



## Endoscopic repair of duodenal perforation with over-the-scope clipping system and endoclips: A case report

Ali Tüzün İnce<sup>1</sup>, Orhan Kocaman<sup>1</sup>, Kemal Yıldız<sup>1</sup>, Birol Baysal<sup>1</sup>, Mukaddes Tozlu<sup>1</sup>, Ümit Akyüz<sup>2</sup>, Ahmet Danaloğlu<sup>1</sup>, Hakan Şentürk<sup>1</sup>

<sup>1</sup>Department of Gastroenterology, Bezmialem Vakif University Faculty of Medicine, İstanbul, Turkey

<sup>2</sup>Department of Gastroenterology, Yeditepe Vakif University Hospital, İstanbul, Turkey

### ABSTRACT

Herein, we present an endoscopic repair of iatrogenic duodenal perforation by over-the-scope clipping system (OTSC) and endoclips in an 84-year-old woman that occurred during linear endosonography (EUS) examination. One OTSC and 8 clips were used for repairing the perforation hole. After 3 days in the intensive care unit (ICU) by chest tube and without oral feeding, she was discharged from the hospital at 6. admission day, and she also had an acute coronary attack during 4. hospital day. OTSC and clipping devices are very useful for repair of iatrogenic perforations, especially in older patients who have comorbid diseases and who can not tolerate the surgery.

**Keywords:** Complications of EUS, duodenal perforation, iatrogenic perforation, OTSC, endoscopic clip

### INTRODUCTION

During examination by linear endosonography (EUS), undesired iatrogenic duodenal perforation complications may occur. The incidence of gastrointestinal perforation during EUS ranges from 0% to 0.4% in prospective series enrolling more than 300 patients (1,2). Although rare, it may be fatal in older patients who have comorbid diseases, such as severe cardio-pulmonary problems. Duodenal perforations are more frequent than the cervical esophageal perforations caused by linear EUS (3). The rigid tip of linear EUS may perforate the lumen during advancement, particularly in the areas of angulation or stenosis, or a blind lumen, such as the diverticulum. Perforation frequently occurs during the training period of endosonographers and can also be seen in the hands of experienced ones during usage of new equipment with different tip designs.

Until recently, the only therapy of iatrogenic endoscopic gastrointestinal perforations was surgery. Endoscopic clipping, stenting, and over-the-scope clipping (OTSC) systems are used for repair of gastrointestinal perforations. Clipping devices are designed to accomplish to approximation of tissues during endoscopy and were first introduced in the 1970s to stop gastrointestinal bleeding

(4). Then, it was used for the nonsurgical closure of gastrointestinal walls, such as fistulas, dehiscence of surgical anastomosis, and spontaneous and iatrogenic perforation in the 1990s (5).

Repair of the duodenal perforation can be performed either by endoscopic or surgical measurements. OTSC systems, clips, and stents are being used for endoscopic repair. Endoscopic methods are preferable and life-saving methods, especially in older patients who have comorbid diseases. Herein, we will present the repair of a huge iatrogenic duodenal perforation by OTSC and endoclips caused by curvilinear EUS.

### CASE PRESENTATION

A 84-year-old female was sent to our unit from an outpatient clinic for EUS evaluation for suspicion of a malignant biliary stricture because of right upper quadrant pain and narrowed distal common bile duct on ultrasonography and MRI. She was complaining of abdominal pain for 20 days. Her right upper quadrant was tender by palpation, and mild elevation was present in AST and GGT levels, but her ALT, alkaline phosphatase, total and direct bilirubin, CEA, and CA19-9 levels were in normal limits. Pain was mild and radiated

**Address for Correspondence:** Ali Tüzün İnce, Department of Gastroenterology, Bezmialem Vakif University Faculty of Medicine, İstanbul, Turkey E-mail: dralinice@gmail.com

**Received:** 30.9.2012 **Accepted:** 9.11.2012

© Copyright 2014 by The Turkish Society of Gastroenterology • Available online at [www.turkjgastroenterol.org](http://www.turkjgastroenterol.org) • DOI: 10.5152/tjg.2014.4314



Figure 1. Perforation site



Figure 2. Serosal surface of the duodenum

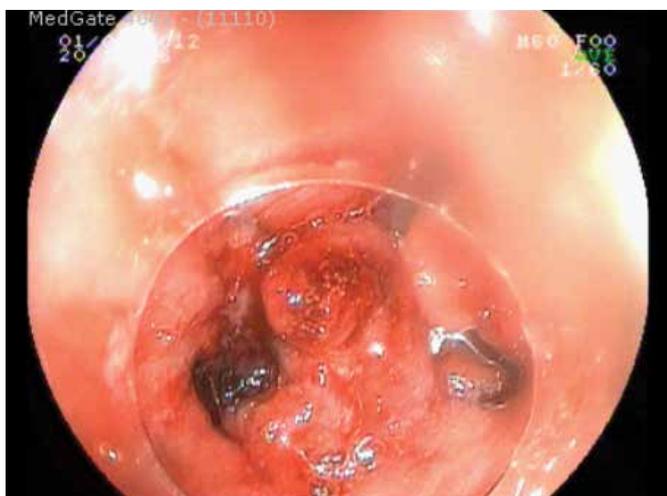


Figure 3. OTSC application to perforation



Figure 4. Complete repair of perforation by endoclipping and OTSC

to her back and right shoulder, which was related to fatty meals. She denied complaints of nausea, vomiting, fever, and weight loss. The patient had a past history of hypertension and had been on antihypertensive therapy for the last 20 years; she had a cholecystectomy 2 years ago for gallstones and coronary bypass operation 20 years ago for coronary artery disease.

After having signed a consent form, the EUS examination began. During examination by curvilinear endoultrasound, the back wall of the first part of the duodenum was perforated while advancing the EUS to the duodenum from a narrowed pylorus (Figure 1). The hole size was large enough (1.5 cm) to allow us to see the serosal layer by endoscope (Figure 2). It was very difficult to inflate the perforated lumen enough to see because of air leakage into abdomen, and also, it was very difficult to stay in front of the perforation site by endoscopy for endoscopic management because the location of the perforation site was at a corner (1 and 2. site of the duodenum). An OTSC device (OTSC, Ovesco Endoscopy, Tübingen, Germany) with a twin grasper was used to close the huge hole, but it was not enough to close the whole perforation site completely (Figure

3). Then, 8 clips (EZ clips, Olympus, Tokyo, Japan) were applied for the rest of hole. So, the whole site was closed and repaired completely (Figure 4). After the endoscopic procedure, she was sent to the radiology department for evaluation by abdominal and thorax CT. Subdiaphragmatic free air and mediastinal air as well as the OTSC and metallic clips were noted on CT (Figure 5). Then, she was sent to the ICU for chest tube placement because of subcutaneous emphysema and pneumomediastinum. The general condition of the patient was good, and she had no sign of acute abdomen, such as guarding, rigidity, vomiting, and difficulty passing gas and stool. Oral feeding was discontinued; antibiotics and parenteral nutrition were begun. On the second hospital day, no leakage was detected by gastrografin swallow. On the 4<sup>th</sup> day, while her thorax tube was removed and she was planned to be discharged from the ICU, she had a squeezing retrosternal pain radiating through to the left arm and hand fingers. On electrocardiogram, ST wave elevation of more than 2 mm and negative T waves on V<sub>3</sub>-V<sub>6</sub> precordial derivations were detected. Serum CK-MB and cTnl levels were slightly increased. Acute coronary syndrome was diagnosed by cardiology consultation, and coronary dilators

Case Report



**Figure 5.** A CT image that shows free abdominal air and endoclips and OTSC

were ordered. On Day 6 of hospital admission, her general condition was good, and she voluntarily wanted to be discharged from the hospital.

## DISCUSSION

Duodenal perforation by linear EUS is a rare and serious complication with increased mortality and morbidity. It has been shown that perforation generally occurs in older people. Narrowed or angulated lumens as well as diverticula are other main reasons of perforation. Our patient was an older-aged woman and had pylori canal narrowing. Endoscopic clipping is generally used for small perforations because of the small size of the endoclips currently available. Khokhar O et al. (6) closed duodenal perforations of 2 patients aged 68 and 87 years old by multiple endoscopic clips (5 and 7 mm in size), discharged within 3-6 days from the hospital and followed for 120 days without problem. Sebastian S et al. (7) reported a duodenal perforation case with a 10-mm tear, and Siebert DG reported a linear EUS duodenum perforation in a 78-year-old woman with a 6-mm tear repaired with multiple endoclips (7,8).

The literature is very scarce about the use of OTSC for duodenal perforation. Parodi A et al. (9) reported that 2 of 10 patients with duodenal leak and 8 of these 10 patients leakage was closed successfully by OTSC. Also, OTSC was successful in an experimental animal study on 24 pigs by creating a 10-mm perforation in the duodenum. According to them, the OTSC system is comparable with surgical closure in a nonsurvival porcine model. This technique is easy to perform and seems suitable for repairing duodenal perforations (10).

In our patient, the perforation size of the duodenum was about 15 mm, and one OTSC was not enough for repair of the big perforation hole; so, 8 more endoclips were used for the remaining hole of the perforation. OTSC and endoclips were useful for the patient, and there was no leakage of gastrografin into

the peritoneum. The patient was discharged in 6 days, even though she also had acute coronary syndrome during her 4<sup>th</sup> hospitalization day. We also experienced that the perforation site caused air leakage into the abdomen and prevented adequate visualization for endoscopic management of the lesion. In conclusion, OTSC and endoclips are very useful and important arms of gastroenterologists in cases of perforation during endoscopic procedures, with a high success rate.

**Ethics Committee Approval:** N/A.

**Informed Consent:** Written informed consent was obtained from patient who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author contributions:** Concept - A.T.I.; Design - O.K., K.Y.; Supervision - H.Ş., A.D.; Materials - M.T., K.Y.; Data Collection&/or Processing - B.B., M.T.; Analysis&/or Interpretation - A.T.I., Ü.A.; Literature Search - Ü.A.; Writing - A.T.I.; Critical Reviews - H.Ş.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

## REFERENCES

- O'Toole D, Palazzo L, Arotçarena R et al. Assessment of complications of EUS-guided fine-needle aspiration. *Gastrointest Endosc* 2001; 53: 470-4. [CrossRef]
- Wiersema MJ, Vilmann P, Giovannini M et al. Endosonography-guided fine-needle aspiration biopsy: diagnostic accuracy and complication assessment. *Gastroenterology* 1997; 112: 1087-95. [CrossRef]
- Jenssen C, Faiss S, Nürnberg D. Complications of endoscopic ultrasound and endoscopic ultrasound-guided interventions - results of a survey among German centers. *Z Gastroenterol* 2008; 46: 1177-84. [CrossRef]
- Hayashi T, Yonezawa M, Kuwabara T. The study on staunch clip for the treatment by endoscopy. *Gastroenterol Endosc* 1975; 17: 92-101.
- Binmoeller KF, Grimm H, Soehendra N. Endoscopic closure of a perforation using metallic clips after snare excision of a gastric leiomyoma. *Gastrointest Endosc* 1993; 39: 172-4. [CrossRef]
- Khokhar OS, Nguyen DT, Johnson L et al. Endoscopic management of iatrogenic duodenal perforation with linear-probe echoendoscope. *Gastroenterol Hepatol (NY)* 2010; 6: 657-9.
- Sebastian S, Byrne AT, Torreggiani WC, Buckley M. Endoscopic closure of iatrogenic duodenal perforation during endoscopic ultrasound. *Endoscopy* 2004; 36: 245. [CrossRef]
- Siebert DG. Use of an endoscopic clipping device to repair a duodenal perforation. *Endoscopy* 2003; 35: 189. [CrossRef]
- Parodi A, Repici A, Pedroni A, Bianchi S, Conio M. Endoscopic management of GI perforations with a new over-the-scope clip device (with videos). *Gastrointest Endosc* 2010; 72: 881-6. [CrossRef]
- von Renteln D, Rudolph HU, Schmidt A, Vassiliou MC, Caca K. Endoscopic closure of duodenal perforations by using an over-the-scope clip: a randomized, controlled porcine study. *Gastrointest Endosc* 2010; 71: 131-8. [CrossRef]