

A1 segment hypoplasia

[Anterior cerebral artery A1](#) segment hypoplasia is an uncommon fetal variant of the [circle of Willis](#).

There is an association of unilaterally absent or hypoplastic A1 segments of the anterior cerebral artery with ipsilateral decrease in [internal carotid artery](#) (ICA) caliber, and this can be seen on MR angiograms ¹⁾.

Epidemiology

Hypoplasia of the proximal (A1) segment of the anterior cerebral artery (ACA) was examined in 50 human brains and on 8 selected carotid arteriograms. Hypoplasia has been found in 22% of the cases. Two types of this phenomenon exist, namely the mild and extreme hypoplasia. Mild hypoplasia has been noticed in 14% of the specimens. The hypoplastic vessel has ranged from 1.3 to 1.9 mm in diameter (average 1.6 mm) and it was from 0.6 to 0.9 mm smaller than the opposite A1 portion. Extremely hypoplastic proximal segment has been present in 8% of the cases. It has varied from 0.3 to 1.1 mm in size (average 0.9 mm) and has been more than 1 mm smaller than the opposite proximal segment. Both mild and extreme hypoplasia have been associated in 81.8% of the cases with the corresponding variations or malformations of the anterior cerebral, posterior cerebral, posterior communicating and basilar arteries ²⁾.

The incidence of right-sided A1 segment hypoplasia either accompanied with AcomA aneurysm or not was much greater than that of left-sided. Intracranial AcomA aneurysm development appeared to be associated with A1 segment hypoplasia ³⁾.

Complications

The A1 segment of the anterior cerebral artery is a principal supplier of anterior collateral blood flow.

The aim of a study was to determine whether A1 segment hypoplasia may be responsible for [acute ischemic stroke](#).

Chuang et al. consecutively examined 280 acute ischemic stroke patients (aged 66.9 +/- 14.2 years). Cerebral magnetic resonance angiography was performed within 72 h of ischemic stroke onset. The overall incidence of A1 variation in our experimental group was 15.0% (n = 42, agenesis/hypoplasia = 18/24), which was statistically higher than in the control group (n = 12). The majority (n = 30, 71.42%) had ipsilateral striatal [lacunar infarctions](#). Based on these results, A1 agenesis/hypoplasia appears to be a risk factor contributing to ischemic stroke, especially to strokes in arteries penetrating the striatal area ⁴⁾.

Yamaguchi et al. report two cases of bilateral anterior cerebral artery (ACA) territory infarction. On magnetic resonance (MR) angiograms, the A1 segment of the ACA was unilaterally hypoplastic in both cases, suggesting that unilateral hypoplasia of A1 is a significant predisposing factor for this rare type of cerebral infarction. When the contralateral A1 is dominant, embolic materials may enter into it more easily ⁵⁾.

Hypoplasia of the **A1 segment of the anterior cerebral artery** is frequently observed in patients with **anterior communicating artery aneurysms**. The effect of this anatomical variant on ACoA aneurysm morphology is not well understood ⁶⁾.

Case series

2017

Yang et al. retrospectively reviewed 251 patients with ACoA aneurysm who underwent surgical clipping in **Beijing** Tiantan Hospital between September 2011 and September 2016. Their clinical and radiologic features, as well as clinical outcomes were reviewed. In addition, univariate and multivariate logistic regression analysis was performed to identify independent risk factors for the postoperative infarction and unfavorable clinical outcomes of surgical clipping ACoA aneurysm.

The incidence of **A1 segment hypoplasia** was 49.8% (125 of 251 patients). Univariate analysis revealed that multiple aneurysm ($P=0.025$), diameter of aneurysm ($P=0.040$) and A1 segment hypoplasia ($P=0.010$) were associated with anterior cerebral artery (ACA) territories infarction, and A1 segment hypoplasia ($P=0.002$) is significantly correlated with unfavorable clinical outcomes of surgical clipping ACoA aneurysm. Moreover, multivariate analysis showed that multiple aneurysm ($P=0.038$, OR=2.571), diameter of aneurysm ($P=0.034$, OR=1.097) and A1 segment hypoplasia ($P=0.007$, OR=3.619) were strongly independent risk factors for ACA territories infarction. In addition, Hunt and Hess scores (HH) ($P=0.036$, OR=2.326) and A1 segment hypoplasia ($P=0.002$, OR=2.873) are significant independent risk factors for unfavorable clinical outcomes of surgical clipping ACoA aneurysm.

A1 segment hypoplasia is a significant independent risk factor for unfavorable clinical outcomes of surgical clipping ACoA aneurysm and ACA infarction after surgery ⁷⁾.

Case reports

2016

A case of anterior cerebral artery **A1 segment hypoplasia** syndrome presenting with right lower limb monoplegia, abulia, and urinary incontinence ⁸⁾.

2000

A 68-year-old man presented with a Hunt and Hess Grade II subarachnoid hemorrhage and symptoms of headache, nuchal rigidity, and facial paresis.

Angiographic evaluation with superselective exploration revealed a small ruptured aneurysm located on a duplicated hypoplastic A1 segment of the left anterior cerebral artery with associated middle cerebral artery stenosis and secondary early moyamoya changes. Surgical clipping of the aneurysm was performed successfully while sparing the hypoplastic A1 segment.

A1 aneurysms occurring on a duplicated anterior cerebral artery segment probably develop from a congenital weakness of the parent vessel and increased local shear stress. Superselective angiography was helpful in the preoperative planning and facilitated the decision to treat with surgical clipping instead of embolization ⁹⁾.

1)

Kane AG, Dillon WP, Barkovich AJ, Norman D, Dowd CF, Kane TT. Reduced caliber of the internal carotid artery: a normal finding with ipsilateral absence or hypoplasia of the A1 segment. *AJNR Am J Neuroradiol.* 1996 Aug;17(7):1295-301. PubMed PMID: 8871715.

2)

Marinković S, Kovacević M, Milisavljević M. Hypoplasia of the proximal segment of the anterior cerebral artery. *Anat Anz.* 1989;168(2):145-54. PubMed PMID: 2712326.

3)

Chen H, Li MH. A1 segment hypoplasia accompanied by AcomA aneurysms assessed with magnetic resonance angiography. *Surg Radiol Anat.* 2014 May;36(4):353-7. doi: 10.1007/s00276-013-1182-5. Epub 2013 Aug 4. PubMed PMID: 23912562.

4)

Chuang YM, Liu CY, Pan PJ, Lin CP. Anterior cerebral artery A1 segment hypoplasia may contribute to A1 hypoplasia syndrome. *Eur Neurol.* 2007;57(4):208-11. Epub 2007 Jan 19. PubMed PMID: 17268201.

5)

Yamaguchi K, Uchino A, Sawada A, Takase Y, Kuroda Y, Kudo S. Bilateral anterior cerebral artery territory infarction associated with unilateral hypoplasia of the A1 segment: report of two cases. *Radiat Med.* 2004 Nov-Dec;22(6):422-5. PubMed PMID: 15648459.

6)

Rinaldo L, McCutcheon BA, Murphy M, Bydon M, Rabinstein AA, Lanzino G. 360 Relationship of A1 Segment Hypoplasia to Anterior Communicating Artery Aneurysm Morphology and Risk Factors for Rupture. *Neurosurgery.* 2016 Aug;63 Suppl 1:207. doi: 10.1227/01.neu.0000489849.55193.67. PubMed PMID: 27399558.

7)

Yang F, Li H, Wu J, Li M, Chen X, Jiang P, Li Z, Cao Y, Wang S. Relationship of A1 segment hypoplasia to the radiological and clinical outcomes of surgical clipping anterior communicating artery aneurysm. *World Neurosurg.* 2017 Jul 29. pii: S1878-8750(17)31222-6. doi: 10.1016/j.wneu.2017.07.122. [Epub ahead of print] PubMed PMID: 28765030.

8)

Lakhotia M, Pahadiya HR, Prajapati GR, Choudhary A, Gandhi R, Jangid H. A case of anterior cerebral artery A1 segment hypoplasia syndrome presenting with right lower limb monoplegia, abulia, and urinary incontinence. *J Neurosci Rural Pract.* 2016 Jan-Mar;7(1):189-91. doi: 10.4103/0976-3147.168438. PubMed PMID: 26933381; PubMed Central PMCID: PMC4750332.

9)

Taylor R, Connolly ES Jr, Duong H. Radiographic evidence and surgical confirmation of a saccular aneurysm on a hypoplastic duplicated A1 segment of the anterior cerebral artery: case report. *Neurosurgery.* 2000 Feb;46(2):482-4. PubMed PMID: 10690739.

From:

<https://neurosurgerywiki.com/wiki/> - **Neurosurgery Wiki**

Permanent link:

https://neurosurgerywiki.com/wiki/doku.php?id=a1_segment_hypoplasia

Last update: **2024/06/07 02:54**

