



## EUS of a submucosal lesion at the appendiceal orifice using a double-balloon endoluminal intervention platform

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### INTRODUCTION

The use of curved linear array (CLA) and radial EUS in the lower GI tract has largely been limited to the sigmoid colon and rectum, as their oblique optics present a challenge in advancement to the right side of the colon. While catheter-based miniprobes are available for endosonographic assessment of lesions in the right side of the colon, they are limited by the inability to perform fine-needle biopsies (FNBs). Recently, a double-balloon endoluminal intervention platform (DEIP) has become available to aid in EMR and endoscopic submucosal dissection. The DEIP consists of a soft, flexible sheath equipped with 2 manually inflatable balloons: a “fore” or front balloon, and an “aft” or rear balloon. Together, these balloons are designed to create a stable “therapeutic zone” during EMR or endoscopic submucosal dissection. However, the DEIP may also aid in cecal intubation, as retraction of the sheath and endoscope with an inflated aft-balloon shortens the colon, allowing for the endoscope to be advanced further. We present a case in which a DEIP was used to advance a radial and CLA echoendoscope into the cecum for evaluation of a submucosal lesion at the appendiceal orifice.



**Figure 1.** CT imaging demonstrating soft tissue density at the cecum.

of unclear etiology and clinical significance (Fig. 1). The patient was evaluated by general surgery for a discussion of surgical options but favored a conservative approach and repeat endoscopic evaluation with EUS. A decision was made to therefore perform DEIP-assisted EUS of the lesion.

### CASE

An asymptomatic 56-year-old man was referred to our practice after a screening colonoscopy revealed a 20-mm submucosal lesion at the appendiceal orifice. A contrast-enhanced CT scan of the abdomen and pelvis noted an ill-defined mixed soft tissue density just inferior to the cecum

*Abbreviations: CLA, curved linear array; DEIP, double-balloon endoluminal intervention platform; FNB, fine-needle biopsy.*

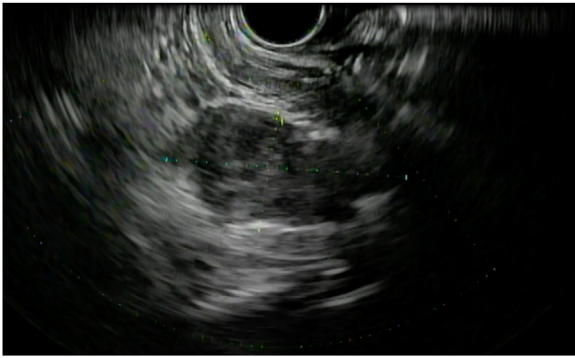
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**Figure 2.** The double-balloon endoluminal intervention platform (DiLumen; Lumendi, Westport, Conn, USA).



**Figure 3.** EUS image of submucosal lesion at the appendiceal orifice measuring 33 × 16 mm.

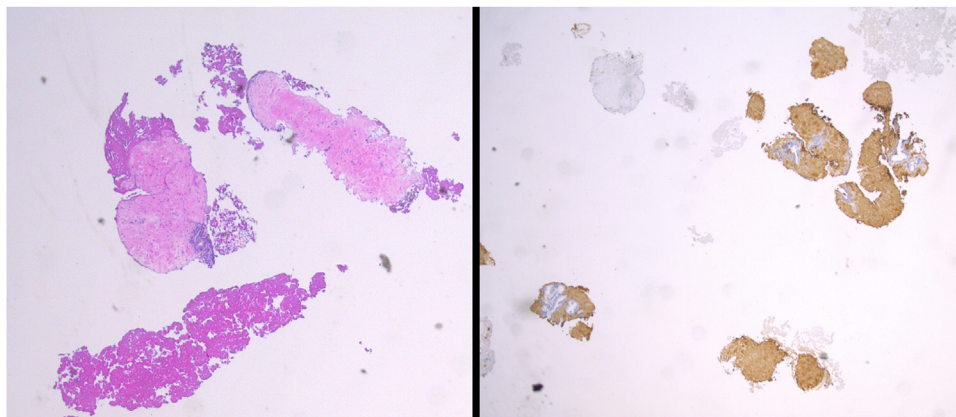
## METHODS

A pediatric colonoscope equipped with a DEIP (DiLumen; Lumendi, Westport, Conn, USA) (Fig. 2) was advanced to the cecum where a 20-mm submucosal lesion was seen at the appendiceal orifice (Video 1, available online at [www.giejournal.org](http://www.giejournal.org)). The aft-balloon was inflated, and the DEIP was left in place, after which a radial echoendoscope (Olympus, Center Valley, Pa, USA) was passed through a slit cut into the sheath of the DEIP, and advanced into the cecum. Radial EUS demonstrated a hypoechoic lesion arising from the fourth layer (muscularis propria). The radial echoendoscope was then exchanged for a CLA echoendoscope (Olympus) through the DEIP, and the linear EUS revealed an irregular 33- × 16-mm hypoechoic mass (Fig. 3). FNB of this lesion was then performed using a 22-gauge US biopsy needle using a transcolonic approach. Final pa-

thology demonstrated a leiomyoma (Fig. 4), and the patient was able to avoid an unnecessary surgery.

## DISCUSSION

High-quality EUS using radial and CLA echoendoscopes have enabled accurate diagnoses of submucosal lesions in the GI tract; however, lesions in the right side of the colon have often remained out of reach. To our knowledge, this is the first reported use of a DEIP for the facilitation of EUS with FNB in the lower GI tract. This technique is reproducible throughout the entire colon and may also be beneficial in settings where mucosal biopsies are inconclusive and core biopsy specimens need to be obtained. While there are forward-viewing echoendoscopes that may allow conventional cecal intubation, they are not widely available and have a narrower scanning range (90°) compared with CLA echoendoscopes (180°).<sup>1</sup> By functioning similar to a single-balloon enteroscope, the DEIP offers a degree of familiarity to most endoscopists but is instead equipped with manually inflatable balloons. This alleviates the need for additional equipment and offers a simpler learning curve to support staff. While our case demonstrated this technique to be safe and effective, special attention should be made during insertion of the echoendoscopes, and the assistance of fluoroscopy should be considered. Additionally, careful consideration should always be taken prior to pursuing FNB in the lower GI tract, as adverse events such as perforation and bacteremia have been reported.<sup>2</sup> While further studies of this technique are necessary to assess its true safety and efficacy, our case demonstrates that with use of a DEIP, high-quality EUS with FNB can be performed in the right side of the colon, allowing for an



**Figure 4.** Biopsy revealed a leiomyoma with histopathology demonstrating smooth muscle with fibrin, positive for smooth muscle actin stain (H&E, orig. mag. × 2.5).

accurate diagnosis. Use of this technique should be considered in the investigation of lesions in the proximal colon.

## DISCLOSURE

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## REFERENCES

1. Levy MJ, Abu Dayyeh BK, Fujii LL, et al. Prospective evaluation of adverse events following lower gastrointestinal tract EUS FNA. *Am J Gastroenterol* 2014;109:676-85.
2. Thinrunroj N, Hara K, Mizuno N, Kuwahara T, Okuno N. Utility of forward-view echoendoscopy for transcolonic fine-needle aspiration of extracolonic lesions: an institutional experience. *Clin Endosc* 2020;53:60-4.

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