

Symptomatic focal nodular hyperplasia during pregnancy: A case report

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Abstract

A 30-year-old woman presented with hepatomegaly and an audible hepatic bruit at 24 weeks gestation. Non-contrast MRI demonstrated an exophytic 12.6 x 7.8 x 12.8 cm mass arising from the right lobe of the liver with a central scar, suggestive of focal nodular hyperplasia (FNH). Conservative management included monthly abdominal ultrasound examinations until the time of delivery, to assess growth of the mass and monitor for risk of rupture. Seven weeks post partum the patient experienced severe right upper quadrant pain. A CT angiogram of the liver demonstrated a stable mass with no evidence of bleed or rupture and multiple hypervascular masses throughout the liver. Surgical resection of the dominant lesion was performed. Histological examination of the lesion confirmed FNH. The patient is now 22 months post surgery with radiographic evidence of stable multifocal FNH.

Key words: Focal nodular hyperplasia, liver, pregnancy

Introduction

A 30 yr old white female, gravida 4 para 3, was evaluated for the presence of an abdominal mass. Routine gynecological ultrasound at 24 weeks gestation revealed significant hepatomegaly. Subsequent magnetic resonance imaging (MRI) demonstrated an exophytic vascular mass measuring 12.6 x 7.8 x 12.8 cm arising from the right lobe of the liver and extending caudally. T1 weight-

ed images on MRI demonstrated a central linear hypointensity, raising the possibility of a central scar and the diagnosis of FNH.

The patient had a history of Osler-Weber-Rendu syndrome. Her medications at the time of presentation included prenatal vitamins and iron. Examination revealed a healthy appearing female with no peripheral stigmata of chronic liver disease. Abdominal examination was notable for a gravid uterus consistent with an early third trimester of pregnancy. There was palpable hepatomegaly with the liver measuring 18 cm. A loud bruit was audible over the liver surface. Laboratory data revealed normal liver biochemistries and normal hepatic synthetic function. A viral screen was negative for hepatitic viruses. Alfa fetoprotein and Ca 19-9 were within normal limits.

The patient had increasing right upper quadrant discomfort as the pregnancy progressed. Monthly abdominal ultrasound exams showed the mass abutting the wall of the gravid uterus but without change in size. The patient delivered a healthy baby boy at term via normal vaginal delivery.

Six weeks post partum a hepatic CT angiogram was performed to assess the size and vascularity of the mass (*Figure 1*). It demonstrated innumerable arterial enhancing lesions in all segments of the liver. The dominant lesion was again visualized arising from the right lobe and was unchanged in size. There were numerous arterial feeding vessels visualized around the rim of the lesion with the dominant supply from the left hepatic artery. The pattern of involvement of the liver was suggestive of hepatic adenomatosis (*Figure 2*). Five days later she presented with severe right upper quadrant pain. A repeat CT angiogram remained unchanged with no evidence of hemorrhage. The patient proceeded to laparotomy.

At laparotomy a 16 x 18 cm mass was seen arising from the medial segment of the left lobe (segment 4B), contrary to prior imaging studies. There was a second pedunculated mass (3.5 x 3 cm) also arising from the left lobe (segment 3), in addition to multiple other lesions measuring between 2-5 cm scattered throughout the liver. Frozen section studies on wedge resections of the masses in segments 3 and 4B and were consistent with FNH. A segmental hepatectomy of segments 3 and 4B was performed in addition to a cholecystectomy. The final histology report was consistent with FNH (*Figure 3*). The pa-

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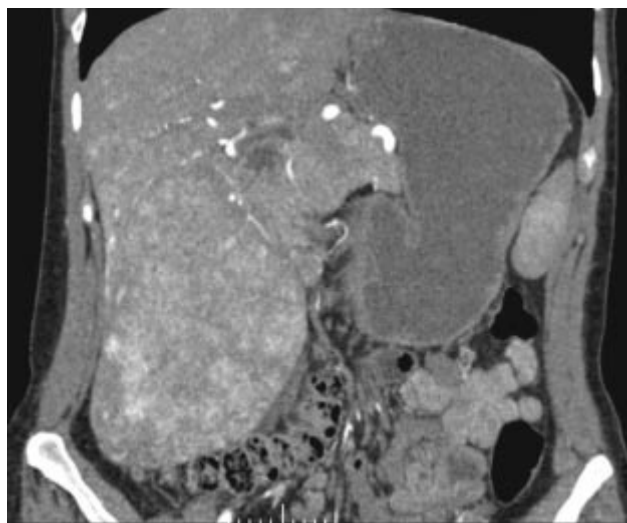


Figure 1. Coronal reconstruction of liver CT arteriogram at 7 weeks post-partum demonstrating a 12 cm exophytic liver mass off the inferior right lobe. (Courtesy of Ann McNamara, MD).



Figure 2. Axial CT arteriogram image of the liver showing multiple arterially enhancing masses in both lobes of the liver. (Courtesy of Ann McNamara, MD).

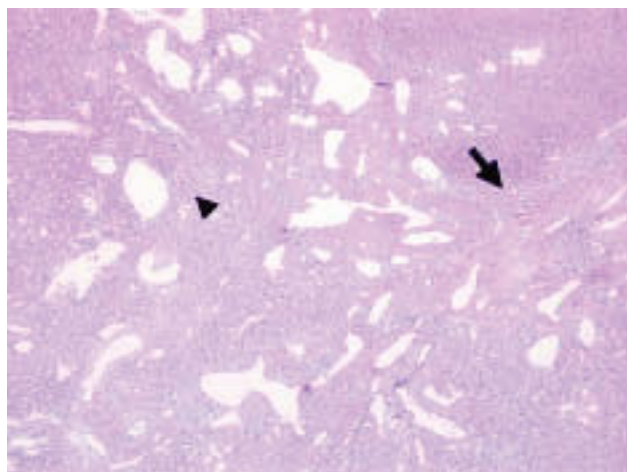


Figure 3. Biopsy of the dominant lesion demonstrating a central scar (arrow) and bile duct proliferation (arrowhead). 4X magnification HE. (Courtesy of Maria L. Botero, MD).

tient was discharged without complications on post-operative day 16.

Follow up abdominal CT scan 8 weeks post surgery demonstrated multiple hypervascular lesions throughout the liver consistent with multi-focal FNH.

Discussion

FNH is the second most common benign solid tumor of the liver. In one autopsy series 8% of non-hemangiomatic lesions were FNH (1). It maybe seen in both sexes but has a female predominance (8:1).² FNH is generally accepted to be a hyperplastic (regenerative) response to hyperperfusion by the characteristic anomalous arteries found in the center of the nodules.²⁻⁴ Its association with

hepatic hemangiomas and hereditary hemorrhagic telangiectasia (Osler-Weber-Rendu disease), as in this case strengthens the belief that FNH is a congenital vascular anomaly.⁵

Unlike hepatic adenomas, the etiologic relationship between FNH and oral contraceptive use is not well defined. However, FNH may be responsive to estrogens, as patients taking the oral contraceptive pill tend to have larger and more vascular tumors.⁶ In addition, reports of rupture or hemorrhage have all occurred in those taking oral contraceptives and enlargement during pregnancy has been reported.⁷⁻¹⁰

A CT evaluation with and without contrast in the arterial and portal venous phases is of proven benefit in the differentiation of FNH from other vascular tumors.¹¹ A central hypoattenuated scar is seen in 43-60% of cases.¹² In contrast to hemangiomas, FNH does not exhibit venous pooling.¹³ MRI has a sensitivity of 70% and a specificity of 98% in the diagnosis of FNH.¹⁴ The enhancement profile is similar to that of CT where T1-weighted imaging reveals early homogenous contrast enhancement of the lesion and increased delayed enhancement of the central scar.

Unlike our case, the lesion in FNH is usually solitary (80-95%) and less than 5 cm in diameter. Lesions rarely exceed 10 cm. Significant tumor growth occurs in 10% of cases and 8% of patients require surgical resection because of symptoms, tumor growth or both.¹⁵ Malignant transformation has not been described. There is no evidence to suggest that FNH is a precursor of fibrolamellar hepatocellular carcinoma.^{14,16,17}

The natural history of FNH is one of stability and lack of complications and conservative management is the usual option.¹⁸⁻²² Surgical intervention is recommended for severely symptomatic patients or for those with en-

larging FNH. Small FNH does not appear to pose a significant risk to a successful pregnancy although close observation is strongly recommended and resection may be prudent for large (> 8 cm) lesions.^{18,23} In uncomplicated FNH, follow up at 3 and 6 month at 1 and 2 year intervals is considered a reasonable approach.²⁴

References

1. Craig J, Peters R, Edmundson H. *Tumors of the Liver and Intrahepatic Bile Ducts*, Fasc 26, 2nd ed. Washington, DC Armed Forces Institute of Pathology, Washington DC 1989 p. 6.
2. Wanless IR, Mawdsley C, Adams R. On the Pathogenesis of focal nodular hyperplasia of the liver. *Hepatology* 1985; 5: 1194-200.
3. Fukukura Y, Nakashima O, Kusaba A, et al. Angioarchitecture and blood circulation in focal nodular hyperplasia of the liver. *J Hepatol* 1998; 29: 470-5.
4. Kondo F, Nagao T, Sato T, et al. Etiological analysis of focal nodular hyperplasia of the liver, with emphasis on similar abnormal vasculatures to nodular regenerative hyperplasia and idiopathic portal hypertension. *Pathol Res Pract* 1998; 194: 487-95.
5. Wanless IR, Gryfe A. Nodular transformation of the liver in hereditary hemorrhagic telangiectasia. *Arch Pathol Lab Med* 1986; 110: 331-5.
6. Nakanuma Y. Non-neoplastic Nodular Lesions in the Liver. *Pathol Int* 1995; 45: 703-14.
7. Nime F, Pickren JW, Vana J, et al. The histology of liver tumors in oral contraceptive users observed during a national survey by the American College of Surgeons Commission on Cancer. *Cancer* 1979; 44: 1481-9.
8. Aldinger K, Ben-Menachern Y, Whalen G. Focal Nodular Hyperplasia of the Liver Associated with High Dose Estrogens. *Arch Intern Med* 1977; 137: 357-9.
9. Klatskin G. Hepatic Tumors: Possible Relationship to Use of Oral Contraceptives. *Gastroenterology* 1977; 73: 386-94.
10. Shortell CK, Schwartz SI. *Hepatic adenoma and focal nodular hyperplasia*. 1991; 173: 426-31.
11. Van Hoe L, Baert AL, Gryspeerdt S, et al. Dual-phase helical CT of the liver: value of an early-phase acquisition in the differential diagnosis of noncystic focal lesions. *AJR Am J Roentgenol* 1997; 168: 1185-92.
12. Brady MS, Coit DG. Focal nodular hyperplasia of the liver. *Surg Gynecol Obstet* 1990; 171: 377-81.
13. Mathieu D, Bruneton JN, Drouillard J, et al. Hepatic adenomas and focal nodular hyperplasia: dynamic CT study. *Radiology* 1986; 160(1): 53-8.
14. Ishak KG, Rabin L. Benign Tumors of the Liver. *Med Clin North Am* 1975; 59: 995-1013.
15. Weimann A, Ringe B, Klempnauer J, et al. Benign liver tumors: differential diagnosis and indications for surgery. *World J Surg* 1997; 21: 983-91.
16. Nguyen BN, Flejou JF, Terris B, et al. Focal nodular hyperplasia of the liver: A comprehensive pathologic study of 305 lesions and recognition of new histologic forms. *Am J Surg Pathol* 1999; 23: 1441-54.
17. Wanless IR. Nodular regenerative hyperplasia, dysplasia, and hepatocellular carcinoma. *Am J Gastroenterol* 1996; 91: 836-7.
18. Mathieu D, Kobeiter H, Maisson P, et al. Oral Contraceptive Use and Focal Nodular Hyperplasia of the Liver. *Gastroenterology* 2000; 118: 560-4.
19. Weimann A, Ringe B, Klempnauer J, et al. Benign Liver Tumors: Differential Diagnosis and Indications for Surgery. *World J Surg* 1997; 21: 983.
20. Heinemann LA, Weimann A, Gerken G, et al. Modern oral contraceptive use and benign liver tumors: The German Benign Liver Tumor Case-Control Study. *Eur J Contracept Reprod Health Care* 1998; 3: 194-200.
21. Di Stasi M, Caturelli E, Di Sio I, et al. Natural history of focal nodular hyperplasia of the liver: An ultrasound study. *J Clin Ultrasound* 1996; 24: 345-50.
22. Leconte I, Van Beers BE, Lacrosse M, et al. Focal nodular hyperplasia: Natural course observed with CT and MRI. *J Comput Assist Tomogr* 2000; 24: 61-6.
23. Weimann A, Mössinger M, Fronhoff K, et al. Pregnancy in Women with Observed Focal Nodular Hyperplasia of the Liver. *Lancet* 1998; 351: 1251-2.
24. Buetow PC, Pantongrag-Brown L, et al. Focal nodular hyperplasia of the liver: radiologic-pathologic correlation. *Radiographics* 1996; 16: 369-88.