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Prominent development of the inferolateral trunk of the internal carotid artery as a collateral pathway to the external carotid system.

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Prominent Development of the Inferolateral Trunk of the Internal Carotid Artery as a Collateral Pathway to the External Carotid System

The development of anastomosis between the inferolateral trunk of the internal carotid artery and the artery of the foramen rotundum of the internal maxillary artery is ascribed to a variety of embryologic vascular channels between the internal and external carotid systems [1], which is thought to be phylogenetically compatible with the rete mirabile in other vertebrates [2]. We describe the angiographic features of such an anastomosis discovered incidentally 29 years after external carotid ligation.

Case Report

A 51-year-old man was admitted to the hospital because of a brain abscess in the left cerebral hemisphere. He had had a left mandibular adamantinoma removed surgically and ligation of the external carotid artery 29 years before. Left carotid angiography revealed a mass effect caused by the abscess and an old surgical occlusion of the external carotid artery. Incidentally, a remarkably well-developed internal-external carotid anastomosis was noticed. The inferolateral trunk arising from the cavernous portion of the internal carotid artery showed a prominent development forming a collateral pathway with the artery of the foramen rotundum of the internal maxillary artery within the cavernous sinus, through which most of the branches of the internal maxillary artery were visualized (Fig. 1).

Discussion

It is well known that the internal and external carotid arteries form a complicated network at the base of the skull. The trigeminal artery, the stapedia artery, and the deep recurrent ophthalmic artery play important roles in the formation of an internal-external carotid communication system during fetal development [3]. The dorsal ophthalmic artery originates from the intracavernous portion of the internal carotid artery and courses through the superior orbital fissure to supply the intraorbital contents. As the ventral ophthalmic artery develops to become the ophthalmic artery, the dorsal ophthalmic artery begins to regress. The proximal remnant remains as the inferolateral trunk of the internal carotid artery; the distal remnant corresponds to the deep recurrent ophthalmic artery. The branches of the internal carotid artery supplying the cavernous sinus region

usually anastomose with the collaterals of the internal maxillary artery. According to Lasjaunias et al. [1] and Brismar and Lasjaunias [4], the internal maxillary artery is the main blood supply to the cavernous sinus area, and the inferolateral trunk may be functionally included in the internal maxillary and the internal carotid systems. The anastomosis may enlarge in patients who have hypoplasia, surgery ligation, or arteriosclerotic occlusion of the internal and external carotid arteries [5]. The inferolateral trunk usually gives rise to three branches: superior, anterior, and posterior (Fig. 2). The anterior and posterior branches anastomose with dural branches of the internal maxillary artery. A tributary of the anterior branch extends and anastomoses with the artery of the foramen rotundum arising from the internal maxillary artery supplying the adjacent temporal dura mater. This collateral pathway between the inferolateral trunk of the internal carotid artery and the artery of the foramen rotundum of the internal maxillary artery was well shown in this patient. Most of the internal maxillary artery circulation was found to be coming from this collateral flow via the inferolateral trunk.

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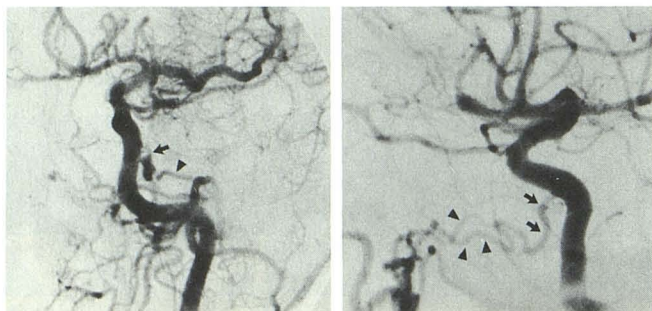
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A

B

Fig. 1.—A and B, Left common carotid arteriograms show that enlarged inferolateral trunk (arrows), originating from C4 portion of internal carotid artery, fills internal maxillary artery in retrograde fashion through anastomosis with artery of foramen rotundum (arrowheads).

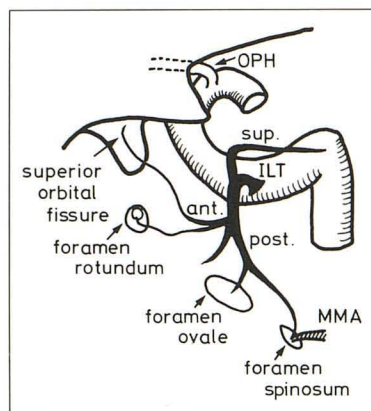


Fig. 2.—Schematic illustration shows that inferolateral trunk (ILT), originating from posterior intracavernous segment of internal carotid artery, gives rise to three branches: anterior (ant.), posterior (post.), and superior (sup.). A ramus of anterior branch anastomoses with artery of foramen rotundum from internal maxillary artery. OPH = ophthalmic artery; MMA = middle meningeal artery. Modified from [1].