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## Ultrasound-guided Core Needle Biopsy of Liver Hemangiomas: Three-Year Experience

**Backgrounds/Objective:** In patients with atypical hemangiomas who have inconclusive imaging features, performing other diagnostic procedures, especially biopsy, is indicated. Bleeding is the most feared complication due to the high vascular nature of hemangioma. The objective of this study was to present our experience on ultrasound-guided core needle biopsy of liver hemangiomas.

**Patients and Methods:** We carried out ultrasound-guided core needle biopsies in 443 patients with focal hepatic lesions of whom 32 were subsequently diagnosed as having cavernous hemangiomas. Biopsies were done using a 16-18 G cutting needle at Mashhad Imam Reza Hospital and Isfahan Baharestan Hospital during 2004-07.

**Results:** The mean age of patients with hemangioma was 49.3 years (F/M = 2/1). The lesions were 0.8-14 (mean: 6.5) cm long. 13 patients had multiple (2-10) lesions; others had solitary lesions with atypical imaging features. We did not observe any complications including hemorrhage during or after the procedure.

**Conclusion:** Ultrasonically-guided core needle biopsy seems to be a relatively safe procedure even when "atypical hemangioma" is a diagnostic possibility.

**Keywords:** ultrasonography, biopsy, liver, hemangioma

### Introduction

Hemangiomas are the most common benign tumors of the liver. They often are asymptomatic and are detected incidentally at imaging studies done for other reasons.<sup>1</sup> In most instances, hemangiomas are typical on imaging and will be correctly diagnosed, however, occasionally in atypical cases, they will present as a diagnostic dilemma and may mimic malignant lesions. Therefore, a tissue diagnosis may be required to guide the subsequent management.<sup>1-4</sup>

Percutaneous fine-needle aspiration biopsy or core biopsy under imaging guidance are well-established methods for obtaining tissue sample for cytological or histological examinations.<sup>1,5</sup> Potential complications of liver biopsy are pneumothorax, infection, biliary or bowel perforation, and bleeding, especially of vascular lesions. There is widespread belief that liver biopsy is contraindicated in hemangiomas due to high risk of hemorrhage. The objective of this study was to present our experience on ultrasound-guided core needle biopsy of liver hemangiomas.

### Patients and Methods

From April 2004 to August 2007, ultrasound guided core needle biopsies were carried out on 443 patients with focal hepatic lesions referred for liver biopsy at two centers—Imam Reza Hospital of Mashhad and Baharestan Hospital of Isfahan. Biopsies were done to determine the nature of the primary or secondary tumor in patients with suspected liver malignancy, and to differentiate between

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**Fig. 1.** Sonographic picture during biopsy in a 61-year-old man. It shows needle biopsy in homogenously hypoechoic liver mass in the left lobe. Pathology report revealed cavernous hemangioma.

malignant and benign focal lesions with equivocal and inconclusive imaging i.e. imaging features (Fig. 1). Core needle biopsies were obtained with free hand sonographic guidance using a 3.5–7 MHz transducer (Siemens Adara, Aloka) and a 16–18 G cutting needle (Bard, England and Galini, Italy). The procedures were performed in bedside of patients with mobile sonographic set in interventional rooms. The procedures were mainly done as inpatient with a short admission period (8–12 hours). Written informed consent was obtained from patients. An intravenous line was established and sedative was administered (midazolam 5 mg IV).

After localizing the lesion, the skin was aseptically prepared and under local anesthesia (lidocaine 2%, 10 mL), the needle was introduced through normal hepatic parenchyma until it reached a visualized mass. At most, 2–4 attempts were made for each patient. After the procedure, the patients remained recumbent over the puncture site for 1–2 hours in recovery room. After sonographic control to find out probable complications such as bleeding, the patients were allowed to rest in a comfortable position. Bed rest continues in hospital for another 8–12 and then in house up to 24 hours. In hospital, pulse rate and blood pressure were recorded

every 30–60 min. The patients were discharged after a final clinical examination. They were informed about symptoms of possible complications following the procedures (e.g., bleeding, fainting, vertigo, severe abdominal pain and dyspnea) and were asked to contact the staff as soon as they encountered any of the symptoms explained.

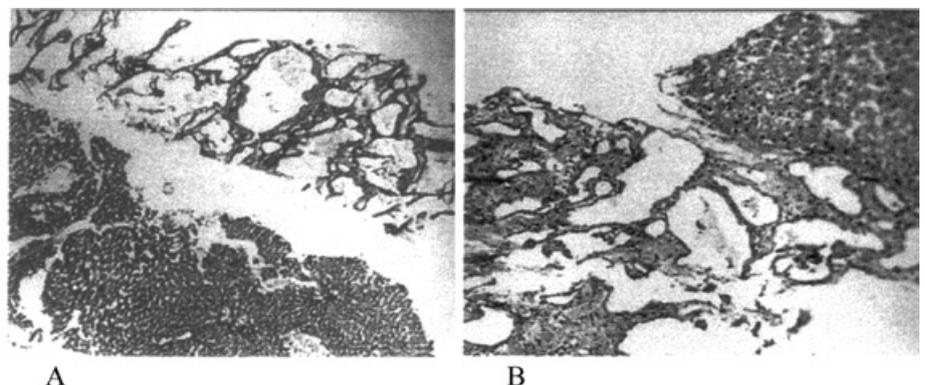
In all patients, the pathological diagnosis was established conclusively based on the core tissue samples. However, in few patients, the procedure was repeated because of inadequate sample obtained.

### Results

Of 443 patients with focal hepatic lesions who underwent ultrasound-guided core needle biopsy, cavernous hemangioma was confirmed in 32 based on histopathologic evaluation (Fig. 2). The mean age of patients with hemangioma was 48.2 years (F/M: 2/1). The lesions were 0.8–14 (mean: 6.5) cm long. Thirteen (41%) patients had multiple (2–10) lesions; the remaining 19 (59%) had solitary lesions with atypical imaging features (i.e., mixed or hypoechoic, ill-defined margins). Three patients had a lesion confined to the left lobe; 17 had lesions confined to the right lobe; and the remaining 12 had lesions in both lobes. There were no complications such as bleeding, during or after the procedure, even in those with atypical hemangiomas.

### Discussion

Because of their vascular nature and dynamic features, 95% of cavernous hemangiomas are easily diagnosed with the help of imaging procedures like ul-



**Fig. 2. A and B.** Microscopic pictures of core needle biopsy specimen show normal hepatocytes and large blood vessels of (cavernous) hemangioma.

trasonography, dynamic contrast-enhanced computed tomography or magnetic resonance imaging and erythrocyte-tagged  $^{99m}\text{Tc}$  scintigraphy. Biopsy is not warranted in those typical cases.<sup>3</sup> When this typical vascular pattern is not present because of thrombosis, fibrosis and hyalinization or fatty liver, hemangioma has an atypical appearance and it is likely to be confused with other lesions. Under such circumstances, more specific methods, such as biopsy, are needed for making the correct diagnosis.<sup>3,4</sup>

However, the most common complication of liver biopsy is bleeding. In contrary to the widespread belief that biopsy is contraindicated in highly vascular masses, especially hemangiomas, some recent studies showed contradictory results. Preliminary reports included small numbers of cases with fine-needle aspiration biopsy (FNAB). In most of these experiences, no bleeding during the FNAB of patients with hemangiomas was observed.<sup>2,3,6-10</sup> In Taavistainen's study, only one out of 36 FNAB of hemangiomas was complicated with serious bleeding requiring transfusion.<sup>11</sup> Caldironi, et al, reported lower bleeding rate in FNAB (2 in 114).<sup>12</sup> Gebel, et al, also found that the risk of bleeding of hemangioma due to FNAB is nearly the same as that of a malignant tumor (2.5% vs 1.5%).<sup>13</sup> Today, imaging-guided FNAB was accepted as a safe procedure to obtain tissue diagnosis in the management of patients with focal liver lesions.<sup>1,5</sup> However, liver FNAB poses a number of diagnostic challenges. First, the diagnostic yield of this method is 84% to 95% for hepatic malignancies<sup>13,14</sup> and 60% to 96% for hemangiomas.<sup>2,3,6-13</sup> Second, there are some difficulties in differentiating primary from secondary hepatic malignancies by cytological examination alone due to inadequate sample.<sup>5,14</sup> Moreover, the diagnosis of hepatic hemangiomas by fine-needle aspiration is sometimes problematic because the cytological identification of benign endothelial cells is difficult.

Core needle biopsy provides greater amount of tissue for histopathologic examination. Tung, et al, demonstrated no bleeding complication in percutaneous biopsy of 38 hemangiomas using a 20 G cutting needle.<sup>15</sup> Heilo and Stenwig also reported no serious complication in core needle biopsy of 29 cases with hemangiomas with an 18 G needle.<sup>16</sup> In our study, we observed no complication during or after the procedure

in 32 patients with hemangioma.

These findings supported the opinion that liver biopsy is a safe procedure, even for hemangioma, and atypical hemangiomas, which cannot be diagnosed with other imaging modalities and which should be evaluated by percutaneous biopsy in the context of approach to the liver masses. Surprisingly, once the typical vascular hemangiomas are excluded, there is little risk of a significant complication from the atypical variety. The reason for this is that existence of thrombosis or fibrosis in this lesion makes its imaging appearance atypical and also reduces the potential for bleeding complications. The potential for significant bleeding, which is probably overstated, may be similar to other liver lesions. Ultrasound-guidance, normal bleeding parameters, suitable trajectory planning with distance from main vascular structures or gallbladder and via a small cuff of normal liver may all contribute to the low complication rate.<sup>4</sup>

Ultrasound-guided core needle biopsy seems to be a relatively safe procedure whenever atypical hemangioma is a diagnostic possibility.

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## References

1. Chhieng DC. Fine needle aspiration biopsy of liver: an update. *World J Surg Oncol* 2004;2:5.
2. Brambs HJ, Spamer C, Volk B, Wimmer B, Koch H. Histological diagnosis of liver hemangiomas using ultrasound-guided fine needle biopsy. *Hepatogastroenterology* 1985;32(6):284-7.
3. Caturelli E, Pompili M, Bartolucci F, Siena DA, Sperandeo M, Andriulli A, et al. Hemangioma-like lesions in chronic liver disease: diagnostic evaluation in patients. *Radiology* 2001;220:337-42.
4. Vilgrain V, Boulos L, Vullierme MP, et al: Imaging of Atypical Hemangiomas of the Liver with pathologic correlation. *Radiographics*. 2000; 20:379-397
5. Wee A. Fine needle aspiration biopsy of the liver: Algorithmic approach and current issues in the diagnosis of hepatocellular carcinoma. *CytoJournal* 2005;8;2:7
6. Bondestam S, Somer K, Hekali P, et al. Sonography and computed tomography in hepatic haemangioma. *Acta Med Scand Suppl* 1982; 668:68-75.
7. Solbiati L, Livraghi T, De Pra L, Ierace T, Masciadri N, Ravetto C. Fine-needle biopsy of hepatic hemangioma with sonographic guidance. *Am J Roentgenol* 1985;144 (3):471-4.
8. Cronan JJ, Esparza AR, Dorfman GS, Ridlen MS, Paolella LP. Cavernous hemangioma of the liver: role of percutaneous biopsy. *Radiology* 1998;166:135-8.

9. Caturelli E, Rapaccini GL, Sabelli C, De Simone F, Fabiano A, Romagna-Manoja E, et al. Ultrasound-guided fine-needle aspiration biopsy in the diagnosis of hepatic hemangioma. *Liver* 1986;6(6):326-30.
10. Nakaizumi A, Iishi H, Yamamoto R, Kasugai H, Tatsuta M, Okuda S et al. Diagnosis of hepatic cavernous hemangioma by fine needle aspiration biopsy under ultrasonic guidance. *Gastrointest Radiol.* 1990; 15(1):39-42.
11. Taavitsainen M, Airaksinen T, Kreula J, Paivansalo M. Fine-needle aspiration biopsy of liver hemangioma. *Acta Radiol* 1990;31(1):69-71.
12. Caldironi MW, Mazzucco M, Aldinio MT, Paccaqnella D, Zani S, Pantini F, et al. Echo-guided fine-needle biopsy for the diagnosis of hepatic angioma. A report on 114 cases. *Minerva Chir* 1998;53(6): 505-9.
13. Gebel M, Horstkotte H, Koster C, Brunkhorst R, Brandt M, Atay Z. Ultrasound-guided fine needle puncture of the abdominal organs: indications, results, risks. *Ultraschall Med* 1986;7(5):198-202.
14. Ljubicic N, Bili A, Lang N, Bakula B. Ultrasonically guided percutaneous fine needle aspiration biopsy of the hepatic and pancreatic focal lesions: accuracy of cytology in the diagnosis of malignancy. *Journal of the Royal Society of Medicine* 1992;85(3):139-41.
15. Tung GA, Cronan JJ. Percutaneous needle biopsy of hepatic cavernous hemangioma. *J Clin Gastroenterol* 1993;16(2):117-22.
16. Heilo A, Stenwig AE. Liver hemangioma: US-guided 18-gauge core-needle biopsy. *Radiology* 1997;204(3):719-22.