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Abnormal Subclavian Branching of the Left Aortic Arch in a Native Goat

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Abstract: This study describes a case of abnormal subclavian branching of the left aortic arch in a Native Goat. During the dissection performed on a cadaver of a 1-year-old, male Native Goat, brachiocephalic trunk and left subclavian artery were seen to arise as 2 separate branches while the bicarotic trunk was not formed.

Key words: Aortic arch, abnormal branching, goat, aortic arch, bicarotic trunk

INTRODUCTION

The anomalies of the aortic arch are developmental anomalies which result from one or more aberrant development of the pharyngeal arch (Sadler, 2004) and constitute <1% of the total congenital cardiac effects in human (McElhinney and Goldmuntz, 2004). Many reports have been issued on the anomalous arterial developments of aortic arch in various species of dogs (Bezuidenhout, 1989; Ricardo *et al*., 2001; Nam *et al*., 2003; Kim *et al*., 2006), cats (Yarim *et al*., 1999), horses (Bartels and Vaughan, 1969), pigs (Van Den Ingh and Van Der Linde-Sipman, 1986), cattle (Roberts *et al*., 1953; Rooney and Watson, 1956) and sheep (Van Den Ingh and Van Der Linde-Sipman, 1986). To the best of their knowledge, there is no documentation about the abnormal branching of the aortic arch in goats so far.

MATERIALS AND METHODS

In our study, a 1-year-old, male, native goat of 30 kg body weight, with no known clinical disorder, was submitted to the Department of Anatomy from the Animal Production Research and Application Centre of the Veterinary Faculty for student education. The animal was anaesthetized with an intramuscular injection of xylazine hydrochloride (Rompun®, Bayer; Istanbul, Turkey) and ketamine hydrocloride (Ketalar®, Parke-Davis; Istanbul, Turkey) and exsanguinated through a cannula inserted into the common carotid artery. After the preparation of the cadaver with 10% neutral buffered formalin, dissection sets were used for cadaver dissection.

During the dissection performed, brachiocephalic trunk and left subclavian artery were seen to arise as 2 separate branches from the craniodorsal of the aortic arch with 8.27 mm distance in between (Fig. 1). The external diameters of the brachiocephalic trunk and left subclavian

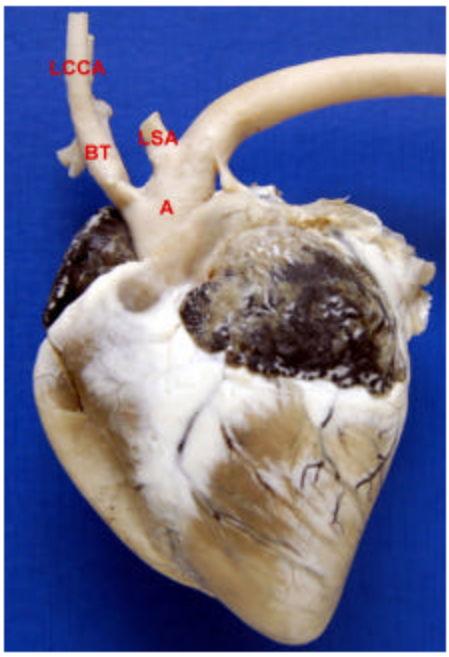

Fig. 1: Separate branching of the brachiocephalic trunk and left subclavian artery from the aortic arch. Aorta (A), Brachiocephalic Trunk (BT), Left Subclavian Artery (LSA), Left Common Carotid Artery (LCCA)

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artery at their origins were 10.40 and 10.01 mm, respectively. Brachiocephalic trunk continued cranially and formed the left common carotid artery after 27.84 mm with an external diameter of 5.45 mm. The rest of the trunk proceeded as right subclavian artery (diameter: 8.34 mm) and right common carotid artery (diameter: 5.94 mm). The further branching of the left subclavian artery was normal.

RESULTS AND DISCUSSION

Aortic arch anomalies result from the abnormal settlement and progression of the aortic arch or its branching arteries. Examples of such anomalies are double aortic arch, right aortic arch mirror imaging, right aortic arch with abnormal branching, left aortic arch with abnormal branching and cervical branching (McElhinney and Goldmuntz, 2004). These variations do not affect the dynamic equilibrium of circulation in most cases and thus are asymptomatic (Sadler, 2004; Goldmuntz, 2001). Increasing usage of imaging techniques such as chest radiography, ECG, MRI allows the identification of these abnormalities more frequently.

In this study, we observed the abnormal branching of the subclavian arteries from the aortic arch. In normal goat, the aortic arch gives rise only to the brachiocephalic trunk and both left and right subclavian arteries arise from the brachiocephalic trunk. Five or 6 cm after the origin of the brachiocephalic trunk, the left and right subclavian arteries leave the trunk at the level of the 3rd rib. These arteries feed the front half of the thorax and forelimbs (Nickel *et al*., 1981).

The anomaly in the present study fits in the category of left aortic arch with anomalous branching

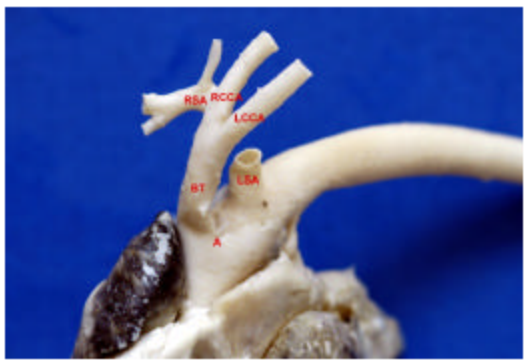

Fig. 2: The bicarotic trunk which is normally observed in goats was not formed. Aorta (A), Brachiocephalic Trunk (BT), Left Subclavian Artery (LSA), Right Subclavian Artery (RSA), Left Common Carotid Artery (LCCA), Right Common Carotid Artery (RCCA)

(Mcelhinney and Goldmuntz, 2004) and the morphological characteristics of the arch is similar to that normally present in dogs. The bicarotic trunk which is normally observed in goats was not formed in our study (Fig. 2).

CONCLUSION

Knowledge of the anatomy and variations of aortic arch is important for radiological examinations and surgical interventions. Clinicians must be aware of possible variations when performing procedures without good visibility such as needle biopsies or injections. In surgery, misidentification of the brachiocephalic trunk for the subclavian arteries could be life-threatening. Careful examination and correct identification of the vessels by veterinary practician are essential to avoid major complications.

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