9VT-D mini 3D TEE probe guiding personalized subaortic and aortic valve surgery

Courtesy of Justin Tretter, M.D., Cleveland Clinic Children's, US

Patient history/ pathology

9-year-old with recurrent subaortic membrane following initial resection at 3 years of age, with progression towards moderate-to-severe stenosis (peak gradient = 64 mmHg; mean gradient = 33 mmHg), supporting proceeding with repeat surgery. The trileaflet aortic valve had restricted motion and mild-to-moderate regurgitation.

Challenges

Surgeons often rely on visual inspection, limited by a narrow field of view and non-hemodynamic state, to understand the three-dimensional extent of the subaortic membrane and its relationship to the semilunar attachments of the aortic valvar leaflets. Standard two-dimensional echocardiographic imaging commonly misinterprets this relationship, with the imaging failing to appreciate the semilunar attachment lines of the leaflets.

System, probe & device used

Three-dimensional echocardiographic evaluation was possible in this small child using the 9VT-D mini 3D TEE probe during the preoperative study.

Step-by-step procedure

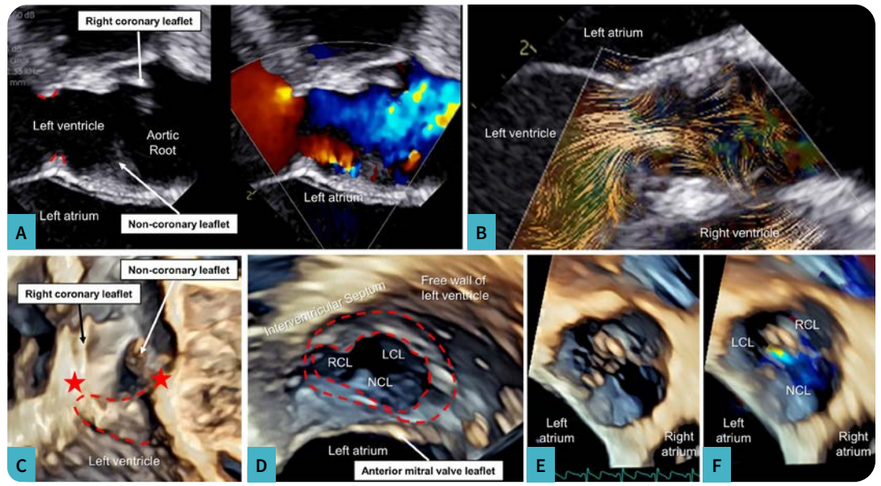
Preoperative 4D TEE delineated the circumferential subaortic membrane attaching to each leaflet nadir. Leaflet thickening suggested extension of fibrotic tissue along the undersurface of the leaflets, restricting leaflet motion. The membrane was resected circumferentially with meticulous resection of the membrane extension along the undersurface of the leaflets. Post-operatively there was no residual stenosis with trivial regurgitation, with improved leaflet motion and coaptation, and favorable hemodynamics suggested by Blood Speckle Imaging (BSI).

Conclusion

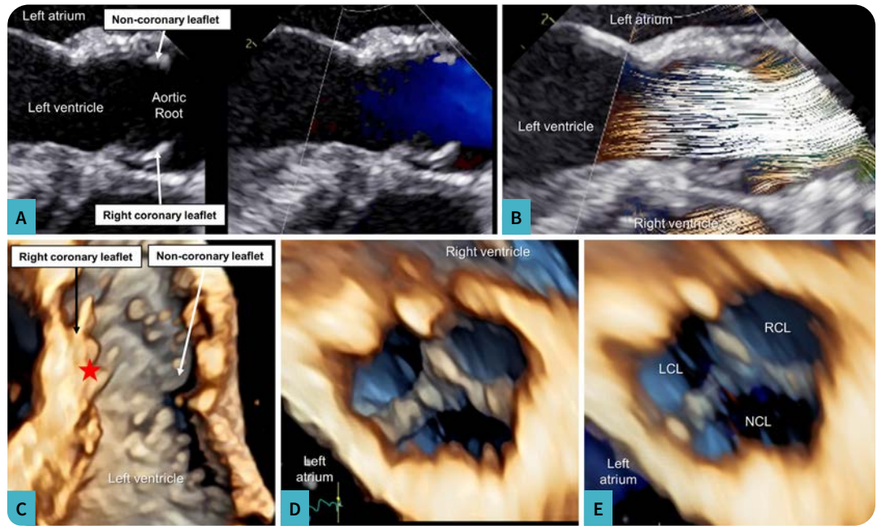
The 9VT-D mini 3D TEE probe provided improved understanding of the three-dimensional extent of the subaortic membrane, including its relationship to, and extension along the undersurface of the aortic valvar leaflets. In addition to standard Doppler assessment, BSI provided immediate understanding of improved, favorable hemodynamics following membrane resection with improved leaflet mobility.

Echo lab follow-up

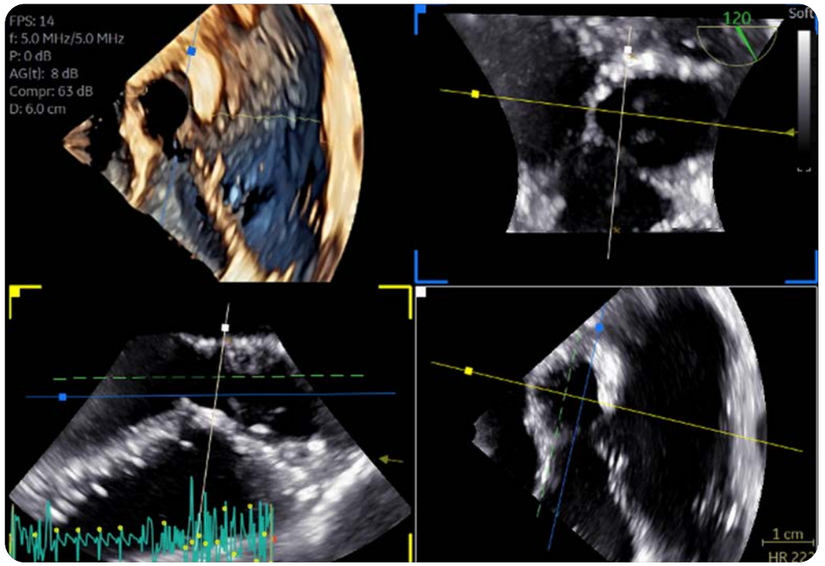
Two-month follow-up TTE demonstrate no residual subaortic or aortic valvar stenosis with trivial regurgitation.



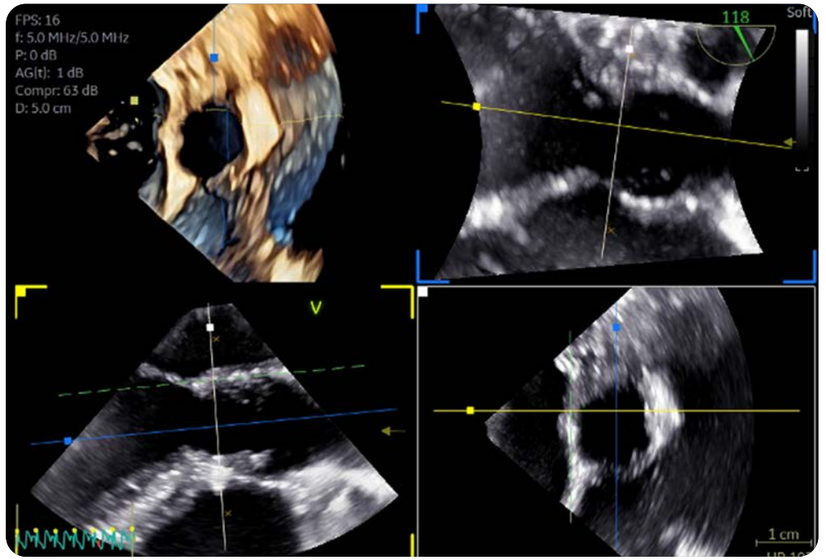
Preoperative transesophageal echocardiographic evaluation. **A)** Color Doppler comparison in systole demonstrates flow acceleration starting at the level of the subaortic membrane (red hashed lines outline the membrane in this and the other panels). **B)** BSI in systole demonstrates narrowing of the outflow jet at the level of the subaortic membrane with subsequent turbulence. **C)** 3D long axis imaging in systole shows the prominent subaortic membrane which has attachment to the nadir of the visualized leaflets (red stars) with mild thickening of the leaflets extending from leaflet hinge to tip. **D)** 3D short axis imaging in systole viewing left ventricular outflow tract and aortic valve from the ventricular apex demonstrates the circumferential membrane, which is most prominent under the coronary leaflets. **E)** 3D short axis of the aortic valve in diastole. **F)** 3D color Doppler demonstrates the trileaflet aortic valve with notable thickening of the right coronary leaflet (RCL) with mild to moderate central regurgitation. LCL, left coronary leaflet; NCL, non-coronary leaflet.



Post-operative transesophageal echocardiographic evaluation. **A)** Color Doppler comparison in systole demonstrates no significant residual subaortic membrane with laminar flow across the left ventricular outflow tract and aortic valve. **B)** BSI in systole depicts laminar flow. **C)** 3D long axis imaging in systole shows a very trivial residual subaortic membrane near the nadir of the right coronary leaflet (red star) with a noticeable thinner right and non-coronary leaflet. **D)** 3D short axis of the aortic valve in diastole. **E)** 3D color Doppler demonstrates notable thinning of the right coronary leaflet (RCL) tip with improve coaptation and no significant residual regurgitation. LCL, left coronary leaflet; NCL, non-coronary leaflet.



Preoperative transesophageal echocardiographic FlexiSlice evaluation of the aortic virtual basal ring. The short axis is reformatted in the bottom right-hand image, measuring 1.4 x 1.0 cm in systole. The subaortic membrane narrows this plane, most prominent along the ventricular septum to left ventricular free wall under the coronary leaflets.



Post-operative transesophageal echocardiographic FlexiSlice evaluation of the aortic virtual basal ring. The short axis is reformatted in the bottom right-hand image, now measuring 1.6 x 1.4 cm in systole following membrane resection.

JB26331XX

GE HealthCare

Discover the key to previously unreachable hearts

with a 3D TEE probe that has a 57% smaller tip volume[1]

Vivid™ 9VT-D

Smaller probe. Better access.

1. Volume of the TEE probe tip compare to standard adult probe 6VT-D Vivid probe. DOC2639172. 9VT-D probe is exclusively available for Vivid E95 and Vivid E90 systems.

© 2023 GE HealthCare
Vivid is a trademark of GE HealthCare. GE is a trademark of General Electric Company used under trademark license.