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Opinions

Endohepatology: current status and perspectives

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1. Introduction

Hepatology is a dynamic sub-specialty of gastroenterology related to the evaluation and management of patients with challenging liver diseases, that often require clinical expertise, as well as a variety of resources including laboratory, imaging, endoscopic and percutaneous or intravascular interventions. Caring for the growing subset of patients suffering from complex liver conditions carries significant implications at many levels, involving additional time, human resources and the need for special equipment availability, all of which impact the cost of healthcare delivery.

Over the past three decades, endoscopic ultrasound (EUS) has become a very important diagnostic and therapeutic tool for patients with pacreatobiliary diseases. However, recently the use of EUS in the diagnosis and management of liver diseases has acquired greater relevance, evolving into an exciting new area referred to as Endohepatology. This concept was introduced in 2012 by KJ Chang et al., who emphasized the need to incorporate advanced endoscopic techniques into the hepatology practices [1].

The anatomical relationship of the liver with the stomach and duodenum makes it an accessible organ to visualize through EUS. This method provides real-time imaging, which allows for performing diagnostic evaluations and therapeutic interventions in the hepatic parenchyma and vessels (figure 1). EUS thus offers advantages to hepatologists as an alternative diagnostic and, in specific instances, therapeutic method [2,3]. Technically, the EUS probe can be placed close to the liver, avoiding overlapping structures such as bowel loops, the gallbladder and the ribs. It contributes not only to achieving superior quality images in real-time but also to performing transient elastography, tissue sampling and portal pressure measurements during a single procedure.

The most studied topics in the field of Endohepatology are shown in table 1 and described below:

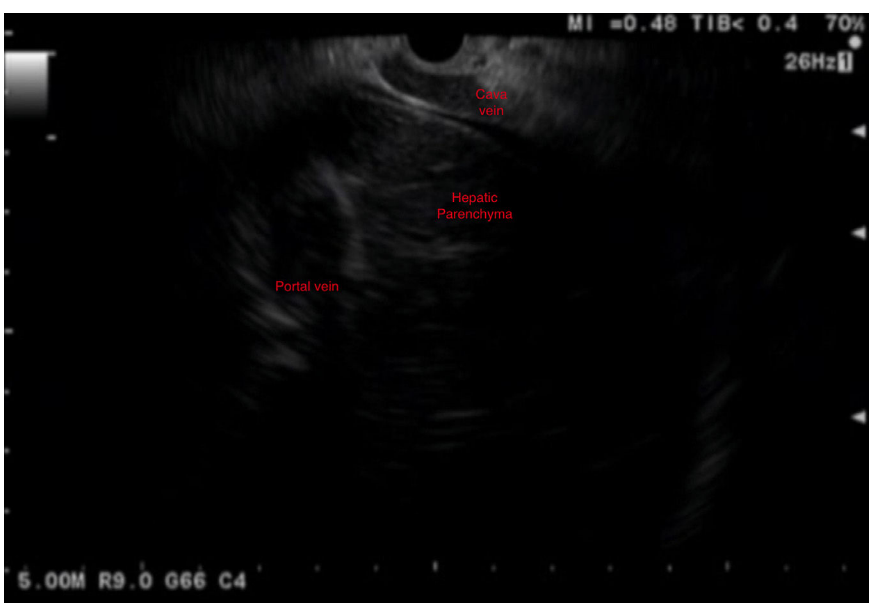

Figure 1. As the EUS scope is passed through the gastroesophageal junction and then is rotated counterclockwise Portal vein, Cava vein and liver parenchyma could be seen.

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Table 1
Endohepatology: current and future areas

Area	Use
Liver parenchyma	Evaluation of liver parenchyma Transient elastography EUS guided tissue acquisition
Vascular	Portal Pressure measurement EUS guided variceal obliteration
Future	EUS guided TIPS Portal blood sampling

EUS: Endoscopic Ultrasound; TIPS: transjugular intravascular portosystemic shun.

1.1. Evaluation of Liver parenchyma: tissue sampling and elastography

Since 2017, liver biopsy acquisition through EUS (LB-EUS) has been described as a safe and standardized procedure, offering results comparable to those of traditional methods such as the percutaneous biopsy (PCB) and transjugular approaches. PCBs remain the gold-standard procedure, reported to have a diagnostic yield of between 67-94% [4], with potential adverse effects observed only in 0.09- 3.1% of patients [5]. The transjugular approach has also represented an attractive option, especially with the development of interventional radiology, since it offers the possibility of measuring the hepatic venous pressure gradient (HVPG) while performing biopsy sampling. This provides a more physiologic correlation of the biopsies with low complication rates between 0.56-6.5% [5]. Bleeding at the puncture site, abdominal pain, liver capsule distention caused by a hematoma, hemorrhages from an extracapsular liver puncture, capsular perforation of the hepatic artery and ventricular dysrhythmia are all complications reported as a result of using the transjugular approach. By contrast, the advantages of LB-EUS include the anatomical relationship between the stomach and the liver, tissue sampling in real-time, avoiding intravascular access, lower levels of pain, and the possibility of simultaneously performing other endoscopic procedures such as elastography, portal pressure measurements and, in specific instances, providing primary prophylaxis with endoscopic band ligation (EBL) or cyanoacrylate as well as coiling for gastric varices.

A number of authors have compared LB-EUS vs. PCB. However, the results have been inconclusive because their criteria for defining "adequate liver biopsy" have differed. This notwithstanding, in balance, EUS-LB has proved to be an effective and safe approach when properly indicated, comparable to more traditional methods in terms of its diagnostic performance and safety profile [6–8].

Ultrasonographic elastography is a modality used to visualize the elastic properties of tissues. Technological advances in ultrasound equipment have supported the evaluation of elastography (EG) in endosonography procedures. Strain elastography (SE) initially served to perform qualitative examinations based on color patterns; while quantitative tissue elasticity diagnoses (strain ratio (SR), and histogram analyses (SH)) can be performed by image processing. Nevertheless, because tissue elasticity cannot be measured using absolute values, these can only be used for subjective measurements. Shear wave elastography (SWE) can objectively measure tissue elasticity using absolute values. Thus, EUS can provide a one-stop diagnostic modality to screen and assess fibrosis stages in patients with liver disease correlated with LB-EUS.

Real-time elastography can be advantageous over transient elastography by Fibroscan (Echosense, Paris) in the detection of fibrosis, as it can estimate liver stiffness in all patients, regardless of BMI, and has the potential to differentiate between fibrosis and steatosis, allowing histological confirmation is needed through LB-EUS, EUS -guided liver biopsy is a safe technique with a diagnostic yield for liver parenchymal at least comparable to percutaneous or transjugular routes [9,10]

1.2. Vascular interventions: EUS-guided variceal obliteration and portal pressure measurement

Ligation is the recommended form of endoscopic therapy for acute esophageal variceal bleeding. Endoscopic therapy with tissue adhesives (e.g., N-butylcyanoacrylate/thrombin) is recommended for acute bleeding from isolated gastric varices and type 2 gastro-esophageal varices that extend beyond the cardias. [11] At present, options for treatment of gastric varices include transjugular intrahepatic shunts (TIPS), balloon retrograde transvenous obliteration (BRTO) when TIPS are contraindicated and expertise is available, and the endoscopic use of tissue adhesives such as cyanoacrylate through EGD or EUS. It has been suggested that EUS-guided therapy for GV is

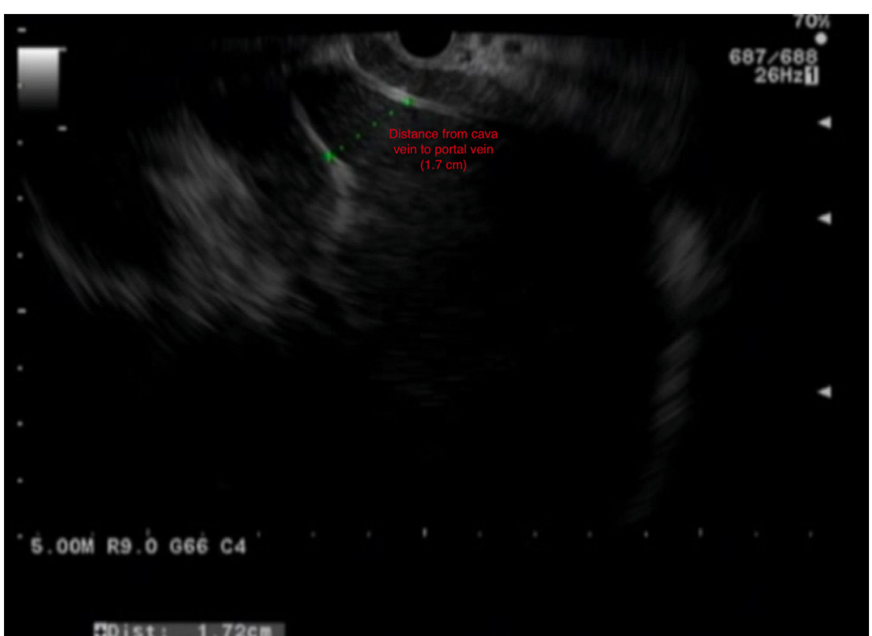

Figure 2. In transgastric position, the portal system and general circulation (cava vein) could be seen in the same axis and potentially, with a stent, could be "connected".

superior to an endoscopic injection as it decreases the rate of rebleeding [12]. When total costs are considered, EUS-guided coils plus cyanoacrylate offers a more cost-effective option than the cyanoacrylate injection alone by upper endoscopy [13].

The uses of EUS in portal hypertension are numerous and go beyond the treatment of GV; for instance, it is currently possible to assess hemodynamic changes (measure portal pressure). Even though evidence regarding the uses is scarce, the fact is that portal pressure measurement through EUS is direct (a clear difference from the intravascular approach). There is evidence in humans not only of the accuracy and performance of EUS-guided portal pressure gradient (PPG), but also of the correlations between EUS-PPG and the clinical markers of portal hypertension. [14, 15]

The future

Given the information discussed above, the future of EUS in Endohepatology is clearly promissory. Of course, further evidence is needed and soon will be arriving. New frontiers for Endohepatology are emerging in areas such as the development of EUS-guided TIPS (figure 2), portal vein blood sampling through liquid biopsy technology, screening for liver tumors using artificial intelligence and EUS-guided ablation of liver neoplasias, all of which are already under development.

Declarations of interest

None

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