Letter

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Primary hepatic angiosarcoma mistaken for a giant hemangioma

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SUMMARY: Primary hepatic angiosarcoma (PHA) is a rare hepatic mesenchymal tumor that accounts for 2% of all primary malignant liver tumors. It typically presents with nonspecific symptoms, is highly aggressive, and there are limited treatment options. Imaging characteristics of PHA overlap with that of hepatic hemangioma, a common benign hepatic lesion, creating a potential diagnostic pitfall. We present a case of PHA that mimicked hepatic hemangioma on imaging. We review the differentiating characteristics between these two hepatic tumors. PHAs demonstrate irregular/infiltrating margins, higher lesion multiplicity, higher risk of tumor rupture, and rapid growth, which are not typically seen with hepatic hemangiomas.

Keywords: primary hepatic angiosarcoma, hepatic hemangioma, magnetic resonance imaging

Primary hepatic angiosarcoma (PHA) is a rare tumor of mesenchymal origin that makes up 2% of all primary malignant liver tumors (*1*). These tumors are more common in men, with a ratio of 3-4:1 male to female. The median age at diagnosis is in the fifth or sixth decade of life (*1-4*). PHAs have been associated with environmental exposure to chemicals like thorotrast, polyvinyl chloride, and arsenic; however, most patients have no known chemical exposures (*5*).

Symptoms at presentation are typically nonspecific and can include abdominal pain, weight loss, weakness, and fatigue (*1,2*). Up to 27% of patients present with spontaneous tumor rupture and intraperitoneal hemorrhage (2). Many patients present with multiple liver masses and metastatic disease (*1,3*).

Computed tomography imaging characteristics of PHA as described in the literature are highly variable. These masses are generally hypoattenuating to liver parenchyma on both arterial and portal-venous phase. Some lesions are hyperattenuating on arterial phase imaging and isoattenuating on portal-venous phase imaging. Tumours can show fluid-fluid levels, which are postulated to be from intra-tumoral hemorrhage (*6*). Some PHA masses can show the characteristic peripheral arterial enhancement typically associated with hemangiomas (*2,6,7*).

On magnetic resonance imaging (MR), PHA has irregular areas of high signal intensity on T1-weighted imaging, suggesting hemorrhage (*8*). There can also be fluid-fluid levels on T2-weighted imaging, with heterogenous architecture and focal areas of high intensity with septum-like or rounded areas of low intensity on T2 sequences. There is often heterogenous enhancement on arterial and portal-venous phases with progressive delayed enhancement. There can also be high inter-lesional variability on diffusion weighted imaging (*5*).

Pathologically, PHAs demonstrate atypical large pleomorphic sinusoidal cells that infiltrate and spread along vascular channels, replacing normal endothelial cells. Polynuclear giant cells may also be seen. PHAs can invade portal or hepatic vein branches (*1*).

Unfortunately, treatment options are limited with median survival without treatment ranging from 5-7 months (*1,2,9*). Hepatic resection has been associated with increased overall survival but is confounded by the fact that patient eligibility for resection implies earlier stage disease (*9*). Liver transplant is not a viable option due to high tumor recurrence rate (*2*). PHAs are also radioresistant. Chemotherapy is typically palliative, without a standardized regimen.

A 70-year-old woman presented to the emergency department with right upper quadrant pain. She had no nausea, vomiting, diarrhea, or hematochezia. Initial laboratory studies including blood counts, electrolytes, renal function, bilirubin, and liver enzymes were normal. Abdominal ultrasound revealed a heterogenous, hypervascular, and predominantly solid mass in the right lobe of the liver measuring 9 × 6 cm. Other smaller echogenic lesions were seen scattered around the liver.

Further investigation with abdominal MR was

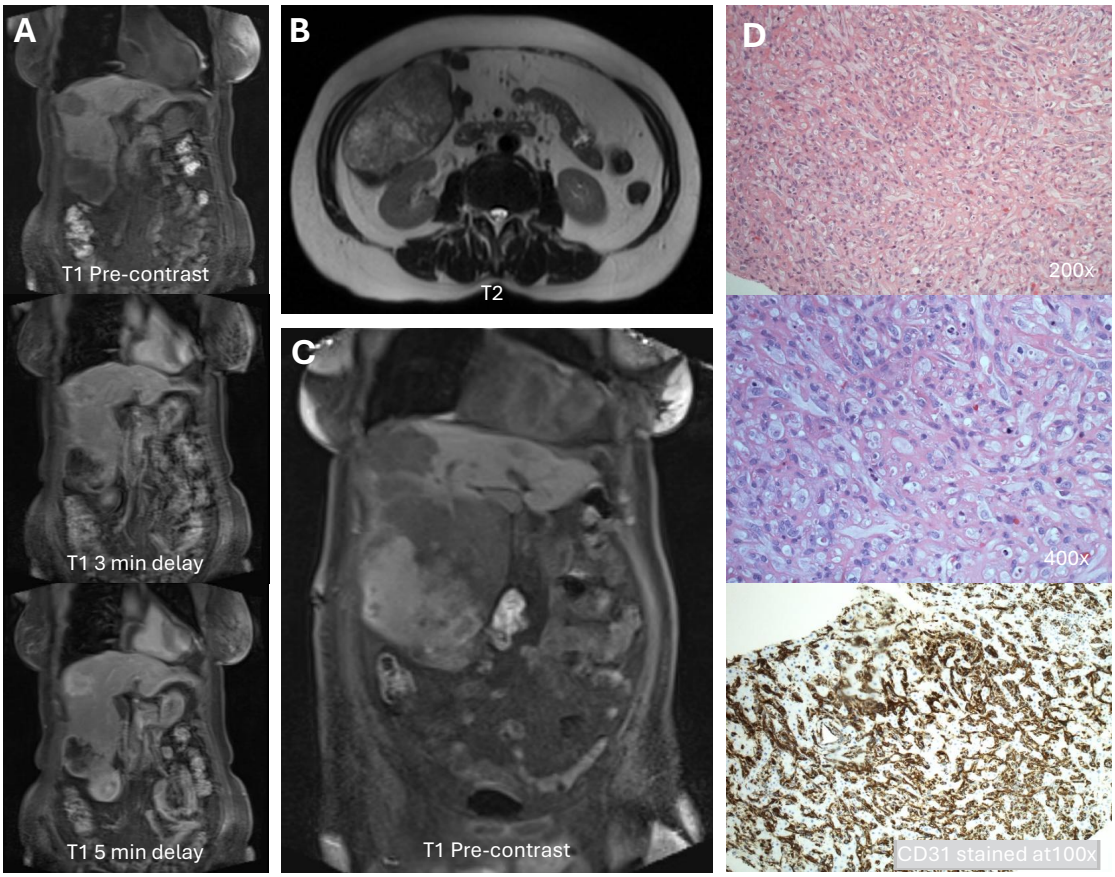

Figure 1. MR and pathological characteristics of hepatic angiosarcoma. (A) T1 weighted pre-gadolinium contrast and 3-minute and 5-minute delayed post-contrast coronal images of the liver. Hepatic masses are low signal on pre-contrast images. They demonstrate nodular gradual peripheral enhancement on post-contrast images. **(B)** T2 weighted axial image of the liver showing the heterogeneously hyperintense mass, not characteristic for hemangiomas. **(C)** T1 weighted pre-gadolinium contrast coronal image of the liver taken five months after images in "A" demonstrating marked enlargement of the hepatic masses. **(D)** The sections show proliferation of epithelioid malignant endothelial cells replacing the normal sinusoid lining endothelial cells. The tumor cells are large, have mostly wider spindle to oval contours with associated nuclear atypia. The tumor cells show positive strong expression of CD31 supporting their endothelial source.

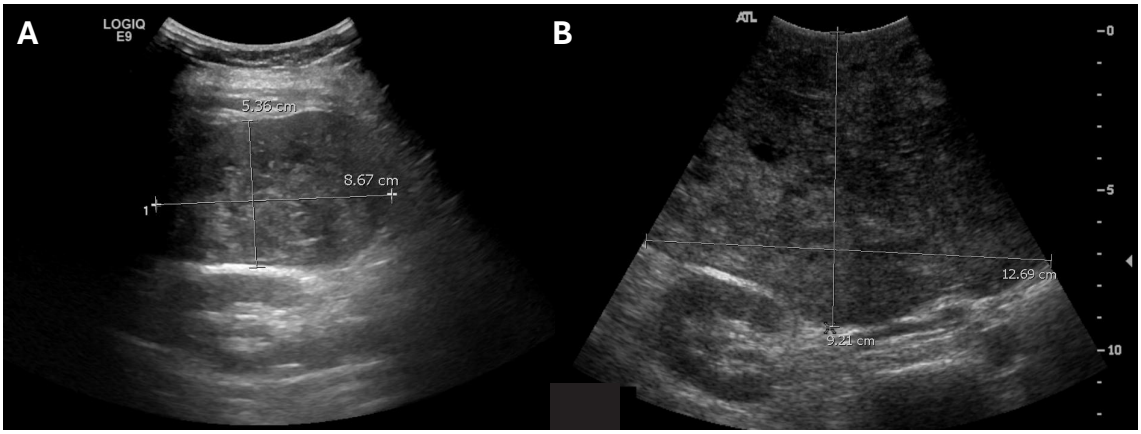

Figure 2. Initial (A) and intraoperative (B) ultrasound images of the large right hepatic mass. The mass is heterogenous and rapidly enlarged in the span of five months.

pursued. The MR demonstrated a heterogenous lesion measuring 7 × 7 × 8 cm with T1 hypo- and T2 hyperintense signal. Gadolinium enhanced images showed nodular peripheral enhancement with partial centripetal fill-in in the dominant mass – characteristic of a hemangioma, which was the initial diagnosis. The other smaller hepatic lesions initially seen on ultrasound demonstrated similar imaging characteristics (Figure 1, A and B).

Because the patient had persistent symptoms,

surgical resection of this lesion was attempted five months after initial presentation. In the operating room, the mass was much larger than described on preoperative imaging, confirmed with intraoperative ultrasound (Figure 2). There were also characteristics of malignancy, with evidence of omental and transverse colon invasion. The resection was aborted because the patient had a small left hepatic lobe and would not have been able to tolerate an extended right hepatic lobectomy. Intraoperative biopsies of the lesion were suspicious for hepatocellular carcinoma or angiosarcoma.

Final pathology analysis of the biopsies revealed proliferation of epithelioid malignant endothelial cells dilating the sinusoids and compressing hepatocytes. There was prominent nuclear atypia and mitotic activity. Immunohistochemistry is positive for CD31 and CD34 – endothelial markers, in keeping with angiosarcoma (Figure 1D).

Follow-up abdominal MR two days after the aborted surgery re-demonstrated a markedly enlarged tumor, now measuring 15 × 10 × 10 cm again with lobular peripheral enhancement with some centripetal fill in on delayed enhancement (Figure 1C). The other smaller hepatic lesions were also enlarged. There was new evidence of splenic and pulmonary metastases. The patient decided to move out of the country and therefore further follow-up was not possible.

The rarity of PHAs combined with initially similar imaging characteristics to hemangiomas, a more common hepatic lesion, creates a potential diagnostic pitfall of which radiologists need to be aware (*7*). In our case, the PHA did show peripheral nodular arterial enhancement with centripetal progression on delayed imaging and an enhancement intensity that followed blood pool, findings that overlap with hemangioma. However, further evaluation of the initial MR showed heterogeneous intermediate to high T2 signal intensity in the larger lesions with irregular/infiltrative margins, a feature not typical for hemangiomas, which show uniform high T2 signal intensity and smooth margins. Other characteristics that can differentiate PHA and hemangiomas include lesion multiplicity, tumor rupture, rapid growth making it important to compare to previous imaging studies, and metastases such as to the spleen, lungs and lymph nodes. If there is diagnostic uncertainty, short-term imaging follow-up, evaluation with F-18 fluorodeoxyglucose positron emission tomography, or biopsy should be considered.

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