

## **An assessment of the clinical significance of aortic arc variations**

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### **Letter to the Editor**

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We have read the original article 'Evaluation of the Variations in the Aortic Arch and its Branches by Multi-sectional Computed Tomography' by Boyacı et al. [1] in your journal published in the January 2015 with interest. We congratulate the authors for this article. As known, as a standard left aortic arch and descending thoracic aorta is observed in 70% of the individuals [2]. Aortic arch abnormalities are classified in three groups as 1- Vascular ring, 2- Abnormalities that cause a vascular pressure on the structures such as trachea, bronchi and oesophagus without ring, and 3- Non-compressive aortic arch malformations [3]. Aortic arch variations (AAV) increases the risk of aortic aneurysms/dissections, may lead to abnormalities by changing the hemodynamics of the brain and to recurrent cerebral infarctions with unknown source, and may be observed together with some congenital abnormalities such as left common coronary artery that exits the pulmonary artery, DiGeorge's syndrome, congenital cardiac valve disorders, trisomy 13, 18 or 21, Fallot's tetralogy or Noonan's phenotype, oesophageal atresia, and tracheoesophageal fistula [4,5]. Bovine aortic arch variation is the most common type AAV that is observed in 10-22% of the population, according to the data in the literature [1,2,5]. Aortic arch variations are important

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when a cerebral protection is planned in aortic Aneurysm/dissection surgery. First, antegrade cerebral perfusion via single cannula is advantageous since both common carotid arteries are fed through the same orificium. Secondly, in dissections including the intimal tear region within the arch, the number of anastomoses is decreased and the time is shortened during debranching. However, during thoracic endovascular aortic repair (TEVAR), the possibility of closure of the left common carotid artery's orificium is low, and closure of the brachiocephalic truncus by the proximal landing zone of the graft is a very important problem. In such a situation, carotico-subclavian, subclavio-subclavian by-pass or carotico-carotid cross-over by-pass is needed. Aberrant right subclavian artery (ARSA) is the most frequent abnormality of the arch and is observed in 1% of the population [5]. In this abnormality, the right subclavian artery leaves the left part of the aortic arch as the final branch and progresses into the right axillary region through the posterior aspect of the oesophagus (which means from the left to the right). Occasionally it progresses between the oesophagus and trachea or by the anterior aspect of the trachea [2]. This pathology is generally asymptomatic; however, this may lead to respiratory symptoms in children and difficulty swallowing or a chronic cough in the adults. In case of pressure on the oesophagus, 'Dysphagia lusoria' may be observed. In case of an aneurysmatic widening of aberrant subclavian artery in a segment close to the Aorta, it is referred to as 'Kommerell's diverticule'. This diverticule may cause pressure on the tracheoesophageal region and lead to dissection/Rupture due to excessive widening [6]. Antegrade cerebral protection via the subclavian or axillary cannulation is preferred during aortic arch surgeries. However, placement of the aortic cross clamp on the proximal aspect of the left subclavian artery may lead to serious cerebral complications in patients with ARSA pathology. In such a situation, cerebral protection may be achieved by antegrade cerebral perfusion through bilateral common carotid arteries. In patients with

aberrant right subclavian artery abnormalities, and in the presence of a gastrointestinal bleeding due to delayed nasogastric or endotracheal intubation, tracheoarterial fistula (between trachea and ARSA) should be suspected [7]. Transradial coronary angiography is 40% unsuccessful in patients with ARSA. The direction of the catheter towards the ascending aorta or to the aortic root may be difficult via the right transradial approach. The aberrant right subclavian artery abnormality may be observed with the absence of right recurrent laryngeal nerve in some cases. This is important in patients undergoing thyroid surgery. The right recurrent laryngeal nerve is absent in its normal place in the inferior pole of the thyroid gland. It is placed in the lateral aspect of the gland or in an aberrant location, and nerve injury may be observed during thyroidectomy [7]. Again, during interventions of anterior cervicothoracic region pathologies (tumor, disc hernia, etc), during right thoracic outlet syndrome surgery, notification of ARSA prior to the surgery would avoid vascular injuries and related bleedings. In conclusion, previous notification of ARSA is important in avoiding vascular injuries and cerebral complications in patients undergoing endovascular intervention on the aorta, aortic arch surgery, thyroidectomy or cervico-thoracic surgery.

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