

Endoscopic closure of an endoscope-related duodenal perforation using the over-the-scope clip

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Perforations of the duodenum are a significant source of morbidity in clinical practice. Surgical repair is usually mandated, but it is associated with significant morbidity and mortality. Until recently, there has been no technique available which reproducibly and safely allowed endoscopic closures of penetrating defects within the digestive tract. With the new over-the-scope clipping system", which regarding design and function is similar to a bear-trap, the endoscopic closure of perforations has become possible. Here, we report our first experience with the over-the-scope clipping system for the closure of duodenal perforation developed during endoscopic retrograde cholangiopancreatography. A 79-year-old woman with jaundice resulting from obstruction of the common bile duct caused by choledocholithiasis underwent endoscopic retrograde cholangiopancreatography. At the time of the procedure, an endoscopy-related perforation measuring about 15 mm was visualized proximal to the papilla. Endoscopic repair was performed by using the over-the-scope clipping according to a standardized operating procedure. Amsterdam type plastic stent was placed into the common bile duct. An abdominal computed tomography with gastrograffin showed a pneumoretroperitoneum in the peripancreatic-perirenal area and complete closure of the perforation. The patient remained symptom free, no signs of sepsis developed, and the obstructive jaundice was relieved by endoscopic biliary drainage. The patient was allowed to have a full diet one week later and was discharged from the hospital 2 weeks later. It seems that, the over-the-scope clipping is effective for endoluminal closure of endoscopy-related duodenal perforations.

Key words: Over-the-scope clipping, duodenal perforation, endoscope-related perforation

Endoskoplaki ilişkili bir duodenal perforasyonun skop-üstü-klip kullanılarak kapatılması

Duodenum perforasyonları klinik pratikte önemli bir morbidite kaynağıdır. Cerrahi onarım genellikle zorunlu olmakla birlikte, önemli morbidite ve mortalite ile ilişkilidir. Yakın zamana kadar, sindirim sistemi içindeki delici yaraları tekrarlanabilir ve güvenli bir şekilde endoskopik olarak kapatmaya izin veren bir teknik yoktu. Tasarımı ve fonksiyonu aynı tuzağına benzeyen yeni bir "scope üzerinden yakalama sistemi" ile perforasyonların endoskopik olarak kapatılması mümkün olabilir. Burada, endoskopik retrograd kolanjiyopankreatografi sırasında gelişen duodenal perforasyonun kapatılması için kullandığımız scope üzerinden yakalama sistemi ile ilk deneyimimizi rapor ediyoruz. Koledokolitiazise bağlı safra kanalının tıkanması sonucunda oluşan sarılık nedeniyle 79 yaşındaki bir kadına endoskopik retrograd kolanjiyopankreatografi yapıldı. İşlem sırasında, papillanın proksimalinde 15 mm çapında endoskoplaki ilişkili bir perforasyon izlendi. Endoskopik tamir, standart prosedürlere göre scope üzerinden yakalama kullanılarak yapıldı. Amsterdam tipi plastik stent koledok içine yerleştirildi. Gastrografin ile çekilen abdominal bilgisayarlı tomografi peripankreatik-perirenal alanda serbest hava ve perforasyonun tamamen kapatılmış olduğunu gösterdi. Hastada yan etki ve sepsis bulguları gelişmedi ve tıkanma sarılığı endoskopik biliyer drenajla düzeldi. Hastaya bir hafta sonra normal diyet verildi ve 2 hafta sonra da hasta taburcu edildi. Endoskoplaki ilişkili perforasyonların endoluminal kapatılmasında scope üzerinden yakalama etkili gözükmetedir.

Anahtar kelimeler: Scope üzerinden yakalama, duodenal perforasyon, endoskop ilişkili perforasyon

INTRODUCTION

Duodenal perforations during diagnostic upper endoscopy are rare; however, when therapeutic techniques are performed, the risk increases and is directly correlated to the invasiveness of the procedure (1). Most cases of iatrogenic perforations occur during therapeutic procedures, such as endoscopic submucosal dissection (ESD), endoscopic mucosal resection, endoscopic ultrasound-guided fine needle aspiration, and endoscopic retrograde cholangiopancreatography (ERCP)-sphincterotomy (2-4). In a retrospective study among 12,817 patients undergoing ERCP at the Medical University of South Carolina between 1995 and 2008, a total of 24 perforations (0.2 percent) were reported. Twelve were retroperitoneal perforations occurring during sphincterotomy, and the other 12 were wall perforations at sites remote from the papilla (5). Perforations occurring during diagnostic and therapeutic endoscopy may be large in diameter (6). Surgical repair is usually standard treatment, but it is associated with significant morbidity and mortality.

Endoscopic perforations treated with endoclips have been described in the literature since 1997 (7). However, they have limitations. For example, the restricted opening distance between the jaws and the low closure force reduce their ability to capture damaged tissue. Therefore, it is common to place multiple clips to treat endoluminal lesions (8).

A new over-the-scope clip system called OTSC (Ovesco Endoscopy, Tuebingen, Germany) has been developed (9). It is a nitinol clip loaded at the tip of the endoscope that can capture a large amount of tissue and compress the lesions until healing. Experimental studies have demonstrated the ability of the OTSC to close perforations (10-12) and the superiority of OTSCs relative to TTS clips for closure of perforations (13, 14). However, data regarding its role in the management of perforations in humans are scant (9, 15-22).

We report here a large duodenal perforation during ERCP that was sealed with an OTSC device and managed conservatively.

CASE REPORT

A 79-year-old woman with jaundice resulting from obstruction of the common bile duct caused by choledocholithiasis underwent ERCP. The patient's medical history included hypertension and asthma bronchiale. Ultrasonography and cholangiography revealed a stone in the distal bile duct with

marked biliary dilatation. At the time of the procedure, an endoscope-related perforation measuring about 15 mm was visualized proximal to the papilla (Figure 1). The patient was inoperable because of advanced age and comorbidities, so we tried endoscopic repair of the perforation. Because the hole was too large, we decided to close the perforation with an OTSC device [12-mm OTSC with blunt teeth (12-t); Ovesco Endoscopy, Tübingen, Germany] by using a therapeutic-channel gastroscope with a distal attachment. The patient gave informed consent before the endoscopic procedure. The clip was applied by pulling taut a wire threaded through the working channel of the endoscope similar to endoscopic band-ligation systems. The twin grasper was introduced through the working channel of the endoscope and used to approximate the borders of the defect and pull the tissue inside the cap (Figure 2). The edges of the perforation were suctioned into the cap at the same time. On-

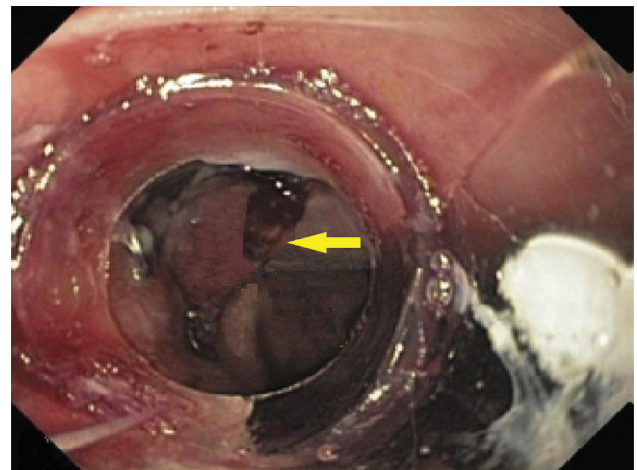


Figure 1. Endoscopic view of duodenal perforation.



Figure 2. The over-the-scope clip placed on the tip of the endoscope and the twin grasper introduced through the working channel.

ce the damaged tissue was fully pulled into the applicator cap, the clip was deployed (Figure 3). After this procedure, an Amsterdam type plastic stent was placed into the common bile duct. An abdominal computed tomography (CT) with gastrographin showed a pneumoretroperitoneum in the peripancreatic perirenal area and complete closure of the perforation (Figure 4). Peripheral parenteral nutrition and intravenous administration of antibiotics were begun, and oral intake was withheld. The patient remained symptom free, no signs of sepsis developed, and the obstructive jaundice was relieved by endoscopic biliary drainage. Repeat endoscopy with fluoroscopy showed

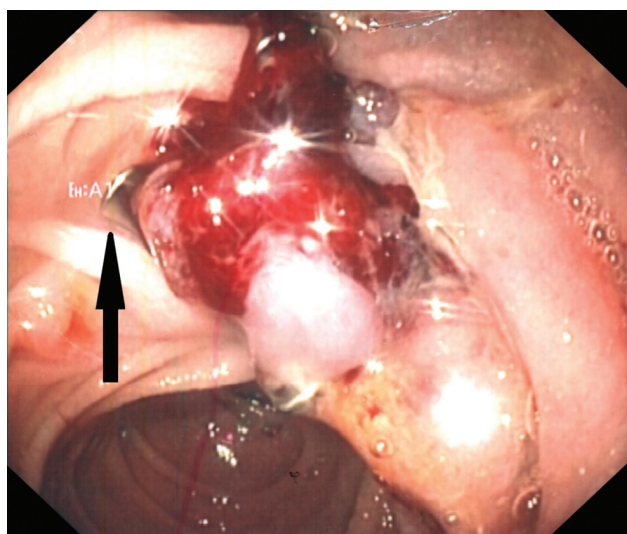


Figure 3. Endoscopic view of the perforation site closed with OTSC (arrow).

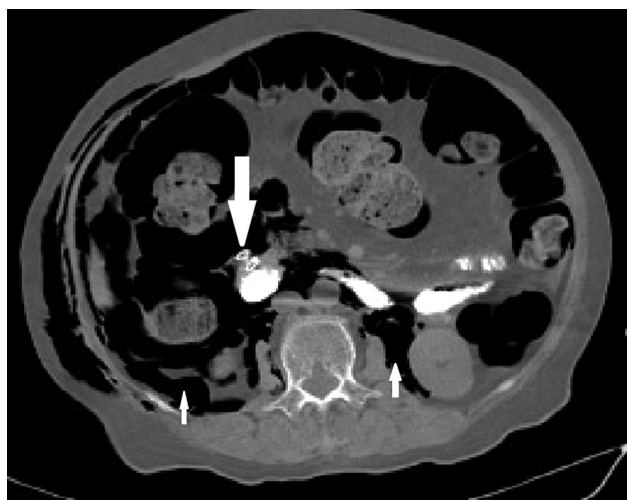


Figure 4. CT performed after the closure of the perforation with the over-the-scope clip (large arrow) showing the presence of a pneumo-retroperitoneum in the perirenal area (small arrows) and no evidence of leaks.

complete closure of the perforation 1 week later (Figure 5). The patient was allowed to have a full diet one week later and was discharged from the hospital 2 weeks later. A repeat CT performed 30 days later showed complete reabsorption of the retroperitoneal air (Figure 6).

DISCUSSION

Surgical repair is the mainstay of therapy in the case of acute duodenal perforations. Although sur-

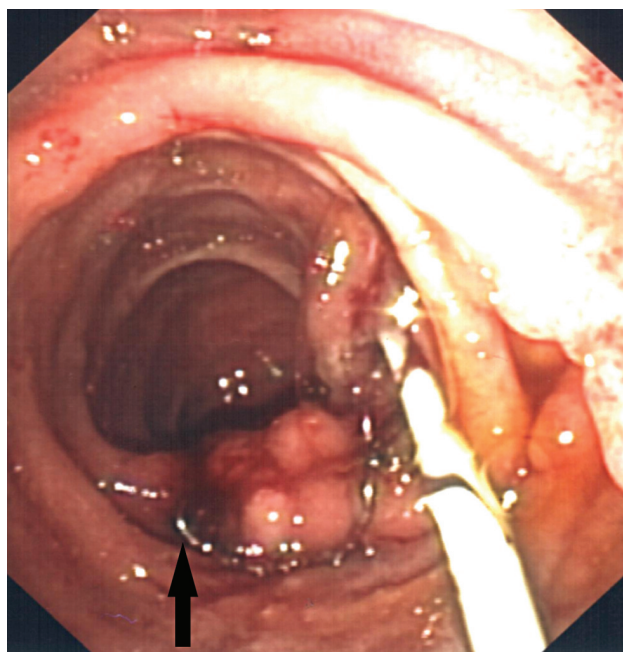


Figure 5. Endoscopic view of the perforation site closed with OTSC (arrow) 1 week later.



Figure 6. CT at day 30: complete reabsorption of the retroperitoneal air with the OTSC (arrow).

gery allows for reliable repair, it is not without significant morbidity and mortality, need for general anesthesia, and possible prolonged recovery, whereas endoscopic closure could represent a less-invasive alternative (3, 23, 24). Although associated with satisfactory clinical outcomes in some cases, the applicability of conventional endoclips is limited to small, localized lesions without inflammation or edema (23, 24).

The OTSC system is a new technique that enables the closure of gastrointestinal (GI) defects (fistulae, perforation sites, leaks) and may stop severe bleeding from large lesions of the GI tract. This clip surpasses conventional endoclips in terms of breadth and closure power and may therefore improve therapeutic options in endoscopy (9). It is simple to use, and experience with variceal ligation aids in feeling at ease with applying an OTSC because the application technique is alike.

Since its introduction in 2007, there are limited clinical experiences on the use of OTSC in patients with perforation. Based on our search on Pubmed, there are nine published case reports or case series with a total of 36 patients with gastrointestinal perforation in the literature (Table 1). Most of them (24 patients) were related to colon (9, 16, 18, 20-22). Six perforations were located in the stomach (15, 16, 18, 21), two perforations were in the esophagus (17, 21), and one perforation - in the jejunum (21). Only three perforations were related

to duodenum (16, 19), two of them (2/3 patients) being acute duodenal ulcer perforation (16). In the remaining one patient who had Billroth II anatomy, ERCP-related duodenal perforation was present (19). Closure of all perforations by using the OTSC was successful except one perforation located in the stomach (18).

As seen in the table, data supporting the use of OTSC to close duodenal perforations in clinical practice are still limited. The OTSC system comprises a variety of clips, based on the diameter and depth of OTSC caps (11, 12 and 14 mm) used and type of teeth (atraumatic with blunt teeth vs. traumatic with sharp teeth). To date, the selection of a particular type of clip for a specific indication and location within the GI tract has not been established, and there are no recommendations or guidelines to direct the choice of clip to be used. We used 12-mm OTSCs with short (blunt) teeth (12-t) for closing defect in the duodenum.

To our knowledge, this is the second report of ERCP-related duodenal perforation that was sealed with an OTSC device and managed conservatively. In the first report of ERCP-related duodenal perforation, Buffoli et al used a "retroperitoneal fat patch" to obtain complete closure of the large perforation (20 mm) at the OTSC clip deployment (19). We did not need anything other than the standardized operating procedure.

In our case, no complications were observed second-

Table 1. Summary of case series reporting endoscopic closure of perforations with over-the- scope clip (OTSC).

Author (Reference)	n	Perforation site	Technical success	Technical problem
Kirschniak (9)*	2	Colonic	Successful in all	-
Kirschniak (15)	1	Gastric	Successful	-
Parodi (16)	6	Colonic	Successful in all	-
	2	Gastric	Successful in all	-
	2	Duodenal	Successful in all	-
Pohl (17)*	1	Esophageal	Successful	-
Seebach (18)*	3	Colonic	Successful in all	-
	1	Gastric	Unsuccessful	The edges of the perforation could not be pulled into the cap of the OTSC
Buffoli (19)	1	Duodenal	Successful	-
Kirschniak (20)*	11	Colonic	Successful in all	-
Baron (21)*	1	Esophageal	Successful	-
	2	Gastric	Successful in all	-
	1	Jejunal	Successful	-
	1	Colonic	Successful	-
Dişibeyaz (22)*	1	Colonic	Successful	-

*, includes only patients with perforation

dary to the OTSC technique. But, we think that the OTSC system does not appear to be appropriate for closure of duodenal perforations close to the major duodenal papilla, such as perforations secondary to ERCP with biliary sphincterotomy. The risk of bile duct occlusion would be considerably high. Combination of OTSC with a biliary or pancreatic prosthesis might be an option, but further research is needed.

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CONCLUSION

In conclusion, OTSC clips are easy to apply and they can be used to achieve excellent short-term closure of endoscope-related duodenal perforations. Despite the disadvantage of requiring the endoscope to be removed once the lesion is identified to mount the clip on the instrument, the endoscopic view is optimal, and progression of the endoscope is easily performed.