



The orange-cross section appearance in focal nodular hyperplasia

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Focal nodular hyperplasia (FNH) is the second most common benign hepatic neoplasm [1–3]. It is believed to represent a hyperplastic regenerative response to vascular injury or congenital vascular malformations. FNH is a focal hepatic tumor formed by the proliferation of non-neoplastic hepatocytes that are abnormally arranged in a nodular aspect. The use of gadoxetic acid as a hepatocellular MR contrast agent facilitates the differentiation between FNH and other liver lesions [4] allowing dynamic images of the arterial and portal phase, followed by the hepatobiliary phase. The fibrous component, typically a stellate central scar with arterial vessels within [2], and the absence of portal vessels are responsible for the hypervascularity and intense arterial enhancement of the tumor in the dynamic images, except for its central scar, which presents delayed enhancement due to the fibrous component [3]. The FNH bile ducts (pre-existent or abnormal bile ducts) are responsible for the excretion of gadoxetic acid in the hepatobiliary phase MRI images with various enhancement patterns, unlike other focal hepatic lesions, such as metastases, adenoma, or hepatocellular carcinoma, which usually do not show enhancement during the hepatobiliary phase [2, 4].

The presence of central scar is mandatory in typical FNH greater than 3 cm and may be present if the lesion is smaller than 3 cm. It may present as a scar tissue, but typically presents as a central scar and radiating fibrous septa that resemble a sliced orange (Fig. 1) that demonstrates enhancement in the delayed phases of the dynamic images [1, 3, 4]. MRI (Fig. 2) has a higher sensitivity (70%) and specificity (98%) for the detection of FNH than

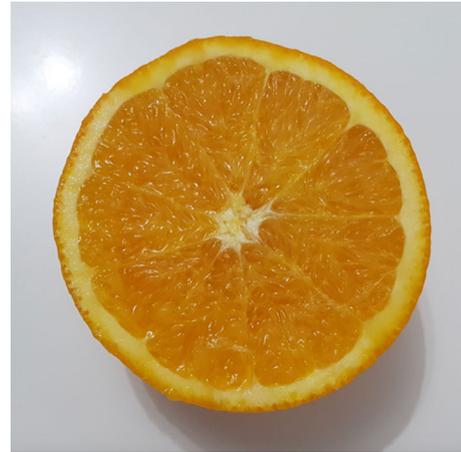


Fig. 1 A cross section of an orange shows a striking resemblance to the imaging features of FNH. The segments in radial conformation of the orange parallel the appearance of the central scar and radiating fibrous septa of typical FNH

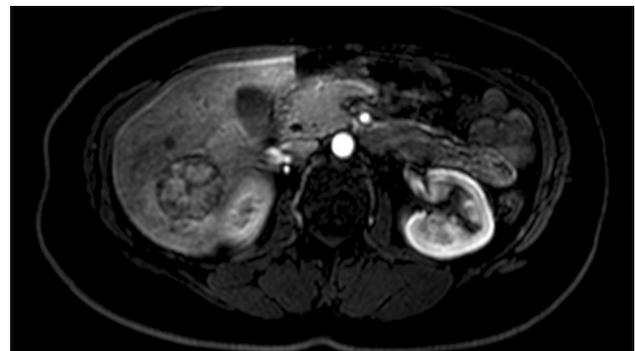


Fig. 2 Postcontrast T1-weighted magnetic resonance image in axial view with fat saturation in arterial phase shows a typical FNH. Note the fibrous septa with radial configuration and the central scar, which closely resemble the cross section of an orange

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the ultrasound and CT [1]. Although the central scar may be a diagnostic clue to FNH, isolated it is not a specific finding as it can be found in other hepatic lesions such as hemangiomas and fibrolamellar hepatocellular carcinoma [1, 4].

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Compliance with ethical standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

References

1. Hussain SM, Terkivatan T, Zondervan PE et al (2004) Focal Nodular Hyperplasia: Findings at State-of-the-Art MR Imaging, US, CT, and Pathologic Analysis. *RadioGraphics* 24:3–17
2. Buetow PC, Pantongrag-Brown L, Buck JL, Ros PR, Goodman ZD (1996) Focal nodular hyperplasia of the liver: radiologic–pathologic correlation. *RadioGraphics* 16:369–388
3. Mortelé KJ, Praet M, Van Vlierberghe H, Kunnen M, Ros PR (2000) CT and MR Imaging Findings in Focal Nodular Hyperplasia of the Liver. *Am J Roentgenol* 175:687–692
4. Van Kessel CS, De Boer E, Ten Kate FJW, Brosens LAA, Veldhuis WB, Van Leeuwen MS (2013) Focal nodular hyperplasia: Hepatobiliary enhancement patterns on gadoxetic-acid contrast-enhanced MRI. *Abdom Imaging* 38:490–501