

# Intraoperative Transesophageal Echocardiography in the Prone Position to Guide Anesthetic Management in a High-Risk Patient after Prior Intraoperative Cardiac Arrest

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## A) Background

- ❖ Intraoperative Transesophageal Echocardiography (TEE) may be used in non-cardiac surgery to guide anesthetic management, particularly when hemodynamic instability is encountered or anticipated (1).
- ❖ While TEE in the prone position is well-described in the critical care literature among patients with acute respiratory distress syndrome, descriptions of intraoperative prone TEE are more limited (2-4).
- ❖ We describe the use of TEE to aid the anesthetic management of a patient undergoing spine surgery in the prone position after previously suffering an intraoperative cardiac arrest during the same procedure five days earlier.
- ❖ The prone position introduces additional risks and considerations when using TEE. The operating room setting adds complexity as surgical position and equipment must be considered and access to the face is often limited.

This report highlights: (i) the choice for TEE in this patient, (ii) TEE guided anesthetic management, and (iii) special considerations for TEE during surgery in the prone position.

## B) Methods

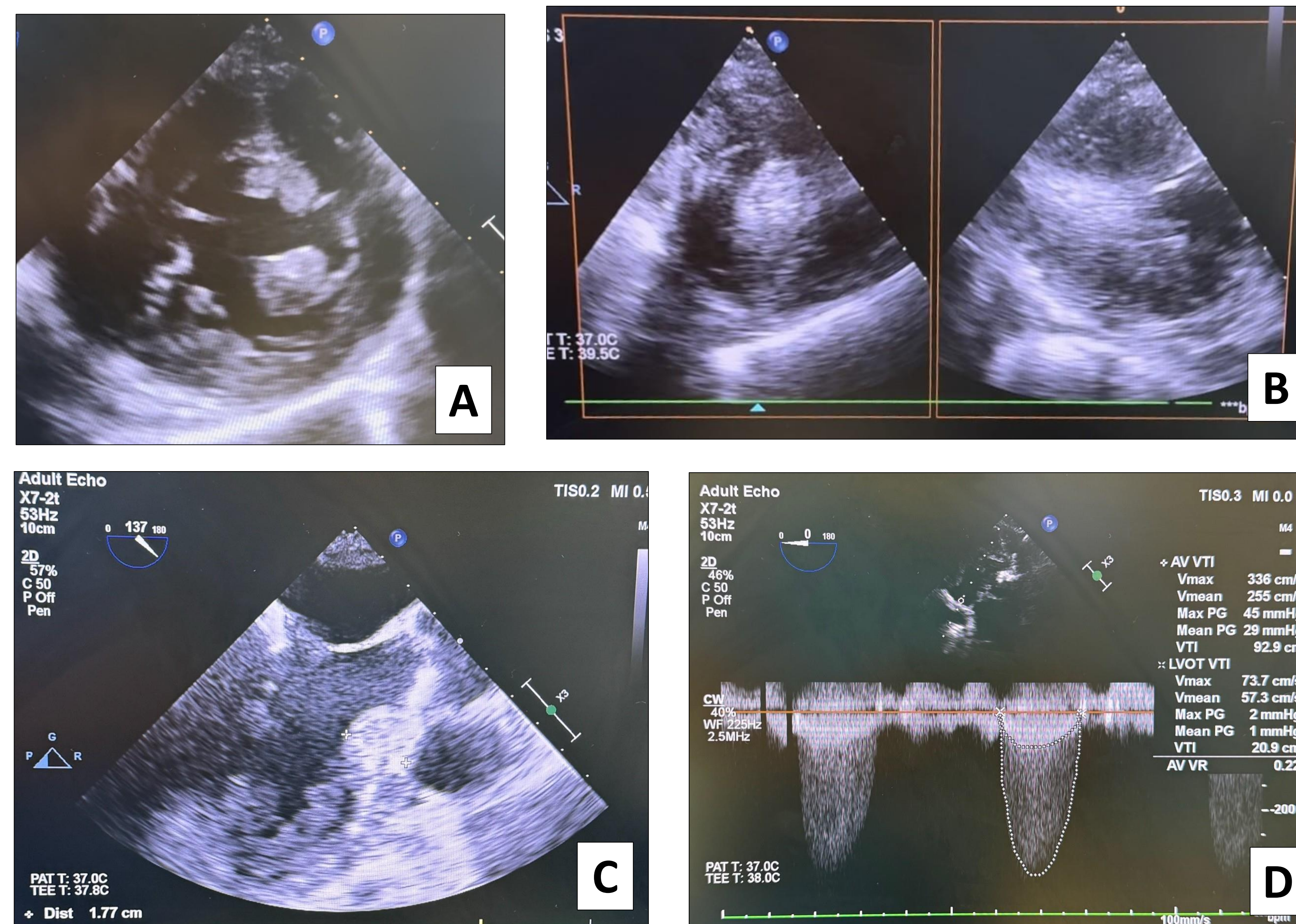
This case was reviewed retrospectively and the evaluation of current pertinent literature was completed.

The patient consented to the creation and presentation of this case report.

Given that the report does not include identifiable patient information, it is exempt from IRB review in accordance with Hartford Healthcare policy.

## C) Case Presentation

- ❖ 80-yo female, PMH of hypertension and diabetes mellitus presented for repeat L4-5 transforaminal interbody fusion
- ❖ Initial procedure five days prior aborted for intraoperative cardiac arrest requiring brief cardiopulmonary resuscitation and blood transfusion.
- ❖ Transthoracic echocardiogram showed a hyperdynamic left ventricle (LV) with severe concentric hypertrophy, dynamic mid-cavity obstruction, and moderate-to-severe aortic stenosis (AS). Multidisciplinary discussion with cardiology, anesthesiology, and neurosurgery decided against urgent valve replacement or balloon valvuloplasty due to infection risk, previous asymptomatic cardiac history, and excellent response to volume resuscitation.



**Figure 1.** A & B) Transgastric mid-papillary short axis views at end-diastole & end-systole, C) Mid esophageal long axis view, D) Continuous wave Doppler interrogation of aortic valve and LV outflow tract in deep transgastric view, E) ProneView Protective Helmet System

## E) Discussion & Conclusions

- ❖ Prone, intraoperative TEE can be highly valuable for guiding anesthetic management in high-risk patients.
- ❖ TEE provided direct, real-time assessment of LV function and obstruction. TEE findings prompted changes to improve anesthetic management (fluid administration and appropriate vasopressor infusions).
- ❖ TEE also allowed for real-time monitoring for venous air embolism, (differential diagnosis for patient's initial arrest).
- ❖ Challenges to TEE during prone spine surgery include increased distance between the probe and machine, managing the probe during repositioning, and preventing both patient injury and probe damage.
- ❖ We recommend: (i) a second operator to assist in image acquisition; (ii) placing the probe in the supine position, disconnecting the probe from the echo machine if connected, and threading the probe through the face mask, prior to flipping prone; (iii) using a solid prone mask system instead of a foam block to ensure sufficient distance from underlying surfaces. This allows the probe to enter the mouth without excessive curvature and avoids applying pressure to the face or tongue.
- ❖ Access to the mouth also improved fine probe manipulation. Placing the patient in pins would be a good alternative for unobstructed access to the face and mitigating against pressure injuries or damage to the probe.
- ❖ This report adds to the paucity of literature on the safe and successful application of TEE during prone surgery.

## F. References

1. Can J Anaesth. 65:381-398, 2018
2. Can J Anaesth. 69:1556-1561, 2022
3. J Cardiothorac Vasc Anesth. 33:877-878, 2019
4. J Clin Anesth. 10:32-35, 1998

## D) Anesthetic Management with TEE

- ❖ Opted for TEE for real-time, direct monitoring of LV function, filling, and obstruction, and to guide intraoperative management. Post-induction supine TEE demonstrated a thick, hyperdynamic LV, and moderate-to-severe AS (**Figures 1A-D**).
- ❖ There was no outflow tract obstruction, and while an intra-cavitary pressure gradient could not be reliably quantified, dynamic cavity obliteration was observed visually. To optimize ventricular filling and mitigate LV obstruction, fluids and a phenylephrine transfusion were administered.
- ❖ The patient was flipped prone with the TEE in place. A ProneView Protective Helmet System (Mizuho OSI) was used to position the head without pressure on the TEE probe as it entered the mouth, minimizing risk of facial pressure injuries (**Figure 1E**). Access to the mouth also aided probe manipulation during image acquisition. The patient tolerated the procedure well and there were no complications.