Visualization of an Aortic Coarctation, Induced by a Thoracic Stent Graft, Using 4D Magnetic Resonance Imaging

Case Blog

In 2001 a 13-year-old girl was taken to hospital after car accident, injured by multiple traumas, including an aortic rupture loco typico. Bleeding was brought under control via an endovascular approach with a Gore (W. L. Gore and Associates, Flagstaff, Ariz, USA) iliac limb 14-16-7. Follow-up CT scans showed over the years a relevant, but constant, bird-beak configuration of the stent graft (Figure 1). In 2009 the patient developed progressive arterial hypertension with a secondary hyperparathyroidism. For further investigation a conventional angiography with pressure gradient measurement and a four-dimensional magnetic resonance imaging was performed. The quantitative flow measurements were obtained by means of a retrospective ECG gated cardiac-phase resolved three-dimensional T1 weighted fast gradient echo acquisition [1,2].

The pressure gradient across the stent graft was 39 mmHg. Angiography showed a significant movement of the proximal end of the stent graft (Figure 2). The MRI confirmed the suspicion of a high-grade stenosis resulting in a functional coarctation. Flow analysis showed acceleration from 58 cm/s in the ascending aorta to 180 cm/s at the proximal end of the stent graft (Figure 3 and Video 1). The patient underwent open conversion with explantation of the stent graft and prosthetic graft insertion.

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References


Figure 3

Sagittal MRI of the stent graft with colour encoded flow analysis.

Video 1

Flow encoded MRI. Deep red visualization indicates strong flow acceleration at the proximal end of the stent graft.