Endo-hepatology: A new paradigm

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Recent advances in the field of hepatology have included new and effective treatment for viral hepatitis, with an increased need for assessment of liver function and histology. At the same time, as demonstrated by the articles in this special edition, there have been a growing number of endoscopic procedures that are pertinent to liver patients. Ironically, although gastroenterology and hepatology are within the same specialty, these trends are not necessarily integrated and perhaps even disparate. Hepatologists increasingly turn to radiologists for liver imaging and interventional radiologists for liver biopsy and management of portal hypertension. However, it would be most ideal if the assessment and treatment of liver disease and portal hypertension could be performed and assimilated by the primary liver/gastrointestinal (GI) specialist. We see this integration among specialists in esophageal and pancreaticobiliary diseases. It should be no different in hepatology. We have termed this area of integration or overlap of endoscopic procedures within the practice of hepatology as "Endo-Hepatology" [Figure 1].

CURRENT STATUS

Currently, most hepatologists perform either upper endoscopy[1] or capsule endoscopy[2] for detecting and assessing the severity of esophageal varices. In addition, endoscopic band ligation is the preferred technique for the treatment of active bleeding and secondary prophylaxis.[3,4] For gastric fundal varices, practice guidelines from our societies (American College of Gastroenterology[5] and the American Association for the Study of Liver Diseases[6]) recommend endoscopic directed intravariceal injection of cyanoacrylate glue as the treatment of choice in the setting of acute bleeding. While the current role of endoscopy in hepatology practice is limited to the assessment and treatment of varices, there is a groundswell of emerging applications of EUS to patients with liver disease.

EUS LIVER ASSESSMENT

Transabdominal ultrasound is routinely utilized in assessing the liver parenchyma for the degree of fibrosis/cirrhosis and detecting occult malignancy in high-risk individuals. Low-frequency gray scale imaging (≤5 MHz) is typically used to assess the liver parenchyma, liver shape and size, spleen size, and hepatic vessel appearance. In contrast, high-frequency linear array gray scale imaging is used to assess the liver surface (>5 MHz). Doppler techniques, such as pulsed wave Doppler is used to study the portal, hepatic and splenic veins, as well as the hepatic artery with measurement of maximum or mean velocities. In this edition, Tsujino will discuss the assessment

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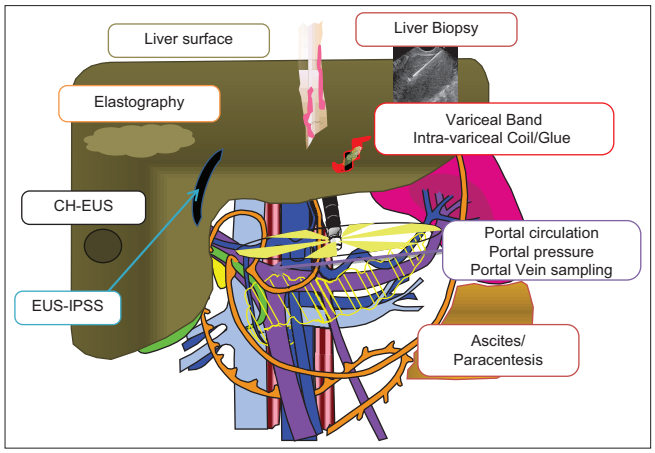

Figure 1. Concept of "endo-hepatology." CH-EUS: Contrast-enhanced harmonic EUS; EUS-IPSS: EUS- intrahepatic portosystemic shunt

of liver segments using linear EUS. As you will see, EUS can be used to accurately evaluate lesion location within the liver. EUS liver segment anatomy will become increasingly important when locoregional treatments under EUS such as radiofrequency ablation, photodynamic therapy, and ethanol injection become more widely available for liver tumors.

As EUS technology advances, we gain imaging enhancements. For example, elastography will likely become a standard option for EUS processors soon. Using elastography (especially transient elastography), the liver parenchymal stiffness has been measured and correlated with the degree of liver fibrosis[7-11] Another EUS image enhancement is contrast-enhanced harmonic EUS.[12-15] This can also potentially help improve detection of tumors in the liver.[16-19] Both these novel EUS enhancements are of great interest in the assessment of liver disease and will be covered in an article by Lisotti, Serrani, Caletti, and Fusaroli.

EUS-GUIDED LIVER BIOPSY

A percutaneous liver biopsy is the standard procedure for obtaining hepatic tissue for histopathological examination and remains an essential tool in the diagnosis and management of parenchymal liver diseases. The use of liver biopsy is increasing with the advent of liver transplantation and the progress being made in antiviral therapeutic agents. While blind percutaneous needle biopsy has been the traditional technique, the use of US guidance has increased considerably. A recent review of the literature indicates that the use of ultrasound-guided biopsy is superior to blind needle biopsy due to higher risk for major complications, postbiopsy pain and biopsy failure in the latter.[20] EUS-guided FNA has been reported to detect and biopsy focal lesions in the liver with high precision.[21-24] In this edition, Huang will show that EUS-guided liver biopsy technique has become a viable option for core tissue acquisition, especially if done concurrently (under same sedation) with surveillance endoscopy.

EUS ASSESSMENT OF ASCITES AND PARACENTESIS

EUS is has been shown to be very sensitive in detecting ascites. If indicated, EUS-guided FNA can be employed to perform diagnostic paracentesis.[25-27] In addition, any suspicious nodule in the peritoneum which can be imaged through the ascites fluid can be targeted by FNA for cytological diagnosis.[28-30] An article by Chin will focus on EUS assessment of ascites and paracentesis.

EUS ASSESSMENT OF PORTAL CIRCULATION

A growing number of studies have explored EUS-guided vascular catheterization and access due to the relative proximity of the GI tract to the major blood vessels of the mediastinum and abdomen. In particular, EUS-guided access of the portal vein (PV) and hepatic vein may be favorable given the relative difficulty of PV access via standard percutaneous routes. Currently, standard practice to measure the portal pressure gradient (PPG) has been limited to percutaneous procedures using ionizing radiation and calculation based on indirect measurements. Samarasena, Yu, and Chang provide a review and update on the advances made in EUS assessment of portal circulation and EUS-guided PPG measurement

EUS-GUIDED VASCULAR INTERVENTION

In this edition, Weilert and Binmoeller provide an overview of emerging EUS-guided vascular access and therapy procedures. These include EUS-guided cyanoacrylate injection of gastric varices, EUS-guided intravascular coil placement (alone or in combination with glue injection), intrahepatic portosystemic shunt, and microcoil embolization of vascular structures to occlude small and large vessels. These are preliminary concepts with very limited data but nonetheless indicate an interesting and exciting growth area.

Table 1. Current and potential future roles of endoscopy in liver disease and portal hypertension

	Diagnosis	Therapy
Current standard of care	Assess esophageal varices Assess gastric varices	Esophageal band ligation of esophageal varices Intra-variceal glue injection of gastric varices
Emerging role	EUS-guided liver biopsy Portal pressure gradient measurement	EUS-guided coil embolization of gastric varices
Potential future role	Assessment of liver surface Assessment of liver parenchyma with elastography and contrast enhancement Portal vein sampling in gastrointestinal cancer Assessment of obliteration of esophageal and gastric varices	EUS-guided RFA or cryoablation of liver lesions EUS-guided TIPS procedure perform high volume paracentesis EUS-guided glue injection in combination with coils EUS-guided large volume paracentesis

RFA: Radio-frequency ablation, TIPS: Transjugular intrahepatic portosystemic shunt

EUS-GUIDED PORTAL VEIN SAMPLING

Recent studies have demonstrated that in patients with pancreaticobiliary cancer, EUS-guided aspiration of blood from the PV can be safely performed and yield a higher number of circulating tumor cells when compared to peripheral blood. EUS-guided PV access is an exciting new field and natural advancement for the procedure. Chapman and Waxman will review the rationale and technical aspects of EUS-guided PV sampling for diagnostic purposes in GI cancer

CONCLUSIONS AND FUTURE DIRECTIONS

Among the emerging EUS procedures, perhaps the "low lying fruit" may be EUS-guided liver assessment and biopsy. However, we believe many of the other possibilities will become reality as well. Table 1 summarizes the current, emerging, and potential future roles of endoscopy in liver disease and portal hypertension. As this intersection of endoscopy and hepatology expands, it would broaden the field of Interventional EUS to include proficiency in EUS assessment of the liver, peritoneum, and portal circulation, including EUS-guided liver biopsy and therapeutic vascular intervention. Consolidating surveillance endoscopy (assessing for varices) with a complete EUS evaluation into a single comprehensive procedure would, in our opinion, optimize patient care.

Conflict of Interest

There are no conflicts of interest.

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