Current Problems in Diagnostic Radiology 48 (2019) 626–628

Current Problems in Diagnostic Radiology

journal homepage: www.cpdrjournal.com

Imaging and Pathologic findings of Hepatic Small Vessel Hemangioma

Balasubramanya Rangaswamy, MD[a], Marta Minervini, MD[b], Mitchell Tublin, MD[a], Biatta Sholosh, MD[a], Anil K. Dasyam, MD[a,*]

[a] Department of Radiology University of Pittsburgh Medical Center, Pittsburgh, PA
[b] Department of Pathology, University of Pittsburgh Medical Center, Pittsburgh, PA

Hepatic small vessel hemangioma represents a distinct yet very rare pathologic entity of the liver. The entity has also been in the past referred to as adult capillary hemangioma of the liver and congenital noninvoluting hemangioma. Imaging findings are not definitive and biopsy or resection is ultimately necessary. Pathologically these represent vasoformative abnormalities with infiltrative margins that can potentially mimic hepatic angiosarcoma. Immunohistochemistry can help differentiate hepatic small vessel hemangioma from angiosarcoma. Given the infiltrative growth pattern and unknown outcomes, resection and or close follow up has been recommended. Recently the term hepatic small vessel neoplasm has been coined in view of the unknown outcomes and some concerning findings on molecular analysis. We report 2 cases of this unusual entity and describe its imaging, gross pathologic, histopathologic, and immunohistochemical features.

Case Report

Case 1: A 48-year-old woman recently diagnosed with hereditary hemochromatosis, H63D mutation. She was found to have an enhancing mass on screening magnetic resonance imaging (MRI) examination of the liver and was referred to our hepatobiliary surgical service. She did not have any previous history of liver disease, hepatitis, or cirrhosis. There was no scleral icterus or jaundice. Her abdomen was soft and nontender. Her liver function tests and alpha-fetoprotein levels were normal and a hepatitis panel was negative.

Case 2: A 67-year-old woman with mildly abnormal liver function tests. She was evaluated at an outside hospital with right upper quadrant ultrasound, which revealed a relatively hypoechoic right lobe mass and background liver steatosis. She was referred to our hepatobiliary surgical service. She denied abdominal pain, nausea, or vomiting. On physical examination, she did not have scleral icterus; her abdomen was soft, nontender, and nondistended. Her alpha-fetoprotein was minimally increased at 9 ng/mL while the hepatitis panel was negative.

Imaging and Pathologic Findings

Imaging Findings

Our first patient underwent multiphase computed tomography (CT) examination (Fig 1) while the second patient underwent Gadoxetate disodium (Eovist; Bayer Healthcare, Wayne, NJ) enhanced MRI (Fig 2). The postcontrast imaging findings were similar for both modalities. The late arterial phase showed a mass with thick, continuous peripheral enhancement with central unenhanced areas. Portal venous phase showed progressive centripetal enhancement and equilibrium phase showed complete filling of the central areas of the mass. The enhancement of the mass paralleled aortic blood pool on all phases. The robust, slightly irregular, peripheral enhancement with central nonenhancement on the late arterial phase had an appearance of a "sunflower." With experience from the first patient's imaging, we prospectively suggested the diagnosis in the second patient.

Pathologic Findings

At pathology these were nodular masses showing small anastomosing vascular channels that were unencapsulated and relatively circumscribed but with areas of microinvasion into the adjacent liver parenchyma (Fig 3). The vascular spaces contained variable numbers of erythrocytes with occasional extramedullary hematopoiesis. Cells lining the channels formed a delicate meshwork and contained little to no intervening fibrous stroma. Nuclei were round to oval with little variation in size and with an overall bland appearance resembling endothelial cells. No areas of necrosis or mitotic activity were seen. The immunophenotype supported endothelial origin, with uptake of CD34 (Fig 4) and CD31 and no evidence of keratins. Ki67 stain (Fig 5) showed no significant cell cycle activity, with positivity limited to intravascular hematopoietic cells.

Discussion

A distinct yet very rare pathologic entity of the liver composed of small vessels without diagnostic features of cavernous hemangioma or hepatic angiosarcoma has been designated as hepatic small vessel

*Reprint requests: Anil K. Dasyam, MD, Department of Radiology, University of Pittsburgh Medical Center, Radiology Suite 200 East Wing E2051B, 200 Lothrop St, Pittsburgh, PA 15213.
E-mail address: anil.dasyam@gmail.com (A.K. Dasyam).

https://doi.org/10.1067/j.cpradiol.2018.02.006
0363-0188/

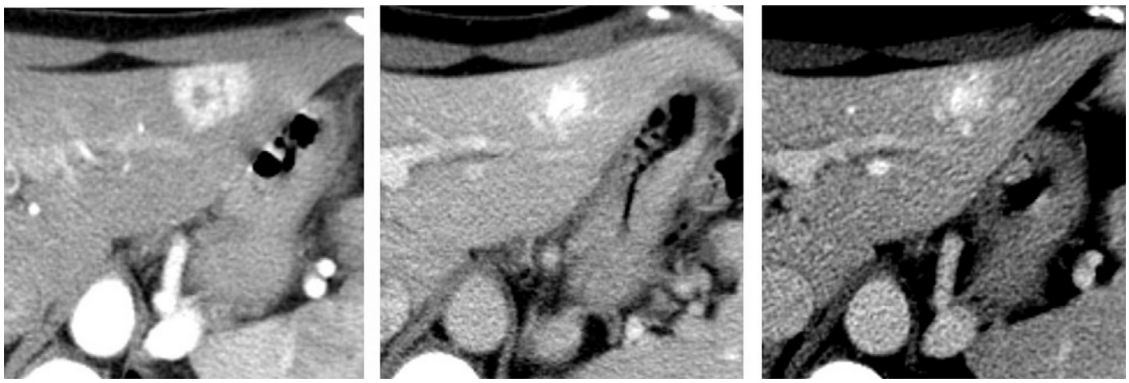

FIG 1. Case 1. Axial postcontrast dynamic phase CT imaging obtained in late arterial, portal venous, and equilibrium phase shows lateral segment mass showing early thick, peripheral and continuous enhancement with progressive centripetal enhancement matching blood pool.

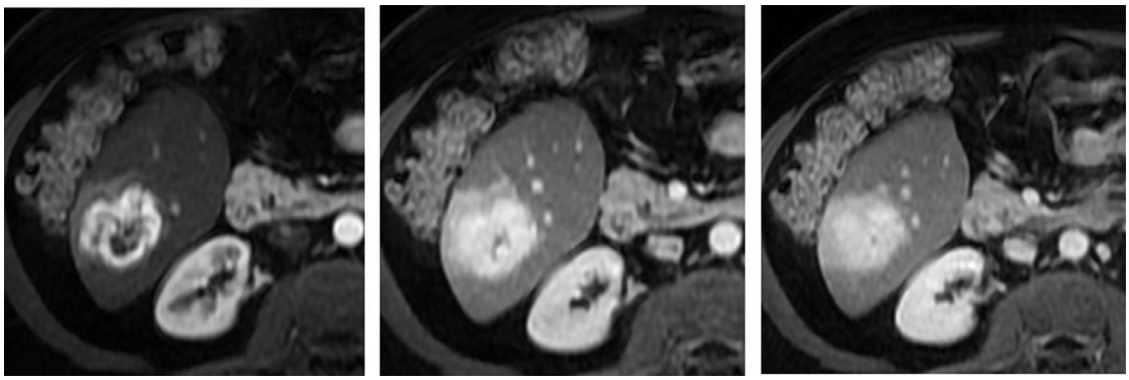

FIG 2. Case 2. Axial postcontrast dynamic MRI LAVA (liver volumetric acquisition) sequences obtained in late arterial, portal venous, and equilibrium phase shows segment VI mass showing early thick, peripheral and continuous enhancement with progressive centripetal enhancement matching blood pool.

hemangioma. It has been variably known as capillary hemangioma and congenital noninvoluting hemangioma of the liver.

A recent study by Gill et al[1] investigated the clinical, histologic, and molecular characteristics of this rare hepatic vascular abnormality in 17 patients. The true incidence of this abnormality is unknown.

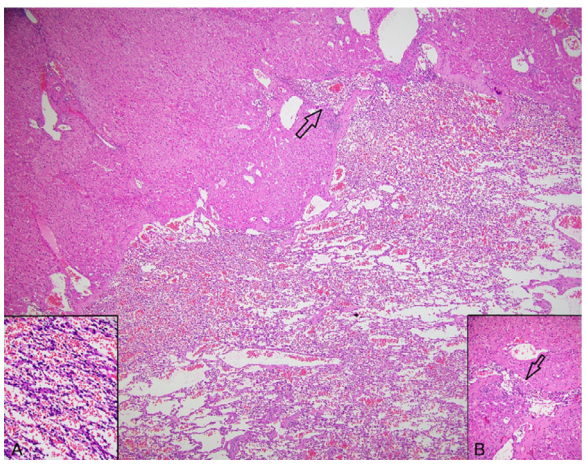

FIG 3. Small vessel hemangioma. The lesion consists of a mass of small to variably sized anastomosing vascular spaces with a thin-walled capillary-type lining and little to no intervening fibrous stroma. Some red cell aggregates can be seen in the vascular spaces. The arrow highlights a focus of microinvasion into the adjacent hepatic parenchyma, a characteristic of these unencapsulated lesions (H&E ×4). Inset A: the relatively uniform appearance of the lining endothelial cells and delicate nature of the thin-walled vasculature is seen (H&E ×40). Inset B: a separate focus of microinfiltration into the adjacent hepatic parenchyma is seen. A small island of hepatocytes (arrow) is surrounded by a serpiginous tongue of extending hemangiomas cells (H&E ×20). (Color version of figure is available online.)

Our 2 cases are in concordance with Gill et al series with respect to gross description, morphologic features, and immunohistochemical (IHC) results. Grossly this is a well-marginated brown hemorrhagic mass. At microscopy, it is a vascular lesion composed of thin walled vascular spaces lined by flat to plump-ovoid (hobnail-like) endothelial cells without papillary growth, hyperchromasia or nuclear pleomorphism. At immunohistochemistry, these lesions demonstrate uniform CD34 and CD31 positivity highlighting vascular origin. Ki-67 staining shows low frequency uptake.

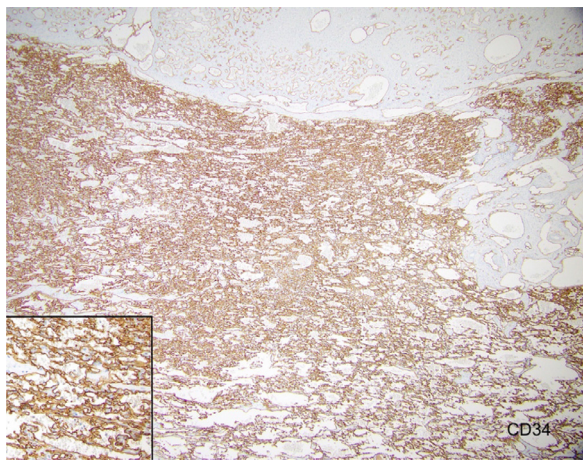

FIG 4. Small vessel hemangiomas—CD34 stain. This vascular marker highlights the architecture of the tumor in the lower two-thirds of the photomicrograph. Hepatic parenchyma is seen primarily in the upper portion of the photo. The irregularity of the tumor border can be appreciated in the upper right hand area. CD34 immunoperoxidase (×4). Inset: a higher power view shows the interdigitating nature of the tumor vasculature (×20). (Color version of figure is available online.)

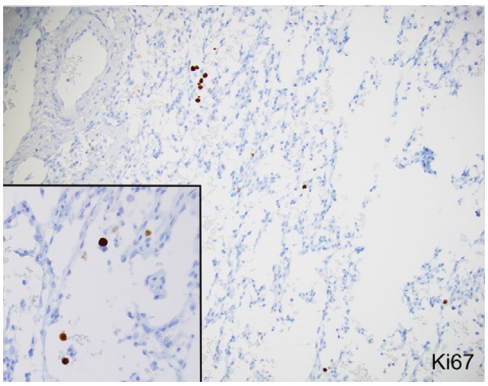

FIG 5. Small vessel hemangioma—Ki67 stain. Immunolabeling with the cell cycle marker Ki67 shows no uptake in the endothelial component of the lesion. The only positive uptake seen is in the occasional intraluminal cells representing extramedullary hematopoiesis. Gill et al[1] found a proliferative index of 10% or higher in the endothelial cells to be a reliable discriminator between small vessel hemangiomas and angiosarcoma (Ki67 immunoperoxidase ×20). Inset: high power photomicrograph demonstrating Ki67 positivity in isolated intraluminal (hematopoietic) cells with no uptake in lining endothelial lesional cells (×40). (Color version of figure is available online.)

There is a paucity of literature regarding hepatic small vessel hemangioma, especially in imaging journals. One recent case report described imaging features of a pathologically and IHC proven small vessel hemangioma in a cirrhotic patient.[2] A case report in pathology literature describes adult capillary hemangioma of the liver describing similar gross pathologic, microscopic, IHC, and radiologic features.[3] Another earlier case report describing adult capillary hemangioma of the liver potentially alludes to the same entity, albeit without IHC testing.[4] However, the small and variably sized vascular channels are not identical to the more typical true lobular capillary hemangiomas seen elsewhere in the skin and oral mucosa, as observed by Scialpi et al.[5]

Distinctive imaging features similar to what has been described in these case reports were noted in our cases as well. These include early thick peripheral continuous enhancement with persistent enhancement equaling or higher than aortic blood pool on portal venous and late phase imaging. The appearance at arterial phase imaging somewhat resembles a “sunflower” with thick slightly irregular intense peripheral enhancement with central regions of nonenhancement. Although not diagnostic, these features can point the radiologist toward the vascular nature of this abnormality.

The Gill R et al[1] study assessed the molecular nature of this abnormality. A small subset of patients was tested and 2 out of 3 cases demonstrated activating hotspot GNAQ mutation at 19% and 18% mutant allele frequency. This mutation has been associated with uveal melanoma and blue nevi. One of these cases also demonstrated hotspot mutation in *PIK3CA* at 20% mutant allele frequency. This mutation has been implicated in breast cancer. Known mutations associated with hepatic angiosarcoma were not demonstrated in the small vessel hemangioma samples. IHC analysis with Ki-67, p53, and c-Myc were utilized in this study to distinguish angiosarcoma and small vessel hemangioma. Based on these molecular findings, infiltrative margins at microscopy and lack of long-term follow up; the authors concluded that the malignant potential was uncertain and recommended complete resection and close clinical follow up. The authors also coined the term small vessel hepatic neoplasm in view of the aforementioned concerning findings.

Our cases and the small number of reported cases in literature follow similar imaging pattern on contrast-enhanced CT and MR imaging. Larger cases series demonstrating concordant imaging features along with histopathologic, IHC, and molecular correlation and long-term follow up would ultimately be necessary to determine the growth potential of this rare vascular abnormality.

In conclusion, hepatic small vessel hemangioma is a rare hepatic vascular abnormality that shows a distinctive yet not entirely specific postcontrast CT/MR imaging appearance. Nonetheless, awareness of its enhancement features should prevent an erroneous diagnosis of a benign capillary or atypical hemangioma and should prompt either biopsy or resection.

Acknowledgment

We are very thankful to Dr Michael A. Nalesnik, MD (Professor, Department of Pathology, University of Pittsburgh Medical Center) for his valuable guidance with pathology aspects of the manuscript.

References

1. Gill R, Buelow B, Mather C, et al. Hepatic small vessel neoplasm, a rare infiltrative vascular neoplasm of uncertain malignant potential. Hum Pathol 2016;54:143–51.
2. Lewis S, Aljarallah B, Trivedi A, et al. Magnetic resonance imaging of a small vessel hepatic hemangioma in a cirrhotic patient with histopathologic correlation. Clin Imaging 2015;39(4):7026.
3. Jhuang J, Lin L, Hsieh M. Adult capillary hemangioma of the liver: Case report and literature review. Kaohsiung J Med Sci 2011;27:344–7.
4. Noda T, Sasaki Y, Yamada T, et al. Adult capillary hemangioma of the liver: Report of a case. Surg Today 2005;35(9):796–9.
5. Scialpi M, Piscioli I, Pusiol T, et al. Does hepatic adult capillary hemangiomas exist? Surg Today 2010;40:92.