

Esophageal Perforation due to Transesophageal Echocardiogram: New Endoscopic Clip Treatment

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Key Words

Transesophageal echocardiogram · Esophageal perforation · Endoscopic treatment · OTSC® clip

Abstract

Esophageal perforation due to transesophageal echocardiogram (TEE) during cardiac surgery is rare. A 72-year-old female underwent TEE during an operation for aortic valve replacement. Further, the patient presented hematemesis. Gastroscopy revealed an esophageal bleeding ulcer. Endoscopic therapy was successful. Although a CT scan excluded perforation, the patient became febrile, and a second gastroscopy revealed a big perforation at the site of ulcer. The patient's clinical condition required endoscopic intervention with a new OTSC® clip (Ovesco Endoscopy, Tübingen, Germany). The perforation was successfully sealed. The patient remained on intravenous antibiotics, proton pump inhibitors and parenteral nutrition for few days, followed by enteral feeding. She was discharged fully recovered 3 months later. We clearly demonstrate an effective, less invasive treatment of an esophageal perforation with a new endoscopic clip.

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Introduction

Transesophageal echocardiogram (TEE) has been introduced to the operating room over 30 years ago [1]. Post-TEE complications such as esophageal perforation are extremely rare. Daniel et al. [2] reported a complication rate of 0.18% and a mortality rate of 0.0098%. These complications can be treated surgically and under some circumstances conservatively.

We report a case of esophageal perforation caused by TEE during an aortic valve replacement operation, treated successfully with a new endoscopic clip. To the best of our

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knowledge, this is the first case of post-TEE esophageal perforation treated endoscopically with this new clip device.

Case Report

A 72-year-old female was admitted to the operating theater for aortic valve replacement. During the operation and in the first hours in the intensive care unit (ICU) the patient had to undergo TEE in order to assess postoperative left ventricle performance status. Soon after, in the ICU, the patient presented hematemesis. Gastroscopy revealed a corkscrew esophagus along with a bend before the gastroesophageal junction. A deep 2×1.5 cm ulcer covered with blood thrombus was found approximately 2 cm above the gastroesophageal junction. Blood oozing was clearly seen from the ulcer edges. Despite thorough irrigation the thrombus could not be removed. Endoscopic therapy with 10 ml NaCl 0.9% solution successfully stopped bleeding. The rest of the endoscopy was unremarkable. Within the next 48 h, thoracic and abdominal CT scans were ordered twice to rule out esophageal perforation. Only a few blood clots were found in the area between the stomach and the left liver hilum, but no signs of mediastinitis or free intra-abdominal air. The patient remained in the ICU hemodynamically stable and on nil by mouth.

Four days later, as the patient became febrile, a second gastroscopy was performed. A 2×1.5 cm perforation was seen at the same site of ulcer with no bleeding (fig. 1). Abdominal X-ray confirmed subdiaphragmatic air. Due to the patient's clinical condition and the size of the gap, an endoscopic intervention was decided. A new 12-mm clip (OTSC®; Ovesco Endoscopy, Tübingen, Germany) was engaged. The clip is made of nitinol and approximates large perforation margins like a surgical clamp. It is preloaded over a transparent cap attached to the scope tip. The perforation size was endoscopically assessed with a biopsy forceps. The edges of the perforation were approximated by using a specific endoscopic double grasping forceps and applying suction through the cap. Thus, the tissue was pulled into the cap and the clip was released by rotating the wheel attached to the shaft of the endoscope. The result was inspected endoscopically (fig. 2). A nasogastric Levin tube was uneventfully left in the stomach under direct vision for long-term enteral feeding. The whole procedure lasted approximately 14 min. Further, the patient was offered two intra-abdominal drainage catheters in the operating theater so that intra-abdominal air and blood clots be drained and high fever get under control. All intra-abdominal and peripheral blood cultures were sterile.

The patient was kept on intravenous antibiotics, proton pump inhibitors and parenteral nutrition over the next 10 days followed by enteral feeding through the Levin tube. Two weeks later she was transferred to the clinical ward, experiencing no dysphagia, and was discharged fully recovered 3 months after the operation.

Discussion

TEE has safely been applied in patients undergoing cardiac surgery and in ICU departments for diagnostic purposes and monitoring over 30 years [1]. Post-TEE esophageal perforation is extremely rare. Daniel et al. [2] reported a complication and mortality rate of 0.18 and 0.0098%, respectively. Factors that may determine the way of intervention following esophageal perforation are age, clinical condition, location and size of the perforation, cost of intervention and elapsed time since the injury [3]. Surgical repair remains

the backbone of treatment for patients considered good surgical candidates [3]. Conservative treatment may be an alternative for seriously ill, poor surgical candidates [4]. The factors mentioned earlier may determine who will benefit from endoscopic management. The time since perforation has occurred is crucial. A diagnosis delayed for more than 36 h is associated with high mortality (50%), despite surgical intervention [5]. Up to date, there have been no randomized controlled trials comparing surgical to endoscopic intervention regarding patient outcome.

In our case, the TEE performed in the operating theater and the ICU led to esophageal perforation due to the patient's esophagus anatomy. The delayed diagnosis of perforation is attributed to the blood thrombus on top of the ulcer seen in the first endoscopy that behaved as a sealant. This is why the CT scan did not reveal free intra-abdominal air. Our patient's serious clinical condition precluded major surgical intervention, and it was decided to provide her with endoscopic therapy. The sterile origin and area of ulcer further supported this decision. Clipping of the perforation was considered much cheaper compared to stent placement. Additionally, due to the size of perforation and cost, a single clip that could seal the gap was very appealing. Last, by leaving this clip in place for a long time, longer than common clips, could possibly guarantee safe sealing of this perforation. According to clip manufacturers, the clip may remain in place for over 6 months and is magnetic resonance imaging-safe.

Esophageal perforations closed endoscopically range from 3 to 25 mm in size [6]. Due to the new device technology (twin grasper and the cap at the tip of endoscope), a single clip is enough and able to create a full-thickness closure of perforations up to 3 cm in diameter [7]. This new clip provides a secure and successful esophageal perforation closure rate, up to 100% in perforations diagnosed within the first 24 h [7]. According to this study, the clip remains in place for over 6 months and is not associated with any kind of esophageal stenosis or clinical dysphagia.

The mean repairing time of an esophageal perforation after successful multiple clipping is 18 days (interquartile range 6–26) [6]. Most importantly, chronicity of perforation (>10 days) was the only independent predictive factor for successful perforation closure in univariate and multivariate analysis [6]. However, esophageal perforation as a complication of this clip during patient intubation has been reported in up to 3% of patients, but probably this can be attributed to the learning curve [7]. Indeed, in another study with 94 patients regarding the use of the OTSC clip to narrow the pouch in patients who underwent gastric bypass surgery, no esophageal perforation occurred [8].

In conclusion, although TEE is a safe procedure, it may be complicated by esophageal perforation. We clearly showed and strongly suggest that esophageal perforation of 5 days can safely and successfully be treated endoscopically by applying this new OTSC clip device.

Author Contributions

John Robotis performed the endoscopic part and wrote the paper. Andreas Karabinis participated in the writing of the paper.

Disclosure Statement

The authors have no conflict of interest.

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Fig. 1. Esophageal perforation proximal to the esophageal lumen.

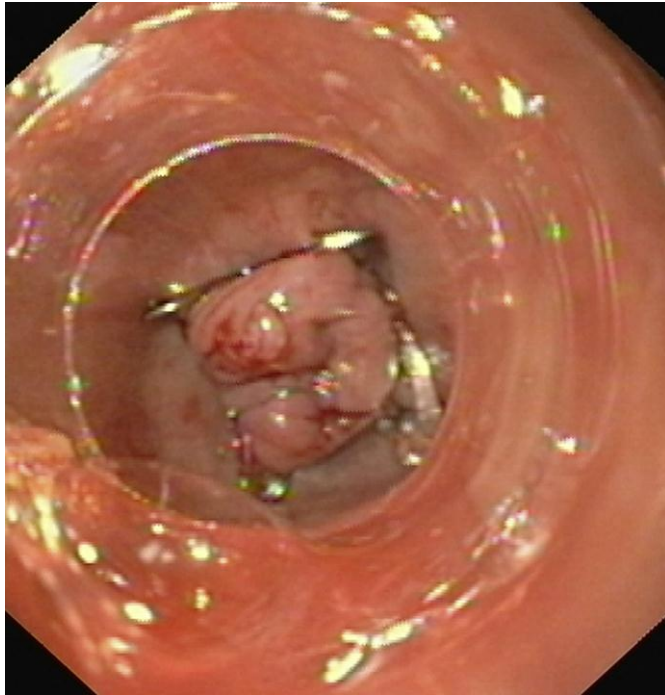


Fig. 2. Clipped perforation.