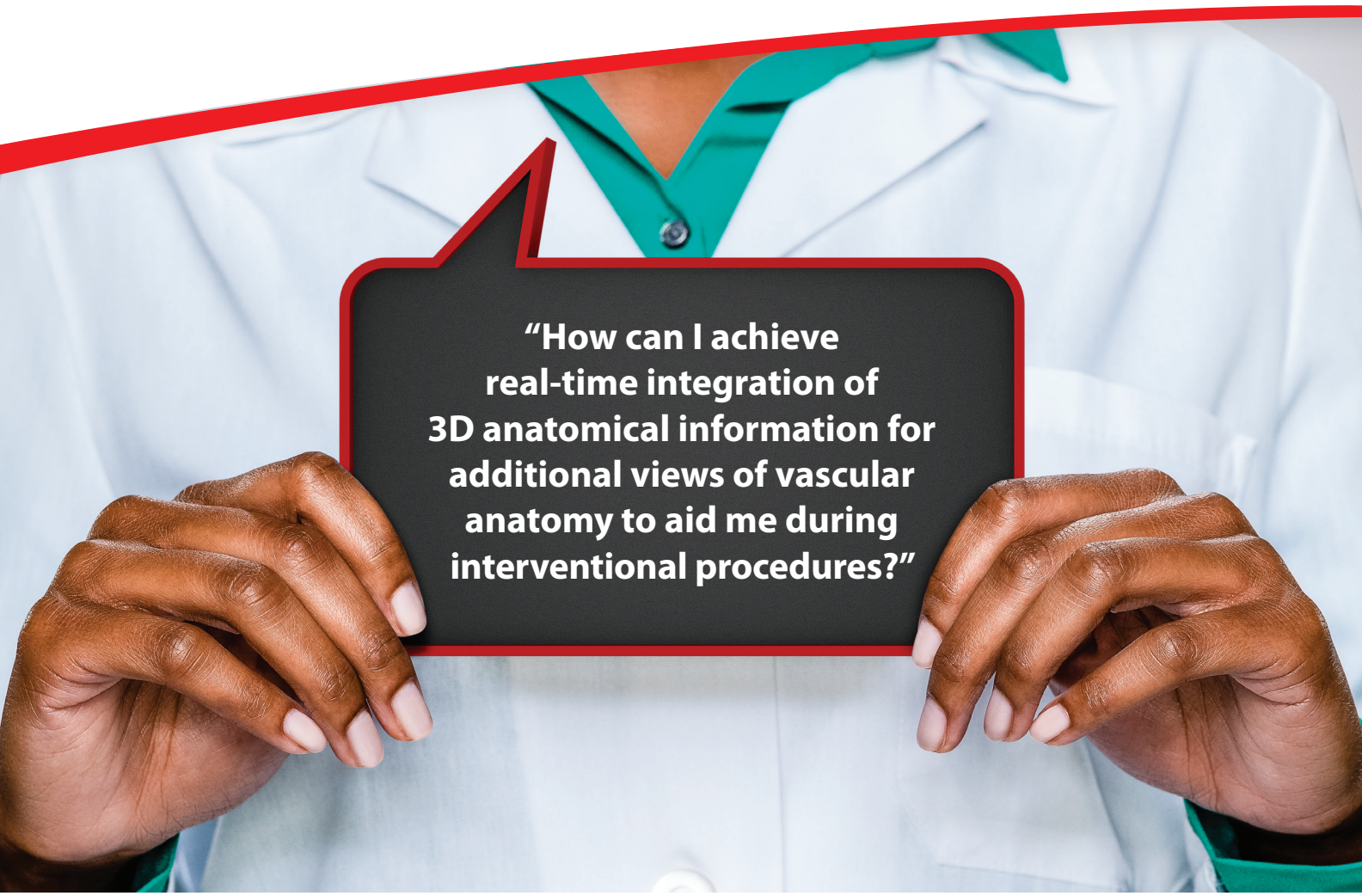
TOSHIBA
Leading Innovation

VL Clinical Case Study

Multi-Modality Fusion

Shyam K. Sathanandam, MD., Assistant Professor of Pediatrics, Division of Pediatric Cardiology
Section of Interventional Cardiology, University of Tennessee, Le Bonheur Children Hospital



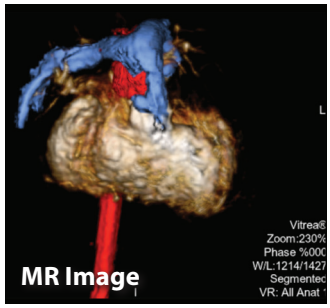
USE

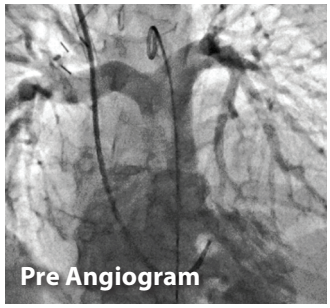
Multi-Modality Fusion (MMF) software provides additional views from 3D images of the vascular anatomy to aid clinicians in procedure planning and guidance of trans-catheter interventions for the management of congenital heart disease. Children and adults with congenital heart disease often require several operations and catheter based interventions throughout their lifespan. Typical diagnostic procedures include CT (computerized tomography) scans and MR (magnetic resonance) scans, as well as digital angiography. These procedures may require the use of radiation and/or the injection of contrast media.

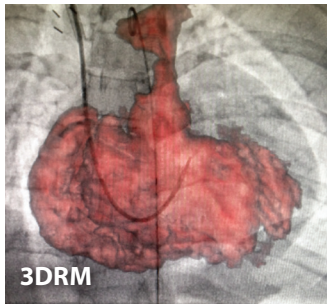
HISTORY

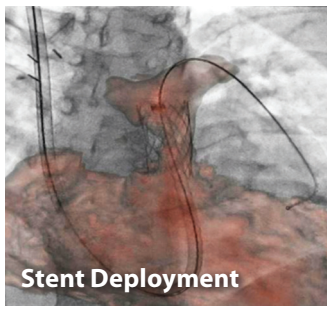
The patient was a 22-year-old male with DiGeorge Syndrome. He was born with structural heart defects, which included a ventricular septal defect (VSD), an interrupted inferior vena

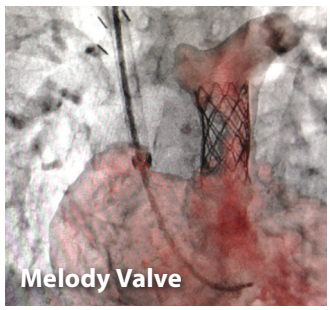
cava (IVC), and an interrupted aortic arch that was previously surgically repaired. The patient also had a RV to PA (right ventricle to pulmonary artery) conduit placement, which was discovered to have a stenosis during a MR scan.

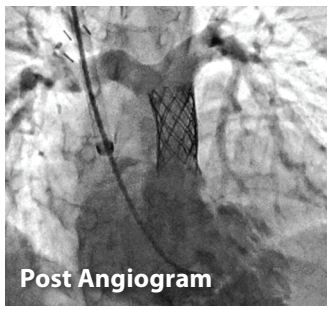












TECHNOLOGY

Toshiba's MMF software enables overlay of 2D fluoroscopy images with previously acquired 3D images. The previously acquired 3D images can be rendered from either a CT or MR scanner (vendor neutral) or the Toshiba Infinix angiography systems using 3D rotational acquisitions. The 3D images are overlaid on live 2D fluoro images on the Infinix exam room monitor. The 3D image of the vessels is automatically updated according to movement of the C-arm and the tabletop. The 3D image display changes according to the C-arm rotation angle, C-arm sliding angle, SID, field size, tabletop height, and tabletop panning of the X-ray angiography system. This capability will show the vascular anatomy with every rotation and angulation of the C-arm. In this case study, 3D MR images were used for overlay on the live 2D fluoro images during an interventional cardiac catheterization to implant a pulmonary valve (Melody® Valve).

FINDINGS

At the start of the interventional procedure, fiducial markers seen on the MR images were aligned with fluoroscopy images of the patient acquired in the AP and lateral positions. The 3D MR images enabled visualization of the anatomy in 3D. The 3D display of the anatomy was used as a 3D Road Map (3DRM) during the angiography, assisting in the visualization of a stenosis and the assessment of its severity prior to the intervention. The fused 3D MR volume facilitated catheter manipulation by the clinician through the patient's difficult anatomy, and aided the clinician in accurate stent positioning and valve placement. Furthermore, using MMF reduced the clinicians need for additional acquisitions, resulting in less radiation exposure and injected contrast medium volume.

CONCLUSION

Toshiba's MMF software provided additional views from 3D reconstructions of anomalous vascular anatomy during the interventional procedures in the pediatric patient. The ability to utilize the MMF software during angiography aided the clinician in the clinical guidance and device placement. An additional benefit appreciated by the clinician was the reduced duration of radiation exposure and amount of injected contrast medium administered to accomplish the procedure successfully.

Toshiba gives you a voice. What's yours?

2441 Michelle Drive, Tustin CA 92780 / 800.421.1968 medical.toshiba.com

VLCS12446US
MOIXR0041EB