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Short communication

Variations of ramification of external carotid artery – common trunks of collateral branches

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Summary

This research involved 50 patients processed in PZU, »Medicom« Zenica, by the method of MRI-angiography when performing MR of the neck. The way of ramification of the a. carotis externae, that is described in classical anatomy textbooks, where its branches separate as individual branches, is found in 76,6% to 81%, according to the data from the literature available. These data are confirmed by our researches, where presence of this ramification type was found in 84% of the total number of technically accurate MRI angiograms (91 angiogram). In 16% of cases, the branches of a. carotis externae originate as common trunks, or have unusual place of origin (a. carotis communis). A. thyroidea superior in 1,09% originates as common trunk with a. lingualis, but in three cases (3,33%) it originates as common trunk with a. lingualis.

INTRODUCTION

Development of procedures and techniques of vascular, plastic and reconstructive surgery of the head and neck demands knowledge on variations of vascular system, that appears more frequently than known and described so far. Microsurgucal anatomy of cerebral and cerebellar blood vessels in relation to techniques and procedures of revascularization includes extracranial-intracranial bypass of blood vessels, then interpositions of blood vessels and their heterolateral anastomosing, as well. At the time when the procedures of cerebral revascularization are not completely defined, it is important to realize mutual relation of microsurgical techniques to corresponding anatomical structures (*1–5*). Safe and effective transarterial embolization in the cases of abundant haemorrhage in maxillofacial and nasopharyngeal area demands precise and detailed knowledge on local anatomy (*6, 7*). Morphological properties of the external carotid artery branches represent a base for planning reconstructive surgery of the head and neck (8–12). Branches of a. carotis externae may originate unusually, they may appear in larger or small number than it is described in classical textbooks of anatomy. When they appear in small number, they originate as common trunks, or as the branches of its individual branches. Sometimes all the branches originate near one another, immediately above bifurcation of the a. carotis externae (*13*). The a. carotis externa gives individual branches in 76–80% of cases (*14, 15*). The a. lingualis originates as a separate artery in 77–81% of cases, and as a common trunk with the a. facialis (truncus linguofacialis) it ranges to 20% cases, and in 1% as common trunk with a. thyroidea superior (*14,*

16, 17). The a. facialis originates as common trunks with a. maxillaris in 20% of cases making the truncus maxillofacialis (*14, 16, 18, 19*).

The objective of this research was to examinate how common trunks of collateral branches of the a. carotis externae evolve and in what percentage.

EXAMINEES AND METHODS

Prospective research involved 50 consecutive adult patients, both sexes, examinated in PZU »Medicom« in the town of Zenica. All the 50 patients were examined by the method of MRI-angiography (non-invasive method with no addition of contrast material) as a part of MR of the neck.

RESULTS

After MRI-angiogram have been analyzed, all the branches of the a. carotis externae could not be identified in 9% out of total number of examinees. To analyze variation of ramification of the a. carotis externae the rest of 91 MRI angiogram was taken as the full (100%) sample. It was established that the a. carotis externa shows variation of ramification. In 84,61% of cases (77 analyzed MRI-angiograms) of total number of the analyzed, branches of the a. carotis externae originate as individual arterial trunks. A thyroidea superior and a. lingualis in one case (1,09%) originate as common trunk (Figure 1).

Figure 1. *A. thyroidea superior and a. lingualis originate as common trunk.*

A. facialis in 88 cases (96,70%) out of total of analyzed MRI-angiograms originates from the front wall of the a. carotis externae, above the outcome of a. lingualis as an individual artery, and in three cases (3.29%) as common trunk with a. lingulais (Figures 2 and 3).

DUSCUSSION

The way of ramification of the a. carotis externae, that is described in classical textbooks of anatomy, where its branches originate as individual trunks, according to the data cited by Frick et al., Shima *et al.*, and Hayashi *et al.*, is present in 76,6% to 81% of cases (*14–16*). These data are confirmed by our reseraches, where this type of ramification is present in 84,61% cases of total number of analyzed MRI-angiograms (91 angiograms).

In 11,01% of cases, branches of the a. carotis externae have unusual place of origin (a. carotis communis), i.e. in 4,38% of cases originate as common trunks.

Results of our researches correspond to those presented by Shima *et al.*, and Hayashi *et al.*, Their researches established that a. thyroidea superior originates as an individual branch of the a. carotis externae ranging from 70–95% of cases (*15, 16*). A. carotis externa gives a. thyroidea superior as an individual branch in 87,90% of the analyzed angiograms. In 1,09% it originates as a common trunk with a. lingualis, what corresponds to the percentage of truncus thyrolingualis presence (1,7–2,5%), that is presented in all the papers of Shima *et al.*, and Zumre *et al.* (*15, 20*).

Figure 2. *Common trunk of the a. lingualis sinistrae and a. facialis sinistrae.*

Figure 3. *Common trunk of the a. lingualis dextrae and a. facialis dextrae.*

Zumre et al., and Hayashi *et al.* noted the truncus linguofacialis (common trunk of a. lingualis and a. facialis), whose presence ranged from 18–20% in their research material (*16, 20*). Our results show considerably smaller presence (3,29%) of the truncus linguofacialis, and they are opposite to the results of the authors cited above. The a. facialis in our investigational material appears as an individual branch in 95,71% of total number of examinees, what approximately corresponds to the data (82–87,5%) presented by Zumre *et al.*, and Hayashi *et al.* (*16, 20*).

CONCLUSION

Some variations of ramifications of the a. carotis externae appear very rarely and are found in small percentages. On the other hand, some variations of the carotid blood vessels are suprisingly frequent, and they are in the focus of surgical anatomy of the head and neck. Embryogenesis of these variations is not comletely explained, but anatomical outcomes have great clinical implications. Being familiar with anatomy of blood vessels of the neck is necessary for an acurate explanation of radiological records of these areas, for the precise diagnosis and safe surgical approach to this region. It is especially important, because most of these variations happen asymptomatically and that is a great risk factor, so these variations may cause intraoperative damages of blood vessels in the neck region.

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