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# Histological adequacy of EUS-guided liver biopsy when using a 19-gauge non–Tru-Cut FNA needle

**Niraj Gor, MD,[1] Suhail B. Salem, MD,[1] Shriram Jakate, MD,[2] Rikin Patel, MD,[1] Nikunj Shah, MD,[1] Abhitabh Patil, MD[1]**

Chicago, Illinois, USA

Liver biopsy continues to play a critical role in the evaluation and management of patients with liver disease. Although history, physical examination, and serological markers often obviate the need for a diagnostic liver biopsy, it is still considered the criterion standard, especially when the etiology of liver disease remains obscure. Even with a thorough history and laboratory workup, significant fibrosis and/or cirrhosis can be missed in as many as 32% of patients without a liver biopsy.[1] In fact, results of a liver biopsy have been shown to alter diagnosis in as many as 14% of patients with chronically elevated liver enzymes and significantly affect patient management in as many as 18% of such patients.[1,2] Moreover, current noninvasive imaging and serological markers of hepatic fibrosis remain investigational and have not been shown to be as accurate as liver biopsy.

EUS has an established and integral role in the diagnosis, management, and treatment of several GI, liver, and pancreaticobiliary diseases. New indications and techniques for EUS continue to emerge as experience grows with this technology. Although there are reports of EUS-guided FNA of the liver for evaluation of discrete hepatic lesions, there is only limited information on the role of EUS in assisting with diagnostic liver biopsy. Only 1 study to date has evaluated the histological adequacy of liver tissue obtained with EUS guidance; this particular study used the 19-gauge Tru-Cut core biopsy needle.[3] There are no data regarding histological adequacy when EUS-guided liver biopsy is performed by using a 19-gauge FNA needle. It is presumed that use of such a needle may limit the histological adequacy of the specimen obtained.[4] It remains uncertain whether EUS-guided liver biopsy by using a 19-gauge aspiration needle can acquire an adequate tissue specimen to provide a histological diagnosis.

Therefore, the primary aim of this study was to evaluate the histological adequacy of liver tissue specimens obtained using a 19-gauge aspiration needle via a EUS-guided approach. Specifically, we analyzed the length of the biopsy specimen, the number of complete portal tracts (CPTs), and the ability of the pathologist to make a diagnosis with the obtained specimen.

## PATIENTS AND METHODS

A case series of patients who underwent EUS-guided transluminal liver biopsy with a 19-gauge FNA needle from February 2012 until June 2012 was retrospectively reviewed. All patients were older than 18 years of age, had abnormal liver function test results, and were undergoing upper endoscopy for another appropriate indication. EUS-guided liver biopsy was not the primary reason for upper endoscopy. The most common indication was to exclude biliary obstruction via EUS and to evaluate for the presence of varices via EGD. No patients in this study had previous histopathological evaluation of their liver. Liver biopsy was not performed on any patients with a platelet count less than 50,000, international normalized ratio greater than 2.0, and/or the use of anticoagulant medications within 5 days of the procedure. Informed consent was obtained

*Abbreviations: CPT, complete portal tract; TJLB, transjugular liver biopsy.*

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Current affiliations: Section of Gastroenterology (1), Division of Pathology (2), Rush University Medical Center, Chicago, Illinois, USA.

Reprint requests: Suhail Salem, MD, Section of Gastroenterology, Rush University Medical Center, 1725 W. Harrison St., Suite 207, Chicago, IL 60612.

**TABLE 1. Liver biopsy results**

| Patient | Age, y | Sex | Primary indication for endoscopy | Biopsy length, mm | CPTs | Diagnosis |
|---|---|---|---|---|---|---|
| 1 | 57 | F | Abnormal LFT results, EUS for choledocholithiasis | 10 | 8 | Viral hepatitis |
| 2 | 55 | F | Suspected cirrhosis, EGD for varices screening | 6 | 6 | NAFLD |
| 3 | 49 | F | Abnormal LFT results, EUS for choledocholithiasis | 13 | 14 | NASH |
| 4 | 25 | M | Abnormal LFT results, EUS for choledocholithiasis | 9 | 6 | NASH |
| 5 | 63 | F | Abnormal LFT results and anemia, EGD for anemia | 23 | 7 | NASH |
| 6 | 50 | M | Suspected cirrhosis, EGD for varices screening | 13 | 6 | Viral hepatitis |
| 7 | 23 | F | Abnormal LFT results, EUS for choledocholithiasis | 13 | 15 | Autoimmune hepatitis |
| 8 | 70 | F | Abnormal LFT results, EUS for choledocholithiasis | 22 | 10 | Primary biliary cirrhosis |
| 9 | 52 | M | Abnormal LFT results, EUS for choledocholithiasis | 22 | 12 | Autoimmune hepatitis |
| 10 | 48 | M | Elevated LFT results, EUS for choledocholithiasis | 13 | 8 | Viral hepatitis/cirrhosis |

*CPTs*, Complete portal tracts; *F*, female; *LFT*, liver function test; *NAFLD*, nonalcoholic fatty liver disease; *NASH*, nonalcoholic steatohepatitis; *M*, male.

from all patients in this study. The study protocol was reviewed by the institutional review board and was approved.

All patients underwent deep sedation (monitored anesthesia care) with the presence of an anesthesiologist in the endoscopy suite. All EUS procedures included routine evaluation of pancreatic, biliary, and hepatic anatomy. All biopsy specimens were obtained from the left lobe of the liver (via either a transgastric or transesophageal approach). Three to-and-fro motions were used to obtain liver tissue per pass. A total of 3 passes per patient was performed. Care was taken to select an avascular tract with the assistance of power Doppler flow. Liver biopsy specimens were obtained by using a 19-gauge FNA needle (Expect; Boston Scientific; Natick, Mass) under EUS guidance with a therapeutic linear echoendoscope at 10-MHz imaging (Olympus GF-UCT140-AL5; Olympus, Tokyo, Japan).

## RESULTS

Ten patients were included in this study (4 men and 6 women). The average age was 49 years (range 23-70 years). On average, liver FNA for histology added 4 minutes to the time of the EUS procedure.

The average tissue core length was 14.4 mm (range 6-23 mm). The average number of CPTs per biopsy specimen was 9.2. The number of CPTs per millimeter of tissue was 0.64. Diagnostic adequacy was 100% (Table 1). There were no adverse events reported after liver biopsy.

## DISCUSSION

Liver biopsy remains an essential tool in the evaluation of patients with hepatic disease. The primary goal of performing a liver biopsy is to obtain an adequate specimen so that the pathologist can make an assessment of the nature and degree of liver injury. The best indicators of specimen adequacy are considered to be tissue length and CPTs. It has been suggested that the ideal aggregate tissue length is between 1.5 and 3 cm after formalin fixation with at least 11 CPTs.[5] This may be difficult to achieve regardless of whether a percutaneous or transjugular approach is used.

It was originally thought that the size of the specimen obtained was directly proportional to the size of the needle used to obtain the sample. Initial studies showed inaccurate grading and staging of viral hepatitis with smaller needles (such as 18 gauge) in as many as two thirds of patients.[6,7] Therefore, larger needles often used for percutaneous liver biopsy were preferred because of the robust size of the tissue specimen. Percutaneous liver biopsy results in significant pain in nearly 85% of patients that is not relieved with anxiolytic treatment combined with a local anesthetic before the procedure.[8] Recent studies have shown that as many as 1.1% of patients undergoing percutaneous liver biopsy experience serious adverse events, and 0.6% experience severe bleeding regardless of the size and type of needle used or whether the biopsy was performed with US guidance.[9]

Transjugular liver biopsy (TJLB) has gained popularity over the past several years. This may be attributable to studies showing that biopsy needles as small as 20 gauge can provide tissue specimens comparable to those with larger needles with no major difference in the ability of the pathologist to make a histopathological diagnosis.[10] TJLB is considered safer in patients at high risk of bleeding and allows for measurement of portal pressures. Unfortunately, TJLB is expensive because it requires the use of a separate

procedure suite, a postprocedure recovery area for the patient, and the expertise of a completely separate group of physicians who are often not involved in the direct care of the patient. Minor adverse events can occur in as many as 15% of patients, and major adverse events are seen in as many as 3% of patients. Mortality related to the procedure can reach 0.3%.[11]

EUS-guided liver biopsy for purposes of diagnosis and/or staging of diffuse parenchymal liver disease has largely been studied with use of the Tru-Cut needle. In the only study to look at the adequacy of biopsy specimens obtained by using such an approach, the aggregate mean tissue length attained was 16.9 mm, yielding a median of 7 CPTs.[3] A recent analysis done by Stavropoulos et al[12] in which patients underwent EUS-guided liver biopsy with a 19-gauge FNA needle after a EUS negative for biliary obstruction suggested that such specimens may be adequate for histopathological interpretation. This is consistent with previous studies showing that the use of a smaller needle can provide excellent specimen size without increasing the adverse event rate when a greater number of passes are performed. This was shown by using a transjugular approach and can likely be extrapolated to the EUS-guided approach.[13]

The results of this initial case series appear promising. EUS-guided liver biopsy by using a 19-gauge FNA needle is a technically feasible, safe, and rapid means of acquiring a diagnosis, potentially obviating the need for an expensive and time-consuming serological workup. Tissue specimen was easily obtained and comparable in size to specimens acquired via a percutaneous and/or transjugular approach.[5,9,13,14]

Many patients with hepatic disease have concurrent indications for endoscopy, such as screening for varices. Integrating the use of EUS-guided liver biopsy at the time of routine endoscopy may prove to be cost-effective, similar to the significant cost reduction achieved in single-session EUS and ERCP for patients at moderate risk of choledocholithiasis.[15] Additionally, patient satisfaction will likely increase if all requisite procedures are performed on the same day during the same endoscopic session while the patient is sedated. Given the superior images seen on EUS with real-time visualization of the FNA needle with concomitant visualization of the liver parenchyma, surrounding vasculature and intrahepatic biliary radicles, there may be a lower adverse event rate by using an EUS-guided liver biopsy approach. These are all areas of potential research. As such, we would recommend that larger studies be performed to assess the utility of EUS-guided liver biopsy.

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