

Abstract

Post-surgical colorectal leaks and fistulas are severe complications that dramatically increase morbidity and mortality. Over-the-scope clip (OTSC) application, introduced in clinical practice in 2007, represents an innovative technique to seal the visceral wall for acute and chronic colorectal post-surgical leaks and fistula management. Endoscopic closure of colorectal post-surgical leaks and fistulas with OTSC is a safe technique that accomplishes a high success rate in both acute and chronic cases, including rectovaginal, rectovesical, and colocutaneous fistulas. Overall success rate is higher than 80%, as reported in the literature, in both acute and chronic situations. No OTSC-related complications have been described in the lower gastrointestinal tract so far. This article is part of an expert video encyclopedia.

Keywords

Anastomosis; Clips; Colorectal; Endoscopy; Fistula; Leakage; Video.

Video Related to this Article

Video available to view or download at doi:10.1016/S2212-0971(13)70186-9

Materials

- Endoscope: Olympus PCF-Q180 Video Colonoscope Innoflex[®]; Olympus Endoscope, Tokyo, Japan (any endoscope would be suitable as well).
- Clip: OTSC[®] system, consisting of an applicator cap and a hand wheel; Ovesco GmbH, Tuebingen, Germany.
- Accessory: OTSC[®] anchor/OTSC[®] Twin Grasper; Ovesco GmbH, Tuebingen, Germany.
- Guide wire: Radifocus[®] Guide Wire M Nonvascular, diameter 0.035"/0.89 mm, length 260 cm, tip shape straight; Terumo, Tokyo, Japan.

Background and Endoscopic Procedures

Anastomotic leakage is the most feared complication from colorectal surgery, leading to significant morbidity, increased mortality, prolonged hospital stay, and considerable extra cost. Its reported prevalence varies widely, from 1% to 39%, but clinically significant leaks probably occur in 3–6% of cases, depending on the definition and the type of resection undertaken.¹ There is no universally accepted definition of a dehiscence colorectal anastomosis. There is a wide range of clinical presentations: It might be clinically asymptomatic or present as a generalized peritonitis or as fecal discharge from the wound and/or drain requiring abdominal reoperation.² Operative endoscopy may play a significant role in achieving wound healing. In case of a localized abscess or an

anastomotic stenosis with an associated fistula or leakage, endoscopic vacuum-assisted closure (VAC) (also known as endo-VAC) therapy³ and endoluminal stenting⁴ are routinely performed and valid treatment options. An extravasation of radiological contrast in an otherwise low-symptomatic or even asymptomatic patient is still a strategic dilemma. Although it may only require surveillance, the need for a loop ileostomy or colostomy represents an indication for secondary surgery, and still does not ensure healing in all cases. In contrast to colonic perforation occurring during therapeutic endoscopy⁵, conventional endoscopic clipping is often unsuccessful on the anastomotic scar tissue, even at an early stage.

A new over-the-scope clip system called OTSC (Ovesco Endoscopy, Tuebingen, Germany)⁶ appeared on the market approximately 3 years ago. The system consists of a nitinol clip loaded at the tip of the endoscope that can capture a large amount of tissue and compress the lesion, thereby stimulating healing. Data from animal models and initial clinical use support the efficacy of OTSC in the treatment of gastrointestinal (GI) bleeding, though its role in the management of perforations in humans is minimal, and colorectal post-surgical leaks and fistulas anecdotal.^{7–9} Here are presented some tips and tricks that have been learned during development of the technology and long-lasting clinical application of endoscopic treatment of colorectal post-surgical leaks and fistulas using OTSC.

The first rule is that the OTSC should be placed into a clean bowel, or at least as clean as possible. Although there is an agreement today that bowel preparation is no longer needed for colon surgery, bowel preparation is recommended before rectal surgery, due to the higher incidence of complications (not only leaks and fistulas). If bowel preparation has not been performed properly, extensive washing from below should not be proceeded, neither blindly nor under endoscopic guidance, as this might cause dissemination of the bowel content in the extraluminal cavity, even to the peritoneum. If the amount of feces is considerable, and the patient does have a stoma as protection for the anastomosis, intensive lavage from above should be done, through the stoma.

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In a clean environment, although contaminated, the suspected leakage is first inspected using a standard endoscope. Indications for OTSC placement are leaks and fistulas with a wall defect/orifice measuring <12 mm diameter, in maximum. No extraluminal cavity should be present, as this would be a risk factor for abscess creation. It is not mandatory to fill the leakage/fistula lumen with glue; in fact, it would be better to simply wash it with iodopovidone solution.

Once indication is confirmed, after inspection and washing through the orifice applied, the endoscope is retrieved and the OTSC cap is mounted on the tip of the scope. It should be borne in mind that the releasing mechanism consists of a thread passing from the knob through the working channel to the tip of the scope, and then connected to the cap. It must be made sure while mounting the clip that the cap is rotated in a way that the thread moves straight from the channel of the scope to the cap, so that inner vision will not be impaired. Before reintroducing the endoscope, always turn the knob a half turn back to reduce tension on the thread, thus avoiding undesired release of the clip during the introduction.

While reintroducing the endoscope through the anus, it might be of some help, in order to avoid the pain resulting from the spikes of the jaws, to use a standard single-use anoscope as introducer, once the compatible internal diameter is verified.

If the tissue surrounding the defect is still soft (this is mostly the case directly after surgery), tissue manipulation might not be necessary, as simple suction into the cap should be sufficient. If the defect is wide, the use of the Twin Grasper is recommended. This consists of a single grasper with two independent opening jaws, thus allowing capture of both edges of the defect through a single working channel of the scope.

However, if the defect is fibrotic, the scar tissue requires particular strength for retraction, which can be obtained for small/medium orifices, measuring up to 5 mm, by means of the dedicated tripod anchor grasper. This is opened within the fistula, and the operator has to be careful not to release the clip over the anchor. Therefore, it is needed to retract the metal anchor until it appears out of the orifice.

One very important thing is to place the edge of the cap adherent on the entire circumference of the bowel wall. This is obtained by positioning the cap, i.e., the tip of the scope, perpendicular to the bowel wall. This maneuver is not so easy, especially in narrow tracts of the bowel. In these cases, a forceps or a dedicated grasper placed into the defect might help to keep the lesion in the center of the cap and to position the cap perpendicular to the wall.

If not contraindicated, the 'traumatic' version of the clip should be always used, which has sharp spikes at the tip of the jaws for better tissue entrapment.

The release of the clip is a four-hands procedure. Once the endoscopist has faced the defect and possibly grasped it with the Twin Grasper or the Anchor Grasper, the endoscopic assistant keeps the endoscope firmly in position while the endoscopist turns the knob until the OTSC pops off the cap.

If the clip is not properly released on the target, and if suspected that the fistula orifice is still patent, water-soluble

contrast may be injected to verify this. In case the OTSC is not correctly deployed, it can be removed. However, the forces of the clip are strong and removal is not as easy as for conventional metal clips. For removal of the OTSC clip, it is recommended to cool the clip by submerging it in cold water (it is suggested to always keep in a fridge for this event). After a few minutes, the clip loses its force and can be pulled away from the tissue with a normal foreign body forceps, so as to be able to better release a second one on free tissue.

Key Learning Points/Tips and Tricks

- The bowel is cleaned as much as possible with extensive washing.
- It is verified that the wall defect/orifice measures <12 mm and no extraluminal cavity is present.
- While mounting the clip, the cap is rotated in a way that avoids impairment of visualization.
- Before introducing the endoscope, the knob is half turned back to avoid undesired release of the clip.
- T-tube cap is preferably used for the working channel to allow washing.
- A standard single-use anoscope is used as introducer, to avoid pain in the anal region.
- Simple suction is used if the tissue is soft and the orifice is small.
- A Twin Grasper is used if the tissue is soft but the leak is wide.
- A tripod Anchor is used on chronic orifices measuring <5 mm.
- The lesion is kept in the center of the cap and the cap is perpendicular to the wall.
- If not contraindicated, the 'traumatic' version of the clip with sharp spikes is used.
- The knob is turned and the clip released while the tissue inside the cap is retracted.
- If the clip is misplaced, remove it by submerging it in cool (<10 °C) water for 2 min and pulling it out with a normal foreign body forceps.

Complications and Risk Factors

There are no complications reported during application in the lower GI tract.

Alternatives

The correct indication to release an OTSC is a wall defect measuring <12 mm, with no extraluminal abscess and, of course, no luminal stricture.

In case of a larger defect or in the presence of a stenosis, a covered, self-expandable metallic stent should be preferred.

In case an extraluminal cavity is present, for the risk of determining a closed abscess, endo-VAC therapy should be preferred instead.

Scripted Voiceover

Time (min:sec)	Voiceover text
00:00	A 62-year-old male underwent anterior resection for rectal cancer. On day four a CT scan is performed for suspected dehiscence, confirming the anastomotic defect and the surgical drain in place.
00:20	Here we perform endoscopic repair of the defect. You see the over-the-scope clip positioned at the tip of the scope. The anastomotic leak is faced with the endoscope and the soft tissue is sucked into the cap.
00:40	The clip is released by rotation of the knob, until the clip pops off.
00:50	Contrast injection confirms sealing of the defect and patency of the anastomosis.
01:00	A CT scan performed 5 days later confirms the defect closure, with no extra-luminal spillage of contrast means.

Time (min:sec)	Voiceover text
00:00	Six months after right colectomy for cancer, this patient was readmitted for an enterocutaneous fistula. A CT scan shows no abdominal liquid collection and confirms the fistula originating from the ileo-transverse anastomosis.
00:25	First we placed a drain tube through the abdominal wall through the fistula, for easy endoscopic localization of the colonic fistula opening. Then we performed colonoscopy and we see two internal orifices, visualized only in reverse position.
00:40	Despite the difficulty in reaching the area and visualizing the internal orifices, we attempt initial treatment with placement of an over-the-scope clip. At first the draining tube is pulled back. Then an 11 mm over-the-scope clip is placed in reverse position, over-the larger orifice. To pull the fistula into the cap we use a tripod anchor that is advanced 1 to 2 cm inside the fistula. Then the anchor grasper is enfolded so that the hooks of the grasper grasp the tissue inside the fistula. The grasper, with the captured scar tissue, is then pulled back inside the cap and suction is applied. Before the clip is released make sure that the grasper is pulled back enough, otherwise the clip might capture the grasper inside the fistula.
01:40	Always make sure that the edges of the cap encompass the entire circumference to the fistula opening. In most cases this is best achieved by meticulously positioning the cap perpendicular to the bowel wall. This maneuver is not so easy, especially in narrow tracts of the bowel. In difficult cases the dedicated grasper placed into the defect might help to keep the lesion in the center of the cap and to position the cap perpendicular to the wall.

	Here we see the clip is perfectly placed and completely closes the left sided fistula opening.
02:40	Now we can proceed and close the second fistula.
03:20	First, the opening of the fistula is positioned in the central position. Then the anchor grasper or the Twin grasper is advanced inside the fistula to retract the fibrotic tissue inside the cap. However, in many cases application of these accessories is not required and maximal suction is sufficient to place the fistula opening inside the cap. The release of the clip is a two-operator procedure. Once the fistula opening is sucked into the cap the assistant keeps the endoscope in position while the endoscopist releases the clip. This is done by turning the knob at the handle of the endoscope until the clip pops off the cap.
04:30	The positioning of a second clip reduced the output to about 20 ml/day. This is a follow-up colonoscopy 2 months after the intervention. You see complete closure of the larger defect, while the smaller one, although reduced to just 2 mm, persists. A hydrophilic guide wire is introduced through the abdominal wall to confirm the persistence of the fistula. A further 11 mm over-the-scope clip is placed with immediate success, persisting 2 months after the procedure.
05:25	It has been argued that anastomosis leakage and larger dehiscence can also be treated by over-the-scope clip to avoid further surgery, but the utility in this situation needs to be defined. The present case demonstrates that, despite the cluttered dimensions of the clip and the stiffness of its accessories for tissue handling, over-the-scope clips are a valid option for treating even complex fistulas in areas of limited access.

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Further Reading

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