

Aberrant Right Subclavian Artery
—Three Case Reports—

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Abstract
Conventional angiography detected three cases of aberrant right subclavian artery. A 51-year-old female presented with a small infarction in the left medulla oblongata and severe stenosis of the left subclavian artery. A 59-year-old female presented with multiple cerebral infarctions and severe atherosclerotic changes in the intracranial arteries. A 58-year-old female presented with aneurysmal subarachnoid hemorrhage. The aberrant right subclavian artery was asymptomatic in all patients.

Knowledge of this anatomical variation is important in diagnostic neuroangiography and interventional neuroradiology.

Key words: aberrant subclavian artery, cerebral angiography, embryology

Introduction
Aberrant right subclavian artery is a congenital anomaly consisting of a right subclavian artery originating from the left aortic arch. This anomaly might be detected as a superior mediastinal mass on chest radiography or as a mass compressing the esophagus on barium contrast radiography. We report three cases of aberrant right subclavian artery and discuss a possible embryological origin for this variation.

Case Reports
Case 1: A 51-year-old female suffered sudden onset of right hemiparesis and was referred to our department. Chest radiography found no abnormalities. Magnetic resonance (MR) imaging disclosed a small infarction in the left ventral medulla oblongata. Digital subtraction angiography (DSA) demonstrated severe stenosis of the left subclavian artery and occlusion of the left vertebral artery. The vertebral artery occlusion was apparently caused by artery-to-artery embolism from the stenosis of the left subclavian artery. The right subclavian artery originated from the left aortic arch (Fig. 1). The diagnosis was an aberrant right subclavian artery.

Case 2: A 59-year-old female presented with mild right hemiparesis. She had a history of intracerebral hemorrhage 10 years earlier. Chest radiography found no abnormalities. MR imaging demonstrated multiple cerebral infarctions and severe stenosis of the right middle cerebral artery. DSA revealed severe atherosclerotic changes in the intracranial arteries and an aberrant right subclavian artery (Fig. 2).

Case 3: A 58-year-old female suffered sudden onset of severe headache and was referred to our department. Head computed tomography demonstrated subarachnoid hemorrhage. Chest radiography found no abnormalities. Diagnostic DSA demonstrated a right internal carotid artery aneurysm. DSA also revealed an aberrant right subclavian artery (Fig. 3).

Discussion
The aorta consists of a ventral aorta and paired dorsal aortic roots in the early embryo (Fig. 4). The six-paired aortic arches diverge from these dorsal aortic roots. Normally, the first, second, and fifth aortic arches disappear, and the third aortic arches are involved in the formation of the common carotid artery complex. The seven-paired intersegmental (cervical) arteries arise from the dorsal aortic roots or the dorsal aorta, and supply the adjacent somites. The subclavian arteries originate from the bilateral seventh intersegmental arteries and the vertebral arteries originate from longitudinal anastomoses between these intersegmental arteries. The left fourth
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Fig. 1 Case 1. Frontal aortogram demonstrating that the right subclavian artery arises from descending aorta distal to the left subclavian artery (arrow), and severe stenosis of the left subclavian artery.

Fig. 2 Case 2. Aortogram revealing an aberrant right subclavian artery (arrow).

Fig. 3 Case 3. Aortogram demonstrating an aberrant right subclavian artery (arrow).

Fig. 4 Schematic drawings of the embryonic aortic arches. Modified from Tanohata's schema.5) A: The six-paired aortic arches diverge from the dorsal aortic roots and the seven-paired cervical intersegmental arteries arise from the dorsal aortic roots or the dorsal aorta. B: Normal regression occurs in the right dorsal aortic root. The right fourth aortic arch and the seventh intersegmental artery form the right subclavian artery. C: Abnormal regression occurs in the right fourth aortic arch and the proximal dorsal aorta to form the aberrant right subclavian artery. III–VI: third to sixth aortic arches, ASA: aberrant right subclavian artery, CCA: common carotid artery, CIA: cervical intersegmental artery, DDA: distal dorsal aorta, PDA: proximal dorsal aorta, SA: subclavian artery, VA: vertebral artery.

Aortic arch enlarges and the final anatomic configuration begins to unfold with regression of the right dorsal aortic root. The right fourth aortic arch is involved in the formation of the right subclavian artery with the seventh intersegmental artery. Aberrant right subclavian artery is formed by abnormal regression in the right fourth aortic arch and interruption proximal to the normal origin of the right subclavian artery.1–3,5) Therefore, the aberrant right subclavian artery arises as the last branch of the aortic arch complex.

The incidence of aberrant right subclavian artery is 0.2% to 1.7%.2,3) In our department, conventional angiography in 348 patients found an incidence of...
0.9%. However, only a three-vessel study (bilateral common carotid arteries and left vertebral artery) was performed in some patients and aortography was not performed in all patients, so the true frequency may be higher.

Aberrant right subclavian artery seldom manifests as clinical symptoms, excluding the rare case of dysphagia caused by compression of the esophagus. However, knowledge of this anatomical variation is important in diagnostic neuroangiography and interventional neuroradiology.

References

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