

AIRWAY COMPRESSION INDUCED BY  
TRANSESOPHAGEAL ECHOCARDIOGRAPHY  
PROBE INSERTION IN AN ADOLESCENT  
PATIENT DURING MITRAL VALVE REPLACEMENT  
AND AORTIC VALVE REPAIR

CARINE ZEENI, ELIANE EL HALABI  
AND SAHAR M. SIDDIK-SAYYID

Transesophageal echocardiography (TEE) is used in cardiac surgery to assess valvular disease surgical repairs, ventricular function, and wall motion abnormalities. Complications associated with probe insertion such as obstruction of the tracheobronchial tree or endotracheal tube has been described in pediatric population<sup>1-3</sup> and in few adult patients<sup>4-6</sup>. Here, we report the case of a 19-year-old adolescent male patient (weight 46 kg, height 168cm) with rheumatic heart disease who underwent mitral valve replacement and aortic valve repair, and developed intraoperative left mainstem bronchus compression resulting in lung collapse probably caused by the TEE probe.

The preoperative transthoracic echocardiography showed moderate mitral stenosis and severe regurgitation, thickened and calcified anterior and posterior mitral valve leaflets with significant restrictive motion, severely dilated left atrium and left ventricle, in addition to mild to moderate aortic insufficiency. The left ventricular systolic function was mildly to moderately reduced and the estimated pulmonary artery systolic pressure (PAP) was 45 mmHg. The electrocardiogram revealed a normal sinus rhythm and a chest X-ray (CXR) showed clear lung fields.

In the operating room, the oral endotracheal tube (ETT, 7.0-mm internal diameter) was taped at the 20-cm mark at lips, and its position was confirmed by auscultation. A 17-mm adult multiplane adult TEE probe (Philips Ultrasound, X7-2t, Bothell, WA) was introduced after several attempts under direct laryngoscopic visualization. No major changes in endtidal CO<sub>2</sub>, capnograph wave, or peak airway pressures were noted, and oxygen saturation remained in the normal range on 100% oxygen. After median sternotomy, the surgeon noticed that the left lung was completely collapsed while the right lung was expanding properly. Lung recruitment maneuvers and ETT suctioning were done to no avail.

During hypothermic cardiopulmonary bypass (CPB) and cold cardioplegic arrest, the TEE probe was removed in order to perform a direct laryngoscopy and check if the tube had inadvertently been advanced into the right mainstem bronchus during probe manipulation. Furthermore a fiberoptic bronchoscopy was done revealing adequate positioning of the ETT with very mild narrowing of the left mainstem bronchus. While still on pump and upon surgical completion the TEE probe was reinserted with some difficulty, and examination confirmed adequate aortic valve repair and mitral valve replacement.

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1 Department of Anesthesiology, American University of Beirut- Medical center, Beirut-Lebanon.

**Corresponding Author:** Sahar M Siddik-Sayyid, MD, Professor, American University of Beirut, Department of Anesthesiology. P.O. Box: 11-0236, Beirut, Lebanon. Telephone: 961 1 350000; extension: 6380, Fax: 961 1 745249. E-mail: ss01@aub.edu.lb

Prior to weaning from CPB, alveolar recruitment maneuvers were performed, but the left lung remained collapsed. The TEE probe was removed after chest closure, followed by another fiberoptic bronchoscopy showing the same findings as the previous exam.

The patient was transferred intubated to the intensive care unit on controlled mechanical ventilation with an oxygen blood saturation of 100%.

An immediate postoperative CXR revealed re-expansion of the left lung with some atelectatic changes in the left lung base. The patient was extubated five hours later and the postoperative course was uneventful.

In our patient, the left mainstem bronchus had slight narrowing (unknown preoperatively), as shown by bronchoscopy, probably due to extrinsic compression by the dilated pulmonary arteries and the enlarged left atrium. We speculate that it was further compressed by the TEE probe that was difficult to insert in the esophagus (though size is appropriate for patient's weight), thus leading to left lung collapse. Additionally, this was likely to be aggravated by the increased dynamic compression of the airway by the enlarged cardiovascular structures in response to

positive pressure ventilation and muscle relaxation. At no time was lung ventilation done on an open chest without the TEE probe in place; however, left lung reexpansion after removal of the TEE probe, as shown in the postoperative CXR supports our hypothesis.

Case reports of compression at the level of left mainstem bronchus by the TEE probe have been limited to small pediatric patients<sup>2,3</sup>, but none have been described in older adolescents. Of note, intraoperative bronchoscopy was not immediately performed when left lung collapse was noted and the TEE was in place. Such an intervention would have allowed us to directly visualize the left mainstem bronchus obstruction by the TEE probe and its reversal when the TEE probe was removed. As a result, a definitive diagnosis could have been established. However, this was not in our differential diagnosis during the intraoperative management.

In conclusion, this case demonstrates that we should be alert to the possibility of inadvertent compression of the left mainstem bronchus by the TEE probe in adolescent patients undergoing cardiac surgery, in particular with enlarged cardiovascular structures.

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