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Agensis of the Right Internal Carotid Artery with an Unusual Transsellar Intracavernous Intercarotid Connection

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Unilateral agenesis of the internal carotid artery (ICA) is a very rare anomaly. Generally, when the ICA is congenitally absent, blood is carried to the affected side through the circle of Willis by the basilar artery and the opposite ICA. We report a case of unilateral agenesis of the ICA in which the affected hemisphere was supplied by an anomalous artery between the cavernous parts of the two ICAs. Only nine other angiographic reports of intercarotid anastomosis of this type are in the literature [1–8].

Case Report

A 43-year-old man was hospitalized with a mild left hemiparesis. Routine skull films showed only a depression on the left side of the sellar floor (fig. 1A). Percutaneous right common carotid angiography showed that only the external carotid artery was opacified; the branches of this artery were normal and revealed no anomalies nor unusual anastomoses. Examination of the carotid bifurcation

showed that the common carotid artery did not bifurcate normally, but continued cranially to give rise to the external branches; no carotid siphon or vestiges of the ICA were observed.

Percutaneous left carotid angiography revealed a dilated and tortuous ICA, the intracranial branches of which filled normally. Also the supraclinoid part of the right ICA and the right middle cerebral artery were filled through a horizontal artery connecting the intracavernous segments of the two ICAs (figs. 1B and 1C). This intercarotid collateral artery crossed inside the sella turcica within the sella depression. The horizontal part of the right anterior cerebral artery was absent and the right anterior cerebral artery was opacified through the anterior communicating artery from the left carotid artery.

A subsequent right retrograde brachial angiogram, obtained to exclude an anomalous origin of the right ICA, showed no ICA proximal to the intercarotid anastomosis. A further tomographic study of the base of the skull revealed a complete atresia of the right carotid canal confirming, therefore, the congenital origin of the vascular anomaly. The patient was discharged from the hospital with no change in his neurologic function.



Fig. 1.—A, Anteroposterior projection of skull: depression on left side of sellar floor (*arrows*) due to impression of anomalous artery. B, Left carotid angiogram, anteroposterior projection. Course of anomalous artery between

intracavernous segments of two ICAs. C, Lateral projection. Anomalous vessel (*arrows*).

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Discussion

Since the intercarotid anomalous vessel coursed inside the sella turcica, the origin of this vessel could be embryologically explained as follows. During human development several arterial systems exist for a time, only to regress later. One of them is the primitive maxillary artery, which arises from the midline of the cavernous carotid artery in the C5 segment, anterior to the trigeminal artery, and courses over the sellar floor, above the pouch of Rathke, and anastomoses with the artery from the opposite side [9, 10]. Normally this vessel regresses early in development and its remnant is the precursor of the future inferior hypophyseal artery.

In our case, because of the agenesis of the right ICA and the incomplete formation of the circle of Willis with aplasia of the right A1 and of the posterior communicating artery on the same side, the two primitive maxillary arteries are likely to have supplied the right middle cerebral artery since embryonal life. Of the nine similar cases described, in only six [2, 3, 6–8] did the collateral artery extend across the sellar floor; thus, our case makes a total of seven analogous cases.

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