A 7-year-old girl presented with severe dyspnea and pneumonia, which required endotracheal intubation, mechanical ventilation, and intravenous antibiotics. She had a history of several severe airway infections with inspiratory stridor. After she recovered, a bronchoscopy and an esophagogram (Figure 1) were performed to screen for a vascular ring.

An echocardiogram revealed a double aortic arch. For preoperative imaging, MR angiography was chosen, which clarified the pathological condition in detail. The investigation was performed on a 1.5 Tesla Magnetom (Vision, Siemens) using a phased array body coil. Paramagnetic gadolinium (Magnevist, Schering) with an injection rate of 3 mL/s was administered using an automated injector (Tomoejet, Bruker). Then, a large 3D volume was acquired during breath-hold (23 s) using a standard angiographic sequence with the following parameters: repetition time/echo time/flip angle, 4.6 ms/1.8 ms/50°; rectangular field of view, 390×290 mm; slab thickness, 90 mm; acquisition time, 23 s; bandwidth, 390 Hz/pixel; and real voxel size, 1.36×0.76×3 mm³.

After image acquisition, volume-rendering was performed on a workstation (SGI) using a proprietary software tool (Virtuoso, Siemens). Figures 2 and 3 show details of the shaded-volume reconstruction of the double aortic arch. Additionally, a rotation of the 3D MRI is provided Online.

The patient then underwent cardiac surgery. The vascular ring was opened, and the retroesophageal right-sided aortic arch was resected.
Figure 1. X-ray of the thorax: lateral view with barium enhancement of the esophagus. Dorsal narrowing in the upper third of the esophagus is produced by the right aortic arch.

Figure 2. Ventral aspect of volume-rendered MR angiography. The frontal division of the aorta in a left (LAoA) and a right arch (RAoA) is displayed; both override the main, right, and left pulmonary arteries (LPA). An anonymous vein (V. Ann.) passes ventral to the left aortic arch. The right carotid (RC) and right subclavian artery (RSA) arise from the right aortic arch and the left carotid (LC) and the left subclavian artery (LSA) from the left aortic arch.

Figure 3. Dorsal aspect of volume-rendered MR angiography. The dorsal division of the left (LAoA) and right arch (RAoA) is displayed. The dorsal curvature of the right arch results from passing near the vertebral column. RPA indicates right pulmonary artery; LPA, left pulmonary artery; and V. Ann., anonymous vein.
Double Aortic Arch
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