

Developmental abnormalities of the fourth primordial pharyngeal arch

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Introduction:

Anatomical variants of the aortic arch and its supraaortic branches occur repeatedly. They might be incidentally discovered on imaging or present with respiratory or digestive symptoms when forming a vascular ring and compressing the trachea and esophagus. Moreover, these vascular abnormalities could produce challenges during conventional angiography, endovascular and surgical procedures, especially if such anatomic variations are previously not well-known. Our aim was therefore to undertake a study, analyzing the structural variations of the aortic arch and its supraaortic vessels according to their embryological basis with an emphasis in the development of fourth primordial pharyngeal arch.

Methods and Results:

A retrospective study of medical records and our surgical database identified various anatomic variants of aortic arch and its supraaortic branches. Imaging modalities include echocardiography, CT, MRI as well as invasive catheterization. In this study, the embryologic development and imaging appearance of the aortic arch system and its various malformations are reviewed. Diverse aortic arch anatomic variants such as left/ right aortic arch, bovine/ equine arch, aberrant/ isolated subclavian artery, interrupted arch and cervical aortic arch are discussed based on their embryological basis.

Conclusions:

Various congenital malformations of the aortic arch vessels have been reported in the literature, which reflects the complexity of their embryologic development. Most of these malformations are incidental findings and remain asymptomatic until adulthood. However, they can also be responsible for a variety of clinical symptoms and frequently associated with congenital cardiac diseases. Familiarity with the spectrum of the possible aortic arch malformations is essential for their accurate diagnosis, classification and management. This could be simplified by understanding the cardiovascular embryology.