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The anatomy of the median branches of the basilar artery

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The aim of study was the examination of the median branches (MB) of the basilar artery (BA). 783 MB were found in 100 human brainstems injected with coloured latex. The attachment of the MB to the quadrants of the BA's trunk, their structural shape, length of trunks, topographical arrangement (on three vascular levels) and the clinical importance of this vascular pattern was evaluated.

The MB arise from Pr and Pl quadrants of the BA's trunk in 100% cases, represent 37.7% of BA's branches and are mostly located in the foramen caecum area (56%). The MB confine the BA's stem mobility on the V CN area and above, because of their shortest trunks especially on these vascular levels. In the examined specimens the MB varied in number from 0 to 22 (mean, 8).

key words: paramedian branches, basilar artery, pontine syndromes

INTRODUCTION

This study is devoted to the median branches (MB) of the basilar artery (BA).

The basilar artery (BA) is the single vascular trunk running along the ventral surface of the pons. Its branches that supply the brain stem and the cerebellum have been classified into four structural types. From type 1 (the paramedian branches) we excluded type 5 and call them the median branches (MB).

The examination of the median branches concerned the attachment of these vessels to the quadrants of the basilar's (BA) trunk. For this purpose the transverse section of BA's trunk was divided into the following quadrants: R — right, L — left, C (Cr+Cl) clivial (directed to the clivus) and P (Pr+Pl) pontine (directed to the pons). The clivial and pontine quadrants were subdivided into right and left parts. The structural shape, number of given perforators, and topographical study of the median branches (MB) were also studied. The clinical meaning of this branching pattern was also evaluated.

MATERIAL AND METHODS

The study was performed on 100 human brain stems in which 783 MB were examined. The basilar arterial system was injected with the coloured latex. All these specimens were fixed in 10% formaldehyde solution. Dissection was carried out with the aid of standard set of neurosurgical instruments and under surgical microscope with magnification 4 x 40. For visualising the MB the retraction of BA trunk from its anatomical position was necessary.

RESULTS

The median branches (MB) — definition

The median branches (Fig. 1 and 2) of the basilar artery can be definite as the population of the BA's branches separated from the paramedian arteries (Fig. 3 and 4). They arise from the pontine quadrants of the BA's trunk (in 100% cases), represent 37.17% of the BA's rami and enter the pons directly or in the close neighbourhood of the basilar sulcus.

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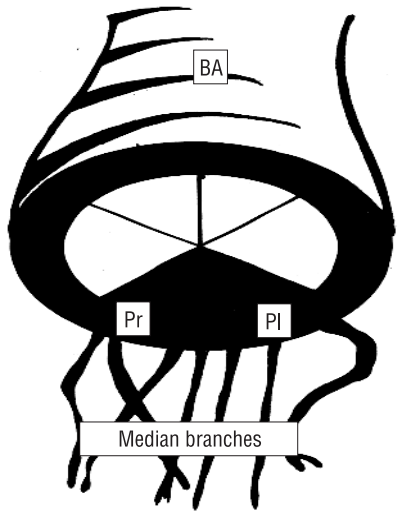

Figure 1. Scheme of median branches of the basilar artery.

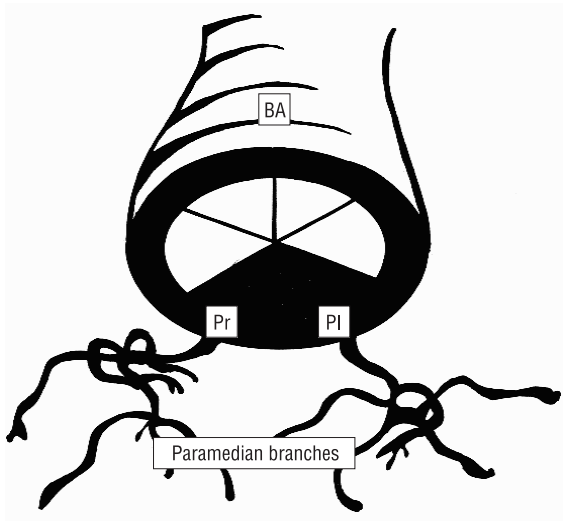

Figure 3. Scheme of the paramedian branches of the basilar artery.

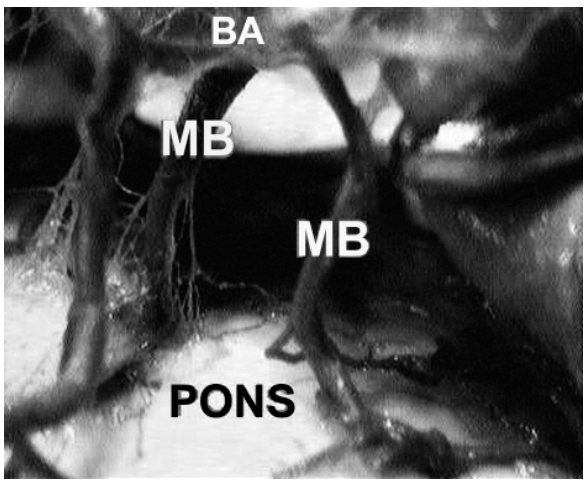

Figure 2. The macro-photograph of the median branches of the basilar artery.

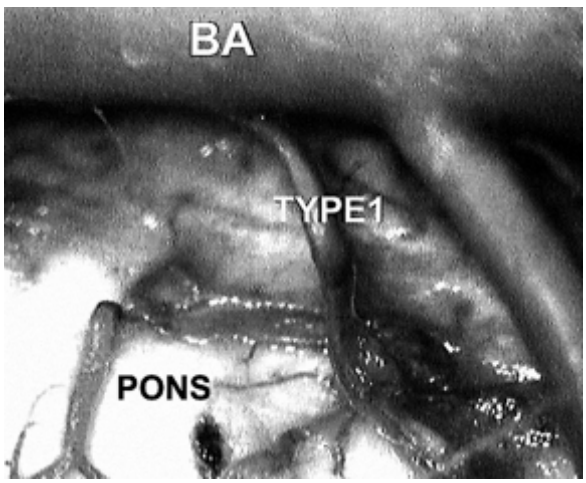

Figure 4. The macro-photograph of the paramedian branches of the basilar artery (type 1).

In the specimens the MB varied in number from 0 to 22 (mean — 8). The MB cannot be visualised without retraction of the BA's trunk from its anatomical position.

The median and paramedian branches

The paramedian branches of the basilar artery (type 1) can be seen without retraction of the BA's trunk. Moreover their ramification is well developed and they possess quite long trunks, whereas the trunks of the MB are rather short.

The topography of the median branches

The topographical study of the MB was performed on three vascular levels.

The ventral surface of the pons was divided into three areas:

1. Area below the trigeminal cranial nerve (the foramen caecum neighbourhood),
2. Area of the trigeminal nerve (the width corresponds to the pedunculus cerebellaris medius),
3. Area above the trigeminal cranial nerve.

The obtained results are demonstrated in the diagram (Fig. 5). These data indicate the MB are mostly located in the foramen caecum area (about 57% — Fig. 5).

The trunks of the median branches

The measurement of the MB's trunks was performed on the three vascular levels.

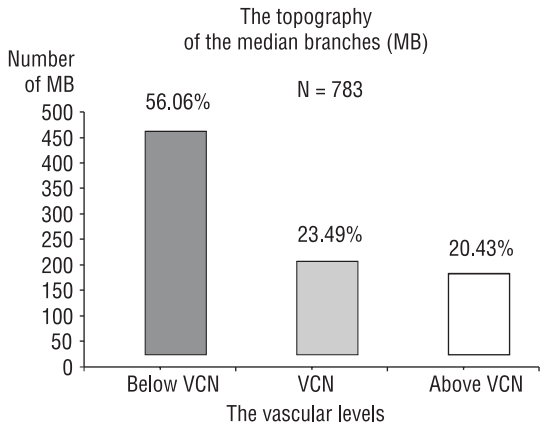

Figure 5. The localisation of the median branches in accordance with the trigeminal cranial nerve (V CN).

The results are as follows:

1. Area below V CN — from 7 to 13 mm (mean — 5),
2. Area V CN — from 1.5 to 4 (mean — 2.5),
3. Area above V CN — from 1 to 4 mm (mean — 2).

DISCUSSION

It is well known that brainstem haemorrhages often occur secondarily to the various supratentorial expanding conditions (for example: tumours, haemorrhages, and so forth). The appearance of the intrapontine haematoma depends on the resistance of the BA's branches for snapping, when the great displacement of brain stem occurs. This resistance is closely related to the length of the vessels' trunks which was very often underlined by many authors [1–12].

The topographical study of the MB shows they are mostly located in the foramen caecum area. These results indicate the BA's mobility should be the least in this area. This is, however, not always the case, because the trunks of the MB vary in length on these three topographical areas. The shortest trunks are possessed by the population of the MB located on V CN level and above. This fact may explain the rare existence of the intrapontine haemorrhage in the foramen caecum area. Moreover there were observed certain discrepancies between the presence of the MB in the examined specimens. They varied in number from 0 to 22 (mean 8). This may indicate there are some people who are more or less liable to sustain the intrapontine haematoma in certain cases. The whole obtained results made us exclude the median branches from the population of the paramedian arteries and classify them as the independent vascular pattern.

ACKNOWLEDGEMENT

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