Air in the Moustache Can Choke the Left Ventricle

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AORTIC ROOT PATHOLOGIES often require complex surgical repair techniques due to the involvement and manipulation of the coronary arteries. In 1981, Cabrol et al described a technique to reimplant the coronary arteries into the aortic conduit using a Dacron tube graft.[1] In the 1980s and 1990s, the Cabrol technique and its modifications commonly were performed during aortic root surgery, but now are used less frequently due to the development of improved coronary ostial button mobilization techniques.[2] The Cabrol technique still is considered a reasonable alternative when conventional coronary reimplantation is unsuccessful, such as in redo aortic root surgeries. The authors report a rare complication of this technique, in which echocardiography played a crucial role in the rapid and correct diagnosis.

CASE REPORT

A 43-year-old male (123 kg, 195 cm) was admitted to the authors' institution for evaluation of progressive dyspnea on exertion and worsening lower extremity edema. The patient had a history of Marfan syndrome, hypertension, and glaucoma. He had undergone an emergent ascending aortic replacement for a Stanford type-A dissection 1 year before the current admission. The perioperative course was complicated by a pulmonary embolism requiring the placement of an inferior vena cava filter and oral anticoagulation with warfarin.

During this current admission, the preoperative work-up revealed the presence of a chronic aortic dissection, originating from the aortic arch and extending through the descending thoracic aorta to the level of the inferior mesenteric artery. Additionally, severe aortic regurgitation with a dilated aortic root was reported. Left ventricular function was preserved with no evidence of significant coronary artery disease.

Consequently, the patient was scheduled for redo-sternotomy, a Bentall procedure, and a stage-I elephant trunk. After the patient was brought to the operating room, standard ASA monitors were placed and an indwelling left axillary artery catheter was inserted under local anesthesia. The patient was induced with 100 mg of propofol, 1,000 μg of fentanyl, and 10 mg of vecuronium. The airway was secured with a standard 8.0 cuffed endotracheal tube without difficulty. Subsequently, a 9-French multi-lumen access catheter was placed into the right internal jugular vein under sonographic guidance. Additional monitoring included a pulmonary artery catheter, transesophageal echocardiography (TEE), cerebral oximetry, bispectral electroencephalography, and temperature measurement in both the nasopharynx and the bladder. General anesthesia was maintained with isoflurane and intermittent boluses of fentanyl, midazolam, and vecuronium.

The initial intraoperative TEE showed normal right and left systolic function with an estimated left ventricular ejection fraction of 50%-60% and no regional wall motion abnormalities, severe aortic regurgitation, an aortic root aneurysm measuring 5.2 cm in diameter, and an aortic dissection originating from the arch and extending throughout the descending aorta (Fig 1; Video clip 1).

Because of the close proximity of the right ventricle to the sternum, the right axillary artery was cannulated before redo-sternotomy. The sternum then was divided uneventfully with an oscillating saw, and the cardiac structures carefully dissected. Cardiopulmonary bypass (CPB) was initiated using a double-stage venous cannula through the right atrium. The ascending aortic graft was cross-clamped. Cold blood cardioplegia was administered in an antegrade and retrograde fashion and the patient cooled to 21 degrees Celsius. A modified Bentall procedure was performed using a 27-mm St. Jude Medical mechanical valved graft (St. Jude Medical, Inc., St. Paul, MN). The right coronary button was implanted in a standard fashion into the valved conduit. Because of extreme tissue friability, an 8-mm Dacron graft conduit was anastomosed end-to-end with the left main coronary ostium (hemi-Cabrol technique). The proximal end of the graft then was directed behind the aortic root and connected to the side of the anterior surface of the aortic graft (Figs 2 and 3). The operation then was completed by replacing the aortic arch under deep hypothermic circulatory arrest with a trifurcated graft attached end-to-end to all of the 3 arch branches and end-to-side to the ascending aortic graft. Finally, the ascending aortic graft was anastomosed to the descending thoracic aorta using the elephant trunk technique (a small part of the prosthesis was inserted into the thoracic aorta).

After removal of the cross-clamp, the heart was paced using an epicardial ventricular pacing wire. The transgastric short-axis midpapillary view showed a severely dysfunctional left ventricle with severe hypokinesis in all regions while right ventricular function appeared to be preserved (Video clip 2). Because of the disparity in function of the 2 ventricles, it was concluded that the culprit was most likely a perfusion deficit in

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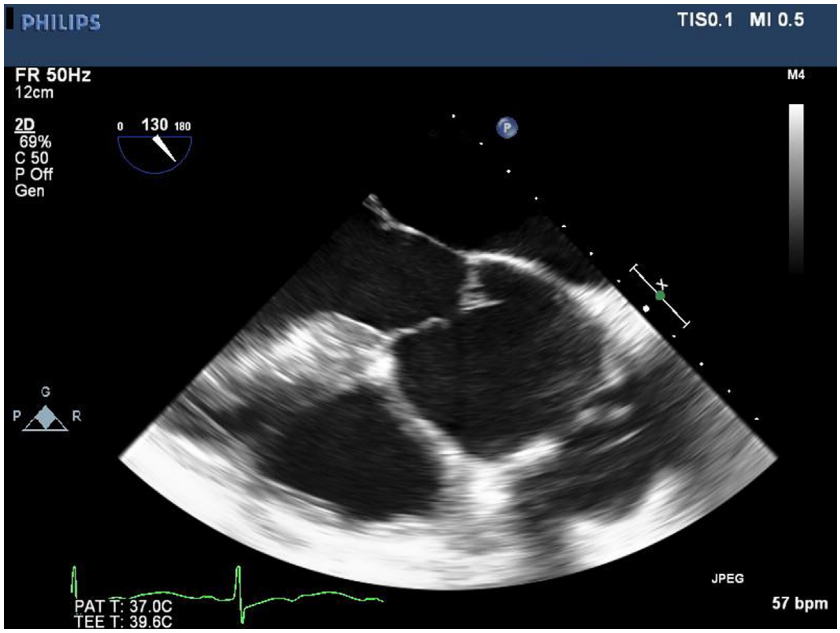

Fig 1. TEE midesophageal long-axis view showing aortic root aneurysm.

the distribution territory of the left main coronary artery. The course of the Cabrol graft could be identified clearly by TEE. The more distal portion of the Cabrol graft that was anastomosed to the left main coronary artery could not be well visualized by TEE due to acoustic dropout from the trachea. Color-flow Doppler imaging of the Cabrol graft seen in the midesophageal ascending aorta views did not demonstrate flow in the graft despite reducing the Nyquist limit to 0.05 cm/s.

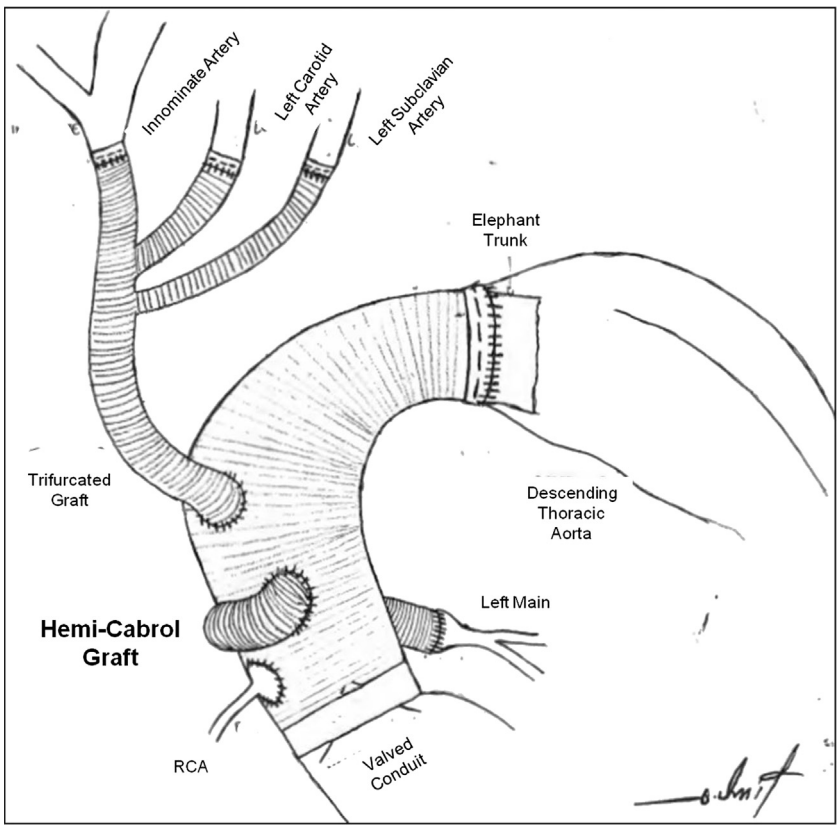

Fig 2. Drawing of a hemi-Cabrol technique.