The Anterior Communicating Artery Has Significant Branches

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SUMMARY  The anterior communicating artery was studied with the operating microscope in 10 autopsy cases. This vessel was present in all cases with reduplication in three. Arterial diameter ranged from 0.8 to 2.3 mm, with lengths of 5 to 10 mm. Branches of the anterior communicating artery were found in every case (range 3-13, average 5.4). Most branches were small (50-250 μ), but at least one large branch (250-1000 μ) was invariably present. Small ventral branches ramified on the optic chiasm. Small and large dorsal branches distributed themselves to lamina terminalis, hypothalamus, parolfactory areas, columns of fornix, and corpus callosum. Injury to these vessels caused by aneurysmal rupture or surgical manipulation may lead to serious clinical deficits.

DIRECT ANATOMIC STUDIES have indicated that the anterior communicating artery has no branches or a single variable branch.1-3 Recently, during microsurgery in this region, Yasargil has noted and spared several branches of the anterior communicating artery.4 Therefore, to evaluate the presence of such branches, we have studied 10 autopsy cases under the surgical microscope.

METHODS  Ten unselected consecutive autopsy cases were examined. All dissection was carried out under the Zeiss Operating Microscope I (6-25 ×). The chiasmal and interhemispheric cisterns were opened sharply. A stay suture retracted the chiasm ventrally, and a sponge separated the two frontal lobes. The anterior communicating artery trunk was evaluated for presence, reduplication, diameter, and length. Branches of the vessel were examined for site of origin, number, diameter, and destination. Photographs of some vessels were made through the operating microscope, and sketches were made of all specimens.
Results

The anterior communicating artery was present in all 10 cases, with partial duplication in two, and complete duplication in one. Arterial diameter ranged from 0.8 mm to 2.3 mm. Arteries were 5 to 10 mm in length.

Branches of the anterior communicating artery were invariably present (fig. 1). All specimens had at least three branches, and 13 were noted in one case (average 5.4 branches). Most branches were 50-250 μm in diameter, but some as large as 1 mm were observed. In one case, a 1 mm branch of anterior communicating artery behaved like a duplicated left pericallosal artery. Most branches arose on the dorsal aspect of the parent vessel, but a few small ventral branches were also seen. Ventral branches ended on the optic chiasm. Dorsal branches could be followed to lamina terminalis, hypothalamus, parolfactory areas of Broca, columns of fornix, and around the genu of corpus callosum along the cingulate gyrus (fig. 2). Dorsal branches frequently exhibited bilateral terminal branches. Branches arose from points all along the anterior communicating artery, including its junction with both anterior cerebral arteries.

Discussion

The data indicate the presence of regular, substantial branches of the anterior communicating artery in man. Previous studies, done without microsurgical technique, may have overlooked these branches. Two other microsurgical anatomic studies, reported during the course of this work, are in general agreement with our findings. The regularity and destinations of these branches suggest an important physiologic function. Subarachnoid bleeding from an aneurysm in this location could produce mechanical disruption or vasospasm of these branches, and thus could account for serious disturbances of function in the territory of supply. Obliteration of the anterior communicating artery, once advocated in the therapy of anterior communicating artery aneurysms, probably leads to adverse psycho-organic syndromes by interruption of these important perforant branches. Careful sparing of these branches is recommended during aneurysm surgery.

References


Figure 2. Termination of ACommA branches (shaded areas). Medial aspect of hemisphere. Supply may go to (1) optic chiasm, (2) lamina terminalis and hypothalamus, (3) parolfactory area of Broca, (4) cingulate gyrus, (5) genu of corpus callosum, and (6) pillar of fornix.
The anterior communicating artery has significant branches.
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