Case report

Right aortic arch with aberrant left innominate artery: MR imaging findings

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Abstract. A rare case of a 60-year-old man with a right aortic arch and aberrant left innominate artery is presented. This case had an unusual clinical presentation. The dysphagia appeared suddenly in adulthood, whereas vascular rings, when symptomatic, usually manifest early in childhood. To our knowledge, MR imaging findings of this anomaly have never been reported. The diagnosis was made by MR imaging and confirmed by surgery. Magnetic resonance imaging can replace angiography in the assessment of the aortic arch anomalies.

Key words: Aberrant left innominate artery – Right aortic arch – MR imaging

Introduction

Right aortic arch with aberrant left innominate artery is a very rare vascular ring. It results from the interruption of the left aortic arch between ascending aorta and left carotid artery during vascular embryonic development [1, 2].

Very similar anomalies have been imaged by MR imaging. However, to our knowledge, MR imaging features of this particular variant have not been described before. The clinical presentation was very unusual, manifesting as a sudden and severe dysphagia in an elderly man. Magnetic resonance imaging diagnosis was confirmed by surgery. It provided an optimal demonstration of the configuration of the aortic arch branches and their relationships with the adjacent structures.

Our case demonstrates that MR imaging can replace angiography in the preoperative evaluation of the vascular rings.

Case report

A 60-year-old man complained of a severe dysphagia for approximately 1 month. The clinical presentation had been sudden. He could drink only liquids and had lost approximately 10 kg of weight.

Chest X-ray showed an enlarged right aortic arch and descending aorta. A barium esophagography was performed. Lateral esophagogram showed a large retro-esophageal impression on the barium-filled esophagus; thus, the diagnosis of vascular ring was suggested.

An MR imaging exam was performed. Electrocardiogram-gated spin-echo (SE) axial, sagittal, and coronal oblique images were obtained. The following parameters were used: TR = 85 % RR interval; TE = 12 ms; NEX = 3–4; matrix = 256 × 160. The slice thickness was 8 mm with an interslice gap of 2 mm in the axial plane, 6 mm with a gap of 1 mm in the sagittal plane, and 4 mm with a gap of 1 mm in the coronal oblique plane.

Flow artifacts were avoided by positioning two presaturation slabs above and under the stack of slices in the axial plane. No presaturation slab was used in the sagittal and coronal oblique planes. Furthermore, a two-dimensional ungated breathhold time-of-flight MR angiography was executed. A stack of 28 coronal slices was positioned to cover the distal aortic arch and the descending aorta. The slice thickness was 3 mm, with no interslice gap. The acquisition time for each slice was 6 s. The following parameters were used: flip angle = 20°; TR = 50 ms; TE = 24 ms; matrix = 256 × 128. The flow artifacts were avoided by using flow compensation. No presaturation slab was used.

Axial SE images showed the “four-artery sign” [2, 3]: The carotid and subclavian arteries were evenly spaced around the trachea (Fig. 1). The left carotid and subclavian arteries arose from a common artery, the aberrant left innominate artery. This vessel originated from the right aortic arch and coursed behind the esophagus and trachea.
Fig. 1 a, b. Axial spin-echo (SE) images. 
a The ventral carotid (c) and the dorsal subclavian (s) arteries are symmetrically spaced around the trachea (t; four-artery sign). 

b The left carotid (c) and subclavian (s) arteries arise from a common artery, the aberrant left innominate artery (i). This vessel originates from the right aortic arch (a) and courses behind the esophagus and trachea (t).

Fig. 2a–d. Coronal SE images. 
a The right carotid artery is the first branch arising from the right aortic arch (a; arrows); 
b the right subclavian artery, the second (arrowheads); 
c, d the left innominate artery (I), the third. It originates from the distal right aortic arch (A) and gives rise to the left carotid (c) and subclavian (s) arteries.

Fig. 3. Sagittal SE images: the esophagus (e) and trachea (T) are compressed and displaced anteriorly by the aberrant left innominate artery (I).