

# Conservative management of a case of transesophageal echocardiogram-induced esophageal perforation

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Esophageal injury or perforation is a rare but life threatening complication of transesophageal echocardiography (TEE). Most of the patients manifest symptoms within 24 hours of the procedure and upper esophagus is the most common site of injury.

Incidence of esophageal perforation is relatively rare, in a large series of 10,000 cases of TEE, the incidence of esophageal perforation was reported in 3 cases (0.03%) and in another study it was found to be 1 in 5,000 TEEs, 0.02%.

This is a case report that highlights a case of esophageal perforation and false passage discovered accidentally 24 hours postoperatively, in contrast to most of the previous esophageal perforation case reports, a conservative management was undertaken successfully since the discovery of the complication until the full recovery and the discharge of the patient from the cardiac ICU, a follow up upper gastrointestinal endoscopy and CT chest showed progressive resolution of the hematoma surrounding the esophagus, healing of the false passage and recovery of the mediastinal gas locules.

## Keywords:

TEE, esophageal, perforation, conservative

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## Introduction

Esophageal injury or perforation is a rare but life-threatening complication of transesophageal echocardiogram (TEE). Most of the patients manifest symptoms within 24 h of the procedure and the upper esophagus is the most common site of injury [1].

A systematic review of TEE-induced esophageal perforation was carried out recently, and it identified 35 cases of esophageal perforation from 22 published studies [2].

In a large series of 10 000 cases of TEE, the incidence of esophageal perforation was relatively rare as it was reported in three cases (0.03%) [3], and in another study, it was found to be one in 5000 TEEs (0.02%) [4].

This is a case report that highlights a case of esophageal perforation with a false passage discovered accidentally 24 h postoperatively. Conservative management was undertaken successfully and the patient remained on cardiothoracic intensive care unit (ICU) until full recovery. Follow-up upper-gastrointestinal endoscopy and computed tomography (CT) chest showed progressive resolution of the hematoma surrounding the esophagus, healing of the false passage, and recovery of the mediastinal gas locules.

## Case report

This manuscript was written after obtaining an informative written consent from the patient's legal guardian.

A 73-year-old woman was admitted to our hospital for mitral-valve replacement and tricuspid valve repair. Her weight was 61 kg and her height was 157 cm, with a BMI of 25. She had a background pathology of severe mitral regurgitation, moderate tricuspid regurgitation, and mild aortic regurgitation with normal left ventricle (LV) and right ventricle (RV) function. She also had a severely dilated left atrium (LA).

Her medical history included bronchial asthma, mild renal impairment, and recently diagnosed atrial fibrillation (AF). She did not smoke or drink alcohol.

Her exercise tolerance was diminished because of pulmonary congestion, which was getting worse over the previous few weeks. Her Euroscore II was 6.94%.

Her preoperative blood results were all within the normal range, including the blood count, the

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coagulation profile, serum electrolytes, and renal and liver function tests.

Her ECG showed controlled atrial fibrillation and her pulmonary function tests showed a mild obstructive pattern consistent with her bronchial asthma (BA) condition.

Her medications included digoxin, bumetanide, bendroflumethiazide, spironolactone, regular salbutamol inhalers, and warfarin, which was stopped more than 1 week before the procedure.

Intraoperative monitoring and induction of anesthesia were according to standard protocols, with 12-lead ECG, SpO<sub>2</sub>, invasive arterial blood pressure, central venous pressure, EtCO<sub>2</sub>, respiratory gas analysis, nasal temperature, and TEE.

Insertion of a Philips X7-2T 3D TEE (Philips, Surrey, UK) probe was undertaken after the induction of anesthesia and before optimum positioning for cardiac surgery. Insertion was easy and uneventful and was performed by an officially qualified and accredited echocardiographer by lifting the mandible up and passing the probe blindly behind the endotracheal tube. The manipulation of the echo probe in the esophagus was performed by the same experienced echocardiographer with no reported difficulty regarding the manipulation of the probe at any time (and always making sure the probe is in neutral position when moved inside the esophagus).

The surgical procedure was uneventful, and the patient was transferred to the cardiac ICU for postoperative care. A few hours later, while the patient was still intubated, 300 ml of dark red blood was noticed inside the oral cavity. At that point, there was no nasogastric tube in place.

An upper gastrointestinal endoscopy was performed in a timely manner, which revealed a probable esophageal perforation with a false passage posteriorly below the level of the carina (Fig. 1).

A CT chest confirmed the presence of a hematoma inside and on the posterior aspect of the esophagus (Figs. 2–4).

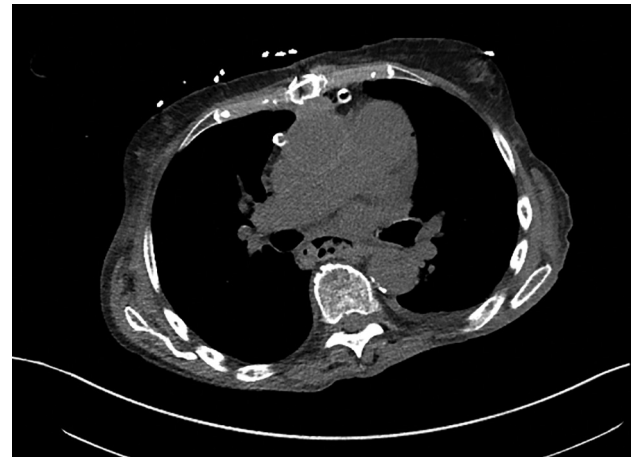
On advice from the gastroenterology team, it was decided to manage the condition conservatively rather than consider invasive options including surgery or stent insertion. She was kept nil by mouth, and a nasojejunal tube was inserted for enteral nutrition. A combination of antibiotic and antifungal treatment was commenced including meropenem, metronidazole, and fluconazole as prophylaxis against mediastinal

Figure 1



An upper-gastric endoscopy view at the level of the lower esophagus day 1 postoperatively showing extensive laceration and hematoma.

Figure 2



Computed tomography (CT) longitudinal cut day 1 postoperatively showing a lower esophageal hematoma and air loculi indicating a false passage.

Figure 3



Computed tomography (CT) axial cut at the level of the lower esophagus day 1 postoperatively showing air loculi posterior to the esophagus.

infection. A pulmonary artery catheter was inserted to monitor the cardiac index and systemic vascular resistance. She was kept under close observation for any signs of deterioration including sepsis, cardiovascular instability, and mediastinitis. Arterial blood gas, lactate, and CO monitoring including mixed venous saturation was carried out on a 2-h basis. Monitoring also included the invasive blood pressure, oxygen saturation, the temperature, and the hourly urine output.

The immediate postoperative echocardiography showed very poor LV function (left ventricular ejection fraction (LVEF) = 20%) with a moderately impaired RV (tricuspid annular plane systolic excursion (TAPSE) = 10 mm). There were no valvular lesions or evidence of a pericardial effusion. Her hemodynamic status did require the use of inotropic and vasopressor

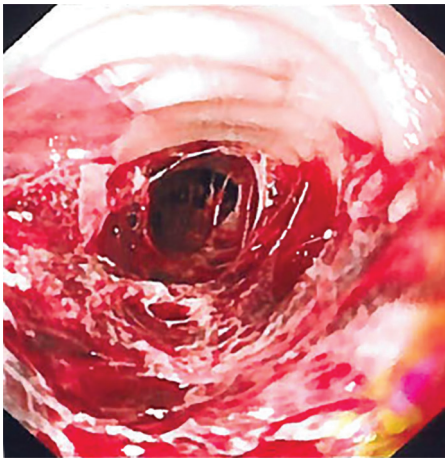
therapy (adrenaline in a dose range of 0.02–0.08 µg/kg/min and noradrenaline in a dose range of 0.02–0.1 µg/kg/min). Serial echocardiography studies showed gradually improving LV and RV function over the next 72 h, and the vasopressors and the inotropes were weaned off successfully.

She was successfully extubated after 3 days of this conservative approach.

Overall, she required a total of only 2 U of packed cells. No additional chest drains were inserted other than the surgical ones placed at the time of surgery.

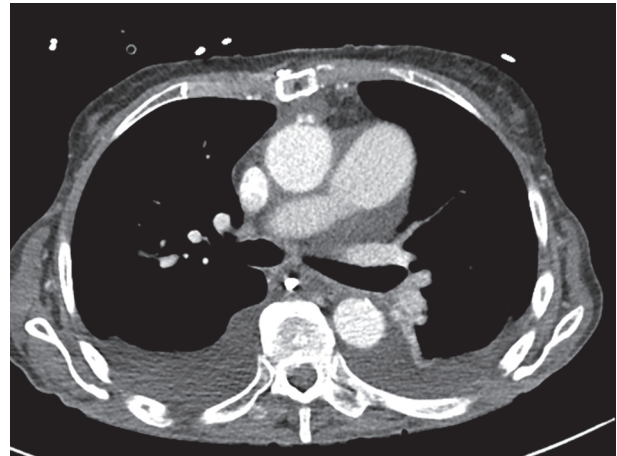
A follow-up upper-gastrointestinal endoscopy and CT of the chest and the abdomen with contrast were performed (Figs 5–7), both of which demonstrated

Figure 4



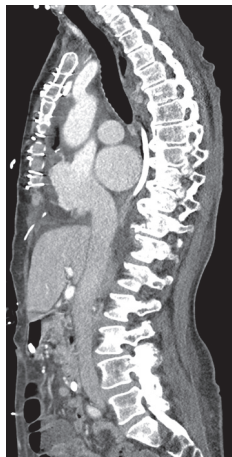
Computed tomography (CT) with contrast at the level of the lower esophagus day 1 postoperatively showing a posterior hematoma.

Figure 5



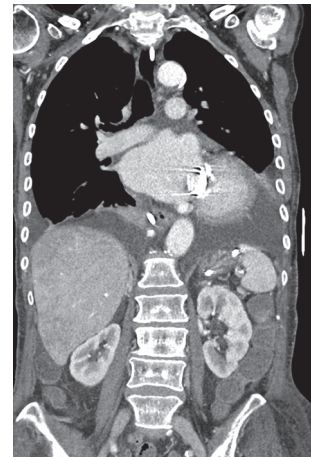
Computed tomography (CT) axial cut at the same level of the lower esophagus day 8 postoperatively showing resolution of the air loculi and healing of the posterior esophagus.

Figure 6



Computed tomography (CT) longitudinal cut day 8 postoperatively showing healing of the lower esophagus.

Figure 7



Computed tomography (CT) coronal cut day 8 postoperatively showing the healed lower esophageal segment.



that her condition had improved significantly. The CT report showed that the esophagus was minimally dilated, but still contained some residual debris, resolution of mediastinal gas locules, and no CT features of esophageal perforation compared with the previous CT, but it showed bilateral moderate pleural effusion.

The patient remained in ITU for 2 weeks, after which she was discharged to the ward without any residual evidence of esophageal injury. She was discharged home 2 weeks later.

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## Discussion

TEE-induced esophageal perforation occurs most commonly in elderly female patients, predominantly in an intraoperative setting. The thoracic esophagus is the most commonly involved segment, especially when the TEE is performed intraoperatively. The majority of the esophageal perforations occur in cases with a perceived low risk and documented uneventful TEE examination. Therefore, screening for high-risk factors is unlikely to reduce the incidence of perforation. The incidence of shock during the detection of the perforation is associated with a higher mortality [2].

Most of the patients manifest symptoms within 24 h [1]. Delayed discovery of esophageal perforation carries a higher risk of morbidity and mortality. Septic shock can develop from the fifth postoperative day [5].

Risk factors for perforation include spasm or hypertrophy of the cricopharyngeal sphincter, cervical arthritis, forward and left lateral bending of the distal esophagus, and esophageal disease such as inflammation or neoplasm [6].

In the set up of cardiac surgery, according to Han and colleagues, it is advisable that in patients with operative risk factors, such as distension of the atria, a long cardiac procedure, and likely ischemia of organs due to cardiopulmonary bypass, the monitoring probe of TEE should not constantly rest in the esophagus and should be withdrawn when it is idle or not in actual use. However, the decision to withdraw the probe during the procedure with heparin in the circulation might lead to more damage and be harmful rather than beneficial.

Also, if resistance has been met during the intraoperative manipulation of the probe in a patient without a history of esophageal disease, perforation might be suspected, especially if the patient sustains

postoperative fever with positive chest radiographic findings [5].

Conservative management of esophageal perforation was described before in a neonate after TEE-induced esophageal perforation, and it also took 2 weeks for full recovery, similar to our patient. Successful conservative management in adults has not been demonstrated before [7]. Our case proves a good example of a patient who was managed conservatively and successfully after the diagnosis of esophageal perforation and false passage induced by a TEE probe.

The mainstay of conservative management includes prophylactic antibiotic and antifungal treatment, close hemodynamic monitoring, jejunal feeding, and nil by mouth for the first 1–2 weeks. A follow-up upper gastroesophageal endoscopy and CT scan is recommended.

In our case, the nasojejunal tube was inserted under endoscopic guidance to avoid any further injury to the inner wall of the esophagus. Parenteral nutrition was not recommended because the patient had normal gastrointestinal tract absorption and there was the added risk of bacterial translocation with parenteral nutrition.

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## Conclusion

Conservative management as opposed to surgical intervention for TEE-induced esophageal perforation can be carried out safely in uncomplicated cases when the patients are relatively stable. It avoids all the risks of surgery. There is no evidence in the literature comparing conservative management of TEE-induced esophageal perforation with surgical management to date.

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## Conflicts of interest

There are no conflicts of interest.

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