EUS-guided liver biopsy provides diagnostic samples comparable with those via the percutaneous or transjugular route

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Background and Aims: Liver biopsy (LB) traditionally has been performed via a percutaneous (PC), transjugular (TJ), or surgical approach. EUS-guided LB (EUS-LB) is an emerging method that has shown promise in terms of tissue yield and procedural safety. Comparison of histologic yield of EUS-LB with other methods of LB has not been done. This study aimed to compare tissue yield of different LB methods.

Methods: EUS-LB, TJ-LB, and PC-LB were identified retrospectively. EUS-LB was obtained via transgastric and transduodenal biopsy, or via transgastric (left lobe) biopsy alone using a 19-gauge FNA needle (non-Trucut). TJ-LB specimens were obtained with an 18- or 19-gauge needle, and PC–LB specimens with an 18- or 20-gauge needle. Stained slides were digitized on a whole slide scanner, and the total specimen length (TSL) and the count of complete portal triads (CPTs) were determined. Comparisons of TSL and CPT among the 3 groups were done with Wilcoxon rank sum tests.

Results: Wilcoxon rank sum tests indicated that EUS-LB of both liver regions produced significantly more tissue in terms of both TSL and CPTs compared with a PC-LB ($P = .0000$ and .0006). EUS-LB produced significantly longer TSL than TJ-LB ($P = .01$) and similar CPTs ($P = .22$). Those EUS-LB cases in which the left lobe only was sampled were not statistically different compared with PC-LB and TJ-LB.

Conclusion: EUS-guided-LB produces specimens at least comparable to, and in some cases better than, PC-LB or TJ-LB. Widely separated liver regions can be easily sampled, which may have some benefit. The role of EUS-LB is likely to increase in the future. (Gastrointest Endosc 2016;83:360-5.)

Liver biopsy (LB) continues to be the criterion standard for the evaluation of hepatic parenchymal diseases. The method for acquisition of liver tissue has evolved over time. The first liver tissue sampling was performed by Paul Ehrlich in 1883, and the first description of diagnostic percutaneous (PC) LB was published in 1923.[1] LB specimens can be obtained via a PC, transvascular, or surgical route. The PC approach can be undertaken blindly by percussion of the liver span or under image guidance with the aid of transabdominal US or CT. The vascular approach is generally transjugular (TJ) but can also be done via a transfemoral venous route. The PC procedure is the most widely used and carries the potential adverse effects of severe pain, intraperitoneal and subcapsular hemorrhage, bile peritonitis, inadvertent sampling of adjacent organs, and pneumothorax. These adverse events may occur in 0.09% to 3.1% of biopsies.[2] The TJ approach is not without risk, and adverse events may be encountered in 0.56% to 6.5% of cases and include neck hematoma, intraperitoneal bleeding, cardiac arrhythmias, and vascular fistulae.[3] These risks increase with the number of needle passes into the liver parenchyma, which may limit the amount of tissue that can be obtained.

EUS is a widely adopted technology that plays a crucial role in the diagnosis and management of several GI

Abbreviations: CPT, complete portal triad; EUS-LB, EUS-guided liver biopsy; LB, liver biopsy; LLP, length of longest piece; PC, percutaneous; TJ, transjugular; TSL, total specimen length.

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diseases. There is emerging evidence of the usefulness of EUS-guided LB (EUS-LB) in providing a tissue sample adequate for histologic interpretation by a pathologist.[4,5] A head-to-head comparison of the histologic yield of EUS-LB with that of other methods of LB has not been done. We hypothesized that EUS-LB performed by using a 19-gauge FNA needle would yield samples of liver parenchyma equal to or superior to those obtained by the PC and TJ routes. The purpose of this study was to determine the specimen adequacy of EUS-LB and to compare tissue yields of different LB methods.

METHODS

A total of 110 patients underwent EUS-LB as part of a multicenter study conducted from November 2011 to September 2013.[5] The inclusion criteria were as follows: 18 years of age or older, the presence of abnormal liver function test results of undetermined etiology with possible biliary obstruction, and those patients already undergoing upper endoscopy who would also benefit from a liver biopsy as determined by the referring hepatologist (eg, abnormal liver function test results, fatty liver disease on imaging). An EUS-LB was done if no biliary obstruction or other anatomic lesions could explain the clinical presentation and/or abnormal laboratory panel.

The exclusion criteria for EUS-LB included thrombocytopenia (platelets <50.000/μL), coagulopathy (international normalized ratio >1.5), use of thrombolytic agents within 7 days of the procedure, and a patient's failure to understand the risk and benefits or provide informed consent for the procedure including possible EUS-LB. Other exclusion criteria were pregnancy and decompensated liver disease. The EUS examination was conducted according to standard endosonographic protocol and consisted of a detailed examination of the left and visualizable right lobe of the liver, the common bile duct, the ampulla, and the gallbladder. Pancreatic imaging was also done at the discretion of the endoscopist. All of the patients provided consent for the procedure.

To compare these EUS-LB cases with other LB methods, consecutive PC and TJ LBs, which had been done by our interventional radiology department from January 2014 to September 2014 at Geisinger Medical Center, were retrospectively identified. For all biopsies (EUS-LB, PC-LB, and TJ-LB), the total specimen length (TSL) and count of complete portal triads (CPTs) were determined. To determine how many patients were required in each arm, slides of PC-LB and TJ-LB specimens were quantitated, and the average CPT and TSL were determined. With these data, a power analysis suggested that 19 PC-LB and 32 TJ-LB patients were required in each arm to detect a difference in the measurements. A sample of 65 consecutive LBs (27 PC, 38 TJ) was selected. Because the presence of cirrhosis is known to decrease the TSL and the number of CPTs,[6] only noncirrhotic TJ-LB patients were included to be compared with EUS-LB. This study was approved by the institutional review board of Geisinger Medical Center.

EUS-LB technique

Patients undergoing EUS-LB were moderately sedated with midazolam and fentanyl or deeply sedated with propofol administered by a certified registered nurse anesthetist or anesthesiologist. The endosonographic study was conducted with a linear array echoendoscope (GF-UC140-AL5; Olympus America, Center Valley, Pa). Before needle puncture of the desired lobe, color Doppler imaging was used to ensure the lack of vascular structures in the trajectory of the needle. The EUS-LB was performed in widely separated regions of the liver or 1 region only by using a regular (non-Trucut) 19-gauge FNA needle (Expect or Expect Flexible 19-gauge EUS needle; Boston Scientific, Natick, Mass). The left lobe was described as liver parenchyma identified a few centimeters below the gastroesophageal junction with the echoendoscope torqued clockwise. A large area of liver tissue can be seen through the duodenal bulb, which is typically the right hepatic lobe.[7] The stylet was removed before needle insertion in the echoendoscope, and the suction device set and attached to the needle. A transgastric approach was used to obtain samples from the left lobe of the liver; a transduodenal approach, with the linear echoendoscope positioned in the duodenal bulb, was used to obtain samples from the large amount of liver parenchyma seen in that location. Once adequate liver parenchymal penetration was achieved with the needle (~2-6 cm), full suction was applied with a 20-mL vacuum syringe. One pass consisted of a total of 7 to 10 to-and-fro needle motions with the fanning technique applied under direct and continuous endosonographic visualization of the tip of the needle.

The needle was then removed from the echoendoscope. The specimen was pushed from the needle with the stylet directly into formalin solution. The contents of the jar were visually inspected to confirm that adequate tissue was obtained. The endosonographer looked for multiple pieces of brown to yellow tissue approximately 5 to 15 mm in length. Usually a second pass was made from the selected region of the liver, depending on preference of the endosonographer or inspection of the macroscopic yield in the specimen cup; usually 2 to 3 passes per procedure were made (range 1-4). A 2-site biopsy (ie, transgastric and transduodenal) was performed at the discretion of the endosonographer. All patients were closely observed in the recovery area for 1 to 2 hours after the procedure. Patients were followed-up in the clinic and by a phone call on day 3 and at 1 month after the date of the procedure.

PC-LB and TJ-LB techniques

TJ-LB specimens were obtained by the interventional radiologists by using an 18-gauge or 19-gauge needle (Liver Access and Biopsy needle set, 18-gauge [LABS100]