

## Mediastinal Hematoma Following Orthotopic Heart Transplantation

Ismail T. Dairywala, M.D., Peng Li, M.D., Ph.D., Gazala N. Khan, M.B.B.S., Jim Carroll, M.D., Michael Deeb, M.D., and Mani A. Vannan, M.B.B.S.

Division of Cardiology, Department of Internal Medicine, University of Michigan Health System, Ann Arbor, Michigan

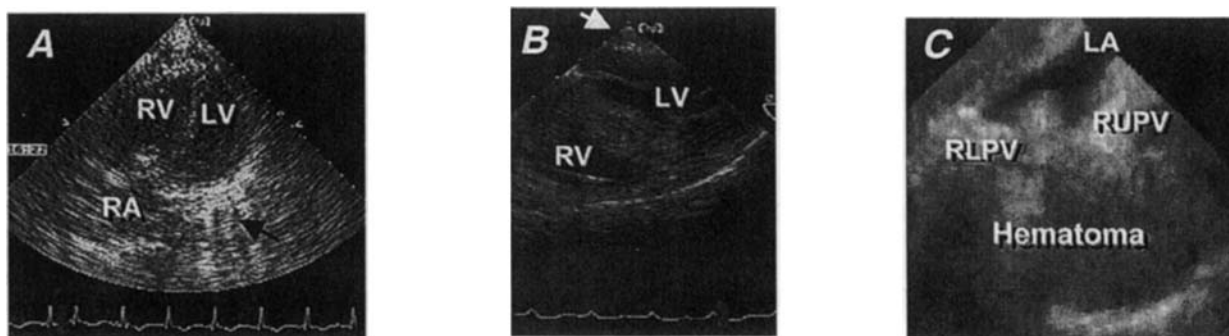
A 59-year-old female with history of end-stage nonischemic idiopathic, dilated cardiomyopathy underwent cardiac transplantation. Twenty-four hours after the procedure, it was noted that she was having excessive drainage from her chest tubes. This was followed by hypotension and a decreased cardiac index. Emergent transthoracic echocardiography (TTE) was suboptimal except it was noted that the left atrium (LA) could not be adequately visualized (Fig. 1-A). Transesophageal echocardiography (TEE) showed compression of the LA roof (Fig. 1-B) and the right lower and upper pulmonary veins (RLPV, RUPV) by a large hematoma (Fig. 1-C). Operative hemostasis of the bleeding from the inferior vena cava (IVC) cannulation sites, pulmonary artery anastomosis sites, and the atrial suture lines was successfully achieved with good clinical outcome. The three-dimensional (3-D) reconstruction of digitally acquired transesophageal images (HP 5500, Agilent Technologies, Andover, MA, USA) was performed off line using EchoView

Version 4.0 (TomTec Imaging Systems, GmbH, Germany). Figures 2-A (systole) and 2-B (diastole) show 3-D echo views of the LA and right PVs in frontal projection. Figures 2-C (systole) and 2-D (diastole) illustrate 3-D projections from the LA looking into the PV, showing distortion of the LA shape. Figure 2-E shows the 3-D “en face” view of the lumen of RLPV (arrow) surrounded by the hematoma.

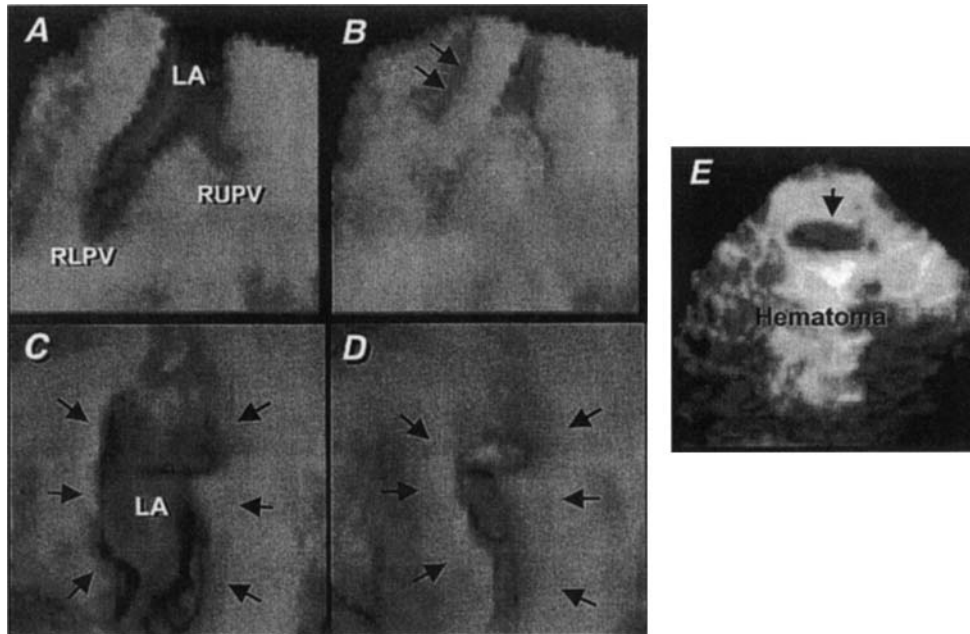
### Discussion

Mediastinal hemorrhage is a potential early complication that may occur following both orthotopic and heterotopic heart transplantation. Both procedures include long suture lines involving the low-pressure venous systems and the high-pressure arterial systems. In the initial postoperative period, mediastinal bleeding manifests itself as hypotension, increased chest tube drainage, a falling hematocrit, mediastinal widening, and a rapidly expanding pericardial effusion leading to tamponade. Ciliberto et al.<sup>1</sup> reported the incidence of cardiac tamponade in the early postoperative period to be 4.6% (a little higher than that reported after other forms of cardiac surgery), which, for the most part, seemed to be due to excessive bleed-

Address for correspondence and reprint requests: Mani Vannan, M.B.B.S., University of Michigan Health System, Women’s L3119, 1500 E. Medical, Ann Arbor, MI 48109. Fax: 734-763-7390; E-mail: mvannan@umich.edu



**Figure 1.** A. Apical four chamber view of 2-D TTE showing poor visualization of the left atrium (black arrow). Right atrium (RA), right ventricle (RV) and left ventricle (LV) (are also shown). B. 2-D TEE image showing collapse of the left atrium (white arrow). C. 2-D TEE image showing the left atrium (LA), right lower pulmonary vein (RLPV), and the right upper pulmonary vein (RUPV) surrounded by the hematoma.



**Figure 2.** A. 3-D reconstruction showing from a frontal view, the left atrium (LA), right lower (RLPV) and upper (RUPV) pulmonary veins during systole. B. 3-D frontal view showing collapse of the roof of the left atrium (double black arrows) by the hematoma during diastole. C. 3-D view of the left atrium looking into the pulmonary veins with distortion of the LA shape due to the surrounding hematoma (multiple black arrows) during systole. D. The same depiction as in figure 2-C but during diastole. E. 3-D "enface" view of the lumen of right lower pulmonary vein (black arrow) surrounded by the hematoma.

ing. Mediastinal bleeding requiring reexploration has been reported in about 9% of cardiac transplant patients.<sup>2</sup> Knisely et al.<sup>3</sup> reported mediastinal bleeding severe enough to warrant return to the operation room for reexploration in 10 of 232 patients. In their series, bleeding sites included aortic anastomosis, right atrial anastomosis, and sternal edges. In our patient, the source of the bleed originated from the IVC cannulation site, the pulmonary artery anastomosis site, and the atrial suture lines.

Hence, mediastinal hemorrhage is a relatively common complication for which TEE is often useful to diagnosis and assess associated complications.<sup>4</sup> The alteration of the anatomy of the transplanted heart due to the expanding hematoma could be better elucidated using 3-D reconstruction techniques, thus enabling better and more targeted surgical approaches.<sup>5</sup> One of the current limitations of 3-D echocardiography is that it is time-intensive with re-

gards to both image acquisitions and requires off line processing.

### References

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