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Unilateral Double Superior Cerebellar Artery Variation: A Cadaveric Case Report

Unilateral Çift Arteria Superior Cerebelli Varyasyonu: Bir Kadavra Vaka Raporu

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ABSTRACT

The superior cerebellar artery (SCA) is a vessel anterior to the brainstem, usually originating from the basilar artery (BA). In this case, a different course of left SCA in a 74-year-old male cadaver was reported. The origin of the SCA was found to be a unilateral double root at the left side on the anterior surface of the pons. The distances of the starting points of roots to the bifurcation of BA were 31.09 mm on the right side, on the left side the rostral root was 33.84 mm and the caudal root was 30.95 mm. The diameter of the right SCA was 2.37 mm, the left rostral root was 2.05 mm and the caudal root was 1.24 mm. Knowing the course of SCA, and especially morphological variations, will be helpful for the clinical branches in preventing complications during surgical operations, evaluating angiographic examinations, and diagnosing and treating neurovascular diseases.
Keywords: Anatomy; duplication; superior cerebellar artery; variation; cadaver.

ÖZ

Arteria superior cerebelli (ASC), beyin sapının önünde bulunan bir damar olup genellikle arteria basilaris (AB)'ten köken alır. Bu olguda 74 yaşındaki erkek bir kadavrada sol ASC'nin farklı seyri bildirilmektedir. ASC'nin kökeninin sol tarafta pons'un ön yüzünde unilateral çift kök halinde olduğu tespit edildi. Köklerin başlangıç noktalarının bifurcatio basilaris'e olan uzaklıkları sağ tarafta 31,09 mm, sol tarafta üst kök 33,84 mm ve alt kök 30,95 mm idi. Sağ ASC çapı 2,37 mm, sol üst kökün çapı 2,05 mm ve alt kökün çapı ise 1,24 mm idi. ASC'nin seyrinin ve özellikle morfolojik varyasyonların bilinmesi, cerrahi operasyonlar sırasında komplikasyonların önlenmesinde, anjiografik tetkiklerin değerlendirilmesinde ve nörovasküler hastalıkların teşhis ve tedavisinde klinik branşlara faydalı olacaktır.
Anahtar kelimeler: Anatomi; duplikasyon; arteria superior cerebelli; varyasyon; kadavra.

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INTRODUCTION

The superior cerebellar artery (SCA) is the most rostral artery of the infratentorial vessels. It originates a few millimeters proximal to the origin of the posterior cerebral artery (PCA), the terminal branches of the basilar artery (BA) at the anterior of the brainstem. It then passes just below the oculomotor nerve (1-3). Each SCA has a short trunk. The rostral (medial-vermian) and caudal (lateral-marginal) branches are separated from this trunk. These branches run along the pontomesencephalic sulcus and bifurcate on the upper surface of the cerebellum, passing around the superior cerebellar peduncle. In the beginning, its rostral and caudal branches run parallel to each other. The rostral branch turns medially towards the lateral faces of the mesencephalon and inferior colliculus, where it arcs upward at the border of the superior colliculus and runs over the upper part of the vermis. It feeds the superolateral cerebellar hemisphere. Its deeper branches provide the nuclei of the cerebellum. It also gives branches along its course that feed the laterotegmental part of the upper part of the pons. Its posterior branches feed the superior cerebellar peduncle. Its caudal branch extends forward and provides the hemisphere of the cerebellum (4-7).

The SCA, which is located in the posterior cranial fossa in terms of origin and location, is the vessel with the least variation in the vertebrobasilar system (1,8). Although the SCA is considered the most consistent artery of the infratentorial branches, variations in its anatomy are noteworthy. Different variation possibilities of the SCA have been described in the literature: duplication, triplication, early bifurcation, fenestration, flattening, hypoplasia, and origin from the PCA (6,9-11). Duplication is among the most common anatomical variations of SCA. In addition to its variations, SCA is clinically important because of its close relationship with the oculomotor, trochlear, and trigeminal nerves. SCA plays an important role in the development of trigeminal neuralgia. However, due to its anatomical variability, SCA can trigger other neurovascular compressions (NVC), such as hemifacial spasm, oculomotor nerve palsy, and ocular neuromyotonia. In addition, it may be associated with ischemic syndromes and aneurysm development, emphasizing its clinical importance. Specific anatomical variants, such as the caudal course of the SCA trunk, may increase the risk of NVC (12).

Knowing the anatomical variations in the origin of SCA is important for anatomists, neurosurgeons, neurologists, and radiologists. The presence of variations can influence the plan of surgical and radiologic procedures. Therefore, a descriptive knowledge of the anatomy of this region with variable vascular structures would be useful to clinical anatomy at any stage of surgical planning. This study aimed to contribute to the literature by presenting the variation detected during routine cadaveric head dissection.

CASE REPORT

SCA variation was observed in a 74-year-old male cadaver during routine dissection for educational purposes at Tokat Gaziosmanpaşa University Faculty of Medicine, Department of Anatomy. First, a coronal incision was made on the scalp between the zygomatic processes of the os frontale passing over the frontal eminence. Then, another sagittal incision was made on the medial line starting from the midpoint of this incision and ending at the level of the external occipital protuberance. Finally, an incision was made horizontally from the end of the second incision to the level of the asterion on each side, and the scalp was opened anteriorly and laterally. The calvaria was cut open with an oscillating bone saw. After the dura mater was visualized, the cranial nerves were carefully dissected individually. Then, the spinal cord was cut at the level of the foramen magnum, and the brain was separated from the skull base. When the VA and BA were examined, it was found that the SCA was separated from the BA as two separate roots for the left side (Figure 1).

The branching and path of the roots were checked. In the course of the rostral root, it was observed that it was divided into two terminal branches distributed in the superior-medial part of the vermis and cerebellum close to the vermis. The second root followed a course close to the normal SCA course. It is divided into two branches, rostrally and caudally, on the anterior surface of the pons, with the caudal root distributed to the lateral part and the rostral root distributed between the vermis and the lateral edge (Figure 2). Both sides were in contact with the oculomotor nerve. The distance to the bifurcation basilaris was measured to determine whether there was a difference in the point of separation of the roots from the BA. The separation point of the right root was 31.09 mm, the separation point of the left rostral root was 33.84 mm and the separation point of the lower left root was 30.95 mm. To check whether there was a difference in vessel diameters, the diameters of the right and left roots were measured. The right root was 2.37 mm in diameter, while the left rostral root was 2.05 mm and the lower root was 1.24 mm. In addition, considering its close neighborhood with the trigeminal nerve, the distance between them was measured to see if there was an effect. The right trigeminal nerve exited 5.57 mm caudal to the right SCA. The left trigeminal nerve exited 8.26 mm caudal to the rostral root of the left SCA, 2.14 mm caudal to the rostral root, and 2.04 mm rostral to the caudal root of the lower root of the left SCA. No variation was found in the branching and course of the right SCA.

DISCUSSION

Since aneurysms and ischemic cerebrovascular diseases occurring in the posterior cranial fossa are evaluated by angiography, it is essential to know the vascular variations in this region (13). SCA occlusions may be asymptomatic depending on the regions involved in the brainstem and cerebellum. SCA occlusions are usually asymptomatic because of the anastomoses of the vessels in the region (14,15).

Some studies have reported that duplications are caused by problems in the connection of arteries during the embryonic period (16,17). Mani et al. (18) reported unilateral duplication of SCA in 28%, bilateral duplication in 8%, and unilateral triplication in two patients. Hardy et al. (14) reported that 43 of the 50 SCAs they examined in their study showed a single SCA, and 7 of them showed duplication. In a study by Avcı et al. (19), 67% of SCAs were single, 26% showed duplication, and 7% showed triplication. The case presented in this study was similar to the study of Arifoğlu et al. (1), the SCA originates from the BA as a single root on the right side and as two separate roots on the left side, and the caudal part branches again.

Mani et al. (18) reported that the oculomotor nerve runs between the PCA and SCA. They argue that these two arteries will be a reference for surgical operations on the nerve. In our case, we found that the rostral and caudal two roots traveled under the oculomotor nerve. Therefore, the thesis of Mani et al. (18) is not always valid in cases with duplication, and taking the arteries as a reference may mislead the diagnosis and treatment. Uchino et al. (16) suggested that SCA anomalies may cause compression syndromes in the adjacent nerves. In our case, the SCA was in contact with the oculomotor nerve, which supports the hypothesis of Uchino et al. (16).

Vascular variations are frequently encountered in cadaveric and autopsy studies. Knowledge of the course of SCA and morphologic variations is essential for preventing complications during surgical operations and for effective diagnosis and treatment of neurovascular diseases.

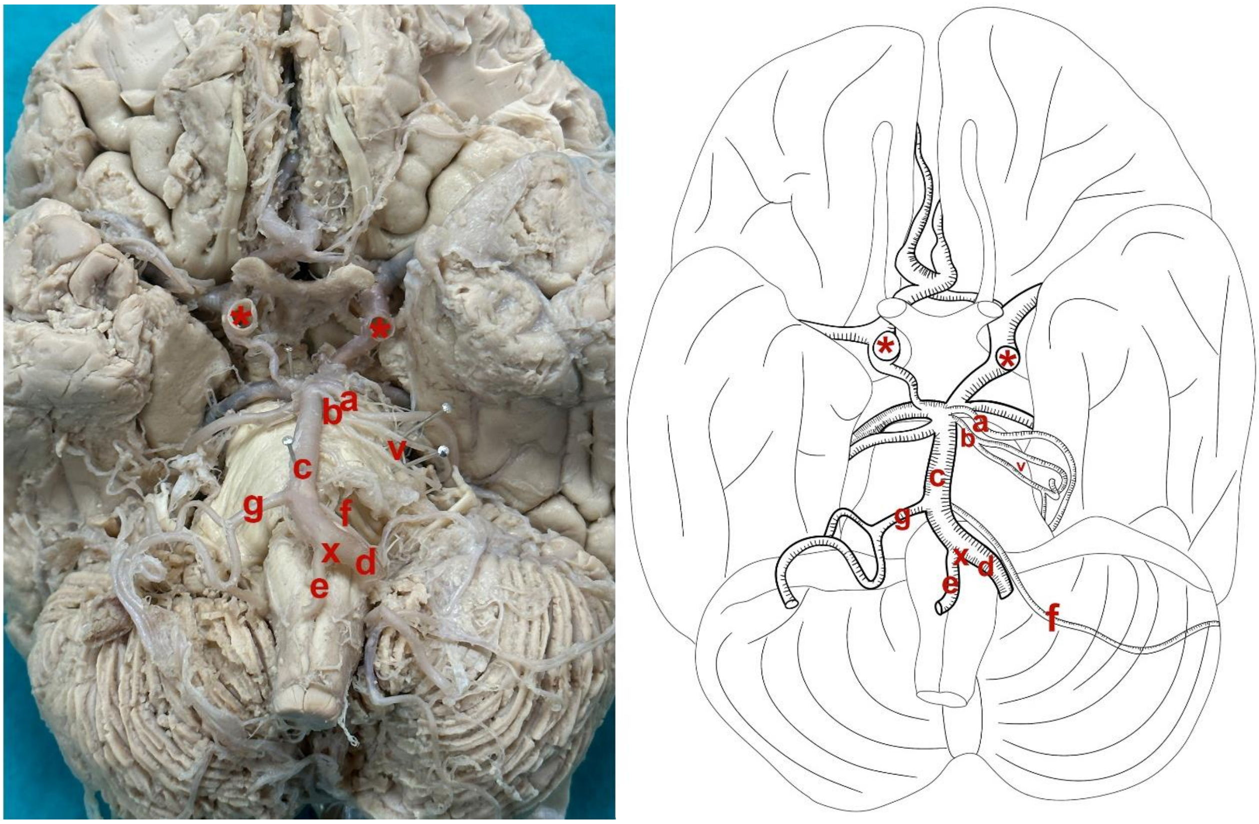

Figure 1. Left side, duplication of superior cerebellar artery, *: internal carotid artery, a: rostral root of superior cerebellar artery, b: caudal root of superior cerebellar artery, c: basilar artery, d: left vertebral artery, e: right vertebral artery, f: left anterior inferior cerebellar artery, g: right anterior inferior cerebellar artery, x: bifurcation; v: trigeminal nerve

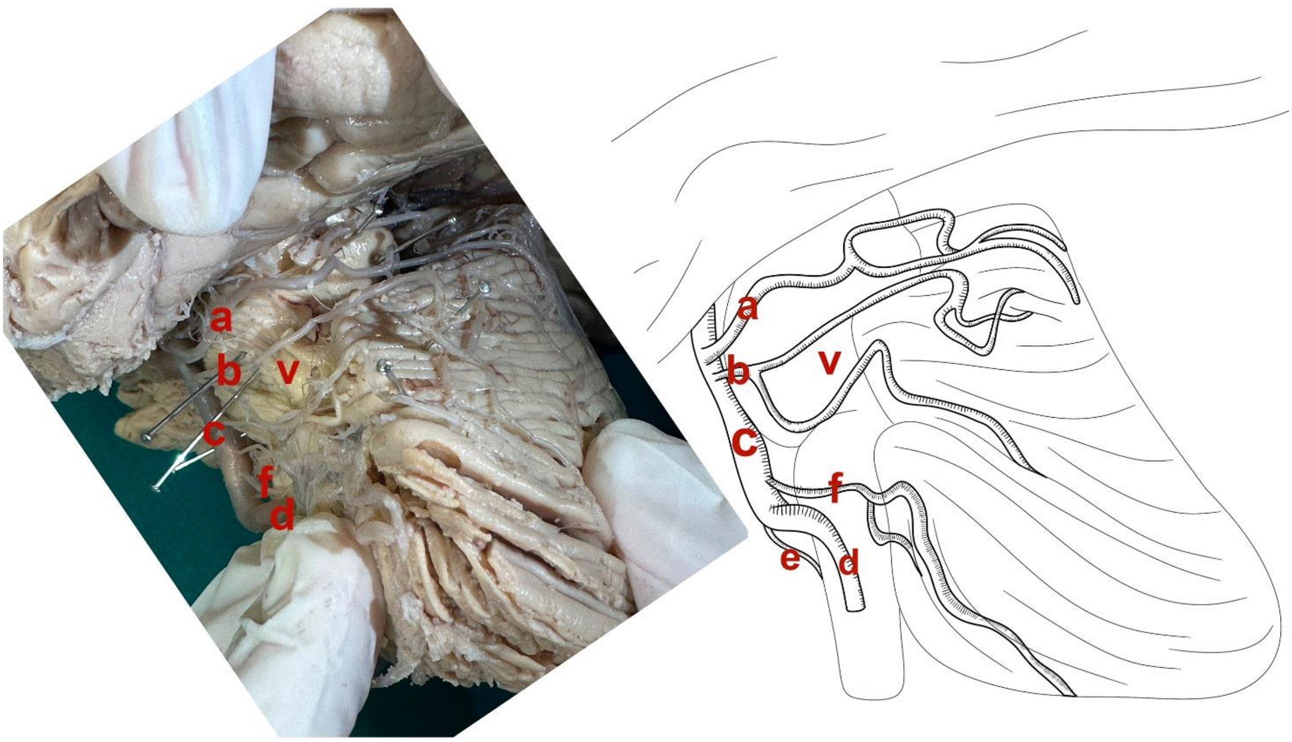

Figure 2. Left lateral aspect of the superior cerebellar artery, a: rostral root of superior cerebellar artery, b: caudal root of superior cerebellar artery, c: basilar artery, d: left vertebral artery, e: right vertebral artery, f: left anterior inferior cerebellar artery

Informed Consent: Since our study was a case report including a cadaveric study, there was no consent form.

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