Harmonic EUS-guided fine-needle aspiration of small cholangiocarcinoma (with video)

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A 66-year-old female presented with painless progressive cholestatic jaundice of 2 months duration. There were no comorbidities. Serum bilirubin was 9.8 mg/dL with conjugated fraction being 7.1 mg/dL. Ultrasound and contrast-enhanced computed tomography done elsewhere revealed a dilated common bile duct (CBD) till the lower end and no mass or stone could be visualized. EUS was performed using a linear echoendoscope (UCT180 linear echoendoscope, Olympus Optical Co. Ltd., Tokyo, Japan) under conscious sedation using intravenous midazolam. EUS confirmed the presence of dilated CBD with intraluminal sludge [Figure 1]. An ill-defined hypoechoic mass lesion measuring 8 mm was seen in the lower end of CBD causing luminal narrowing [Figure 1]. This mass lesion demonstrated stiff blue-colored pattern on EUS elastography [Figure 1; right panel]. A EUS-guided fine-needle aspiration (FNA) from the CBD mass was performed using a 22G Needle (Acquire™ needle, Boston Scientific Corporation, MA, USA). Because of small size of the lesion, visualization of the needle into the mass was difficult [Figure 2]. To improve the visualization of needle into the mass, FNA was performed using harmonic EUS. Switching to harmonic EUS led on to better visualization of the needle as well as the edges of the mass lesion [Figure 3 and Video 1]. Cytological evaluation of the sample aspirated revealed features suggestive of adenocarcinoma. She, subsequently, underwent pancreaticoduodenectomy and resected specimen confirmed the presence of a small mass at the lower end of bile duct [Figure 4]. The pathological evaluation of resected specimen confirmed the diagnosis of cholangiocarcinoma and the resected margins were free of the tumor.

Harmonic imaging is a technique of B-mode imaging in which an ultrasound signal is transmitted at a given frequency known as fundamental frequency, but the image is generated using harmonic frequency.[1] Harmonic frequencies are integer multiples of the fundamental frequency that originate from the native tissues during ultrasound imaging.[2] Harmonic imaging results in improved image resolution because of elimination of the fundamental frequency signal that is responsible for the “noise” in imaging.[1-3] Harmonic imaging results in improved lateral resolution, reduced side-lobe artifacts,
and improved signal-to-noise ratio.\textsuperscript{1-3} It has been shown that smaller lesions are better defined with harmonic imaging.\textsuperscript{2,3} Harmonic imaging has also been shown to be superior to conventional ultrasound in the visualization of lesions containing highly reflective tissues such as fat, and calcium, and therefore would lead to better visualization of needle during FNA as was depicted in our case.\textsuperscript{1-3} In conclusion, simultaneous fundamental B-mode and harmonic EUS imaging can help in better visualization as well as sampling of small subtle lesions.

\textit{Declaration of patient consent}

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understand that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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\textit{Conflicts of interest}

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