

The vascular layers on the rostral ventrolateral medulla

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Abstract

There has been a keen interest in assessing the neurovascular anatomy of the rostral ventrolateral medulla oblongata (RVLM). The present study was aimed at documenting the complete neurovascular anatomy of the RVLM, in order to offer a general picture of the possible offending vessels of this area, which seems to be involved in the pathogeny of the essential hypertension. Noteworthy, syndromes of the last cranial nerves could be due to vascular contacts or compressions. The present study was performed on 20 human adult brainstem-cerebellum blocks, dissected out of the posterior cerebral fossa at autopsies. The origins of the inferior cerebellar arteries (anterior – AICA and posterior – PICA) were traced bilaterally ($n=40$ sides). When present (26/40) AICA most frequently left the basilar artery and PICA (28/40) most frequently left the vertebral artery. At the level of the RVLM, a quadrilateral space delimited by the vertebral artery (VA) and the vertebrobasilar junction, the AICA and the PICA, was defined. Within that space, three vascular layers were identified: a superficial one, formed by the inferior cerebellar arteries, a middle one, consisting of perforating arteries, and a deep, venous one. The RVLM perforating arteries left the VA (31/40), basilar artery (BA) (3/40), anterior spinal artery (ASA) (34/40), PICA (28/40) and AICA (24/40). These perforators had a transverse or oblique course if given off by the VA, BA or ASA, were descendant if given off by the AICA or BA, and were ascending if given off by the VA or PICA. Microanatomical studies of the vascular relations of the RVLM are able to complete the somewhat limited findings of studies based on imaging techniques. The offending vessels of the RVLM could be any of the vessels inside the quadrilateral space. Major vessels, such as the VA, AICA or PICA should not be viewed as the only possible offending vessels at this level. The perforators and the venous layers in the quadrilateral space should also be better evaluated from this perspective.

Keywords: cerebellar arteries, perforating arteries, RVLM, PICA, AICA, vertebral artery, olive, anatomy.

Introduction

There has been a keen interest of researchers in evaluating the neurovascular anatomy of the retroolivary root entry zone of medulla oblongata.

This is mostly because various observations support the assumption that neurovascular compression of the left ventrolateral medulla oblongata may determine neurogenic hypertension [1–3].

Nevertheless, various syndromes involving cranial nerves V–XI are determined by neurovascular compressions and can benefit from neurosurgical decompression [1, 4–21].

Actually, most of the existing data on the neurovascular anatomy of the rostral ventrolateral medulla (RVLM) in humans resulted from imaging (MRI) studies on various groups of patients. Usually, and undoubtedly justified by the methods used, only larger arteries were involved as offending vessels of the RVLM, such as the antero-inferior cerebellar artery (AICA), the postero-inferior cerebellar artery (PICA), or the vertebral artery (VA) [3, 22].

The medullary perforators, the anastomoses at this level and the veins are usually omitted when neuro-

vascular compressions of the RVLM are approached. Thus, we aimed at documenting the complete neurovascular anatomy of the RVLM, in order to offer a general picture of the possible offending vessels of this area playing a role in the **pathogeny of the essential hypertension**.

Materials and Methods

The present study was performed on 20 human adult (aged 44 to 64 years, with a sex ratio of 1:1) blocks of brainstem and cerebellum dissected out of the posterior cerebral fossa at autopsies. The cause of death was traumatic, the patients were negative for neurodegenerative disorders, and the bodies were refrigerated before necropsies. Sampling was conducted in accordance with the Romanian law regarding procedural norms for medical legal expertises No. 1134/C/25/05.2000 (Ministry of Justice), and 255/4.4.2000 of the Health Ministry, Art. 42, regarding the ethics of autopsy practice, and the Ethical Code of the Romanian College Board regarding the scientific use of medical cases. Microdissections were performed with surgical magnifying glasses (4.5× magnification). The results were documented by digital photographs.