What are the current indications for over-the-scope clips?

The current indications for over-the-scope clips (OTSCs) are quite ample and diverse. The major indication is to treat bleeding lesions—generally peptic ulcers—but it has been found that OTSCs are also very useful for other lesions such as Dieulafoy lesions, lesions at anastomoses, and other complex bleeding lesions such as post-resection ulcers and bleeding colonic diverticula. Another major indication for OTSCs is closure of perforations and fistulas. Indeed, OTSCs can be used for many types of fistulas or leaks from the esophagus to the gastroesophageal junction, stomach, duodenum, small bowel, colon, and rectum. These clips are especially useful for the treatment of defects of the gastrointestinal (GI) tract that involve the entire layer: mucosa, submucosa, muscle, and serosa. These clips also can be used to treat large lacerations that have not resulted in complete perforation. Additional indications for OTSCs in current practice are endoscopic full-thickness resections and to hold fully covered self-expanding metal stents in place.

What types of OTSCs are available, and how do clinicians choose among these various types for different clinical indications?

The OTSC system consists of a transparent applicator cap, a clip mounted on the cap, a hand wheel, thread, and thread retriever, following principles similar to those of esophageal band ligation systems. The 2 main types of OTSCs are the c- or bear trap–shaped OTSC and the flat, star-shaped OTSC. Whereas the star-shaped OTSC comes in one size, the bear trap–shaped OTSC (also referred to as the bear claw) comes in various shapes and sizes. The bear claw is the most used OTSC worldwide.

The closing spikes can vary according to intended use (Figure). One type of spike, referred to as t (for therapeutic) is intended for closure of perforations whereby the sharp spikes penetrate the tissue margins and keep them anchored. Small spaces in between the spikes allow for blood circulation, thus improving wound healing. T-shaped spikes may be the most versatile.

Another type of spike is rounded or blunted, and is referred to as a (for atraumatic). The atraumatic design was developed for use in bleeding lesions, especially in the presence of a visible vessel. The clip tightly compresses the center of the bleeding lesion.

A third type of clip, referred to as the gastric closure bear claw, has a combination of a rounded and sharp tip. It is especially useful to close recalcitrant gastrocutaneous fistulas.

The original diameter sizes were 11 and 12 mm. These sizes can be easily advanced through the mouth, esophagus, stomach, and on through the colon. A 14-mm clip was then developed for larger defects. This clip can be advanced through the anus into the rectum and colon.

A mini OTSC with a smaller-diameter application cap is now also available and is especially useful for patients who have a narrower esophagus or for holding stents in place. This smaller-diameter clip uses a cap no larger than the one used for esophageal variceal ligation. The principle of application of the OTSC is the same as for elastic banding.

OTSCs also can be used to hold endoscopes in place. The clips began to be used this way 10 years ago in...
Germany. The use of these clips to hold endoscopes has evolved since then, and now there is a clip specifically for holding endoscopes. Its cap has 2 edges on the tip that allow placement on the edge of the stent so that application is easier. Another newer OTSC is for endoscopic full-thickness resection.

**G&H** How are OTSCs positioned in current treatment recommendations for endoscopic hemostasis and upper GI bleeds?

**KM** In the European, Japanese, and several American gastroenterology society recommendations, OTSCs are considered first-line therapy. The introduction of OTSCs has challenged old dogmas about the treatment of peptic ulcer bleeding. Until recently, it was thought that whenever hemostasis for peptic ulcer bleeding was performed, dual therapy was needed. The field is moving away from the concept of requiring 2 interventions thanks to the introduction and expanded use of OTSCs, which were considered mainly as rescue therapy approximately 10 years ago.

**G&H** When using OTSCs to close perforations in the upper or lower GI tract, are there limits to the size of the wall defect that can be closed?

**KM** As discussed, there is an array of styles to fit different needs, but there are certainly limitations. It is important to understand that OTSCs are just another useful instrument in the toolbox; they are not a cure-all. For example, when using a clip without any additional supportive equipment, such as a special grasper, the maximum size of a defect that can be closed is approximately 10 to 20 mm. However, the beauty of these clips is that a special grasper with 3 arms can be advanced through the working channel of an endoscope. The grasper has an arm to the left, an arm to the right, and a small prong in the middle. Each arm can open and close separately so that 1 edge of a perforation can be tightly grasped and then the other. This allows for closure of defects that are up to 30 to 35 mm, especially in the colon, where the wall is thinner and tissue is more flaccid. Use of such a clip in the small intestine would not be feasible because of the tortuosity of the small bowel and the inability to move the endoscope back and forth in a smooth fashion.

As for the esophagus, many fistulas and leaks may be closed; however, in a scenario involving a 10-mm fistula in a patient following a course of radiation for cancer treatment, clip use would be challenging. Radiation is known to destroy target tissue and create fibrosis to heal a tumor. The tissue can be rock hard, creating problems for closing postradiation fistulas. Other solutions are needed to address these fistulas.

**G&H** Are sites within the GI tract more amenable than others to interventions using OTSCs?

**KM** Gastrocutaneous fistulas that occur after removing percutaneous endoscopic gastrostomy tubes are an ideal indication for OTSCs. Endoscope-associated perforations of the duodenum are another example, as are colonic perforations, specifically if the perforations are in the cecum, ascending colon, or sigmoid rectum. Use in tortuous areas, such as the descending colon, right colonic flexure, and small bowel, is quite challenging or impossible. Nevertheless, colleagues at the University of Alabama at
Birmingham have recently published a case report of successfully closing a fistula of the small bowel using OTSCs.

**G&H** How do OTSCs compare with standard therapies for the management of perforations?

**KM** The popularity of OTSC use has been evolving much like the transition from the use of sclerotherapy to banding for varices. Sclerotherapy was the standard of care, and banding slowly came into practice, but younger practitioners adopted banding quickly because of its ease of use and therapeutic superiority. The same attitude is being seen with the introduction of OTSCs. As mentioned, OTSCs were first thought of as a rescue therapy, but it began to be apparent that an OTSC could be used instead of traditional therapies such as injection and clipping or injection and cauterization. Complications—such as perforation caused by excessive cauterization, for example, in the treatment of a posterior ulcer in the duodenum—can be avoided. OTSCs, like the banding device, provide better ease of use and improve the ability to treat many types of bleeding lesions.

**G&H** What is involved when choosing among different treatment modalities?

**KM** Risk stratification based on how the lesion looks and where it is located is very important. Patient age also has to be taken into account. OTSC use may not be appropriate in a very old patient or in a patient who has a very short or tight esophagus. Also, OTSCs may be better than through-the-scope clips for use in the treatment of posterior duodenal ulcers because the endoscope can be better positioned. Of course, the availability of utensils and accessories also determines the choice of therapy. However, OTSCs should now be a standard tool in every endoscopy unit.

**G&H** How safe is OTSC use, and is magnetic resonance imaging a concern?

**KM** OTSCs are magnetic resonance imaging (MRI)-compatible; however, if they are released in an area close to where a tumor is being investigated with methods such as computed tomography or MRI, reflections can cause blurring on the image.

Regarding overall safety, operator error could be an issue, so the expertise of the practitioner is paramount. In one published report, a clip misdeployed on the finger of a nurse. In another report, a clip misdeployed on the tongue of the patient. These are clearly preventable operator-related incidents. Endoscopy units should be equipped with wire cutters to cut misdeployed clips.

It is also important to be aware of the amount of volume that the cap can accommodate to avoid full lumen closure by inadvertent suction of too much tissue. Like any endoscopic procedure, proper training and endoscopic skills are important for ensuring success and improved outcomes.

**G&H** What further developments in OTSC technology can be expected in the future?

**KM** More developments regarding mini clips can be expected. They will likely become easier to insert in patients with a smaller-caliber esophagus. These mini clips also will be incorporated into treatment of peptic ulcer bleeding and other causes of GI bleeding.

I invite readers to learn more about OTSCs and GI endoscopy at the worldwide endoscopy community EndoCollab at http://www.endocollab.com.

**Disclosures**

Dr Mönkemüller has served as a consultant for Cook Medical (USA), Ipsen (France), and Ovesco Endoscopy (Germany and USA).

**Suggested Reading**


