Colonoscopy Complications: No Longer a Tough Nut to Crack!

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Introduction

Both hemorrhage and perforation are representative adverse events related to diagnostic or therapeutic colonoscopies. Clipping, bipolar or monopolar coagulation, epinephrine solution injection, and argon plasma coagulation are widely available therapeutic modalities for the procedure-related hemorrhage. Endoscopic closure methods using through-the-scope clips is now considered as an intraprocedural treatment option for colonoscopy-related perforation in selected cases. However, a certain proportion of the perforation and hemorrhage cannot be effectively treated in spite of these conventional endoscopic treatments and some of the endoscopic suturing techniques combined with conventional hemostatic clips may need high level of skills to apply in the clinical practice. Recently developed endoscopic devices such as, over-the-scope clip (OTSC), Overstitch suturing system and other endoscopic suturing devices may provide more reliable hemostasis and stronger sealing of the mural defect.

Over-the-scope clip (OTSC)

Currently available OTSC (Ovesco AG, Tübingen, Germany) has been tested in various ex-vivo and animal studies since 2007. After several studies about its therapeutic efficacy, this new device has been approved by Food and Drug Administration (FDA) in the United States since 2011.

1. Endoscopic closure for the perforation

Endoscopic perforation closure can be an effective alternative for surgical treatment in selected cases. In a single center based retrospective study including 4 colonoscopy-related perforations, 1 rectovaginal fistula, and 1 rectovesicular fistula, primary closure of the perforation or fistula site was possible after application of the OTSC. Although two fistula cases recurred, 4 colonic perforations were successfully treated without additional interventions. Two retrospective studies about the therapeutic efficacy of OTSC usage including 1 case of iatrogenic colonic perforation in each study showed successful endoscopic closure and favorable outcomes. A prospective multicenter study evaluated the efficacy of the OTSC for closure of the acute gastrointestinal perforations including 13 colonic perforation cases. In this study, 12 of 13 (92%) of colonic perforations were suc-
cessfully closed. However, 1 patient in whom a colonic perforation after polypectomy was shown to be adequately closed suddenly deteriorated 5 hours later. Immediate laparotomy revealed a detached clip and persistent perforation. In spite of subsequent surgical treatment, this patient died within 36 hours after study inclusion. A recent study including 10 colorectal perforations showed 9 of 10 successful closure using OTSC. One failed closure case was a sigmoid colonic perforation related to diagnostic colonoscopy and underwent laparoscopic segmental resection on the next day of the endoscopic closure due to peritonitis. Surgical specimen revealed the incompletely sealed perforation site. According to a systematic review about the performance in the endoscopic closure of iatrogenic gastrointestinal perforations, including experimental studies and clinical reports about endoscopic procedure-related perforations and/or postoperative anastomotic leakage, OTSC system showed a consistently high mean rate of procedural success of 80-100% and durable clinical success of 57-100%.

2. Hemostasis

A randomized study compared the OTSC with the Resolution Clip (Boston Scientific, Natick, MA) and Quickclip2 (Olympus, Tokyo, Japan) on spurting vessels of an ex vivo porcine stomach. In this study, OTSC needed significantly less time and number of clips to achieve hemostasis than the other clips. In a recent multicenter case series, 30 patients with refractory gastrointestinal bleeding, including 6 cases related to colonic endoscopic mucosal resection or submucosal dissection, underwent OTSC placement and primary hemostasis was achieved in 29 patients except 1 duodenal ulcer case that required angiographic embolization. One gastric ulcer patient and one duodenal bulb ulcer patient needed additional epinephrine injection due to rebleeding, but there was no rebleeding case in the colonic bleeding cases of this study. Randomized clinical trials to evaluate the therapeutic efficacy of OTSC for colonic bleeding are not available yet.

Overstitch endoscopic suturing system

Overstitch (Apollo Endosurgery, Austin, TX) is approved by FDA for endoscopic suturing and commercially available in the United States. However, the clinical application of Overstitch for the colonoscopy-associated complications such as perforation and bleeding were rarely reported. Stavropoulos et al. described that a Crohn’s disease patient who underwent endoscopic closure for the iatrogenic perforation at the splenic flexure using Overstitch. This patient had a second perforation at the cecum that was not found by the referring endoscopist and was discovered during surgical exploration performed due to persistent abdominal pain, fever and leukocytosis 24 h after the index colonoscopy. The surgeon discovered a second perforation in the cecum, which he successfully repaired surgically and confirmed successful endoscopic closure of the splenic perforation not requiring surgical intervention. In another recent report, a large colonic perforation related to endoscopic submucosal dissection was successfully managed after endoscopic suturing using Overstitch. Regarding the role of endoscopic suturing system for the treatment of GI bleeding, a recent study reported the successful and durable hemostasis of 3 patients with large gastric ulcer bleeding using Overstitch suturing. Little is known about the treatment outcome of endoscopic suturing for refractory colorectal bleeding, although endoscopic suturing may have a potential therapeutic role in a certain selected case.
Other endoscopic suturing devices

In addition to OTSC and Overstitch, several endoscopic suturing systems have been developed, including T-bar (Wilson-Cook Medical, Winston-Salem, NC), Eagle Claw (Olympus Medical, Tokyo, Japan), and double-arm-bar suturing system (DBSS) device (Zeon Medical Co., Tokyo, Japan). Among these, DBSS is the most recently developed and under evaluation in the ex-vivo models. In two recent studies, DBSS showed similar strength and air leak test results to hand sewn suture and better strength and air leak test results than OTSC system in the experimental model using porcine stomach.\textsuperscript{13,14}

Conclusions

Currently, OTSC and Overstitch have been approved by FDA for endoscopic treatment. Although these devices seem to be effective especially for the perforation or bleeding refractory to the conventional endoscopic treatment, there were limited data about their therapeutic efficacy for the colonoscopy-related complications. More clinical data are necessary to evaluate the role in the colonoscopy-related complications and to establish the indication of these new devices in the clinical practice.

References

12. Chiu PW, Chan FK, Lau JY. Endoscopic Suturing for Ulcer Exclusion in Patients With Massively Bleeding Large Gastric Ulcer.