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CLINICAL NOTE

A novel system for endoscopic closure of iatrogenic colon perforations using the Ovesco® clip and omental patch

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ABSTRACT

The growing endoscopic activity, both diagnostic and therapeutic, are also globally makes frequent endoscopic complications, perforation being one of the most serious. However, we also have more possibilities for endoscopic resolution of iatrogenic caused. We report the case of a sigmoid perforation during a colonoscopy that was resolved satisfactorily, avoiding surgery, by endoscopic closure with a nitinol clip Ovesco®.

Key words: Iatrogenic perforation. Colonoscopy. Ovesco®. Nitinol clip.

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CASE REPORT

An 82-year-old woman was admitted for assessment of iron deficiency after an episode of syncope. She had a surgical history of hiatal hernia repair 20 years earlier (which subsequently relapsed) and hysterectomy. Tumour markers were normal. Gastroscopy confirmed the presence of a hiatal hernia. Colonoscopy under deep sedation with propofol only and CO_2 insufflation revealed no abnormalities in the explored colonic segment. After traversing about 25 cm of the fixed sigmoid colon with difficulty, an iatrogenic perforation occurred. The perforation was immediately noticed and the endoscope was withdrawn, revealing an approximately 12 mm hole 18 cm distal to the anal margin, through which omentum could be seen (Fig. 1).

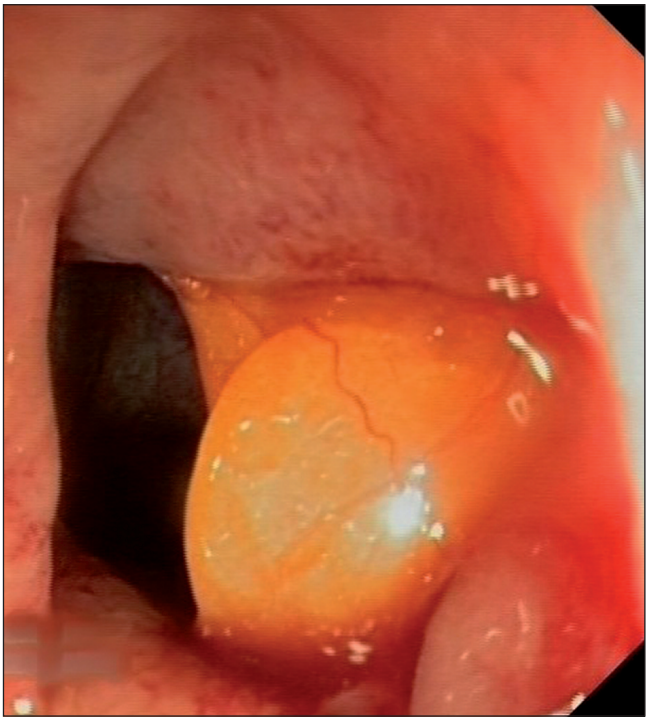

Fig. 1. Endoscopic image of colonic wall perforation, through which an epiploic appendix is visible.

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Fig. 2. Ovesco® clip pre-mounted on its plastic cap, which is fitted into the tip of the endoscope. One of the Ovesco® system forceps, with a double paddle and separate openings, designed to facilitate insertion of tissue into the cap, can be seen protruding from the working channel of the endoscope. Courtesy of IZASA.

Given the clinical stability of the patient, we decided to attempt the endoscopic closure of the perforation with the placement of an Ovesco® clip (Fig. 2). This involved removal of the colonoscope from the colon followed by insertion in the distal end of a therapeutic gastroscope (Olympus GIF 1TQ160), on the end of which was fitted an open nitinol clip mounted on a plastic cap. In this case, an 11-mm clip with rounded edges was selected. After reaching the perforation with the gastroscope, we moved the tip of the endoscope towards it by aspiration. There was no need to pull on the tissue with a clamp. We managed to insert the edges of the perforation into the cap, as well as a fragment of omentum that was aspirated from the colonic lumen. We then deployed the clip, which, when released from the gastroscope cap, closed onto the edges of the perforation, apposing and trapping them. The clip also encircled the aspirated omentum fragment, thus reinforcing closure with an omental patch. Closure was then completed with minimal, superficial residual recess by placement of two endoscopic clips (Boston Scientific®). Finally, the area was explored carefully with a 4.9 mm gastroscope (Olympus GIF N 180), to confirm sealing of the perforation and access to nearby sections (Fig. 3).

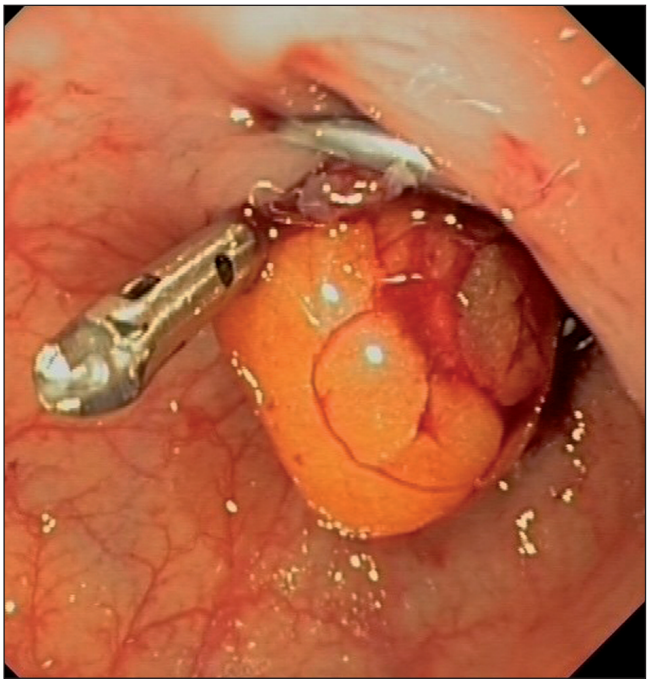

Fig. 3. Endoscopic closure of colonic perforation using an Ovesco® clip and endoscopic clips, with therapeutic intussusception of an epiploic appendix.

Fig. 4. CT image showing metallic material (clips) in the sigmoid colon and very little pneumoperitoneum.

The patient was transferred to the surgical ward for supervision. The surgeon on call had prior knowledge of the case and agreed with use of the endoscopic approach. Vital signs were normal and the patient complained of mild abdominal pain, but there were no signs of developing peritonitis. A liquid diet, fluid replacement, analgesics and broad-spectrum antibiotics were prescribed. At 24 hours, an abdominal CT scan was performed, which showed (Fig. 4) metallic artefacts in the sigmoid colon (consistent with the clips used to seal the perforation) and perihepatic and upper abdominal gas bubbles. A second CT scan performed five days later showed a small fluid collection (2.5 x 2 cm) adjacent to the sigmoid, with no pneumoperitoneum. This collection later disappeared and treatment was continued as originally prescribed. Oral feeding was resumed at 48 hours, and the patient was discharged 10 days after the perforation. At 7-month follow-up, she remains asymptomatic and the metal clip is still in situ, as confirmed by abdominal CT.

There were no complications. The patient declined further examination, as she was asymptomatic and her iron deficiency did not worsen.

DISCUSSION

Perforation of the colon during colonoscopy may be due to pressure against the bowel wall, barotrauma, or after a range of treatments (1). According to the literature, this complication occurs in 0.01% (2) to 0.3% (3) of colonoscopies, although the rate is less than 0.1% (4) in most series. However, due to the overall increase in the number of colonoscopies performed worldwide and the broader age range of individuals who undergo this procedure, the number of iatrogenic perforations can be substantial.

This is a severe complication and often requires surgery, although isolated case reports and small series of gastrointestinal perforations treated successfully with endoscopy alone have been published in recent years.

To date, the major drawbacks of endoscopic management of iatrogenic perforations have been the inability of clips hitherto, the most widely used system for endoscopic closure, to achieve sufficient apposition of the mucosa or submucosa to ensure sealing of the perforation in most cases (5) and the difficulty of using other suture devices developed for NOTES, some of which have shown efficacy comparable to manual surgical suture (6) but are quite complicated to use.

The Ovesco® system, used in the case described herein, is a novel nitinol clip which is preassembled in the open position on a plastic cap, which can be fitted to the distal end of an endoscope. When released, by means of a spool-and-wire system similar to that used in endoscopic band ligation for oesophageal varices, it closes and traps the edges of the perforation or even the entire thickness of the bowel wall (5). In an animal model, the system demonstrated efficacy similar to that of handmade sutures for closure of gastrointestinal perforations (6). The system is user-friendly, but its applicability may be limited by the fact that insufflation is reduced by the perforation, as the location of the perforation sometimes makes it difficult to approach with the endoscope. Another drawback is that the endoscope must be removed for placement of the device, since it is mounted on the distal end of the endoscope, as are ligature bands.

Perforations of up to 20 mm can be repaired with this clip. In some cases, two Ovesco® clips may be required, or the clip may be used in conjunction with other endoscopic techniques (7). An overall analysis of published studies in humans shows successful closure of the perforation with the Ovesco® system in 91% of patients in whom it was used (8).

Insertion of the edges of the perforation into the plastic cap is often accomplished with a special instrument, consisting of paddles that can be moved independently, or with a three-pronged hook. In our case, however, aspiration was sufficient. We were also able to insert an epiploic appendix into the cap, which was encircled between the edges of the colonic wall to form a safety patch covering the intraperitoneal side of the perforation, ensuring its closure and mimicking a surgical practice (the omental patch) often used when manually suturing such perforations. This method has also been used to seal gastrostomy holes in NOTES (9) procedures, but is not normally part of the endoscopic closure of an iatrogenic perforation.

In our opinion, the fact that insufflation during colonoscopy is performed with CO_2 instead of room air was a determining factor in our ability to address this complication in a confident manner, as it helped maintain the hemodynamic stability of the patient throughout the procedure. Furthermore, the absence of signs of peritoneal irritation in the hours following the procedure, removing all doubt as to the proper sealing of the perforation, which could have precluded further conservative management (10), probably played an important role as well.

In our case, the patient remains asymptomatic –and the clip *in situ*– 7 months after placement, but we are continuing outpatient monitoring due to the limited long-term follow-up experience in patients in whom the Ovesco® system was used for repair of bowel perforation.

Ultimately, the Ovesco® system appears to be a useful tool that should be available to all endoscopy units, as, after appropriate training, it can be used for conservative management of select iatrogenic perforations occurring during digestive endoscopy and thus avoid surgery.

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