"One stop" liver-focused endoscopy: EUS-guided portal pressure gradient measurement technique

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Referral for abnormal liver chemistry is one of the most frequently encountered reasons for visits to gastroenterologists and hepatologists, particularly given the versatility and vulnerability of the liver.[1] Here, we present a 40-year-old man with class III obesity, essential hypertension, and hyperlipidemia who was referred for further diagnostic workup of his abnormal liver chemistry. Despite periods of significant weight loss, his liver transaminases had remained elevated over the prior 10 years (alanine aminotransferase 20-93 U/L, aspartate aminotransferase 20-71 U/L). Diagnostic workup included an abdominal ultrasound with evidence of hepatic steatosis and transient elastography (Fibroscan) that demonstrated a liver stiffness of 12.8 kPa, S3 (marked steatosis), and F3 (severe fibrosis). After reviewing the risks, benefits, and alternatives, the decision was made to perform an EGD to evaluate for stigmata of portal hypertension and an EUS to obtain a liver biopsy specimen and portal pressure gradient (PPG) measurements.

The patient was intubated and remained in the supine position for the entirety of the procedure (Video 1, available online at www.VideoGIE.org). Initially, an EGD was performed, with no endoscopic evidence of varices or stigmata of portal hypertension. Next, the EUS examination was performed. The left lobe of the liver appeared diffusely hyperechoic, suggestive of steatosis. Real-time elastography was then performed on the left

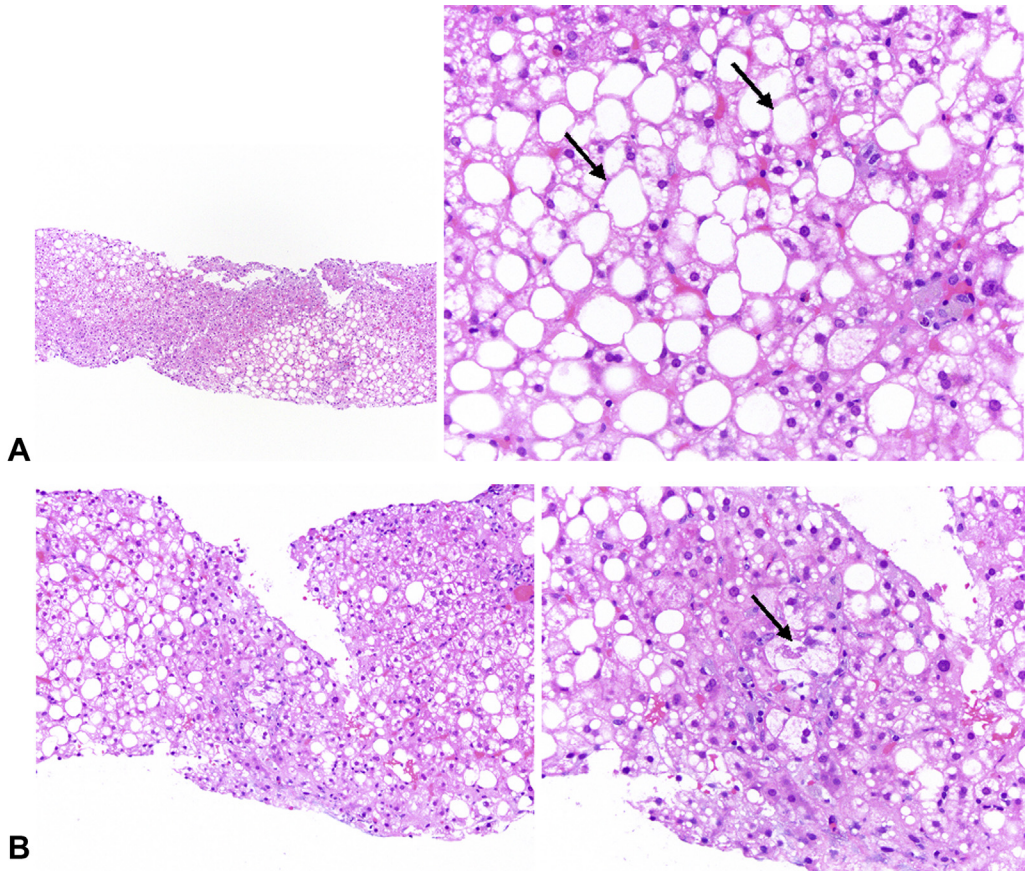

Figure 1. A, Mild macrovesicular steatosis affecting 25% of hepatocytes. Hepatocytes contain intracellular droplets of lipid that displace the nuclei to the periphery *(arrows)*. **B,** Ballooned hepatocytes with Mallory-Denk bodies *(arrows)*, which is indicative of injured hepatocytes in steatohepatitis.

and right lobes of the liver to assess liver stiffness. The region of interest was positioned over the hepatic parenchyma, and an average of 10 measurements was obtained from each lobe of the liver. Mean liver stiffness was 11.5 kPa. The EchoTip Insight Portosystemic Pressure Gradient Measurement System (Cook Medical, Bloomington, Ind, USA) then was set up, involving a 25-gauge FNA needle, noncompressible tubing, a compact digital manometer, and heparinized saline solution. The middle hepatic vein was first identified and punctured using a transgastric approach. Once the needle tip was seen within the vessel, approximately 1 to 2 mL of heparinized saline solution was used to flush the needle. The pressure reading on the manometer was obtained and recorded once stable. This process was repeated a total of 3 times, including repeat flushes of heparinized saline solution to obtain the mean hepatic vein pressure measurement. Next, the umbilical portion of the left portal vein was identified, and using the aforementioned approach, the process was repeated 3 times to obtain the mean portal vein pressure measurement. The PPG was calculated by subtracting the mean hepatic vein pressure (16.4 mm Hg) from the mean portal vein pressure (23.4), which measured 7 mm Hg (consistent with preclinical portal hypertension). Last, EUS-guided liver biopsy was performed. Using a 19-gauge EUS–fine needle biopsy needle primed with heparin, we performed a transgastric puncture to obtain a sample from the left lobe of the liver. This process was then repeated using a transduodenal approach to obtain tissue from the right lobe of the liver. Liver core was then expressed onto a slide and sent to surgical pathology.

The patient was discharged home after endoscopy without any adverse events. Surgical pathology from the liver biopsy revealed mild steatohepatitis with stage 0-1/4 fibrosis (Fig. 1). On outpatient follow-up, the patient was started on a stricter diet and exercise regimen for weight loss. EUS-guided applications have been increasing over the past decade; today, both endoscopy and echoendoscopy offer tremendous diagnostic information to help guide management in the workup of liver disease.[2] In particular, EUS-guided liver biopsy has emerged as a safe and minimally invasive approach and an alternative to a percutaneous technique and now can be paired with EUS-guided real-time elastography and PPG measurement.[3,4] Here, we demonstrate the safety and technique of EUS-guided PPG measurement in the diagnostic workup of abnormal liver tests.

DISCLOSURE

Dr Sharaiha is a consultant for Boston Scientific and Apollo Endosurgery (terminated). All other authors disclosed no financial relationships.

Abbreviation: PPG, portal pressure gradient.

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