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ANATOMICAL FEATURES OF RIGHT-SIDED AORTIC ARCH: LITERATURE REVIEW

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Right-sided aortic arch is defined as an aortic arch coursing to the right of the trachea due to persistence of the right fourth aortic arch with regression of the corresponding left segment (Edwards 1948; Cinà et al. 2004). It represents a rare configuration of the aortic arch complex but is consistently positioned within the spectrum of congenital cardiovascular anomalies because of its association with structural heart disease and vascular rings (Hellinger 2010; Hanneman et al. 2017).

Epidemiological studies estimate its prevalence at around 0.1% in the general population, most frequently as an incidental imaging finding (Hellinger 2010; Park et al. 2019). In isolated cases without concomitant malformations, a right-sided aortic arch is usually regarded as an anatomical variant, whereas its frequent coexistence with conotruncal defects and 22q11.2 deletion justifies classification as a clinically significant congenital arch anomaly (Miglioretti et al. 2013; Hanneman et al. 2017).

According to the classical classification by Edwards, three principal types are distinguished: right aortic arch with mirror-image branching, right aortic arch with aberrant left subclavian artery, and right aortic arch with isolation of the left subclavian artery (Edwards 1948; Knight and Edwards 1974). Subsequent radiologic series have shown that the subtype with aberrant left subclavian artery predominates overall, whereas the mirror-image pattern is more strongly associated with cyanotic congenital heart disease (Stewart et al. 1966; Hellinger 2010; Cinà et al. 2004).

Morphometric investigations using cadaveric material and CT angiography have demonstrated systematic differences in arch diameter, length, curvature, angulation, and the position of the descending aorta relative to the vertebral column compared with the typical left-sided arch (Kadir 1991; Karacan et al. 2008; Morsi et al. 2020). These geometric features, together with characteristic variants of supra-aortic trunk origin, including mirror-image branching, aberrant left subclavian artery from a Kommerell diverticulum, and isolated left subclavian artery, directly influence endovascular device choice, access strategy, and the risk of tracheoesophageal compression (Stewart et al. 1966; Cinà et al. 2004; Park et al. 2019; Hanneman et al. 2017).

Thus, compact but precise anatomical and morphometric characterization of right-sided aortic arch and its branching patterns is of clear clinical relevance, providing a necessary anatomical basis for optimizing diagnostic algorithms and planning surgical and endovascular interventions in patients with aortic arch anomalies.