15. Ohata K, Hamasaki K, Toriyama K, et al. Hepatic steatosis is a risk factor for hepatocellular carcinoma in patients with chronic hepatitis C virus infection. Cancer, 2003; 97: 3036-3043.

16. Morgan TR, Mandayam S, Jamal MM. Alcohol and hepatocellular carcinoma. Gastroenterology, 2004; 127: S87-96.

17. Marrero JA, Fontana RJ, Fu S, et al. Alcohol, tobacco and obesity are synergistic risk factors for hepatocellular carcinoma. J Hepatol, 2005; 42: 218-224.

18. El-Serag HB, Tran T, Everhart JE. Diabetes increases the risk of chronic liver disease and hepatocellular carcinoma. Gastroenterology, 2004; 126: 460-468.

19. Caldwell SH, Crespo DM, Kang HS, et al. Obesity and hepatocellular carcinoma. Gastroenterology, 2004; 127: S97-103.

20. Yano Y, Yamashita F, Sumie S, et al. Clinical features of hepatocellular carcinoma seronegative for both HBsAg and anti-HCV antibody but positive for anti-HBc antibody in Japan. Am J Gastroenterol, 2002; 97: 156-161.

21. Pollicino T, Squadrito G, Cerenzia G, et al. Hepatitis B virus maintains its pro-oncogenic properties in the case of occult HBV infection. Gastroenterology, 2004; 126: 102-110.

22. Gelatti U, Covolo L, Franceschini M, et al. Coffee consumption reduces the risk of hepatocellular carcinoma independently of its aetiology: a case-control study. J Hepatol, 2005; 42: 528-534.

23. Nakamoto Y, Guidotti L, Kuhlen C, et al. Immune pathogenesis of hepatocellular carcinoma. J Exp Med, 1998; 188: 341-350.

24. Nakamoto Y, Kaneko S, Fan H, et al. Prevention of hepatocellular carcinoma development associated with chronic hepatitis by anti-fas ligand antibody therapy. J Exp Med, 2002; 196: 1105-1111.

25. Pikarsky E, Porat RM, Stein I, et al. NF-kappaB functions as a tumour promoter in inflammation-associated cancer. Nature, 2004; 431: 461-466.

26. Balkwill F, Coussens LM. Cancer: an inflammatory link. Nature, 2004; 431: 405-406.

27. Chen CJ, Chen DS. Interaction of hepatitis B virus, chemical carcinogen, and genetic susceptibility: multistage hepatocarcinogenesis with multifactorial etiology. Hepatology, 2002; 36: 1046-1049.

28. Chang MH, Chen CJ, Lai MS, et al. Universal hepatitis B vaccination in Taiwan and the incidence of hepatocellular carcinoma in children. Taiwan Childhood Hepatoma Study Group [see comments]. N Engl J Med, 1997; 336: 1855-1859.

Hepatocellular carcinoma in cirrhotic liver CT an MRI findings

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For all practical purposes, you should consider cirrhosis to be a pre-malignant condition. This means that a patient with cirrhosis is at risk for developing hepatocellular carcinoma (HCC). The greater or lesser risk depends on the etiology of the cirrhosis. There are a lot of complications of cirrhosis, but the most dreaded one is hepatocellular carcinoma. I am going to do a brief review of cirrhosis and then I will talk about the HCC that is the focus of this review.

Imaging the cirrhotic liver is one of the more difficult tasks in radiology. Imaging plays a huge role, regardless of the cause of the cirrhosis and the hepatocellular carcinoma. The first thing that I look for are morphologic changes. Look for nodularity of the liver, signal intensity heterogeneity, and central atrophy. Central atrophy refers to the fact that in many cases of cirrhosis, the anterior segment of the right lobe and the medial segment of the left lobe shrink. This may be accompanied be hypertrophy of the

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caudate lobe and/or the lateral segment of the left lobe. This is reflected in measurements of the caudate right lobe. This measurement will increase, in patients with cirrhosis. Although it is a diffuse process and usually you do get central atrophy, about 25% of patients with end stage liver disease are going to have livers that look normal by size and contour. There may be signal intensity changes that you might note. About one-third of these patients with cirrhosis have diffusely atrophied liver (1,2).

The nomenclature of cirrhotic nodules has been one of the problems over the years fortunately now it is quite simple; there are regenerative nodules (siderotic or no siderotic), dysplastic nodules (high or low grade) and hepatocellular carcinoma if it is small, under 2 cm, it is called small HCC and if it is larger it is called overt HCC. (3) One of the pathologic factors of this spectrum that affects imaging appearances is the vascular supply to the nodule. Through this progression, one sees loss of visualization of portal tracts within the nodules and development of new arterial vessels, termed nontriadal arteries, since typical distal hepatic arterial flow through the portal triad is not typically seen past the lobular level. These nontriadal arteries become the dominant blood supply in large dysplastic nodules and small HCC; this is the main factor for the diagnostic by imaging of HCC (4)

Can imaging be used to differentiate between benign and malignant nodules in the cirrhotic liver? It is the clue.

I am going to talk about magnetic resonance imaging and computed tomography and its possibilities to answer the question.

Despite being present pathologically in all cirrhotic livers, regenerative cirrhotic nodules are seen in a minority of patients at CT and in approximately half of patients at MR imaging, with predominantly siderotic nodules being visualized with both techniques (5). Micronodular changes are rarely seen at CT or MR imaging, macronodular changes, especially large ones (8-10 mm), are readily identifiable because they distort the liver margin and, if they are siderotic, appear at unenhanced CT as predominantly high-attenuation nodules throughout the liver. These nodules typically do not enhance at arterial-phase contrast-enhanced, and during portal-venous-phase, they enhance homogeneously and to the same degree that surrounding fibrotic tissue does; thus, they are indistinguishable. MR imaging, with its increased susceptibility to the effects of iron within regenerative nodules, is better able to show siderotic nodules. These nodules are best identified at T2-weighted and gradient-echo imaging (6,7).

Dysplastic nodules contain cellular atypia without frank malignant changes. MR imaging of large dysplastic nodules may show a distinct pattern of homogeneous high signal intensity on T1-weighted images and very low signal intensity on T2-weighted images (8). Dysplastic nodules may show, along with cellular atypia, pathologically new nontriadal arterial flow to nodules, which characterizes them as distinct from regenerative nodules (3). This increased arterial supply is also present in hepatocellular carcinoma and, as we shall see, is a critical aid to the detection of this carcinoma in patients with cirrhosis. Dysplastic nodules typically do not show vivid arterial-phase enhancement, but occasionally, lesions can become enhanced and simulate hepatocellular carcinoma (9).

Frank hepatocellular carcinoma has a variable appearance at CT and MR imaging. Most small hepatocellular carcinoma nodules are vascular, become enhanced at CT and MR imaging, are optimized with arterial-phase imaging (10), and show a washout of tumoral contrast material during the portal-venous phase. A minority are hypovascular and best seen at portal-venous-phase or equilibrium-phase imaging. The signal intensity of hepatocellular carcinoma varies on both T1- and T2-weighted images among hypo-, iso-and hyperintensity in comparison with liver parenchyma (11).

How does MRI compare to CT? The recommendation of whether to use CT or MR, all depends on personal preference. It depends on what you are most comfortable with and what you do best, I think that the best way to detect HCC is the MRI, because we can see both things, that are important to differentiate the HCC of the others nodules, and are the vascularity and the tisular characterization.

REFERENCES

1. Dodd GD, Baron RL, Oliver JH, Federle MP. Spectrum of imaging findings of the liver in end-stage cirrhosis: part II, focal abnormalities. AJR Am J Roentgenol 1999; 173:1185-1192.

2. Dodd GD, Baron RL, Oliver JH, Federle MP. Spectrum of imaging findings of the liver in end-stage cirrhosis: part I, Gross morphology and diffuse abnormalities. AJR Am J Roentgenol 1999; 173:1185-1192

3. International Working Party. Terminology of nodular hepatocellular lesions. Hepatology 1995; 22:983-993.

4. Peterson MS, Baron RL, Marsh JW, Oliver JH, Confer SR, Hunt LE. Pretransplantation surveillance for possible hepatocellular carcinoma in patients with cirrhosis: epidemiology and CT-based tumor detection rate in 430 cases with surgical pathologic correlation. Radiology 2000; 217:743-749.

5. Murakami T, Nakamura H, Hori S, et al. CT and MRI of siderotic regenerating nodules in hepatic cirrhosis. J Comput Assist Tomogr 1992; 16:578-582

6. Krinsky GA, Lee VS, Nguyen MT, et al. Siderotic nodules in the cirrhotic liver at MR imaging with explant correlation: no increased frequency of dysplastic nodules and hepatocellular carcinoma. Radiology 2001; 218:47-53.

7. Koslow SA, Davis PL, DeMarino GB, Peel RL, Baron RL, Van Thiel DH. Hyperintense cirrhotic nodules on MRI. Gastrointest Radiol 1991; 16:339-341.

8. Mitchell DG. Focal manifestations of diffuse liver disease at MR imaging. Radiology 1992; 185:1-11

9. Krinsky GA, Theise ND, Rofsky NM, Mizrachi H, Tepperman LW, Weinreb JC. Dysplastic nodules in cirrhotic liver: arterial phase enhancement at CT and MR imaging-a case report. Radiology 1998; 209:461-464

10. Baron RL, Oliver JH, Dodd GD, Nalesnik M, Holbert BL, Carr B. Hepatocellular carcinoma: evaluation with biphasic, contrast-enhanced, helical CT. Radiology 1996; 199:505-511

11. Earls JP, Theise ND, Weinreb JC, et al. Dysplastic nodules and hepatocellular correlation. Radiology 1996; 201:207-214

Pathology of liver tumors

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Liver tumors can be clasifficated according to the origin cell in epithelial and no epithelial. The epithelial tumors source of the duct or the hepatic cell. It is malignant an benign. The principal epithelial tumor malignant are hepatocelullar carcinoma, hepatoblastoma and cholangiocarcinoma. The hepatoblastoma is the most common malignant epithelial tumor of the liver, in the first two years of life. Malignant Primary tumors of the liver are relatively rare especially in patients without underlying liver disease.

The most frequent benign epithelial tumors are focal nodular hyperplasia, liver cell adenoma and bile duct adenoma. The adenoma is much most important benign tumor of the liver; and its association with synthetic oral contraceptive and anabolic steroids is well established. Focal nodular hyperplasia occurs in all ages and sexes. It usually solitary, around 5 cms in size and forms a well-circumscribed fibrous globular mass. A central stellate scar is frequently seen in the imaginologic studies.

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