Variation of the Right Subclavian Artery as the Last Branch of the Aortic Arch in Two Japanese Cadavers

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Summary: Two anomalous cases of the right subclavian artery were found in Japanese cadavers. In both cases, the right subclavian artery arose from the posterior wall of the aortic arch as its last branch, and ran rightwards between the esophagus and the vertebral column. The cases described belong to type G of the Adachi-Williams-Nakagawa-Takemura classification of aortic arch branching patterns.

Two anomalous cases of the right subclavian artery as the last branch of the aortic arch were encountered in Japanese cadavers, a female aged 84 years who had died from brain infarction and a male aged 68 years who had died due to acute heart-failure. These cases were found during dissection practice at Chiba University School of Medicine in 1995.

Observations

In both cases, the following branches were found to arise from the aortic arch in order of appearance: 1) the right common carotid artery, 2) the left common carotid artery, 3) the left subclavian artery, and 4) the right subclavian artery (Figs. 1a and 2a). These branches arose independently and a bicarotid trunk was not seen.

The right subclavian artery arose from the posterior wall of the aortic arch at the level around the upper part of the 4th thoracic vertebra (Figs. 1a and 2a). The external diameters of the artery at its origin and during the following course are 15 mm and 11–12 mm in the female cadaver, and 13 mm and 9–10 mm in the male cadaver, respectively. Thus, the so-called diverticulum was formed at its origin. The artery was found to run rightwards between the esophagus and the vertebral column, making a depression on the posterior wall of the esophagus, and then turned upwards to the right side of the esophagus (Figs. 1b and 2b). After ascending up to the level of the 7th cervical vertebra, it gave off the right vertebral artery, and then was seen to bend rightwards taking the course of the normal subclavian artery. The right vertebral artery entered the transverse foramen of the 6th cervical vertebra in the same manner as the left vertebral artery.

In both cases, the right vagus nerve descended anteriorly to the right subclavian artery along the right side of the trachea. The right recurrent laryngeal nerve was absent, but the corresponding branch arose directly from the right vagus nerve at the level of the 1st tracheal cartilage, just above the origin of the superior cardiac branch of the vagus nerve (Figs. 1b and 2b). In the male cadaver, the superior cardiac branch of the vagus nerve proceeded to the anterior surface of the aortic arch and joined the superficial part of the cardiac plexus (Fig. 2b), while that of the female cadaver joined the deep part of the cardiac plexus (Fig. 1b) as in normal cases. The course of the left vagus nerve and that of the left recurrent laryngeal nerve were found to be normal. The courses of the thoracic duct, the sympathetic trunk and the ligamentum arteriosum were also normal.

Discussion

Both of the present cases belong to type G of the Adachi-Williams-Nakagawa classification of aortic arch branching patterns. Holzapfel also classified anomalous cases of the right subclavian artery into 10 types. The present cases belong to type 5 of this classification. Recently, Takemura et al. further subdivided each of the Adachi-Williams-Nakagawa's type G and H into 9 subgroups according to the origin and number of the vertebral arteries. The present cases again belong to type G of Takemura's
classification, since the origin and number of the vertebral arteries present were normal.

The present cases are the 6th and 7th of this anomaly encountered at Chiba University among 2024 corpses, with an estimated frequency of at least 0.35%. The incidence of this variation in Japanese adults ranges from 0.15% to 1.6% with an average of about 0.5%. The present cases are the 95th and 96th of Adachi’s type G (including Williams-Nakagawa’s type H and CG) reported in Japan.

The anomalous right subclavian artery such as that seen in the present cases is not uncommon and developmental considerations have been previously reported. The authors reported the present cases as material for future statistical research.

References

2) Barry A. The aortic arch derivatives in the human adult. Anat Rec 1951; 111:221-238.
9) Nakanishi T. One case of the right subclavian artery as the last branch of the aortic arch. Fukushima Med J 1964; 14:159-164. (in Japanese)
Explanation of Figures

Plate I

Anomalous right subclavian artery (RS) found in the female cadaver (Fig. 1) and male cadaver (Fig. 2). (a) Dorsal view of the aortic arch. (b) Lateral (right-side) view of the cadaver. The right subclavian artery was seen to run behind the esophagus (Es) causing a depression on the posterior wall of the esophagus (arrows). The right inferior laryngeal nerve (IL) arose directly from the right vagus nerve (V). In the female cadaver the right superior cardiac branch (SC) joined the deep part of the cardiac plexus (Fig. 2a), while that of the male cadaver joined the superficial part (Fig. 2b). AA, ascending aorta; DA, descending aorta; LC, left common carotid artery; LS, left subclavian artery; LV, left vertebral artery; RC, right common carotid artery; RV, right vertebral artery; Tr, trachea.