

CASE REPORT

A variable origin of the vertebral artery

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Abstract: This study presents and describes the variation of the vertebral artery arising from the aortic arch as a case report. This variation was found in one of the cadavers at the Institute of Anatomy of Medical Faculty of Comenius University in Bratislava. Anomalous arising was discovered during the student's dissection of thorax and abdomen.

Non standard arising of the vertebral artery is compared to the standard arising in the anatomical literature and atlases. The variable arising was confronted to the possible variations of the vertebral artery reported in literature (Fig. 4, Ref. 9). Full Text (Free, PDF) www.bmj.sk.

Key words: vertebral artery, anatomy, spinal cord.

The vertebral artery supplies the cervical part of the spinal cord, spinal ganglions, meninges and dura mater in the posterior cranial fossa. The vertebral artery arises from the supero-posterior aspect of the subclavian artery. The artery ascends back between the longus colli and scalenus anterior, behind the common carotid artery and vertebral vein. It is crossed by the inferior thyroid artery and on the left also by the thoracic duct. Then the artery passes through foramina transversaria of all cervical vertebrae except the seventh. Between the first and second cervical vertebrae it forms a marked arch. The next arch is formed behind the lateral mass of atlas and the posterior arch of atlas bears a wide groove for vertebral artery. The vertebral artery curves ventro-cranially between atlas and foramen magnum, penetrates the posterior atlanto-occipital membrane and enters the cranial cavity on the anterior surface of the foramen magnum. In the posterior cranial fossa, it lies on the clivus of the occipital bone and at the inferior pontine border it joints its fellow to form the unpaired basilar artery (1, 2, 3, 4).

Case report

During the dissection of the thoracic and abdominal cavity an atypical arising of the left vertebral artery was found in cadaverous material of the Institute of Anatomy, Comenius University. The cadaverous material came from a 70 years old woman.

After opening the thoracic cavity, we started the preparation of great vessel within pericardium. We gently cut the right and left brachiocephalic vein during the dissection of the superior

mediastinum. We observed the course of the vessels branching from the aortic arch to the cervical region. We cut the branches of the aortic arch. We observed the brachiocephalic trunk where arises the right subclavian artery and right common carotid artery, to keep one centimeter long stumps of these two arteries. This relatively thick branch arises from the aortic arch as first and toward the right. In the next step we cut the left common

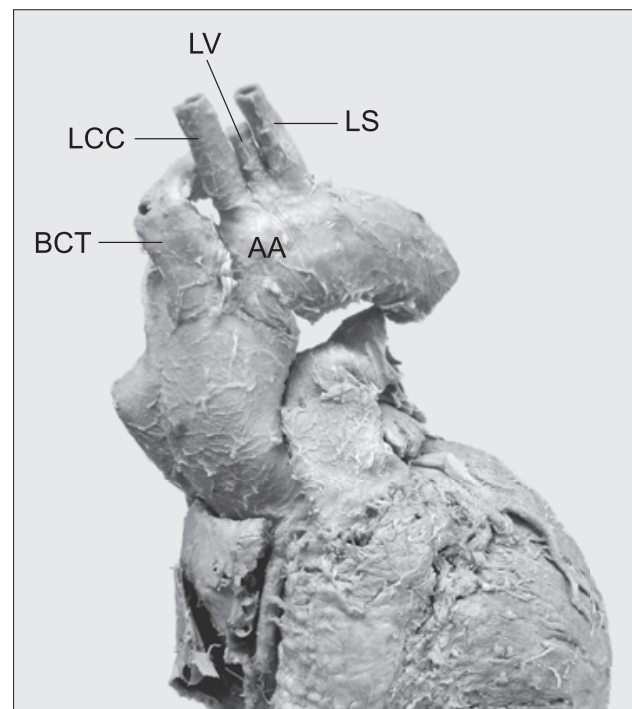


Fig. 1. Anterior view of the dissected heart. AA – aortic arch, BCT – brachiocephalic trunk, LCC – left common carotid artery, LV – left vertebral artery, LS – left subclavian artery.

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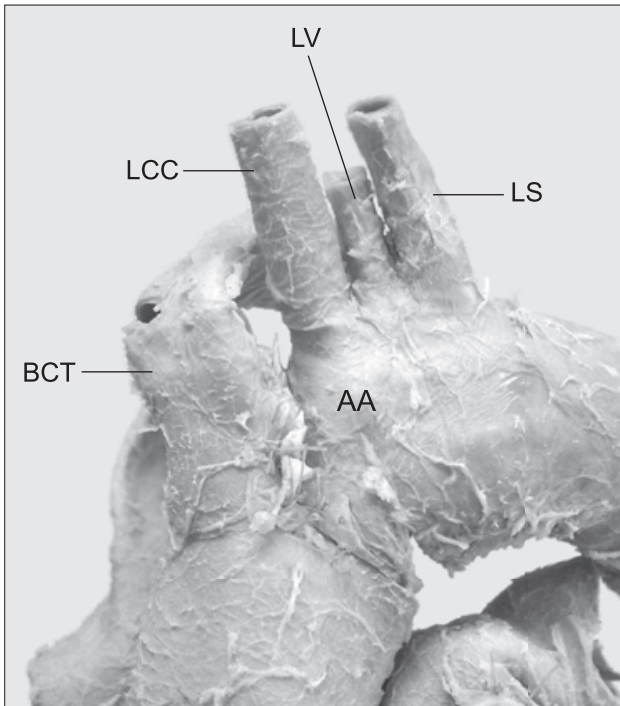


Fig. 2. Detail of the aortic arch. AA – aortic arch, BCT – brachiocephalic trunk, LCC – left common carotid artery, LV – left vertebral artery, LS – left subclavian artery.

carotid artery and left subclavian artery by the same way. These branches course to the left. Between the previously mentioned arteries, we observed an additional branch of the aortic arch. After the observation, consultations and comparison with the cases mentioned in the literature, we consider this variable branch as the left vertebral artery. The diameter of this variable artery was found to be two millimeters.

We continued with the preparation of the superior vena cava and inferior vena cava. We cut the superior vena cava together with the stumps of both brachiocephalic veins. The inferior vena cava was cut after its penetration through the foramen of vena cava in the diaphragm. The pulmonary arteries and veins were dis-

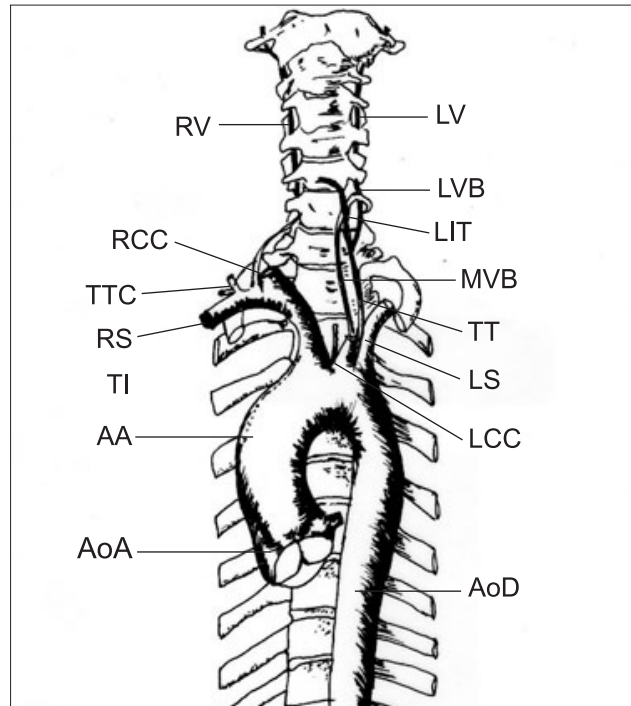


Fig. 4. Rare variation of vertebral artery. The left vertebral artery is arising from two trunks from the arch of aorta: one from the arch which joins the vertebral artery, which is itself a branch of the thyrocervical trunk. AOD – descending aorta, AA – aortic arch, AOA – ascending aorta, RS – right subclavian artery, TI – thyroidea ima, LCC – left common carotid artery, RCC – right common carotid artery, MVB – medial vertebral branch, TT – thyrovertebral trunk, LS – left subclavian artery, TTC – thyrocervical trunk, RV – right vertebral artery, LV – left vertebral artery, LVB – left vertebral branch, LIT – left inferior thyroid artery.

sected closely to hilum of the lungs. When we finished with the preparation of the vessels, we made a dissection of the pericardium. The pericardium was cut by upside down „Y“ cut. The last step was the extraction of the heart from the thoracic cavity (5).

After a final washing and cleaning of our dissected heart, we made a complete photo documentation of the heart, great vessels and the variable branch of the aorta arch (Figs 1–4).

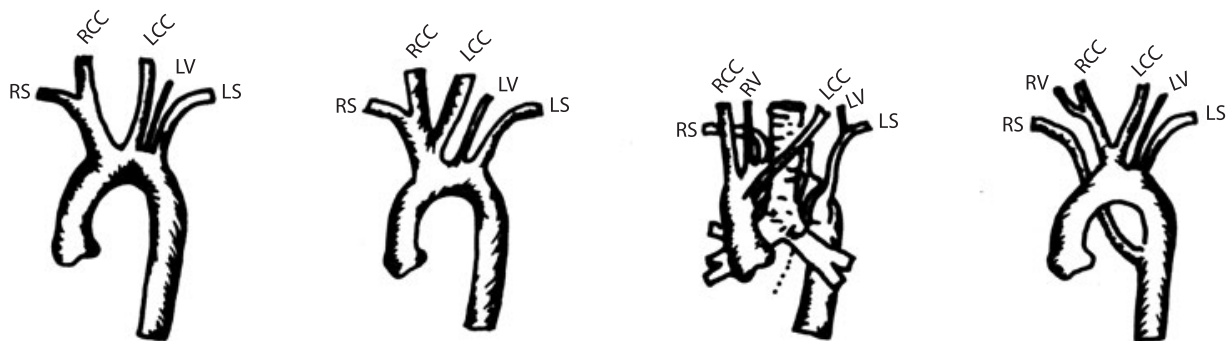


Fig. 3. Possible variations of the vertebral artery arising from the aortic arch. LCC – left common carotid artery, LS – left subclavian, LV – left vertebral artery, RCC – right common artery, RS – right subclavian artery, RV – right vertebral artery.

Discussion and conclusion

Within the pathological and anatomical dissections, were reported an atypical variation of the vertebral artery. As described in literature, the incidence is low.

The right vertebral artery may arise from the following: A. the first part of subclavian artery, closer to the brachiocephalic artery (1 % of cases) or to the anterior scalene muscle; B. directly from the aortic arch (3 % of cases); C. the right common carotid artery when the right subclavian artery is branching from the aorta beyond the left subclavian artery; D. the brachiocephalic trunk. The right vertebral artery may pass behind the oesophagus.

The left vertebral artery may arise directly from the left common carotid artery, or the root of the subclavian artery, close to the arch of the aorta. It may also arise from the aortic arch. The frequency of the left vertebral artery arising from the aortic arch was 5.8 % in the Japanese study. There was no difference between male and female (6). In the Indian study, 1.6 % had left vertebral artery as a branch of aortic arch. Five out of six cadavers with the anomalous aortic arch branching were females. One male cadaver presented an anomalous origin of left vertebral artery directly from the arch (7). Incidentally, two left vertebral arteries can be observed. In such case, one artery arises from the aortic arch, the other from the subclavian artery in the normal position; the second one is smaller than normal.

The left and right vertebral arteries may be doubled, with each vessel entering a different foramen transversarium. In some cases, the left vertebral artery arises from the aortic arch between the origins of the left common carotid artery and left subclavian artery; in one case the vertebral artery enters the foramen transversarium of the fifth cervical vertebra. In another case, the left vertebral artery originates from aorta at the upper angle of the junction of the left subclavian artery with the aortic arch; the vessel enters the foramen transversarium of the fifth cervical vertebra. Additionally, the vertebral artery may enter the foramen transversarium in the second through seventh cervical vertebra. When entering one of the higher foramina transversaria, the artery may lie behind the common carotid artery. The vertebral arteries may enter the sixth cervical foramen transversarium in 88 % of cases and the foramen transversarium of the seventh cervical vertebra in 5 % of cases; they ascend to enter the fifth cervical vertebra in 7 % of cases. Both vertebral arteries may give rise to, or arise from, the inferior thyroid artery, and may

give rise to the superior intercostal artery, deep cervical artery or the occipital artery. Size of both arteries may be increased or decreased. In 3 % of cases, vertebral arteries may arise from the thyrocervical trunk or from the costocervical trunk.

The vertebral arteries are usually unequal in size, the left being larger than the right vertebral artery. This rule is not absolute, since Cruveilhier has reported the left vertebral artery reduced to a small twig with the right vertebral artery being of a normal diameter. The inferior thyroid artery may lie behind the vertebral artery. Very rarely, the vertebral arteries fail to unite to form the basilar artery. The two longitudinal trunks may be united by anastomosis between them. The vertebral artery may exist as several vessels that eventually unite, or it may form an arterial ring traversed by the hypoglossal nerve. One of the anterior spinal branches (usually the left one) is occasionally absent; in such case it is replaced by branches from the contralateral vertebral artery. Occasionally, the spinal branch arises to supply the cervical enlargement of the spinal cord.

The inferior cerebellar artery, middle cerebellar artery, the left anterior spinal artery, one of the posterior spinal arteries and even the posterior cerebellar artery are branches of the vertebral artery which have been reported missing (8, 9).

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Received May, 10, 2007.

Accepted December 3, 2007.