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Morphological characteristics of lateral branches of human basilar artery

Morfološke karakteristike bočnih grana *arteriae basilaris* čoveka

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Abstract

Background/Aim. Lateral branches of basilar artery mostly supply pons and cerebellum. The aim of this study was to determine the morphological characteristics of lateral branches and side branches of the individual lateral branches of human basilar artery. **Methods.** The research was done on 25 anatomical specimens of adult brainstems, both sexes, previously fixed by immersion in a 10% formalin. Microdissection and precise measurements of caliber and length of the basilar artery were done under the stereolupe MBS-9 by the ocular micrometer. **Results.** A number of lateral branches was 9 on both sides, and the number of side branches of the individual lateral branch of basilar artery ranged from 0 to 4. The average diameter of side branches on both sides was 0.15 mm while the average length on the left side was 4.31 mm and 4.06 mm on the right. Side braches on the left side of the basilar artery most commonly penetrated pons and postpontine fossa (29.82% each) and rarely the area of middle cerebellar pedicle (1.74 %). On the right side, side branches most commonly penetrated pons (35.29%), and rarely the areas of inferior and middle cerebellar pedicle (1.96% each). **Conclusion.** Maintrunk of basilar artery gives an equal number of lateral branches on both sides. On average, every lateral branch gives 2 side branches. The most common site of descent of the side branches is pons, while the rarest one was cerebellar pedicle.

Key words:
basilar artery; anatomy; brain stem; pons.

Apstrakt

Uvod/Cilj. Bočne grane *arteriae basilaris* u najvišem procentu vaskularizuju *pons* i *cerebellum*. Cilj rada bio je određivanje morfoloških karakteristika bočnih grana i bočnih ogranaka pojedinačnih bočnih grana *arteriae basilaris* čoveka. **Metode.** Ispitavanje je obavljeno na 25 anatomskih preparata moždanih stabala odraslih osoba, oba pola, prethodno imerziono fiksiranih u 10% formalinu. Mikrodisekcija i precizno merenje kalibra i dužine *arteriae basilaris* i njenih bočnih grana i ogranaka rađeno je pod stereolupom MBS-9, uz pomoć okularnog mikrometra. **Rezultati.** Broj bočnih grana iznosio je 9 na obe strane, a broj bočnih ogranaka pojedinih bočnih grana *arteriae basilaris* kretao se od 0 do 4. Prosečan prečnik bočnih ogranaka na levoj i desnoj strani iznosio je 0,15 mm. Prosečna dužina bočnih ogranaka na levoj strani bila je 4,31 mm, a na desnoj 4,06 mm. Bočni ogranci na levoj strani bazilarne arterije najčešće su ponirali u predelu *pons* i *fossa postpontina* (po 29,82% slučajeva), a najređe u područje *pedunculus cerebellaris medius* (1,74% slučajeva). Na desnoj strani, bočni ogranci najčešće su ponirali u *pons* (35,29% slučajeva), a najređe u područje *pedunculus cerebellaris inferior et medius* (po 1,96% slučajeva). **Zaključak.** Od glavnog stabla *arteriae basilaris* obostrano se odvaja jednak broj bočnih grana. Bočne grane *arteriae basilaris* u najvećem broju slučajeva davale su po dva bočna ogranka. Najčešće mesto poniranja bočnih ogranaka pojedinačnih bočnih grana *arteriae basilaris* obostrano je *pons*, a najređe obostrano, kraci malog mozga.

Ključne reči:
a. basilaris; anatomija; moždano stablo; pons.

Introduction

Basilar artery (BA) arises from the confluence of two vertebral arteries at pontomedullary sulcus between the left and right abducens nerve. It extends to the upper part of the pontine cistern, lying in a shallow groove that limits pyramidal eminence of the pons. Diameter of the BA is mostly constant and below the origin of superior cerebellar artery

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(SCA) is around 4.1 mm. Length of the BA ranges from 15 to 40 mm (32 mm in average). In the caudal part of the interpeduncular cistern, the BA divides into 2 posterior cerebral arteries [1–3]. Number of lateral branches of the BA is somewhat larger on the left side- ranging from 5 to 10 (an average of 8) while on the right side ranges from 4 to 9 (7 in average) [4]. Lateral branches of the BA are: anterior inferior cerebellar artery (AICA), SCA, labyrinthine artery (LA) and many branches for medulla oblongata and pons (pontine arteries). Variations in lateral branches were also seen. For example, posterior inferior cerebellar artery (PICA) may rise from the BA, while the LA may have origin from the SCA [1, 2, 5]. Some authors categorize branches of the BA into paramedian and short and long circumferential arteries. Paramedian arteries originate from the dorsal side of the BA and supply the medial area of the pons, including pontine nuclei, pyramidal and corticonuclear tract, and part of the medial lemnisci. Tegmental, basal and tegmentobasal pontine infarctions are caused by diseases of paramedian branches of the BA. About 60% of infarcts of the pons are paramedian infarctions [1, 6]. Short circumferential branches supply the anterolateral area of the pons. Some branches of these arteries can supply the upper cerebellar pedicle. Long circumferential branches supply the lateral part of the pons, and form anastomoses with branches of the AICAs and SCAs [7, 8].

Detailed knowledge of the morphological characteristics of the BA and its lateral branches significantly contributes to the understanding of the origin and consequences of pathological conditions in areas supplied by these blood vessels.

The aim of the study was to determine the following morphological characteristics of lateral branches of human BA: length, diameter and descending point of lateral branches of the BA; the number of side branches of the individual lateral branches of the BA, distance of their origin from the main trunk of the BA, length, diameter and place of descent of the side branches of the individual lateral branches of the BA.

Methods

The study was approved by the Ethics Committee of the University Clinical Center of the Republic of Srpska. The study was carried out on 25 adult brains, both sexes, aged from 35 to 85 years, who died without diagnosed neurological disease. The material was collected at the Department of Pathology, University Clinical Center of the Republic of Srpska. Using conventional autopsy technique, brains were extracted from the cranial cavity, 24–48 hours after death. Out of the brain tissue were allocated brain stem and submerged in 10% formalin solution for 30-day fixation. Fine preparation of arteries was performed with microsurgical forceps and microscissores under the stereoloupe (MBS-9, Carl Zeiss, Germany) by the ocular micrometer with ×8 magnification. Numbering of lateral branches of the BA was carried out from the beginning of the BA (confluence of vertebral arteries) to the bifurcation of the main tree of the BA. The following parameters were measured: diameter at the starting point of lateral branches, their size and location of descent. Accurate measurement of the distance separating the side branches of the lateral branches in relation to the main trunk of the BA and their caliber and length was done under stereolupe and ocular micrometer with the same magnification. One researcher made 3 independent measurements of all analyzed parameters and these results were used to calculate average values. The results were analyzed by the methods of descriptive statistics. Statisical analysis was done with SPSS software version 16 (SPSS Inc, Chicago, USA).

Results

In this study, we found 9 lateral branches of the BA on each side. Figure 1 shows the BA and some of its lateral branches.

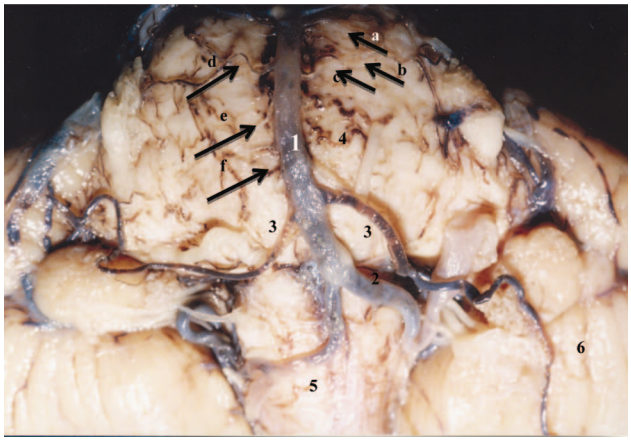

Fig. 1 – Lateral branches of basilar artery (BA): 1– BA, 2-vertebral artery, 3-anterior inferior cerebellar artery (AICA), 4-pns, 5-medulla oblongata, 6-cerebellum. The arrows: a-eighth left lateral branch; b –seventh left lateral branch; c - sixth left lateral branch; d- fifth right lateral branch; e - fourth right lateral branch; f - third right lateral branch.

The average length of lateral branches of the BA in the anatomic samples fixed in formalin was 9.98 mm on the left side and 10.11 mm on the right side. The average diameter of the starting points of lateral branches of the BA on the left side WAs 0.41 mm, while on the right side was 0.42 mm. Lateral branches of the BA in most cases both sides penetrated into the area between the midbrain and cerebellum.

The average values of morphological parameters of all 9 lateral branches of the BA, level of origin from the beginning of the BA, length, diameter and place of descent are presented in Table 1. Number of side branches of the individual lateral branches of the BA ranged from 0 to 4, an average of 2 side branch. The average diameter of the side branches on the left and the right side was 0.15 mm. The average length of the side branches on the left side was 4.31 mm, while on the right was 4.06 mm. Side branches on the left of the BA in 29.82% of cases penetrated pons and postpontine fossa, in 14.03% prepontine fossa, in 8.77% cerebellum and the basilar sulcus, in 7.01% root of the trigeminal nerve and in 1.74% of cases area of the middle cerebellar peduncle. Side branches on the right side of the BA most commonly penetrated pons, in 35.29% of cases, followed

by postpontine fossa in 25.49% of cases, prepontine fossa in 15.68% of cases, basilar sulcus in 9.8% of cases, cerebellum in 5.88% of cases, the root of the trigeminal nerve in 3.92% of cases and areas of middle and inferior cerebellar peduncle in 1.96% of cases each.

The first left lateral branch originated at the average distance of 2.91 mm (range 0.5–6.7) from the beginning of the BA. Its length was 7.4 mm on average (range 2.1–12.5), and diameter 0.3 (average 0.1–1.2 mm). The first right side branch originated somewhat nearer the beginning of the BA – 2.77 mm (range 0.5–7.5); it was longer than the first left side branch (8.38 mm, range 2.1–26.5) while the diameter was pretty similar 0.29 mm (range 0.1–1.1). Bilaterally the first branches of the BA penetrated the postpontine fossa.

Most commonly, lateral branches of the BA showed no side branches. Eight lateral branch on the right side did not give any side branches in all analyzed samples. Eight left and ninth right lateral branches in 92% of each did not give side branches. Second left lateral branch of the BA most commonly gave side branches (Table 2).

Table 1

Morphological characteristics of lateral branches of the basilar artery (BA)

Lateral branches	Level of separation from the beginning of the BA (mm)	Length (mm)	Diameter of lateral branches origin point (mm)	Place of descent
I				
left	2.91 (0.5–6.7)	7.41 (2.5–12.5)	0.3 (0.1–1.2)	Postpontine fossa
right	2.77 (0.5–7.5)	8.38 (2.1–26.5)	0.29 (0.1–1.1)	
II				
left	5.86 (2.3–11.8)	12.75 (1–36.5)	0.44 (0.1–1)	Cerebellum
right	5.42 (1.1–11.3)	15.95 (1.2–44.4)	0.55 (0.2–1.1)	
III				
left	8.35 (5.7–13.3)	10.02 (0.2–33.4)	0.43 (0.1–1.5)	Pyramidal eminence
right	7.97 (2.6–15.4)	8.74 (0.7–32.4)	0.34 (0.1–0.9)	
IV				
left	10.34 (6.2–14.5)	9 (1–32.3)	0.25 (0.1–0.7)	
right	10.45 (5.6–16.1)	7.63 (0.5–27.4)	0.23 (0.1–0.5)	
V				
left	12.51 (8.6–16.7)	6.94 (0.2–13.5)	0.27 (0.1–0.8)	
right	12.29 (7.1–17.8)	6.53 (0.5–13.6)	0.24 (0.1–0.5)	
VI				
left	13.37 (9.7–17.1)	8.79 (1.2–19.4)	0.33 (0.1–0.9)	Between midbrain and cerebellum
right	13.47 (8.6–18.1)	10.45 (1.1–14.7)	0.28 (0.1–0.9)	Lateral side of the pons
VII				
left	13.71 (10.4–18.1)	10.79 (2.5–17.6)	0.43 (0.1–1)	Between midbrain and cerebellum
right	14.34 (10.1–18.3)	9.55 (7.1–18.5)	0.55 (0.2–1)	
VIII				
left	14.86 (11.2–18.4)	11.79 (2.1–16.2)	0.53 (0.1–1)	
right	15.22 (11.2–18.3)	10.45 (5.1–17.1)	0.61 (0.2–0.9)	
IX				
left	15.66 (13.4–18.6)	12.34 (7.4–16.2)	0.72 (0.3–0.9)	
right	14.8 (12.2–18.5)	13.37 (13.1–13.6)	0.73 (0.6–0.9)	

***Note: the values are given as mean values (minimum–maximum).**

Table 2

Percentage of cases in each lateral branch without side branches

Side	Unbranched lateral branch (%)								
	I	II	III	IV	V	VI	VII	VIII	IX
left	76	48	56	88	88	80	80	92	88
right	76	68	64	64	84	80	72	100	92

Note: I–IX – number of lateral branches.

Morphological characteristics of lateral branches of the BA which gave only one side branch are presented in Table 3. The fourth right lateral branch most frequently (32%) gave one side branch, while the ninth right and left lateral branches rarely gave one side branch (4% each). The shortest distance of origin was seen in first left side branch (4.1 mm), while the longest distance was seen in the second right side branch (21.38 mm). Regarding the length, the shortest side branch was the sixth on the right side (1.63 mm), while the longest was the third right side branch (9.48 mm). The diameter of side branches ranged from 0.1 to 0.3 mm.

Regarding the presence of 2 side branches, the fifth and the eight lateral basilar branch showed no side branches on both sides. Other arteries more commonly had side branches on the left side. The second left and the third right lateral branches of the BA, most commonly, gave two side branches (Table 4).

Table 3

Morphometric characteristics of cases where lateral branch of the basilar artery (BA) gave only one side branch (arterial twigs)

Parameter	Arterial twigs, left/right (%)								
	I (16/16)	II (16/16)	III (28/20)	IV (12/32)	V (12/12)	VI (12/16)	VII (16/16)	VIII (8/0)	IX (4/4)
ADI (mm)	4.1 (3.7–7.5)/ 4.15 (1.1–6.4)	13.15 (3.4–21.3)/ 21.38 (0.5–42.4)	8.76 (7.4–12.3)/ 5.92 (0.3–9.1)	5.06 (1.2-10.6)/ 6.06 (0.4-12.1)	9.66 (7.6–11.5)/ 4.13 (1.4–9.5)	8.5 (1–12.5)/ 6.75 (3.5–11.2)	7.42 (3.2–14.2)/ 7.35 (5.5–9.4)	5.65 (4.5–6.8)/ 0	7.2 (2–7.2) / 5.6 (4.5–6.8)
AL (mm)	3.73 (1.2–5.7)/ 2.68 (1.5–4.5)	4.25 (0.5–6.8)/ 4.98 (2.1–9.7)	4.56 (1.2–9.5)/ 9.48 (1.5–31.5)	2.13 (0.7–4.5)/ 2.53 (1.2-6.4)	2.33 (2.2-2.4)/ 3.13 (1.3-6.8)	3.46 (0.6–7.5)/ 1.63 (0.6–3.2)	6.32 (2.5–13.2)/ 6.03 (1.7–8.5)	4.2 (2.5–5.9)/ 0	5.7 (2.4–5.7)/ 7.5 (7.1–7.9)
AD (mm)	0.13 (0.1–0.2)/ 0.2 (0.1–0.3)	0.2 (0.1–0.4)/ 0.18 (0.1–0.3)	0.13 (0.1–0.2)/ 0.2 (0.1–0.5)	0.1 (0.1)/ 0.13 (0.1–0.2)	0.13 (0.1–0.2)/ 0.1 (0.1)	0.13 (0.1–0.2)/ 0.15 (0.1–0.2)	0.17 (0.1–0.2)/ 0.18 (0.1–0.3)	0.2 (0.1-0.3)/ 0	0.2 (0.1-0.2)/ 0.3 (0.2-0.3)
EP (%)	8 postPF; 8 BAS/ 16 postF	8 postPF; 4 P; 4 C/8 postPF; 4 BAS; 4 C	8 postPF; 16 P; 4 BAS/20 P	8 P; 4 BAS/ 24 P; 4 BAS; 4 rV/	8 P; 4 rV/8 P; 4 prePF	8 P; 4 prePF/4 postPF; 12 P	8 P; 4 prePF; 4 BAS/4 prePF; 8 P; 4 C	4 P; 4 prePF/0	4 prePF/4 P

ADI – average distance of origin of side branch: a distance from the origin of lateral branch from the main trunk of the BA to the beginning of side branch; AL – average length; AD – average diameter; EP – emerging point; P – pons; C – *cerebellum*; prePF – *prepontine fossa*; postPF – *postpontine fossa*; BAS – BA sulcus; rV – root of the trigeminal nerv; ICP – *inferior cerebellar peduncle*; MCP – *middle cerebellar peduncle*.
Note: Arterial twigs is term for one side branch.
All values are given as mean (minimum–maximum) or percentage.

Table 4

Morphometric characteristics of cases where lateral branch of the basilar artery (BA) gave two side branches

Parameter	Two side branches, left/right (%)						
	I (8/4)	II (24/8)	III (8/12)	IV (0/4)	VI (8/4)	VII (4/12)	IX (0/4)
Left, 1st/2nd							
ADI (mm)	4.35 (4.2-4.5)/ 5.8 (5.1–6.5)	5.7 (3.4–7.2)/ 9.95 (5.1–21.2)	4.2 (1–7.4)/ 9.4 (9.2–9.6)	0/0	2.75 (1–4.5)/ 6.15 (4.5–7.8)	8.5 (8.5)/ 8.8 (8.8)	0/0
AL (mm)	4.35 (3.5–5.2)/ 4.95 (4.8–5.1)	3.98 (3.5–7.5)/ 3.93 (1.5–5.1)	2.35 (1.2–3.5)/ 5.2 (4.2–6.2)	0/0	2.4 (0.6–4.2)/ 4.3 (4–4.6)	4.1 (4.1)/ 4.8 (4.8)	0/0
AD (mm)	0.15 (0.1–0.2)/ 0.15 (0.1–0.2)	0.2 (0.1–0.4)/ 0.15 (0.1–0.2)	0.15 (0.1-0.2)/ 0.25 (0.2-0.3)	0/0	0.1 (0.1)/ 0.15 (0.1-0.2)	0.2 (0.2)/ 0.2 (0.2)	0/0
EP (%)	8 postPF/8 postPF	20postPF 4 P/12 postPF 8 P; 4	8 P/4 P 4 MCP	0/0	4% P 4 BAS/4rV 4prePF	4 rV/4rV	0/0
Right, 1st/2nd							
ADI (mm)	7 (7)/ 9.5 (9.5)	2.3 (0.5–4.1)/ 3.85 (2.8–4.9)	8.66 (0.8–17)/ 11.83 (7.6–19.5)	10.5 (10.5)/ 12.3 (12.3)	3.5 (3.5)/ 5.1 (5.1)	7.23 (5.5-9.4)/ 9.73 (7.2-12.6)	4.5 (4.5)/ 10.8 (10.8)
AL (mm)	3.2 (3.2)/ 3.5 (3.5)	3.6 (2.1-5.1)/ 4.95 (4.3-5.6)	4.5 (1.7-8.2)/ 6.2 (2.4-9.6)	6.4 (6.4)/ 3.7 (3.7)	2.1 (2.1)/ 1.6 (1.6)	2.26 (1.7-3.4)/ 2.36 (2.1-2.6)	7.9 (7.9)/ 5.1 (5.1)
AD (mm)	0.1 (0.1)/ 0.1 (0.1)	0.2 (0.2)/ 0.25 (0.2-0.3)	0.16 (0.1-0.2)/ 0.25 (0.2-0.3)	0.2 (0.2)/ 0.1 (0.1)	0.1 (0.1)/ 0.1 (0.1)	0.13 (0.1-0.2)/ 0.13 (0.1-0.2)	0.2 (0.2)/ 0.2 (0.2)
EP (%)	4 postPF/ 0.1 (0.1)	4 postPF; 4 BAS/4 postPF 4P	4 P; 4 C 4 BAS/4postPF 4 P; 4 rV	4 MCP/ postPF	4 prePF/4 prePF	8 prePF 4 P/8prePF 4 P	4 P/4 P

For abbreviations see under Table 3.

Regarding the presence of 3 or 4 side branches, in most studied samples they were absent. The second right and the ninth left lateral branch gave three side branches in 8% of each, while the fourth, sixth, seventh and eighth lateral branch did not give three side branches at all. Second left side branch gave four side branches in 8% of cases, third on the left side in 4% of cases, while other lateral branches did not give four side branches (Table 5).

Table 5

Presence (in percentages) of three and four side branches of individual lateral basilar artery (BA) branch

Parameter	Individual lateral BA								
	I	II	III	IV	V	VI	VII	VIII	IX
Three side branches									
left	0	4	4	0	0	0	0	0	8
right	4	8	4	0	4	0	0	0	0
Four side branches									
left	0	8	4	0	0	0	0	0	0
right	0	0	0	0	0	0	0	0	0

Discussion

BA gives important perforating branches into the pons. Cranial part of the BA is filled by internal carotid artery through the posterior communicating arteries [4]. Demel and Broderick [9], divided the BA into 3 segments: the proximal, middle and distal segment. The distal segment is divided into posterior cerebral arteries that supply the occipital lobes, the lower parts of the temporal and medial parts of parietal lobes and thalamus. Other important branches of the BA are the SCA and AICA. Dodevski et al. [10], reported that the SCA separated from the distal segment of the BA in 96.33% of the cases. The authors presented a possibility of unilateral duplication of the SCA in 1.83% of cases which was not confirmed in the results of our study.

In the current literature there is a little amount of data about the morphology of lateral branches of the BA. Available information relates to the "rough" morphology of blood vessels, without their detailed description [11]. In our previous study, we examined the morphological characteristics of the main tree of the BA. We found that the average length of the BA was 27.63 mm and the diameter 3.16 mm [4]. Saeki and Rhoton [12] published similar results: in their samples, the average length of the BA was 32 mm, diameter 4.1 mm and number of lateral branches was 8 on average. In our samples we described 9 lateral branches of the BA on the left and right side. According to the place of descent and the level of separation from the BA, 9 lateral branch could be marked as the SCA. Marinković et al. [13] analyzed the perforating branches of the BA and divided them into 3 groups: caudal (lateral branches which originate from the beginning of the BA to the place of origin of the AICA), middle (lateral branches which originate from the beginning of the AICA to the rostral third of the BA) and rostral (branches from the terminal part of the BA). They described 2 to 5 caudal perforating branches (out of which 1 or 2 originating from the AICA), 5 to 9 perforating branches originating from the middle group, while 1 to 5 originating from rostral part of the BA (out of which 1 or 2 originating from the first part of the SCA). Range of diameters was 0.08 to 0.9 mm [13]. The average diameter of these branches in our study was 0.725 mm, which is somewhat similar to the results of Saeki and Rhoton [12] who published the range of diameter of lateral branches from 0.1 to 0.5 mm [12]. Dodevski et al. [10] had significantly larger average diameter in their study of 1.42 mm. The differences could be explained by the different number of samples and visualization technique.

Diseases of blood vessels are the most common causes of death in human population. Changes in brain vessels are not only caused by age, but also by an increasing number of risk factors and a modern way of life [11, 14]. Patients with the untreated BA stenosis have a bad prognosis, with the posibility for infarction in 50% of patients within the first 2 years [15]. Ćulafić et al. [16] showed a case of a patient with 85% of the BA stenosis, located in the caudal segment of the BA, 3.27 mm in length. Knowledge of the morphological characteristics of the BA, its lateral branches and side branches is important in understanding the ischemic lesions of the cerebellum, pons and medulla oblongata. The incidence of ischemic diseases of the brain, caused by the occlusion of the arteries of the posterior segment of Willis hexagon, is 15–20% of cases and ischemia caused by the BA occlusion is reported in 1–4% of cases in respect of all ischemic brain lesions [9, 17]. Distally from the place of occlusion, the BA can be filled through the vertebral arteries [18]. Paramedian pontine infarction, caused by thrombosis and arterial perforation, manifests as facial hemiparesis with dysarthria and somatosensory disorders. Motor damage in paramedian basal infarction follows the topographic distribution of the pyramid tracts. Due to somatotophic organization of corticospinal tract at the base of the pons, fibers in the upper part of the pons are not affected by paramedian ischemia, and therefore such patients have better prognosis than those with infarction in the lower part of the pons [19, 20]. Park et al. [21] examined morphological characteristics of talamoperforating arteries and their clinical significance in the field of neurosurgery and neurology. Their research emphasized the necessity of precise knowledge of morphological characteristics of the BA and its lateral branches.

Since formalin fixation might cause some retraction or shrinkage of the tissue, samples used in this study do not replicate completely the tissue response *in vivo*. Although we

made every effort to avoid side effects of such fixation, it was difficult to predict how they would influence the results. It could be useful to compare the results of morphometric studies made *in vivo* and on formalin-fixed samples in order to determine the reproducibility and reliability of results in cadaveric samples. Also, samples in this study were fixed without previous perfusion and impregnation with omnipaque and gelatine, which might have caused differences in length and diameter of vessels compared to the other studies.

Conclusion

Number of lateral branches of the BA was 9 on the left and the right side. The average length of lateral branches of the BA in anatomic samples fixed in formalin on the left side was 9.98 mm, and 10.11 mm on the right side. The average diameter of the starting points of lateral branches of the BA on the left side was 0.41 mm, while on the right was 0.42 mm. Lateral branches of the BA in most cases on both sides penetrate into the area between the midbrain and cerebellum.

Number of side branches of the individual lateral branches of the BA ranged from 0 to 4, an average of 2 side branches.

The average diameter of the side branches on the left and the right side was 0.15 mm. The average length of the side branches on the left side was 4.31 mm, while on the right side was 4.06 mm.

Side branches of the lateral branches on the left side of the BA in most cases, plunged into the pons and fossa postpontina and on the right side of the BA they plunged into the pons.

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