EUS-guided liver biopsy for parenchymal disease: a comparison of diagnostic yield between two core biopsy needles

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Background and Aims: EUS-guided biopsy of the liver has a variable diagnostic accuracy and specimen adequacy. A new core biopsy needle has been developed that may improve performance. The objective of this study was to compare the diagnostic yield of a new core biopsy needle with the previous standard needle.

Methods: In this cross-sectional study, consecutive patients who underwent EUS-guided core liver biopsy over a 7-year period for suspected parenchymal disease were prospectively evaluated. Between 2007 and 2011, all biopsies were performed with a 19-gauge Tru-cut biopsy needle (Quick-core [QC]), whereas a novel reverse bevel needle (PC) was used exclusively from 2011 to 2014. All specimens were examined by 1 of 3 experienced, blinded pathologists for the following: presence of visible core, aggregate specimen length, number of complete portal tracts, and specimen adequacy.

Results: A total of 75 patients (mean age 51 years, 51 female) underwent liver biopsy by using the QC (n = 45) or PC (n = 30) needle. The QC and PC groups had similar demographics, indications for EUS, indications for liver biopsy, and liver findings on EUS. Compared with those of the QC, biopsies with the PC required fewer passes (median 2 vs 3; $P < .0001$) but produced longer aggregate length (median 20 mm vs 9 mm; $P < .0001$) with more complete portal tracts (median 5 vs 2; $P = .0003$) and adequate specimens ($P < .01$). Two patients had abdominal pain after liver biopsy with the QC needle.

Conclusions: Compared with the QC needle, EUS-guided core liver biopsy with the PC needle produced longer aggregate length, more complete portal tracts, and more adequate specimens despite fewer passes (Clinical trial registration number: NCT00586313.) (Gastrointest Endosc 2016;83:347-52.)

Liver disease is a major cause of morbidity and mortality. In 2013, liver disease was the thirteenth leading cause of death and killed 11.5 of every 100,000 Americans each year.[1] Liver biopsy is the criterion standard for staging liver disease and can be performed by percutaneous, transjugular, and surgical routes.[2,3] Although noninvasive tests such as elastography or serologic markers for liver fibrosis have been developed, they are primarily limited to differentiating normal and/or minimal fibrosis from advanced fibrosis.[3,4] In addition, they do not provide information on the underlying cause of liver disease for patients with negative serologic and radiologic investigations. Thus, liver biopsy remains an important part of liver disease management.

With the advent of EUS, liver biopsy is now possible through an EUS-guided transgastric approach. Although EUS-guided FNA (EUS-FNA) of liver lesions has been well-described and is diagnostic in >80% of cases,[5-7] less is known about the feasibility and adequacy of EUS-guided core biopsy for parenchymal disease. Gleeson et al[8] reported a 100% diagnostic rate in a retrospective case series of 9 patients who underwent core liver biopsy with the Quick-Core (QC) needle (Cook Medical,

Abbreviations: EUS-FNA, EUS-guided FNA; PC, ProCore; QC, Quick-Core.

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Winston-Salem, NC). However, in a prospective case series of 21 patients, our group found that only 29% of biopsy specimens obtained with the QC needle were considered adequate, defined as the presence of 6 or more complete portal tracts.[9] Because tissue architecture is necessary for the examination of hepatic parenchymal disease, needles specifically designed for core biopsy traditionally have been used. However, 2 recent small case series that used a 19-gauge FNA needle reported a histologic diagnostic rate exceeding 90%.[10,11]

Since the publication of our original study, the ProCore (PC) needle (Cook Medical) has been developed as an alternative to the QC needle, although both are currently commercially available. The utility of the PC needle compared with the QC needle has not been described. The aim of our study was to compare the diagnostic yield between the older QC needle and newer PC needle for EUS-guided core liver biopsy for parenchymal disease.

METHODS

Study design

This cross-sectional study was conducted at Indiana University Medical Center, a tertiary-care referral center in Indianapolis, Indiana, USA. Informed consent was obtained from all patients, and Institutional Review Board approval was granted before the initiation of the study. The study was registered with the National Institutes of Health (ClinicalTrials.gov number NCT00586313).

Patients referred for EUS from 2007 to 2014 were screened for the study. The first 21 patients who underwent liver biopsy with the QC needle between 2007 and 2008 were previously reported.[9] Patients who had never had a liver biopsy but who required one for suspected hepatic parenchymal disease were included. Exclusion criteria included: the presence of a liver lesion, prior upper GI or liver surgery, the presence of varices, international normalized ratio >1.5, platelet count $<50{,}000 \times 10^9$/L, or use of anticoagulants not held before the procedure. Baseline information including demographics, indication for EUS, indication for liver biopsy, and whether a liver biopsy was requested a priori by the referring physician were prospectively recorded. In cases where liver biopsy was not requested explicitly, it was performed if deemed indicated by the endoscopist based on the clinical history and endosonographic findings during the examination.

EUS core biopsy needles

The QC needle was developed in 2002 to obtain histologic specimens when tissue architecture was required (Fig. 1A). It is a spring-loaded needle located within a relatively stiff sheath. The needle assembly is initially placed in the "firing position" by withdrawal of the plunger on the proximal side of the needle before advancement through the accessory channel of the endoscope. The liver is then punctured via a transgastric route and the tissue tray advanced by depressing the plunger to obtain the specimen.

In contrast, the PC needle has a reversed bevel design, located on the side rather than the tip of the needle (Fig. 1B). Biopsies with the PC needle were performed with the stylet in place. After lesion puncture, the stylet was removed, and 10 mL of suction was applied for 30 seconds while the needle was stationary within the liver, followed by movement of the needle several times within the target before the suction was disengaged, and the needle was removed.

EUS-guided core liver biopsy protocol

All procedures were performed by one of two experienced endosonographers, with the patient under deep sedation with propofol under monitored anesthesia care. After performing approximately 50 core biopsies with the QC needle for other indications, we investigated its utility for core biopsy of the liver in 21 consecutive patients as previously reported.[9] From 2007 to 2011, only the spring-loaded QC needle was used for this indication. Because of suboptimal yield, in 2011 we switched to exclusive use of the 19-gauge PC needle for transgastric liver biopsy. All biopsies in the initial study[9] were performed by one endosonographer who subsequently proctored the second endoscopist for several cases. After several proctored procedures, the second endoscopist independently performed PC needle biopsies. The study population therefore represents our entire experience with the QC needle through 2011 and consecutive subsequent patients with the PC needle through 2014.

Before liver biopsy, a complete EUS examination was performed for the referred indication followed by an examination of the visualized liver. Prophylactic antibiotics were not given routinely for the liver biopsy unless otherwise indicated. All patients were monitored in the recovery area for a minimum of 90 minutes before discharge. EUS-guided core liver biopsy was performed under real-time EUS guidance through the lesser curve of the stomach into the left lobe of the liver. The left lateral lobe was the preferred site for biopsy. However, if this site was inaccessible, the medial segment of the left lobe or the caudate lobe was considered. Doppler interrogation of the anticipated needle path was performed to exclude the presence of intervening blood vessels. Liver core biopsy was then performed by using either the QC needle or PC needle as described earlier. For both needles, no further passes were made when the macroscopic aggregate length was >15 mm or the endoscopist believed that further passes were futile. Specimen processing after liver biopsy was the same for both needles. Biopsy specimens were immediately placed in formalin. At our center, we routinely stain for reticulin, fibrosis (Masson trichome), and iron (Prussian blue) in addition to hematoxylin and eosin stains.