Insights into Arch Vessel Development in the Bovine Aortic Arch

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ABSTRACT

Objectives: A bovine arch is the most common variation of aortic arch vessel branching and is characterized by either the innominate artery and the left common carotid artery sharing a common point of origin with the innominate artery or by the left common carotid artery emerging as a branch of the innominate artery. Although believed to be a non-pathologic variant, previous data has shown that children with bovine arch anatomy are at a significantly higher risk of re-coarctation following extended end-to-end anastomosis. This study aims to assess the origin of the arch vessels in bovine versus normal anatomy.

Methods: 34 infant chest CTAs and 15 infant chest CTs performed at the University of Iowa Stead Family Children's Hospital from 2012-2017 were obtained. CareStream software was used to orient the best image plane displaying the sinotubular junction (STJ), brachiocephalic, left common carotid (LCCA), and left subclavian arteries. HV1 denotes the distance from STJ - brachiocephalic artery. HV2 describes the distance between the brachiocephalic artery - LCCA. Finally, the distance between the LCCA - left subclavian artery was measured as HV3. In the case of a bovine arch, the midpoint of the bovine trunk doubled as the midpoint of the brachiocephalic artery and the LCCA. All distances were standardized to body surface area.

Results: HV2 was significantly longer in normal arches, while HV3 was longer in bovine arches. There was no change in HV1 or the total arch length between the two anatomies.

Conclusions: Arch vessels variance from normal to bovine anatomy is largely due to the LCCA moving proximal on the arch to form the bovine trunk.