

症 例

A Gastric Perforation after Transesophageal Echocardiography in an Elderly Patient Undergoing Cardiac Surgery

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Abstract

An 80-year-old male patient (160 cm, 52 kg) underwent a combined coronary artery bypass graft and aortic valve replacement. He had no history of gastric or esophageal disease. Transesophageal echocardiography (TEE) was used for an intraoperative monitor. At the end of surgery, massive fresh blood was aspirated through a gastric tube after removal of the TEE probe. An urgent esophago-gastroduodenoscopy and computed tomography diagnosed a gastric perforation, for which the patient had to undergo an urgent laparoscopic repair. The surgical repair was successful and the patient was discharged on the postoperative day 21.

Key words; anesthesia, transesophageal echocardiography, complication, gastric perforation

Introduction

Transesophageal echocardiography (TEE) is an important diagnostic and monitoring tool in cardiac anesthesia. Although TEE is considered to be safe with a very low rate of serious complications^{1~4)}, recent

reports show a relatively high rate of TEE-related upper gastrointestinal (GI) complications⁵⁾.

We present a gastric perforation after intraoperative TEE in an elderly patient who underwent coronary artery bypass grafting simultaneously with aortic valve replacement. The patient required an urgent laparoscopic repair of the gastric perforation.

Case Report

An 80-year-old male patient (160 cm, 52 kg) was scheduled to undergo coronary artery bypass grafting and aortic valve replacement due to two-vessel coronary artery disease and severe aortic valve stenosis (peak pressure gradient was 123 mmHg and aortic valve area was 0.36 cm²). We obtained the written permission from the patient to report this case. He had no history of gastric or esophageal disease. His physical status was ASA class 3. His medications included benidipine hydrochloride, telmisartan, furosemide and aspirin. Aspirin was discontinued 5 days prior to operation. There was no prior history of coagulation or bleeding disorders.

Anesthesia was induced and maintained with intravenous administrations of fentanyl, midazolam, and vecuronium, and inhalation of sevoflurane. A radial arterial catheter was placed before anesthetic induction and a pulmonary arterial catheter was placed after anesthetic induction under standard aseptic procedures. Monitoring included 5-lead electrocardiogram, pulse oximetry, capnometry, rectal and fingertip

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temperatures, and electroencephalogram.

Following endotracheal intubation, a multiplane TEE probe (6F-OR, GE Vingmed Ultrasound, Horten, Norway) was inserted into the esophagus under direct visualization using a laryngoscope after unsuccessful attempts at blind insertion. No resistance or difficulty was encountered during the insertion into the esophagus and the stomach, or manipulation of the TEE probe. Gastric tube was not placed prior to TEE examination. Prior to cardiopulmonary bypass, the TEE examination confirmed the severe aortic valve stenosis and normal left ventricular function. The TEE probe was left in the unlocked position in the middle esophagus throughout cardiopulmonary bypass. Surgical intervention included a biologic aortic prosthesis and coronary artery bypass grafting. The cardiopulmonary bypass time was 224 minutes, and the aortic cross clamping time was 146 minutes. The core temperature during cardiopulmonary bypass ranged within 32 to 36°C with mean arterial pressures between 60~90 mmHg. After discontinuation of the cardiopulmonary bypass, the TEE examination revealed minor peri-valvular leakage of the prosthetic valve with mid-esophageal view. During the whole TEE procedures, the examinations using a deep trans-gastric view were performed several times.

At the end of surgery, the TEE probe was removed and was found to be stained with fresh blood. A nasogastric tube was inserted without obvious resistance, and gastric suction revealed 250 ml of fresh blood. Esophageal or gastric injury was suspected. Gastric lavage was performed with iced saline, and drained solution became less bloody. Vital signs remained stable, and the patient was transferred to the intensive care unit (ICU).

Upon arrival in the ICU, an additional 200 ml of fresh blood was suctioned through the nasogastric tube, suggesting persistent bleeding. An esophago-gastroduodenoscopy was performed by a gastroenterologist, which revealed a laceration in the anterior wall near the cardia (Fig. 1). The laceration appeared traumatic in nature due to the sharp, well-circumscribed edges. An urgent computed tomogra-



Figure 1

Endoscopy demonstrated a fibrin clot with bleeding in the proximal aspect of the cardia. The ulceration was deep and penetrated the muscle layer, and the edges were sharp with no edema. These findings were suspicious for perforation due to mechanical injury.

phy was performed and revealed pneumo-peritoneum, which confirmed the diagnosis of gastric perforation.

Emergency laparoscopic surgery was performed to repair the gastric perforation 6 hours after the cardiac procedure. During laparoscopy, a hematoma was found at the gastric surface with active bleeding. Hemostasis and repair of the perforation was successfully performed by laparoscopic procedure. The patient was weaned from the ventilator on postoperative day one following the gastric repair. A follow-up esophago-gastroduodenoscopy was performed on the postoperative day 14 and confirmed intact gastric mucosa with a healed scar at the perforated area. The patient was discharged home on the postoperative day 21.

Discussion

In this patient, an inadvertent gastric perforation occurred during cardiac surgery. The etiology of the perforation was attributed to the intraoperative TEE procedure. Although there are several case reports of gastric complications^{5~7)}, the actual incidence of gastric perforation from TEE is not known. In a

recent series, 1.2% of TEE procedures resulted in gastric complications such as a tear, ulcer or perforation⁵. The possible mechanisms behind TEE-related gastric complications include mechanical and thermal effects of the TEE probe on the gastric mucosa for many hours. Preexisting pathology such as gastric ulcer, gastritis, as well as impaired mucosal blood supply during cardiopulmonary bypass may contribute to these complications.

This patient did not have any previous gastric disease, but aspirin was administered until 5 days prior to operation, which might influence on the TEE-induced complications. It has been reported aspirin increases the risk of the peptic ulcer irrespective of the dose and duration⁸. Therefore, the patient might have peptic ulcer even if it had not been detected preoperatively. Moreover, due to his advanced age his gastric mucosa likely had lower tolerance for the mechanical compression from the TEE probe. In addition, several times of TEE examinations by the deep trans-gastric view in this patient necessitated the TEE probe remained in the stomach. Due to the nature of his cardiac disease, the deep trans-gastric position was used to provide better visualization of the aortic valve and assessment of ventricular function. In this maneuver, the probe was anteflexed in the cardia of the stomach with the tip in close contact with the gastric mucosa. This patient's injury was located in the cardia of the stomach, which was confirmed on endoscopy. We believe that the gastric perforation in this elderly patient occurred during TEE examination by the mechanical injury caused by the deep trans-gastric observation for a certain period of time while undergoing cardiac surgery with cardiopulmonary bypass.

This case report illustrates the potential for gastric injury in elderly patients undergoing TEE examina-

tion during cardiac surgery. This is especially important when obtaining the deep trans-gastric view with extreme anteflexion of the probe for an extended period of time.

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