Potential pitfalls in diagnostic EUS of the esophagus

Dear Editors,

The senior authors of "Predicting Pediatric Esophageal Wall Thickness: An EUS Study"[1] have taken the unorthodox step of composing an additional accompanying letter to illustrate potential pitfalls when performing diagnostic EUS. All publications have the implied understanding that other investigators will be able to replicate and extend their findings. As summarized in the discussion section of our article and demonstrated in this letter, variations in the approach to obtaining EUS measurements can yield dramatically different results.

While diagnostic EUS can provide insights into the deeper organization of any healthy or diseased gastrointestinal tract wall, reproducible measurements require a single, uniform approach. This is illustrated in the preliminary attempts to apply EUS to study eosinophilic esophagitis (EoE). Small series in children[2] and adults[3] suggest that increases in esophageal wall thickness (TWT) are seen by EUS, which correspond to esophageal wall remodeling. However, as referenced in our accompanying article, contradictory published observations question if this tool can be utilized in a meaningful way.[1]

Several areas of potential controversy were uncovered while performing 130 diagnostic EUS investigations on 100 pediatric patients with suspected, newly diagnosed or treated EoE. A detailed description of the technique employed and the results of measurements in control children are reported in our article. Studies employed an Olympus 20 mHZ miniprobe through a 2.8-mm channel pediatric Olympus endoscope and an Olympus EU M30S processor, Pennsylvania, USA.

Figure 1a and b illustrates two issues. Two measurements of the lamina propria from the same patient, during the same procedure, yielded significantly different values. Measurements were obtained with either maximal (1a) or passive (1b) distension and with the inclusion (1b) or exclusion (1a) of a furrow. With maximal distension, there is a decrease in the wall thickness. In addition,

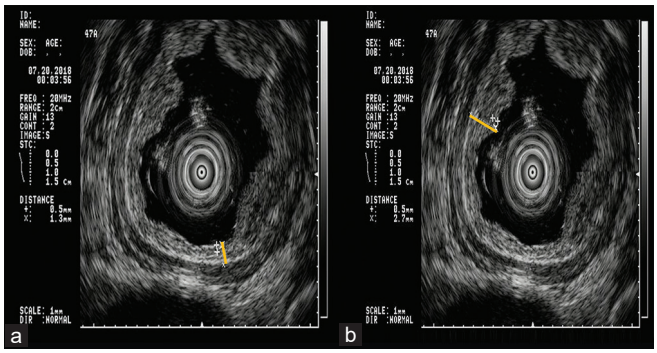

Figure 1. Both images were taken from the same patient, a few minutes apart. (a) The cursors indicate that the mucosa and submucosa measure 1.3 mm in a maximally dilated esophagus by avoiding the thickened folds as has been recommended previously. (b) The cursors demonstrate that measuring with passive distension of the esophagus and including a furrow yields a mucosa + submucosa diameter of 2.7 mm

furrows, a recognized feature of EoE, markedly increase the diameter. Presently, there are no guidelines describing the recommended conditions to guide the performance of EUS in EoE patients.

The issue of passive *vs.* maximal distension can now be circumvented with the utilization of a balloon sheath (*e.g.*, Olympus MAJ-643R , Pennsylvania, USA) which can fit over the Olympus miniprobe. Filling the balloon with water creates the acoustic interface, avoiding the need to add free water to the lumen.

Addition potential sources of controversy in reporting esophageal wall measurements will also require clarification. These include difficulties in distinguishing the mucosa and the submucosa interface, especially in younger children; the presence of additional hypoechoic signals in the lamina propria; the precise definition of distal and proximal measurements; and whether measurements obtained with an adult endoscope with a built-in processor, with a miniprobe utilizing either free water or an endoscopic balloon, are all equivalent.

We recommend that an expert consensus panel address these, and other, issues and that the conclusions be published with representative EUS images to illustrate the principles. This will permit clinical clarity when reporting EUS characterization of submucosal

pathology. In addition, multicentric scientific investigations using a single technique may then provide evidence-based recommendations.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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Received: 2019-12-06; **Accepted:** 2020-04-06;
Published online: 2020-08-14

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Quick Response Code:

Website: www.eusjournal.com

DOI: 10.4103/eus.eus_22_20

How to cite this article: Rabinowitz SS, Grossman E, Gress F. Potential pitfalls in diagnostic EUS of the esophagus. Endosc Ultrasound 2020;9:272-3.