9VT-D mini 3D TEE brings imaging option to patient getting a TAVR from transcarotid approach

Courtesy of Javier Gomez Valencia, M.D., Cook County Health, US

Patient history/ pathology

The patient is a 79-year-old gentleman with a history of end-stage renal disease on chronic hemodialysis, heart failure with preserved ejection fraction, hypertension, chronic obstructive pulmonary disease, and gastrointestinal angiodysplasia, who was evaluated for a transcatheter aortic valve replacement for severe aortic valve stenosis. Baseline transthoracic echocardiogram demonstrated a severely calcified aortic valve with severely restricted leaflet motion, peak velocity of 4.4 m/s, mean gradient of 50 mmHg and an estimated aortic valve area of 0.6 cm^2. CT angiography of the peripheral vasculature demonstrated severe peripheral vascular disease involving the common femoral artery bilaterally. After extensive review by a multidisciplinary team including cardiothoracic surgery, structural cardiology, and structural imaging experts, decision was to proceed with a transcarotid approach.

Challenges

Challenges in this case included a hostile transfemoral access secondary to peripheral vascular disease requiring the use of transcarotid access, limited space at the transcarotid access site to operate both for a surgical field, procedural equipment manipulation and the transesophageal echo probe, high risk of GI bleeding, the need to obtain high quality imaging for valve deployment including potential use of high-quality 3D images.

System, probe & device used

Due to severe peripheral vascular disease and the need to use a transcarotid approach, imaging with the 9VT-D mini 3D TEE probe was used to facilitate catheter and equipment manipulation while at the same time minimizing overlap and interference of imaging probe with the TAVR equipment at the access site. The ultrasound system used was Vivid™ E95 Ultra Edition from GE HealthCare.

Step-by-step procedure

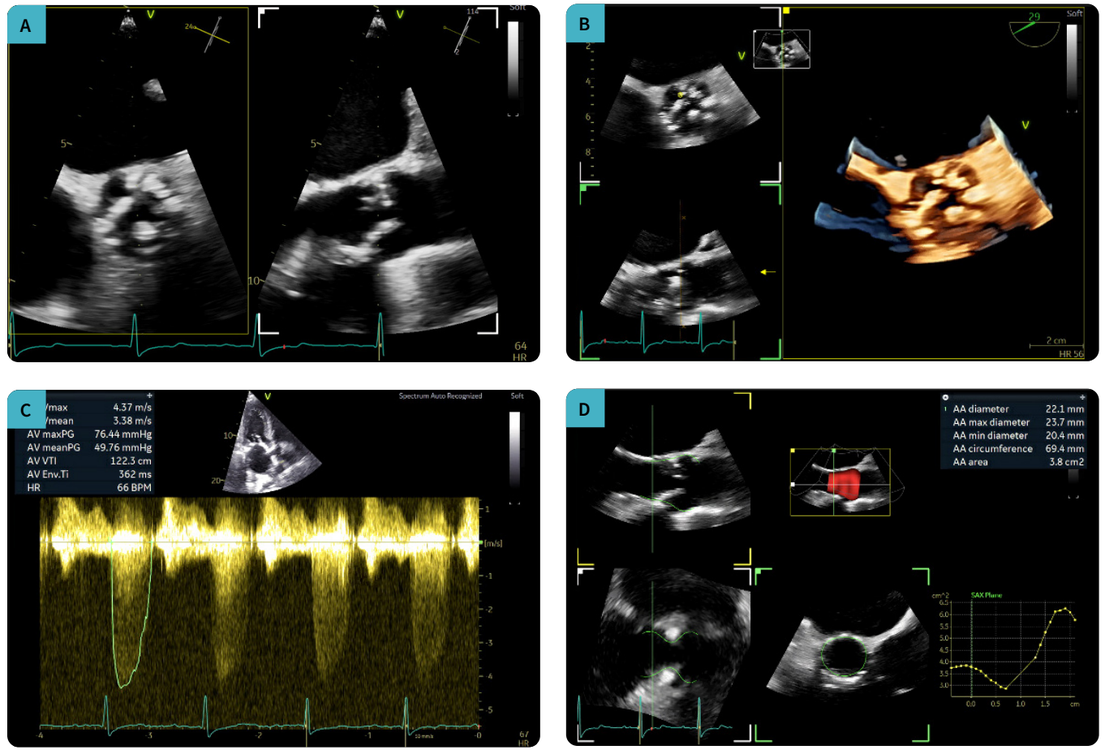
General anesthesia was achieved and a 9VT-D mini 3D TEE probe was advanced into the esophagus with ease. Transcarotid access was obtained by surgical cutdown by the cardiothoracic surgery team. Dedicated valve measurements including 3D aortic annulus size and gradients were obtained at baseline. A 26 mm Edwards Sapien™ 3 ultra TAVR valve was successfully deployed under direct echocardiographic guidance. Thorough evaluation of the valve immediately post deployment demonstrated normal function of the prosthetic valve, no pericardial effusion no significant paravalvular leak. All equipment was removed, and the procedure was completed.

Conclusion

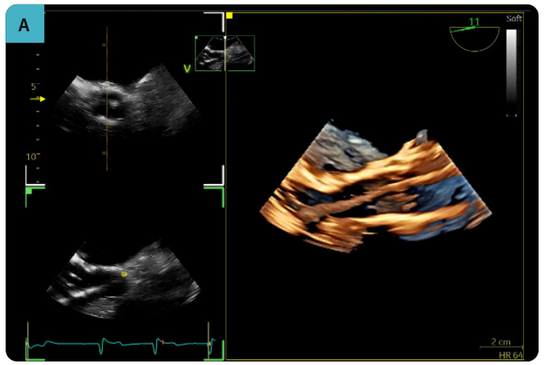
The complex transcatheter aortic valve replacement using a transcarotid approach was successful with a reduction in mean gradient from 50 mmHg to 6 mmHg and no residual paravalvular leak immediately post valve deployment. Imaging with the 9VT-D mini 3D TEE probe was instrumental to minimize interference of the TEE probe with the surgical field, facilitate surgical access, equipment manipulation and direct visualization of the valve deployment in real time.

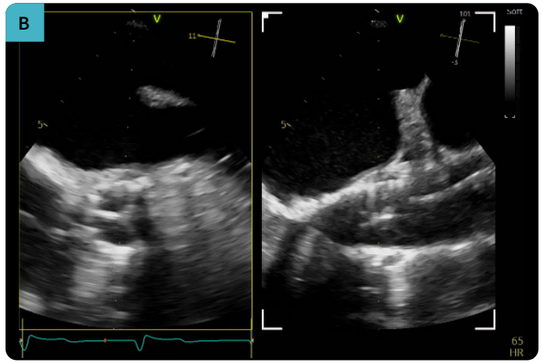
Echo lab follow-up

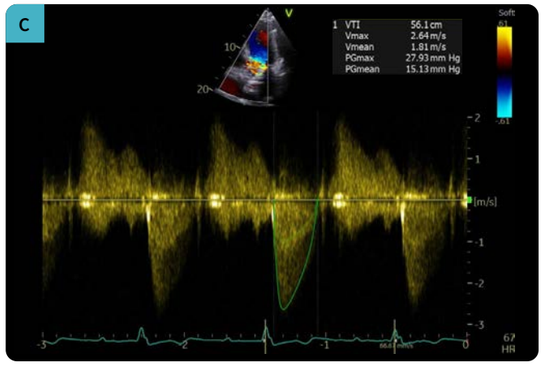
Follow up transthoracic echocardiogram prior to discharge and 2 months later demonstrated a well seated, normally functioning prosthetic valve in the aortic position, peak velocity decreased from 4.5 to 2.7 m/s, mean gradient from 50 to 15 mmHg, and there was no evidence of aortic regurgitation or paravalvular leak.



A) TEE images of aortic valve. 2D short and long axis views prior to device deployment.
B) TEE images of aortic valve. 3D short axis view prior to device deployment.
C) Aortic valve Doppler interrogation prior to valve deployment. Peak velocity 4.37 m/s, mean gradient 49.76 mmHg.
D) Intraprocedural aortic annulus measurements by 3D assessment using 9VT-D mini 3D TEE probe.







A) 3D valve assessment Immediately post deployment of 26 mm Edwards Sapien™ 3 Ultra TAVR valve.

B) TEE images of aortic valve. 2D evaluation post valve deployment.

C) Aortic valve Doppler interrogation after valve deployment. Peak velocity 2.64 m/s, mean gradient 15.13 mmHg.

Javier Gomez Valencia, M.D., is Director of Structural Cardiac Imaging and Cardio-Oncology services for Cook County Health. His clinical expertise includes multimodality cardiac imaging, cardiac CT, cardiac MRI, SPECT, PET and PYP imaging, 4D echocardiography and intraprocedural imaging. He has co-authored several publications and book chapters and his research focuses on applications different cardiac imaging modalities in clinical practice, risk stratification, prevention, and management of patients at risk or who have developed cancer therapy related cardiac dysfunction with a particular focus on the impact of healthcare disparities in clinical outcomes.

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