ASD closure in a 6-year-old patient using the 4D mini TEE probe

Courtesy of Dr. Khaleed Hadeed, Toulouse Children Hospital, France

Patient history/ pathology

A 6-year-old child weighing 16 kg was referred for the management of an atrial septal defect (ASD) of the ostium secundum type. The transthoracic echocardiography (TTE) revealed a significant left-to-right shunt via an ASD measuring 12 mm.

Challenges

The procedure is typically guided by two-dimensional (2D) transesophageal echocardiography (TEE), which requires multiple imaging planes to assess the morphology and measure the defect. This approach often underestimates the true dimensions of the defect.

This procedure is realized under a detailed imaging guidance throughout the procedure to avoid complications, and to ensure the proper positioning of the device.

System, probe & device used

Three-dimensional 3D-TEE guidance was possible in this small child using the 9VT-D mini 4D TEE probe during the procedure.

Step-by-step procedure

The procedure was performed under general anesthesia to ensure the child's comfort and immobilization. The pediatric 4D TEE probe was positioned without any difficulty.

TEE imaging identified the defect's initial dimensions from 8 to 12 mm according to the angle cut from 0° to 120°. 3D-TEE acquisition provided detailed visualization of the defect, and revealed an ovoid shape with the largest diameter in the superior-inferior axis, measuring 10x4 mm.

A sizing balloon was used to measure the stretched diameter of the defect, which was determined to be 14 mm. A 14-mm Amplatzer occluder device was chosen to match the measured stretched diameter witch exactly corresponding to the maximal diameter by 3D imaging.

Under continuous 4D TEE guidance, the device was carefully deployed, ensuring proper positioning and stability without interference with adjacent cardiac structures.

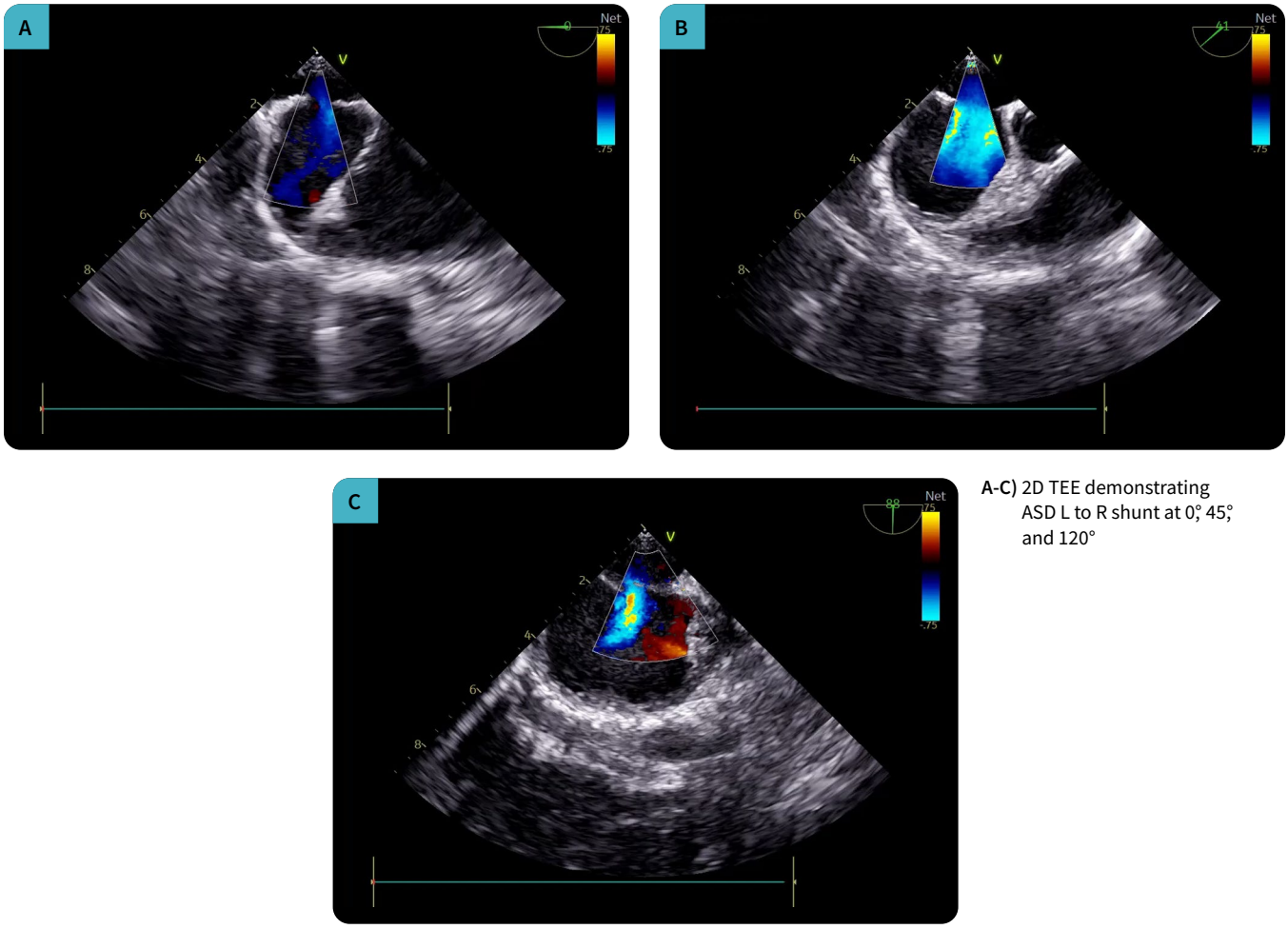
Post-Deployment Assessment confirmed the complete closure of the defect with no residual shunt. The device was well seated, with no obstruction to the pulmonary veins, atrioventricular valves, or other nearby structures.

Conclusion

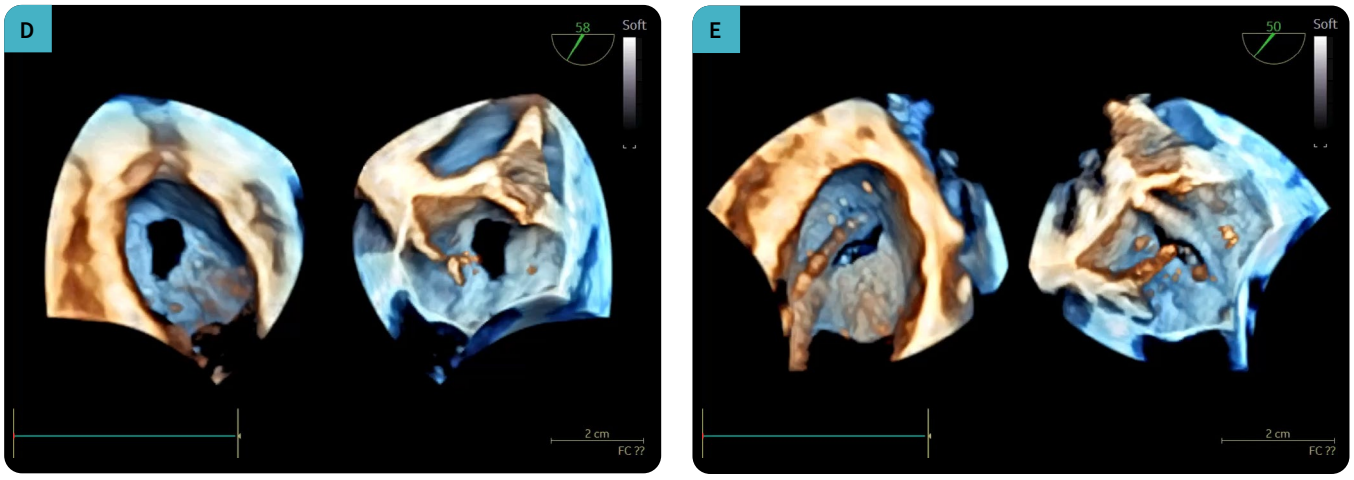
This case highlights the important role of pediatric 4D transesophageal echocardiography in the percutaneous closure of ASD. The enhanced imaging capabilities allowed for precise defect assessment, accurate device sizing, and safe deployment. The procedure was successful, with no complications, demonstrating the value of this advanced imaging technology in pediatric interventional cardiology.

Imaging follow-up

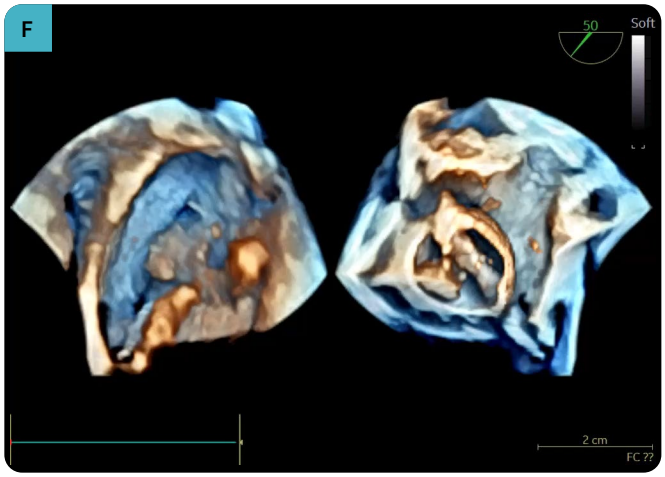
Follow-up imaging was performed using TTE and showed the occluder device in place with no evidence of residual shunting and no interference with surrounding structures, including the pulmonary veins or atrioventricular valves. The child's clinical course was uneventful, with resolution of the left-to-right shunt and no reported complications.



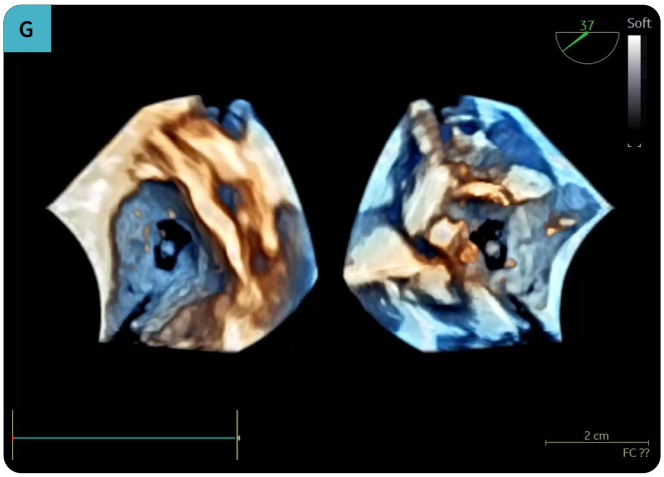
A-C) 2D TEE demonstrating ASD L to R shunt at 0°, 45°, and 120°

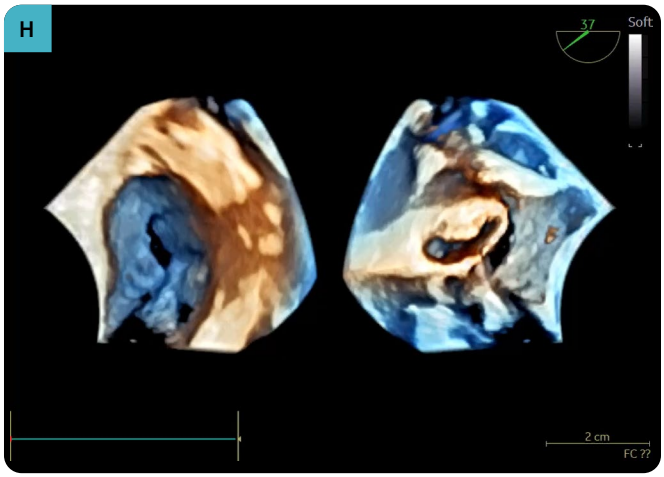


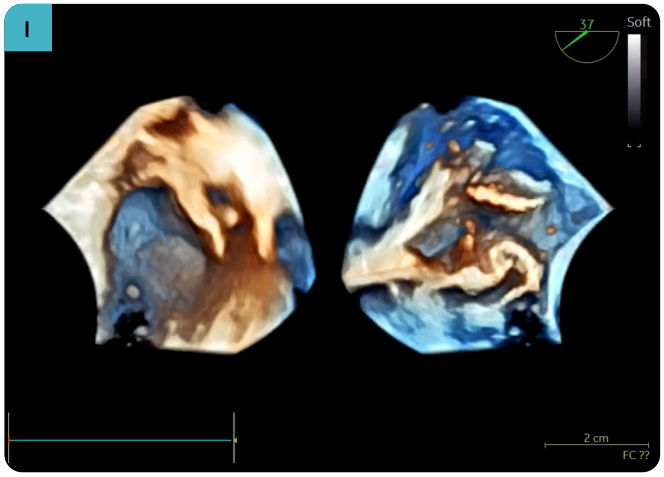
D-E) ASD viewed by 3D TEE from left and right side perspective



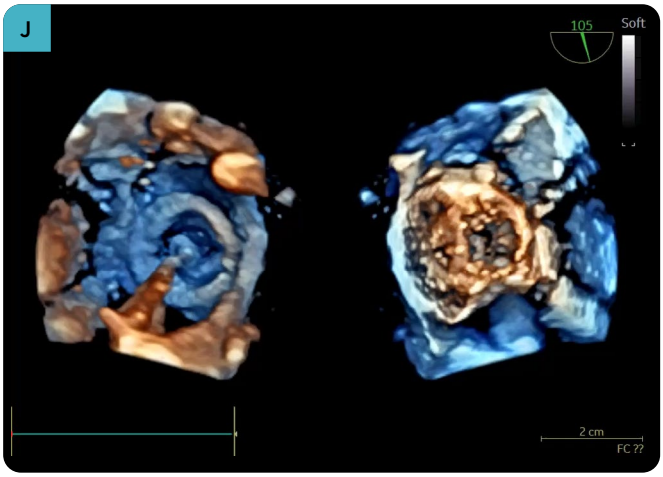
F) Sizing balloon viewed from left and right side

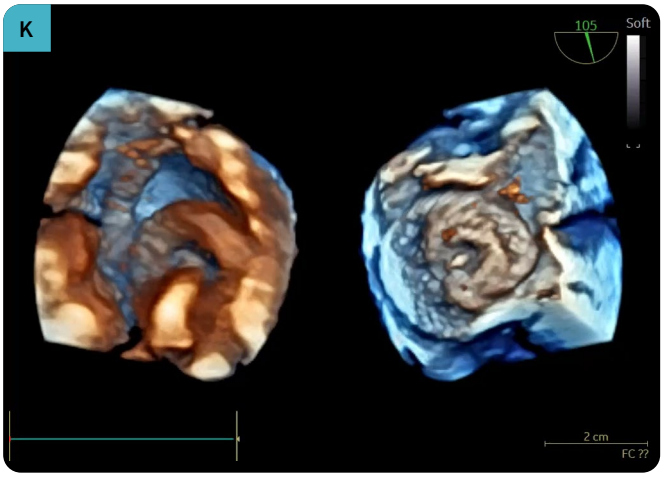


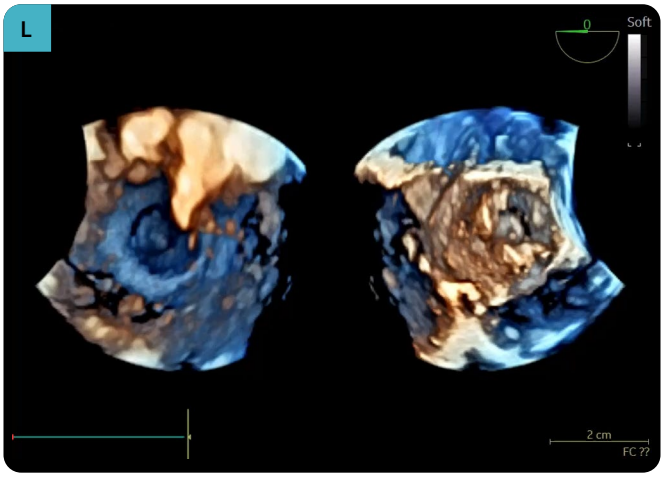




G-I) Device deployment under 3D-TEE live monitoring







J-L) ASD device before release, during Minnesota maneuver, and after release with final position

The statements by Dr. Khaled Hadeed described here are based on his own opinions and on results that were achieved in his unique setting. Since there is no "typical" hospital/clinical setting and many variables exist, i.e., hospital size, case mix, staff expertise, etc. there can be no guarantee that others will achieve the same results.

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