

Post Anterior Communicating Artery Anastomosis

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Abstract

We describe a variant where the A2 segment of one anterior cerebral artery anastomose distal to the origin of the anterior communicating artery with the A2 segment of the contralateral anterior cerebral artery. The anastomoses are seen without any hypoplasia or aplasia of A2 segments prior to anastomoses unlike azygos or bihemispheric anterior cerebral artery. The anastomoses occur prior to bifurcation of the anterior cerebral artery into pericallosal and callosomarginal arteries.

Anterior communicating artery connects the two anterior cerebral arteries at the origin of the longitudinal fissure at the junction of A1 and A2 segments. Several variants of the anterior communicating artery have been described including hypoplastic and aplastic anterior communicating artery [1–3]. There is a variant in which the A2 segment of one anterior cerebral artery supplies both distal anterior cerebral arteries through an anastomosis distal to the origin of the anterior communicating artery [1–3]. However, the variant is associated with unilateral A2 segment aplasia or a single (undivided) A2 segment and termed the azygos anterior cerebral artery. The anterior communicating artery is absent. Azygos anterior cerebral artery was found in 11.6% of 112 formalin preserved brain in one study [4,5]. Other reports suggest that the prevalence may be lower (2%) based on angiographic studies [6]. Aplastic or hypoplastic A2 segments are seen in 1% of the patients and may be more prevalent in patients with intracranial aneurysm of the anterior communicating artery [7]. A bihemispheric anterior cerebral artery variant has been described by some authors [8,9]. When both A2 segments exist, but one segment is dominant and supplies most vessels to both hemispheres. The other A2 segment is hypoplastic or terminates early in its course toward the corpus callosum.

We describe a variant where the A2 segment of one anterior cerebral artery anastomosis distal to the origin of the anterior communicating artery with the A2 segment of the contralateral anterior cerebral artery. The anastomoses are seen despite no hypoplasia or aplasia of A2 segments prior to the anastomosis. The anastomoses occurred prior to bifurcation of the anterior cerebral artery into pericallosal and callosomarginal arteries.

The first patient was a 36-year-old woman who presented with left frontal intraparenchymal hemorrhage and interhemispheric subarachnoid hemorrhage. Patient was suspected to have mycotic aneurysms of both anterior cerebral arteries in A2 segments on cerebral angiography based on distal location and history of intravenous drug abuse. Both A2 segments were patent and no communication between the two A2 segments was noticed. Patient underwent craniotomy and surgical clip placement for both aneurysms. Postprocedure angiogram demonstrated complete obliteration of small aneurysm that originated from the junction of the left anterior cerebral artery A2 segment and anterior frontal branch (orbitofrontal branch). The surgical clip was visualized anterior to the A2 segment of the anterior cerebral artery. There is an attenuation of the left anterior cerebral artery A2 segment at the site of clip placement. The right anterior cerebral artery A2 segment appears to connect to the left A2 segment via a post anterior-communicating artery anastomosis and filled the left anterior cerebral artery distal to the anastomoses.

The second patient was a 55-year-old man with an arteriovenous malformation in the left cerebral hemisphere with a nidus that measured approximately 3 cm × 2.8 cm. Arterial feeders were derived from the M4 segment of the superior division of the left middle cerebral artery and two distal branches of the left anterior cerebral artery which most likely represent an abnormally enlarged and segmenting pericallosal artery. The right anterior cerebral artery A2 segment connected to the left A2 segment via a post anterior communicating artery anastomosis and subsequently fed the arteriovenous malformation. The left anterior cerebral artery A2 seg-

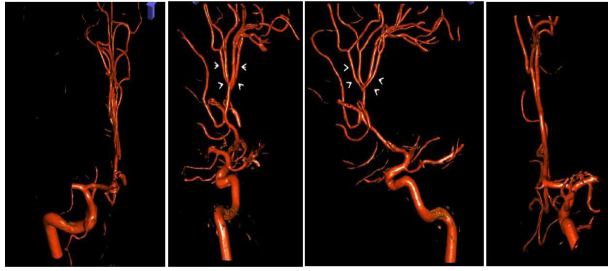


Figure 1. (A) Anteroposterior; (B) oblique; and (C) lateral projections of the right internal carotid artery injection with intracranial views demonstrating the post anterior communicating artery anastomosis connecting the right anterior cerebral artery A2 segment with A2 segment of the left anterior cerebral artery prior to division into pericallosal and callosomarginal arteries. (D) Left internal carotid artery injection with intracranial views demonstrating patent similar caliber A2 segment of the left anterior cerebral artery prior to surgical clip placement.

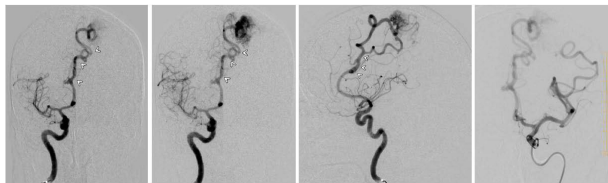


Figure 2. (A) Anteroposterior; (B) anteroposterior in delayed phase; and (C) lateral projections of the right internal carotid artery injection with intracranial views demonstrating the post anterior communicating artery anastomosis connecting the right anterior cerebral artery A2 segment with A2 segment of the left anterior cerebral artery prior to division into pericallosal and callosomarginal arteries. Note the arteriovenous malformation in the left hemisphere; (D) left internal carotid artery injection with intracranial views demonstrating patent similar caliber A2 segment of the left anterior cerebral artery.

ment prior to anastomoses was patent and of normal caliber. The anastomoses were large and prominent due to high flow into the left hemispheric arteriovenous malformation.

The observations from the two patients suggest that post anterior communicating artery anastomosis may actually be silent and become activated to provide blood flow to contralateral anterior cerebral artery distribution. Unlike the azygous artery which is a variant in the development of anterior cerebral arteries, the post anterior communicating artery anastomosis is a connection that occurs between two anterior cerebral arteries with normal A2 segments. The normal and symmetrical caliber of both A2 segments differentiate this variant from the bihemispheric anterior cerebral artery. Further studies may be required to identify the occurrence of this anastomoses on cerebral angiography perhaps with contralateral common carotid artery manual compression to fully activate the post anterior communicating artery anastomosis.

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