Multi-modality imaging of apical aortic conduit

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An 82-year-old lady with prior coronary artery bypass grafting presented with syncope. Echocardiography revealed severe aortic stenosis (peak gradient 165 mmHg, mean gradient 77 mmHg). The patient was at high risk for surgical aortic valve replacement in view of her ‘porcelain’ calcified aorta identified by CT (Panel A). Trans-catheter aortic valve implantation techniques were discounted because she was not suitable for a trans-apical approach due to severe left ventricular hypertrophy causing obliteration of the left ventricular cavity. A MRI angiogram demonstrated a tortuous, ectatic abdominal aorta with areas of severe luminal narrowing. A femoral approach was contraindicated as both iliac and femoral arteries were severely stenosed (Panel B).

The patient underwent apical-aortic conduit implantation. This procedure is designed to relieve aortic stenosis by shunting blood from the apex of the left ventricle through a conduit connected to a valve and a Dacron graft to the descending aorta [MRI showing conduit including anatomical insertion and exit points (Panel C) + 3D echocardiogram showing conduit enface (Panel D)]. Echocardiography demonstrated good blood flow through the conduit with a peak velocity of 2.1 m/s and cardiac output (VTI × cross sectional area × heart rate) via the conduit of 4.7 vs. 1.7 L/min through the aortic valve [colour flow Doppler through conduit (Panel E) + pulse wave Doppler through conduit (Panel F)]. The patient’s symptoms resolved shortly after the procedure.

This report demonstrates the critical role of multi-modality imaging to select the most appropriate therapeutic strategy for high-risk patients with aortic stenosis. Additionally, the complimentary use of echocardiography and MRI to assess the anatomy and function of apical aortic conduit is demonstrated.

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