Variations in Diameters of Vertebro-basilar Tree in Patients with or with No Aneurysm

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ABSTRACT

Introduction: The morphological anatomy of the posterior circulation is very complex and variable. Aims of this research were to document the morphological anatomy of the posterior circulation along with variations in the Bosnian population, in patients with or without aneurysm. Measurements of the outer diameters of the vertebral artery, basilar artery and posterior cerebral artery were taken. The second aim was to determine the possible relationship between diameters of the area with subsequent aneurysm formation.

Material and Methods: The study involved 60 consecutive patients, adults of both sexes, treated in the UKC Tuzla. The patients were divided into two groups. One group consisted of the patients without aneurysm of basilar artery, and the other group of patients with aneurysm. All the 60 patients were treated by means of MRI angiography.

Results: The mean diameter of the vertebral artery was 2.43 mm; 3.61 mm on the right and 2.83 mm; 3.94 mm on the left. The diameter of the basilar artery varied from 3.8 mm; 3.43 mm. The diameter of the posterior cerebral arteries 2.5 mm; 2.52 mm on the right and 2.46 mm; 2.62 mm on the left.

Conclusions: We have documented the various morphometry variations as well as the differences of the anatomy in this area in Bosnian population as compared to the medicine literature.

Key words: vertebro-basilar tree, aneurysms.

1. INTRODUCTION

Arteria vertebralis, branch of subclaviae passes through the openings on lateral extensions of cervical vertebrae and enter the sulcus of arteriae vertebralis at the back arch of the atlas (1, 2). It enters the cranial cavity through the foramen magnum occipitale, merges at a sharp angle with the opposite one, usually below postpontine groove (67%), and form basilar artery (3, 4). After a short course (25–35 mm) at the front of the brain bridge, artery is split into its two terminal branches arteriae posteriores cerebri (5, 6). Vertebral artery diameter ranges from 3.4 mm to 2.9 mm, and of the basilar artery from 3 mm to 7 mm (6, 7).

Aims of this research were to document the morphological anatomy of the posterior circulation along with variations in the Bosnian population, in patients with or without aneurysm. Measurements of the outer diameters of the vertebral artery, basilar artery and posterior cerebral artery were taken. The second aim was to determine the possible relationship between diameters of the area with subsequent aneurysm formation.

2. MATERIAL AND METHODS

The study involved 60 consecutive patients, adults of both sexes, treated in the UKC Tuzla. The patients were divided into two groups. One group consisted of the patients without aneurysm of vertebrobasilar tree, and the other group of patients with aneurysm. Diameters of vertebral, basilar and posterior cerebral artery (0.5 cm above and below the vertebrobasilar junction, as well as 0.5 cm above and below the basilar bifurcation) were determined for all the examined. The statistical analysis of the data collected by means of the basic tests and descriptive statistics (determination of the measured sizes mean value, standard deviation and standard error), and test of correlation between the measured values in order to determine the correlation coefficient with statistical significance of p < 0.05 and Student’s t-test to determine the significance of differences of arithmetic means of the values measured.

3. RESULTS

A.vertebralis dextra in the subjects without aneurysm in vertebro-basilar tree, at the site of merging of both vertebral arteries into the basilar artery, had the average value of diameter 2.43 mm, and a.vertebralis sinistra of 2.83 mm. In 46% of the examinees diameters of both a.vertebralis sinistra and a.vertebralis dextra were approximately the same. Caudal part of a. basilaris, at the site of vertebral arteries merging had an average diameter of 3.8 mm, and the rostral part at the site of bifurcation had diameter of 3.43 mm. The initial part of a. cerebri posterior dextrae had an average diameter of 2.5 mm, while the initial part of a. cerebri posterior sinistrae had an average diameter of 2.46 mm.

In the group of patients with aneurysm of vertebral basilar tree, the average value of diameter, at the site of both vertebral arteries merging into a. basilaris, a.vertebralis dextra had diameter between 3.61 mm, and a.vertebralis
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Average values of diameters of rear cerebral arteries in the group of patients with aneurysm of vertebral-basilar tree, were not statistically significantly different from the average values of diameters of the rear cerebral arteries in the group of subjects without aneurysm.

Discussion

Average diameters of the vertebral arteries (a. vertebralis dextra “vd” and a. vertebralis sinistra “vl”) were statistically significantly higher in the patients with aneurysms of the vertebro-basilar tree (SA) in comparison to the group without aneurysm (BA) (Table 1 and 2).

Average values of diameters in basilar arteries at caudal and rostral end in subjects with and without aneurysm of vertebral-basilar tree.

Table 1 and 2 Differences in average values of diameters of the vertebral arteries in patients with and without aneurysm of vertebral-basilar tree.

Table 3 and 4 Differences in average values of basilar arteries at caudal and rostral end in subjects with and without aneurysm of vertebral-basilar tree. Kasualno = caudal; Kranialno = cranial

In our study, diameter of the right vertebral artery ranged from 2 mm–4 mm, and 1 mm to 4 mm of the left vertebral artery in the patients without aneurysm, whereas in the patients with aneurysm of the right vertebral artery diameter varied from 2 mm–7.6 mm and of the left one from 2 mm–8.1 mm. Basilar artery diameter at caudal end varied from 3 mm–5 mm, and at rostral end of 2 mm–4 mm in patients without aneurysm, while in patients with aneurysm it varied from 2.8 mm–9.9 mm at caudal and of 2.3 mm–8.7 mm at rostral end.

According to the authors Shoja et al. (9) a.vertebralis dextra and a. vertebralis sinistra are in almost 60% of cases of different diameters. The results of our study are nearly identical to results of the authors mentioned, either in the subjects with or without basilar aneurysm.

5. Conclusion

Average values of the measured parameters of vascular geometry of vertebrobasilar tree showed statistically significant differences and higher values in the group of patients with aneurysm compared to those without.
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CONFLICT OF INTEREST: NONE DECLARED

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