Absence of Both Common Carotid Arteries: A Rare Aortic Arch Branching Anomaly
Published on 14.12.2015

DOI: 10.1594/EURORAD/CASE.13212
ISSN: 1563-4086
Section: Paediatric radiology
Area of Interest: Arteries / Aorta
Procedure: Diagnostic procedure
Imaging Technique: CT-Angiography
Special Focus: Congenital Case Type: Anatomy and Functional Imaging
Authors: David Hughes, Rehan Abdul-Halim
Patient: 10 years, female

Clinical History:
An arterial phase MDCT study of the thorax was performed on a 10 year old girl with symptoms of dysphagia looking for an extrinsic vascular ring or other cause of oesophageal compression. Previous medical history included repair of a tracheo-oesophageal fistula complicated by tight oesophageal stricture formation, requiring multiple dilatations.

Imaging Findings:
There was no vascular ring but evaluation of the vascular anatomy revealed an unusual variant (Fig. 1). The first branch of the aortic arch was large and trifurcated to give rise to both external carotid arteries and the right brachiocephalic trunk. The brachiocephalic trunk then divided into the right internal carotid artery and subclavian artery; the right vertebral artery arose as normal from the right subclavian artery. The second branch of the aorta gave rise to the left internal carotid artery. The third and final branch gave rise to the left subclavian artery from which the left vertebral artery arose as normal.

A clue to the abnormal branching pattern is seen on the axial images with separate internal, external and vertebral arteries all visible on upper mediastinal slices (Fig. 2). This “six vessel” sign is analogous to the “four vessel” sign seen with a double aortic arch.

Discussion:
Aortic branching patterns can show significant variation with joint origin of the right brachiocephalic trunk and left common carotid (so called bovine arch) being the most common. Unilateral absence of a carotid artery is well described but there are only two cases in the literature of bilateral absent common carotid arteries, neither in the era of CT.

Branching anomalies are usually asymptomatic in childhood and detected incidentally on imaging for other reasons. However, stenoses of the vessels can develop later in life and with the increasing use of endovascular techniques it is important to be aware of the possibility and range of variant anatomy.

Differential Diagnosis List: Absence of both common carotid arteries, Congenital vascular anomaly, Acquired arterial occlusion
Final Diagnosis: Absence of both common carotid arteries

References:

Description: 3D surface rendered CT demonstrates the separate origins of the external carotid arteries
Origin: Hughes D, Department of Radiology, Sheffield Children's Hospital, Sheffield, UK
Description: Coronal maximum intensity projection demonstrates the separate origins of the external carotid arteries. Origin: Hughes D, Department of Radiology, Sheffield Children's Hospital, Sheffield, UK.
Description: Sagittal maximum intensity projection demonstrates the separate origins of the external carotid arteries

Origin: Hughes D, Department of Radiology, Sheffield Children's Hospital, Sheffield, UK
Description: Axial CT thorax demonstrates the "six vessel" sign of bilateral separate internal and external carotid artery origins. Origin: Hughes D, Department of Radiology, Sheffield Children's Hospital, Sheffield, UK