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Editorial

Single balloon; how deep, safe and successful can an enteroscopist dive!

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The small bowel has largely been an inaccessible area for endoscopic evaluation. The length of small bowel varies from 360–600 cm in the adult and the tortuous anatomy and extreme mobility due to the mesentery limits its complete evaluation. Although Sonde[1] and push enteroscopy[2] have been utilized earlier to diagnose and treat small bowel disease, the former has become obsolete being time-consuming and uncomfortable and the latter is of limited value as the examination is restricted to the proximal jejunum. Intraoperative enteroscopy is another direct access option for lesions deep in the small bowel, but it is invasive. Subsequently, video capsule endoscopy (VCE) and double balloon endoscopy (DBE) were developed for complete examination of the small bowel. DBE offers therapeutic interventions which are not possible with VCE. Recently single balloon enteroscopy (SBE) and spirus enteroscopy have emerged as alternatives for evaluating the small intestine. DBE, SBE and spirus enteroscopy have been categorized as device assisted enteroscopy (DAE).

The most common indication for small bowel enteroscopy is obscure gastrointestinal tract bleeding. In about 5-10% of individuals with gastrointestinal tract bleeding, no cause can be found at upper or lower endoscopy. Some authors suggest a repeat upper and lower gastrointestinal endoscopy as missed lesions have been reported in 25-75% cases.[3] "Mid gut" bleeding still remains the most common cause. The incidence of gastrointestinal bleed is ever increasing due to wide spread use of anticoagulation (double or even triple) for concomitant heart or cerebrovascular disease. Besides gastrointestinal bleeding, important indications for small bowel evaluation include conditions like refractory celiac disease, chronic diarrhea and polyposis syndromes. The diagnostic yield is low when enteroscopy is performed for abdominal pain without additional signs or symptoms.[4] Small bowel enteroscopy has immense therapeutic implications that include stricture dilation, stenting, direct percutaneous jejunostomy tube placement, treatment of bleeding lesions, polypectomy, and endoscopic retrograde cholangiopancreatography in individuals with altered small bowel anatomy.

In 2001, Yamamoto et al's report on DBE, described the first enteroscope that allowed deep access into the small bowel with therapeutic capacity.[5] The DBE (with push-and-pull technique) once passed into the proximal small bowel, allows pleating of bowel on the back of the overtube with serial inflation and deflation of balloons and thus facilitates forward advancement of the enteroscope. In a prospective controlled study on patients evaluated with both DBE and push enteroscopy, the depth of insertion and diagnostic yield were significantly higher with DBE.[6] The main limitation of DBE is failure to advance deep into the small bowel. Beyond the ligament of Treitz, due to the fan-shaped mesenteric stalk of variable length, configuration, and laxity, only variable success of total enteroscopy (4–86%) and diagnostic yield (43–80%) has been reported.[7-9] Total small bowel enteroscopy is possible but requires significant experience (over 150 cases) to improve completion rates as the postsurgical abdomen, altered small bowel anatomy, and large body size may limit complete enteroscopy even in the best

hands.[10] SBE represents another emerging technique for deep enteroscopy, in parallel with DBE. The system includes a flexible video-enteroscope, an overtube with a balloon at its tip, a balloon control pump and a high definition video monitor. The procedure can be performed via oral (antegrade) and/or anal (retrograde) route by a single endoscopist with two assistants. Balloon-assisted enteroscopy requires a significant learning curve in acquiring the skills necessary to perform, with a significant decline in overall procedure time and fluoroscopy time after the initial phase.

Though initial experience with SBE demonstrated that the total enteroscopy rate with SBE was between 5 and 25%, these findings might be explained in part by the learning curve required in using the SBE technique.[11-14] In an Italian multicenter prospective study, the authors reported a total enteroscopy rate for SBE as high as 47%.[15] This is comparable to the results of a recent review on total enteroscopy from 23 studies with DBE involving 1143 patients, which showed that successful total enteroscopy was achieved in 569 patients and the consequent pooled total enteroscopy rate was 44.0%.[16] Ramchandani et al in a series of 106 patients with SBE, showed that overall new diagnosis was established in 46% and the extent of known disease was assessed in 15% of cases. In 21% of patients, therapeutic interventions were carried out while surgical treatment was directed to 8.4% of the patients. No major complications were observed.[17] Takano et al showed that the diagnostic and therapeutic yields were not significantly different between SBE and DBE procedures, and concluded that both techniques seem to be interchangeable in a routine clinical gastroenterology practice.[18] In the first randomized multicenter, head-to-head comparison trial of DBE vs. SBE by Domagk et al, SBE was found to be no more inferior with respect to the insertion depth and complete visualization in a considerable number of patients (130 procedures) over a short study period (12 months).[19] Though most of the clinicians focus on the depth of insertion, it is important to appreciate that the overall detection of lesion and achieving a clinical impact may be more important than the total enteroscopy rate.

In the current issue of the journal, Dutta et al[20] report performance characteristics, diagnostic yield and safety of SBE in a single center experience over the past 3 years. Anterograde route of examination was used in 42 patients, retrograde route in 36 patients and both routes in 6 patients. Thus, a total of 48 antegrade and 42 retrograde procedures were performed. The procedure was unsuccessful in 5 patients (all during retrograde route). The commonest indication was for evaluating suspected Crohn's disease (41.7%) followed by obscure gastrointestinal bleed (31%). In this series the technical success and extent of the bowel examined was better with the antegrade route. The median length of jejunum seen varied from 80 cm to 120 cm, depending on the experience of the endoscopist (lower with initial 15 procedures). The median length of ileum visualized was 75 cm in the retrograde route. They noted that SBE via oral route has a relatively faster learning curve, while retrograde examination seems to be technically more difficult to improve upon. There are no studies from India examining the learning curve for either SBE or DBE.

The common endoscopic findings were small bowel strictures, mucosal nodularity and ulcerations. Apart from targeted biopsy of lesions, random biopsies from normal appearing intestinal mucosa were obtained from all patients with suspected Crohn's disease, abdominal pain and malabsorption. The overall diagnostic yield of the procedure was 32.1% and Crohn's disease was the most frequent diagnosis (17 patients). The yield was highest in patients with suspected Crohn's disease (54.3% of 35 patients) while it was low in rest of the groups including patients with obscure gastrointestinal bleeding. The diagnostic yield of SBE in the current series is about 30% which is less compared to about 45 to 60% yield reported from other more recent series.[21,22] As explained by the authors this could be due to limited depth of examination that was possible in patients with obscure GI bleed. However greater experience should definitely produce comparable results.

The study however reassures the safety of SBE in patients with suspected small bowel disorders with just one patient reporting abdominal pain after retrograde SBE which also resolved without any further intervention. There were no reported bleed or perforation. Similar series have reported occasional perforation and bleed after biopsies. The study spanned a period of over 3 years and during this period they could generate the learning curve of one endoscopist. It would take several years at a single center or require a multicenter study to generate learning curves of multiple endoscopists. The role of fluoroscopic imaging performed in the study is another area that needs to be established. A recent study in DBE failed to show any added benefit of fluroscopy.[23] The authors concluded that SBE is safe and establishes a diagnosis in one-third of the patients examined. SBE via antegrade route has a higher success rate and faster learning curve than retrograde route. The clinical success will improve further with experience.

The limitation of this study is that it does not really address clearly the impact of SBE as a diagnostic and therapeutic approach in these patients with small bowel disease. Moreover it does not answer the burning question of two balloons (DBE) vs. one balloon (SBE) or no balloon (spirus enteroscopy) enteroscopy as the best technique to examine and treat small intestinal diseases. The recently introduced motorized version of the spirus enteroscope seems to be have the potential of ultimately becoming the most acceptable means of enteroscopy and may make comparative studies between single and double "balloons" irrelevant.

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