

Intraoperative 3D TrueVue Transesophageal Echo Imaging in Cardiac Mass: Bridge Between Cardiac Anesthesiologist and Surgeon

To the Editor,

A 76-year-old female with a medical history of arterial hypertension, persistent atrial fibrillation, and recent heart failure was admitted to IRCCS Centro Cardiologico Monzino Hospital with severe dyspnea.

In the emergency department, a transthoracic echo and subsequently a transesophageal echo (TEE) diagnosed extensive, multiple left atrial masses with rapidly growing multilobes. The mass developed widely in

the left atrium and in the left atrial appendage, where minimal residual flow is observed. It involved the cranial portion of the atrial septum with sparing of the oval fossa, the fibrous aortic–mitral continuity, and infiltrated the anterior leaflet of the mitral valve that appeared hypomobile. No mitral inflow obstruction was detected, the mean transmitral pressure gradient was 2 mmHg. The diagnosis was left atrial mass at high embolic risk.

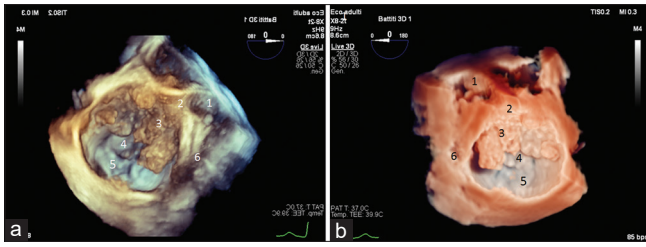


Figure 1: Comparison between standard 3D TEE (a) images and TrueVue (b) of the mass in the left atrium. 1. Aortic valve; 2. Atrial septum; 3. Tumor; 4. Anterior mitral leaflet; 5. Posterior mitral leaflet; 6. Left atrial appendage

Therefore, the patient underwent an emergency surgical procedure; the histological evaluation of the cardiac biopsy in the operating room showed a malignant tumor (later revealed to be an angiosarcoma) of the left atrium. A complete surgical exeresis had to be executed.

During the operation, the entire mass was removed, the mitral valve was replaced with a 29-mm biological prosthesis, and the left atrial appendage was closed.

In the operating room, the anesthesiologist with the help of the cardiologist performed the TEE exam with an Epiq CVx (Philips Healthcare, Eindhoven, NL), Figure 1. The use of photorealism techniques, in conjunction with 3D echocardiography, improved the visualization of the morphological characteristics of the mass before, during, and after mass exeresis and valve replacement.

DISCUSSION

Technological evolutions in 3D imaging allow for the reconstruction of real-time anatomical images of cardiac structure and function. 3D imaging has emerged as a diagnostic technique that overcame some of the limitations of 2D echo.^[1] Moreover, 3D TEE may represent the key adjunctive echocardiographic technique that is able to positively impact cardiac mass surgical planning and intervention and facilitate the interaction between the surgeon and the imaging specialist.^[1] 3D TEE in highly specialized centers has become an important complementary technique when advanced surgical planning is required.

TrueVue photorealistic 3D rendering is designed for better visualization of interventional devices and masses.^[2] Advances in 3D echo with TrueVue technology allow more realistic imaging of cardiac structures, less drop out from thin structures, and a greater understanding of anatomical morphology. In 3D TrueVue mode, a virtual

light source is used for simulating the interaction of light on 3-dimensional surfaces. TrueVue illuminates tissue detail and creates depth perception in the anatomical reconstruction of the “surgeon view” of the surgical field; it is also possible to zoom inside the mass.^[2] It can help with the communication of complicated echo images among caregivers in the operating room, providing a viewing context for the echo image to enhance procedural confidence.

Cardiac angiosarcomas are the most common primary malignant cardiac tumors in adults. The diagnosis is often delayed due to nonspecific clinical symptoms at presentation. The cornerstones of diagnosis are echocardiography and the histological evaluation of the cardiac biopsy.^[3] Cardiac angiosarcomas have a predilection of the right atrium, where they may invade the vena cava and tricuspid apparatus. They often appear bulky and multilobular, are broad based, grow rapidly in an exophytic manner, and may present with intracardiac obstruction.^[4]

3D TrueVue is useful to assess the invasion and patency of the pulmonary veins. Because these tumors are very mobile, real-time imaging by TEE can often visualize them better than cardiac MRI or CT. In addition, TrueVue mode guides the surgeon to evaluate the saving of the pulmonary veins and the infiltration of the anterior mitral leaflet with a consequent need for valve replacement with biological prosthesis. The TrueVue technique is an important tool that could drive the surgeon during complex cardiac mass resection and improve the communication between the anesthesiologist and surgical equipe [video 1 and 2].

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Submitted: 24-Aug-2020 **Revised:** 14-Sep-2020
Accepted: 05-Nov-2020 **Published:** 11-Apr-2022

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DOI:
10.4103/aca.aca_213_20

How to cite this article: L'Acqua C, Piazzoni N, Muratori M, Mazzanti V. Intraoperative 3D TrueVue transesophageal echo imaging in cardiac mass: Bridge between cardiac anesthesiologist and surgeon. *Ann Card Anaesth* 2022;25:241-3.

  2022 Annals of Cardiac Anaesthesia | Published by Wolters Kluwer - Medknow