How to Approach the Small Bowel with Flexible Enteroscopy

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KEYWORDS

• Push enteroscopy • Double balloon enteroscopy
• Single balloon enteroscopy • Balloon-assisted enteroscopy
• Spiral enteroscopy • Small bowel endoscopy

Flexible enteroscopy is a more invasive procedure in comparison with the purely diagnostic capsule endoscopy. However, the main advantages of flexible enteroscopy in comparison with other imaging procedures (eg, capsule endoscopy and magnetic resonance Sellink) are that it allows histologic sampling and endoscopic therapy. Nowadays, several techniques are available for the approach of the small bowel, including push enteroscopy (PE), balloon-assisted enteroscopy (BAE) using 2 balloons (double-balloon enteroscopy [DBE]) or 1 balloon (single-balloon enteroscopy [SBE]), balloon-guided enteroscopy (BGE), and spiral enteroscopy (SE). PE became established in the 1980s but is associated with only a limited depth of penetration into the small bowel. This limitation was overcome through the development of BAE using the DBE or SBE technique.[1–4] In optimal cases, the entire small bowel, or at least considerable proportions of it, can be visualized using balloon enteroscopy (usually by combining the oral and anal examinations). This system has become established throughout the world for diagnostic and therapeutic small bowel examinations and is now being used universally in clinical routine work. In addition to the classic indication for small bowel endoscopy, the DBE or SBE technique has a variety of other potential uses as well, for example, in difficult ileocolonoscopies, for access to the pancreatic and biliary tract in patients with a surgically modified gastrointestinal tract, and for access to the stomach in patients who have undergone bariatric surgery. SE is another promising recently introduced enteroscopic system that is equipped with a raised helix at the tip of the overtube.[5] In contrast to the BAE techniques, which follow the push-and-pull principle, this new enteroscopic technique pleats the small bowel by rotating.

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FLEXIBLE ENTEROSCOPIC TECHNIQUES

PE

Push video enteroscopes are 200- to 250-cm long devices (dependent on type and manufacturer) and might be used with a stiff overtube (85–120 cm) to prevent looping of the enteroscope in the stomach. Although initial studies showed an increase in the depth of insertion with the use of an overtube,[6,7] later studies with graded-stiffness enteroscopes have questioned the additional value of the overtube.[8,9] The following are the main advantages of PE: it is easy and quick to perform, it is not a staff-consuming procedure, the overtube is reusable, and there is no need to set up a special system (eg, a pump control system). All these facts avoid extra costs and, therefore, PE is a cost-saving technique for the investigation of the proximal small bowel.[1] PE for the lower digestive tract is not commonly performed because insertion depth of colonoscopy with ileoscopy seems equivalent to lower PE.[10]

BAE

DBE

The DBE system (Fujinon, Inc, Saitama, Japan) consists of a high-resolution video endoscope with a working length of 200 cm and a flexible overtube made of polyurethane. Latex balloons are attached both at the tip of the enteroscope and also on the overtube and they can be inflated with air or deflated using a pressure-controlled pump. At present, 3 different types of devices are available with the DBE system. First type is the EN450-P5 model with a working channel of 2.2 mm and an outer diameter of 8.5 mm. Second is the EN450-T5 model with a working channel of 2.8 mm and an outer diameter of 9.4 mm. The corresponding overtubes have diameters of 12.2 and 13.2 mm with an overall length of 145 cm. Third is the EC450-BI5 model with a length of 152 cm, an outer diameter of 9.4 mm, a working channel of 2.8 mm, and a corresponding overtube with a diameter of 13.2 mm and a length of 110 cm. This device is mainly used for difficult ileocolonoscopy, endoscopic retrograde cholangiopancreatography in surgically altered anatomy, or proximal small bowel endoscopy. The main advantage is that there is no need for specially designed accessories, and all standard equipment can be used.

The principle of the DBE technique is based on alternating pushing and pulling maneuvers and alternating inflation and deflation of the balloons, allowing the small bowel to be threaded step-by-step onto the overtube (**Fig. 1**).[4,5] Depending on the

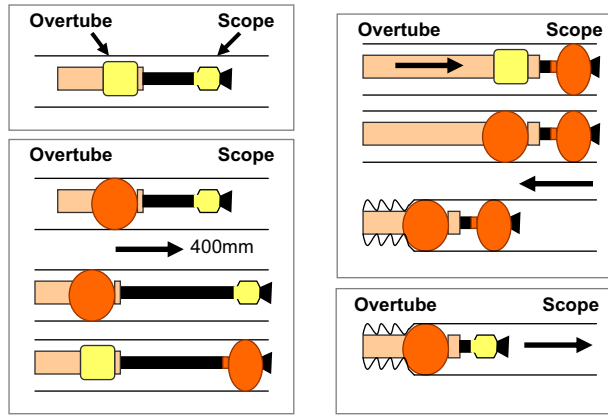

Fig. 1. Principle of push-and-pull enteroscopy in double-balloon technique.