BENIGN LIVER TUMORS AND IMAGING CHARACTERISTICS

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Abstract: This paper concisely reviews the benign hepatic tumors most commonly encountered by clinicians. It includes the epidemiology, pathology, and imaging characteristics of hepatic hemangiomas, focal nodular hyperplasia (FNH), and hepatic adenomas (HAs).

Background: Focal hepatic lesions are frequently encountered due to their wide variety of causes and incidental discovery on cross-sectional abdominal imaging. In this paper, we discuss the three most common benign hepatic tumors, namely hepatic hemangiomas, focal nodular hyperplasia (FNH), and hepatic adenomas (HAs). Along with a pertinent past medical history and physical examination, characteristic radiologic findings can often enable clinicians to noninvasively confirm these benign tumors and prevent unnecessary further workups.

Hepatic hemangioma

Hepatic hemangiomas are the most common benign tumors of the liver. In a large retrospective cross-sectional study consisting of 83,181 patients who had undergone abdominal CT and/or MRI scans, the prevalence of hepatic hemangiomas was found to be 2.5% [1]. Patients are usually middle-aged females, who are also more likely to present with symptomatic lesions.

Although often simply described as dilated vascular malformations, hepatic hemangiomas can demonstrate growth when exposed to increasing levels of estrogen and progesterone. There may be an association between the number of hepatic hemangiomas and lifelong exposure to estrogen [2]. They are typically solitary, range in size from several mm to more than 5 cm, and are found anywhere within the liver. Symptoms arise from distension of Glisson's capsule or mass effect by lesions in the left hepatic lobe. Vascular spaces within the tumor may contain thrombi and subsequently develop calcifications.

Imaging Characteristics

Although tumor calcifications can be demonstrated on plain abdominal radiographs, they are not specific for hepatic hemangiomas and therefore warrant additional imaging. Ultrasound may show a well-demarcated, homogeneous, and hyperechoic lesion with some variation. Similarly, hepatic hemangiomas appear as well-demarcated, homogeneous masses on both non-contrast-enhanced CT and MRI scans. Contrasted studies depict discontinuous peripheral nodular enhancement and slow centripetal filling on delayed images.

Focal nodular hyperplasia

FNH is the second most common benign tumor of the liver. The prevalence of FNH in the general population has been estimated to be approximately 3% in a necropsy study series [4]. Similar to hepatic hemangiomas, FNH has a tendency to occur in adult females, albeit asymptomatically.

Imaging Characteristics

FNH has variable echogenicity on ultrasound and infrequently demonstrates a stellate pattern in approximately 20% of patients [6]. CT scans of FNH feature hypodense lesions that display homogeneous arterial phase enhancement . Since many patients undergoing evaluation for FNH are reproductive-aged females, MRI is sometimes preferred over CT to avoid radiation exposure. Hepatobiliary MRI contrast agents, such as Eovist (Bayer AG, Leverkusen, Germany), reliably distinguish between FNH and other focal hepatic lesions since the former retain contrast in the hepatobiliary phase

Hepatic adenoma

HAs are the third most common benign tumors of the liver. Of the three benign hepatic tumors discussed in this paper, HAs have the poorest estimations of prevalence in the general population. The incidence of HAs in nonusers of oral contraceptives (OCs) is approximately one per million and increases nearly fourfold in female users of OCs [8]. The association of HAs with OCs is particularly strong in those who have been taking OCs for longer than 24 months. In addition to those taking long-term oral contraceptives, patients taking exogenous anabolic androgenic steroids or those with glycogen storage disease appear to have a relatively greater risk of developing HAs

Imaging Characteristics

On CT scan, HAs appear as well-demarcated, isointense lesions with peripheral enhancement (Figure (Figure5).5). T1-weighted MRI shows hyperintense lesions due to hepatocellular steatosis and glycogen. HAs undergo early arterial phase enhancement and may take up Eovist during the portal venous phase, but they will not characteristically retain contrast during the hepatobiliary phase, which distinguishes HAs from FNH

Conclusions: Hepatic hemangiomas, FNH, and HAs are the three most common benign hepatic tumors. In practice, they are differentiated from each other based on the patient's demographics, history of oral contraceptive or steroid use, and comorbidities such as glycogen storage disease and hepatic adenomatosis. Additionally, their characteristic radiologic findings allow clinicians to noninvasively diagnose and manage uncomplicated patients who possess no risk of malignancy. Patients with risk factors for HCC may require management as suggested in the referenced guidelines.