

Study of Anterior Cerebral Artery and its Variations in Adult Cadavers

Cessy Job¹, Prasanna M.B.¹, Nandagopalan P.A.²

ABSTRACT

Introduction: Anterior cerebral arteries supply blood to the midline portion of cerebrum on either sides. Ischaemia of the area normally supplied by anterior cerebral artery can lead to symptoms like constant weakness and sensory loss in the lower limb and behavioural changes, known as Anterior cerebral artery Syndrome. In the present study the variations of anterior cerebral artery have been observed.

Material and methods: One hundred and four brain specimens from the cadavers in the dissection hall of Govt. Medical College Kottayam and P.K. Das Institute of Medical Sciences Ottapalam were studied by grossdissection, mapping of blood vessels, painting and photography, for a time period of 3 years and 6 months (2012 August – 2016 February). Only brain specimens with intact Circle of Willis was included in the study.

Results: Anterior cerebral artery showed variations in 8 cases, like absence, thin and short(Hypoplasia), enlarged and thickened, partial duplication and distal anterior cerebral artery.

Conclusion: Variations of anterior cerebral artery was found to be 7.6%. it is usually associated with anterior cerebral artery syndrome.

Keywords: Anterior, Cerebral, Circle, Specimens, Variations

INTRODUCTION

Anterior cerebral arteries supply blood to the midline portion of cerebrum on either sides. They are inter connected by an anterior communicating artery. Anatomically anterior cerebral artery is divided into five segments A1 to A5. A1 segment is the part from its origin to the level of anterior communicating artery. This ascends on the medial surface of hemisphere and then continues posteriorly on the superior surface of corpus callosum as A2 to A5 segments, demarcated as orbital, frontalpolar, callosal marginal and pericallosal arteries.¹⁻³ They supply the frontal lobe and internal capsule. Ischaemia of the area normally supplied by anterior cerebral artery can lead to symptoms like constant weakness and sensory loss in the lower limb and behavioural changes, known as Anterior cerebral artery Syndrome. In the present study the variations in anterior cerebral artery have been observed.

MATERIAL AND METHODS

One hundred and four brain specimens from the cadavers in the dissection hall of Government Medical College Kottayam and P.K. Das Institute of Medical Sciences Ottapalam were studied by gross dissection, mapping of blood vessels, painting and photography. The study was conducted during the routine dissection classes of these medical colleges. The origin, course and termination of anterior cerebral artery were traced. The length of different parts and the associated variations were noted. Only brain specimens with intact Cir-

cle of Willis were included in the study.

RESULTS

Anterior cerebral artery showed variations in 8 cases.

Variation observed

Artery	Variations observed	No. of cases
Anterior cerebral	Absence	1
	Distal anterior cerebral	1
	Thin and short(Hypoplasia)	3
	Enlarged and thickened	1
	Partial duplication	2

Variations in the Anterior Cerebral Artery

The proximal segment of right anterior cerebral artery was found to be absent in one case where the anterior communicating artery was thickened (Fig-1).

Partial duplication of the initial segment of anterior cerebral artery was observed in two cases (Fig. 2).

The right anterior cerebral was observed to be thin and short in three cases. It was enlarged and thickened in one case on the right side (Fig. 3).

The pericallosal branch of anterior cerebral artery (ACA) supplies the region of precuneus in adults. CMA- Callosomarginal artery, PCA- Pericallosal artery (4).

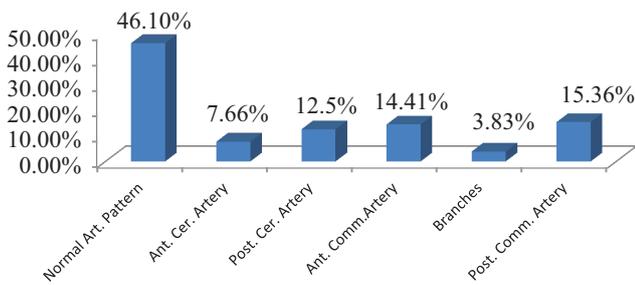
DISCUSSION

In the present study the variations observed in the anterior cerebral artery was only 7.6%. Schaeffer (1924)¹ stated that the right anterior cerebral artery has a chiasmal relation while the left crosses well in advance of the chiasma, which was also observed in the present study. The anterior cerebral artery continues caudally along the dorsal surface of corpus callosum and its terminal branch supplies the precuneus, both in fetuses and adults. This is in agreement with the observation of Salmon and Lazor thes (1971).² According to Dimmick SJ, Faulder KC.³ Hypoplasia of anterior cerebral artery was found in 10% and aplasia in 1-2 %. In the study hypoplasia

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Graph-1: Diagram To Show The Variations in Arteries forming Circle of Willis



Figure-1: Proximal segment of right anterior cerebral artery (ACA) absent with a thick anterior communicating artery (ACC); **Figure-2:** Partial duplication of initial segment of right anterior cerebral artery (ACA)

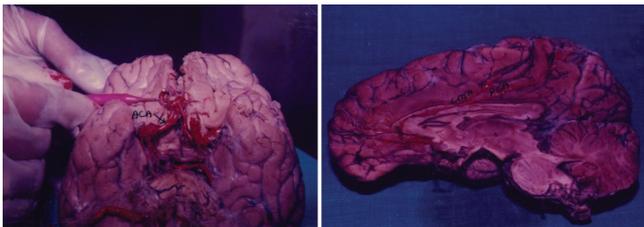


Figure-3: A thickened right anterior cerebral artery (ACA); **Figure-4:** The pericallosal branch of anterior cerebral artery (ACA) supplies the region of precuneus in adults. CMA- Callosomarginal artery, PCA- Pericallosal artery.

was seen in 3% and aplasia in 1%. The anterior cerebral artery was observed to be absent in one case and showed partial duplication in 2 cases. It was hypoplastic in 3 cases. This was in accordance with the study of Fields (1965).⁴ Maurer J., Maurer E., Perneczky A., 1991.⁵ Observed variations in the A1 segment of anterior cerebral artery in 2 cases. In the study there was partial duplication in the A1 segment in 1 case. The greatest length measured for the A1 segment of anterior cerebral artery in the present study was 1.9 cms and a smallest 0.5 cms. According to Sylvia Kamath⁶ (1980) the greatest length measured for anterior cerebral artery was 2.10 cms and 2.56 cms, the smallest was 0.31 cms and 0.34 cms for the right and left respectively. In a study of Variation of Circle of Willis In Adult Human Brains In Nagpur Region Of Maharashtra, India by Saniya H. Lade et al.⁷ show higher percentage of hypoplasia (44%) which is too high to coincide with the previous studies. Abubakhr⁸ and Bertram⁹ revealed only 0.7% and 10% hypoplastic ACA. Stenosis is noted on left side. Circle which has the external diameters of vessels on right side exactly equal to that on left side is the symmetrical circle. (Prof.E.Fawcett 1906).¹⁰

These days there are an increasing number of cerebrovascu-

lar accidents and a grave morbidity associated with it. The awareness of these variations is of importance to the neurosurgeons.

CONCLUSION

Anterior cerebral artery is often said to be associated with Anterior cerebral artery Syndrome. It is found to have 7.6% variations here.

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