



HYPO PLASTIC A1 SEGMENT OF ANTERIOR CEREBRAL ARTERY: INCIDENCE AND CLINICAL RELEVANCE

Radio-Diagnosis

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ABSTRACT

The anterior cerebral artery is one of the terminal branches of the internal carotid artery. The part of the anterior cerebral artery before the origin of anterior communicating artery is called the A1 segment (pre-communicating / Horizontal segment). A1 segment hypoplasia, as a non-competent part of the circle of Willis, is regarded as a predisposing factor in hemispheric low-flow infarcts in carotid occlusive disease. In our case series 42 cases i.e 10.5%, there was a unilateral hypoplastic or absent pre-communicating segment with contralateral ACA giving rise to both the post-communicating segments.

KEYWORDS

Anterior cerebral artery, A1 hypo plastic segment, MRI angiogram, Circle of Willis.

INTRODUCTION

The anterior cerebral artery is one of the terminal branches of the internal carotid artery and starts at the medial end of the lateral cerebral sulcus. It passes forwards and medially above the optic nerve to the commencement of the longitudinal fissure. Here it is joined to the homologous artery of the opposite side by the anterior communicating artery, a short transverse trunk. The part of the anterior cerebral artery before the communication is called the A1 segment (pre-communicating or horizontal), distal to the anterior communicating artery, the two anterior cerebral arteries run parallel to each other in the longitudinal fissure, curving around the genu of corpus callosum and turning backwards along its superior surface. The anterior cerebral artery gives off two types of branches namely central & cortical branches.^[1]

MATERIAL AND METHOD

3D TOF MR angiogram of circle of Willis in 400 patients were retrospectively evaluated who were considered as healthy subjects with regard to the anatomy of the circle of Willis. MR examination was performed with 1.5 T MR machine (GE OPTIMA). The MR angiography examination was performed with standard head coil. The MR angiography protocol consisted of non-contrast 3DTOF transaxial acquisition which was used for examination of all patients with the following parameters: TR/TE/FA (30–40/6–10 ms/20–25). Rectangular field of view (FOV) 150 · 200 mm, matrix size 192 · 256 with slice thickness of 0.8–1 mm and 96 partitions with the total imaged volume (effective slab thickness) 72 mm.

RESULT

In our study of 400 subjects, we found that 42 (i.e 10.5%) were having, unilateral absent or hypoplastic A1 (pre-communicating segment) of the anterior cerebral artery. The bilateral flow of post-communicating segments of anterior communicating artery was maintained by the contralateral pre-communicating segment of anterior cerebral artery. As shown in figure 1

DISCUSSION

Among the general population, only approximately 50% have a complete Circle of willis [3]. Anatomically, the A1 segment of the ACA is not only a principal collateral circulation pathway, but is also the source of numerous penetrating striatal arteries that supply the anterior hypothalamus, septum pellucidum, and the anterior and inferior portions of the corpus striatum. The incidence as reported by various authors has been tabulated in Table 1. The component arteries of the circle of willis are said to be hypoplastic when the diameter of the blood vessel is less than 1mm, regardless of laterality, in the present study, in cases with unilateral A1 segment. Wolschaegn et al^[13] has reported bilateral absence in 3.2% cases, which was not seen in any

case in the present study. With regard to sidedness, predominance of left sided hypoplastic A1 segment of ACA was seen (8.0%) as compared to right (2.5%). With regard to sexual dimorphism, this variation was present in 22 males (5.5%) while only 20 females (5.0%) thus suggesting a predilection for male subjects.

CONCLUSION

An individual with one of these variations may under normal circumstances suffer no ill effects, however there are certain pathological conditions which can present a risk to the person's health and increase the possibility of suffering an ischemic stroke when compounded with the effects of an anatomical variation^[14]. A1 segment hypoplasia, as a non-competent part of the circle of Willis, is regarded as a predisposing factor in hemispheric low-flow infarcts in carotid occlusive disease^[15,16]

Table 1: Incidence of hypoplastic A1 segment in different studies.

S. NO	AUTHOR	PERCENTAGE
1	Jesic et al [3]	2.4%
2	Stefani et al [4]	36%
3	Al Hussain [5]	4%
4	El khamichi[6]	4%
5	Khosrai [7]	6%
6	Eftekhari et al[8]	1%
7	Nordon et al [9]	2%
8	Hashmi [10]	4.5%
9	Gunnal et al [11]	8%
10	De silva et al[12]	4.1%
	Present study	10.5%

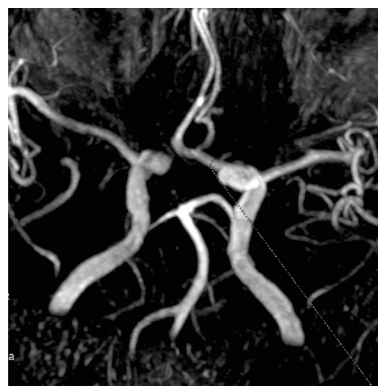


Figure 1: MR Angiogram of the Circle of Willis. There is absence of

right pre-communicating segment (A1 segment) of anterior cerebral artery with left pre-communicating segment of A1 segment supplying bilateral post-communicating segments of anterior cerebral artery.

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