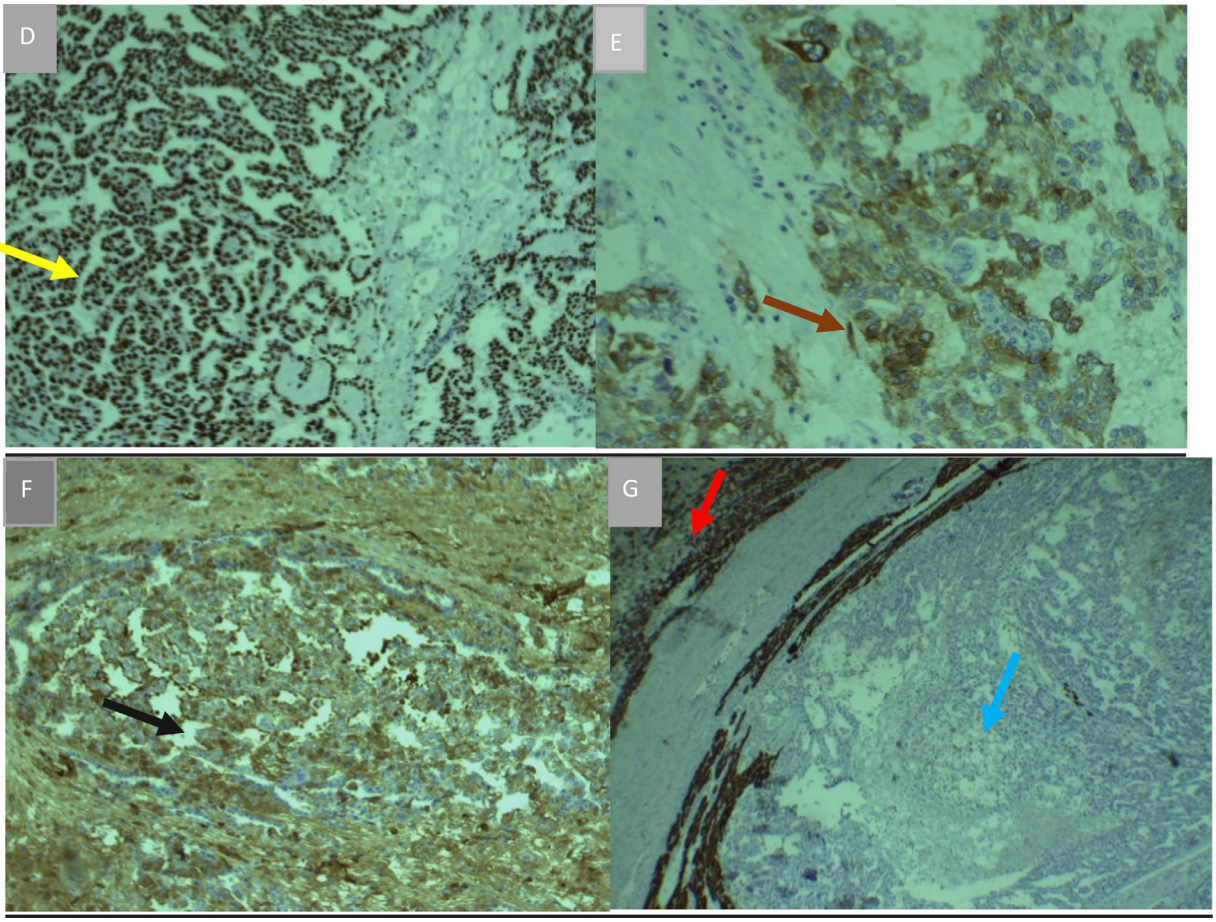

Fig. 5 – Immunohistochemistry shows that tumor cells are strongly positive for anti SALL 4 antibody (tumor cell labelling) (Yellow arrow) at x10 magnification (D), positive for anti-Glypican 3 antibody (Brown arrow), Cytoplasmic labelling of tumor cells, at x20 magnification (E), positive for anti-alpha-fetoprotein antibody (Black arrow), at x10 magnification (F), and negative for anti-hepatocyte antibody (G) (Blue arrow) at x4 magnification.
Note: Red arrow corresponds to normal hepatic parenchyma.

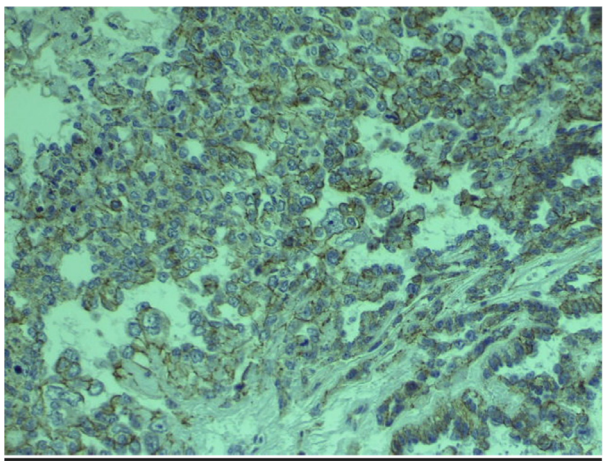

Fig. 6 – Anti-B-catenin antibody, membrane and non-nuclear labelling of tumor cells, at x20 magnification.

vary depending on the location and progression of the disease. When they present in the abdomen, ultrasound reveals homogeneous to heterogeneous abdominal or hepatic masses. Heterogeneous masses may contain cystic areas or hyperechoic calcifications with posterior shadowing, sometimes accompanied by peritoneal effusion. These ultrasound features can be very similar to those of hepatoblastoma [5]. Typical radiological features of yolk sac tumors of the liver are not well defined due to their rarity. On CT, they are generally described as large hepatic masses with heterogeneous enhancement, central necrosis, and in some cases, intratumoral calcifications [15].

Macroscopically, yolk sac tumors appear as soft, solid masses, beige to yellow or gray in color, often with cystic changes, necrosis, and hemorrhage [16]. Microscopically, they exhibit numerous histological types, with the microcystic reticular pattern being the most common, resembling a honeycomb [17]. Schiller-Duval bodies, pathognomonic of YST, are present in 2 to 3-quarters of cases and resemble a glomerulus with a fibrovascular core [18].

The current treatment for YSTs includes surgery and chemotherapy, often with cisplatin, etoposide, and bleomycin, which shows a good response in most patients [19,20]. Long-term survival rates remain uncertain due to the rarity of the tumor, but in young infants, it is generally chemosensitive with a good prognosis [21].

Conclusion

Yolk sac tumor is a malignant germ cell tumor that, despite its rarity, should be considered as a differential diagnosis for hepatic masses. Diagnosis can be achieved through imaging and histological studies, along with elevated alpha-fetoprotein levels.

Patient consent

Written informed consent was obtained from the legal authorized representative (LAR) of the patient for the publication of this case report.

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