Introduction

Balloon-assisted endoscopy (BAE) is the general term for double-balloon endoscopy (DBE) and single-balloon endoscopy (SBE).¹ Both DBE and SBE use the same principle. A flexible overtube with a soft balloon is used to prevent the stretching of the intestine. The balloon, once inflated, “grips” and holds the intestine in place, preventing stretching of the intestine. Consequently, advancement of the endoscope shaft does not stretch the intestine, and the pushing forces are effectively transmitted to the endoscope tip. With BAE active shortening of the intestine is also possible, therefore, it enables deep intubation way over the length of the endoscope shaft.

But the remarkable features of BAE are not only excellent intubation depth, but also stabilization of the intestine which realize the reliable endoscopic control even in the distal small intestine. These features have enabled endoscopic treatments even in the small intestine or unstable positioning in surgically altered anatomy and colon.

Endoscopic treatments in the small intestine

Basically, most of the endoscopic treatments available in the stomach and colon can be performed in the small intestine when BAE is used. Frequently performed treatments include endoscopic hemostasis such as coagulation with argon plasma coagulation (APC) and clip placement, polypectomy and EMR, balloon dilation for strictures, and retrieval of foreign bodies.

To perform endoscopic treatment in the small intestine safely, its anatomical features should be well understood.

1. Anatomical features of the small intestine

The small intestine is a long and tortuous tube-like structure mobile in the abdominal cavity. Endoscopic control is often unstable with a regular endoscope even if the lesion is reached. Even with DBE, it is recommended to start treatments after stabilizing the control by arranging the shape of the endoscope shaft to be simple.
The luminal space is narrow and working space is limited in the small intestine. Over-insufflation should be avoided because it interferes stable control. In order to avoid over-insufflation, a transparent hood at the endoscope tip is useful. CO2 insufflation also prevent over-insufflation. Because intestinal wall is thin and soft, the risk of perforation is higher than in the colon. To avoid the risk of perforation, submucosal injection should be used whenever the risk is expected.

2. Hemostasis for intestinal vascular lesions

There are several types in small intestinal vascular lesions. We proposed endoscopic classification of the vascular lesions based on the presence or absence of pulsation and the size (Fig. 1). For type 1a and 1b, which have no pulsation, we recommend APC for treatment, and for type 2a and 2b, which have pulsation, we recommend clip placement for hemostasis.

3. Polypectomy for Peutz-Jeghers syndrome

The major problem in the management of Peutz-Jeghers syndrome (PJS) is small-bowel polyps, which can cause intussusception and necessitates multiple laparotomies. We had shown that nonsurgical management of small-bowel polyps in this syndrome is possible with extensive polypectomy by using double-balloon endoscopy.

4. New therapeutic DBE, EN-580T

The new model of therapeutic DBE, EN-580T was released in 2013. This model features with a larger accessory channel of 3.2 mm compared to the 2.8 mm of the previous model maintaining the same outer diameter of 9.4 mm. As a result, its therapeutic capability has been significantly improved maintaining the same maneuverability. Despite using the limited space for the large accessory channel, the image quality is also significantly improved by high-quality CCD and new lens system with a wide focus range (2-100 mm).
5. ERCP in patients with surgically altered anatomy

The short DBEs, EC-450BI5 and EI-530B, are suitable for ERCP in patients with surgically altered anatomy. Using the DBE system, biliary tract can be reached endoscopically with a high success rate even in patients with Roux-en-Y anastomosis. Because the working length of the short DBE, which is 152 cm, is short enough for standard accessory devices for ERCP, therapeutic ERCP procedures are successfully conducted using this system.4

BAE as colonoscopy

1. Difficult colon for intubation

BAE is useful in patients with difficult colon for cecal intubation. It has been demonstrated that the use of a short DBE is an effective and safe method for total colonoscopy in patients who previously underwent incomplete colonoscopies in a multicenter, prospective trial.5

2. Difficult treatment in unstable position

The short DBE is also useful for difficult treatment such as ESD in unstable position of the colon. The overtube balloon can grip the colon and stabilize the maneuverability of the endoscope, which enables a straight-forward control of the endoscope tip. Colorectal ESDs in otherwise very unstable positions can be performed using the short DBE.

Conclusions

BAE has dramatically improved small bowel diagnoses and therapeutics. It is especially useful in endoscopic treatments of various small intestinal diseases. BAE is also useful for ERCP in patients with surgically altered anatomy and difficult situations of colonoscopy.

References