JOURNAL OF THE ANATOMICAL SOCIETY OF INDIA XXX (2015) 1–5

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/jasi

Original Article

Morphometry of basilar artery in population of Gujarat

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ARTICLE INFO

Article history:
Received 17 June 2014
Accepted 1 April 2015
Available online xxx

Keywords:
Morphometry
Basilar artery
Variation
Stroke

ABSTRACT

Introduction: The basilar artery is a large median vessel responsible for supplying various parts of the brain. The aim of this study was to observe, record and compare variations in basilar artery regarding its length, mid length diameter, level of origin and level of termination.

Method: Sixty human formalin fixed brain specimens obtained from cadavers donated for the study purpose were under examination in the Dept. of Anatomy, Gov. Medical College, Baroda. The process was undertaken according to the dissection method as per the Cunningham manual. The variation in length and diameter of basilar artery was noted using Digital Vernier calipers. Variation in origin and termination of basilar artery was noted using magnifying glass.

Results: Variation in basilar artery diameter found ranged from min 2.02 mm to max 4.45 mm. Variation in length found ranged from min 20.1 mm to 42.02. In most of the cases basilar artery origin and termination was normal. In 4 cases origin was above the Ponto-Medullary junction and in 3 cases it was below. In 2 cases termination was above the Ponto-Mesencephalic junction and in 1 case it was below.

Discussion: This observation highlight the variations in morphological aspects of the basilar artery, the knowledge of variations would help neurosurgeons safely diagnose, as well as plan and execute vascular bypass and shunting procedures for the treatment of stenosis, aneurysms and arteriovenous malformations in the posterior cranial fossa.

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http://dx.doi.org/10.1016/j.jasi.2015.04.003

Please cite this article in press as: Patel S, et al., Morphometry of basilar artery in population of Gujarat, Journal of the Anatomical Society of India (2015), http://dx.doi.org/10.1016/j.jasi.2015.04.003

1. Introduction

Human brain and its complex vascular network may be viewed as a "three pound biological computer". It is composed of billions of specialized cells and circuits which make it the most vital organ in the human body. It is richly supplied with blood vessels which provide oxygen and other essential nutrients. There may be variations in typical configuration. Vessels generally vary in caliber; often they are hypoplastic, duplicated or even absent.[1]

The basilar artery is formed by the union of two vertebral arteries at the Ponto-Medullary junction. The artery terminates by dividing into two posterior cerebral arteries just after passing superior to the two Oculomotor nerves at the Ponto-Mesencephalic junction[2] (Fig. 1).

Several studies have shown that these variations play an important role in the development of cerebrovascular diseases.[3]

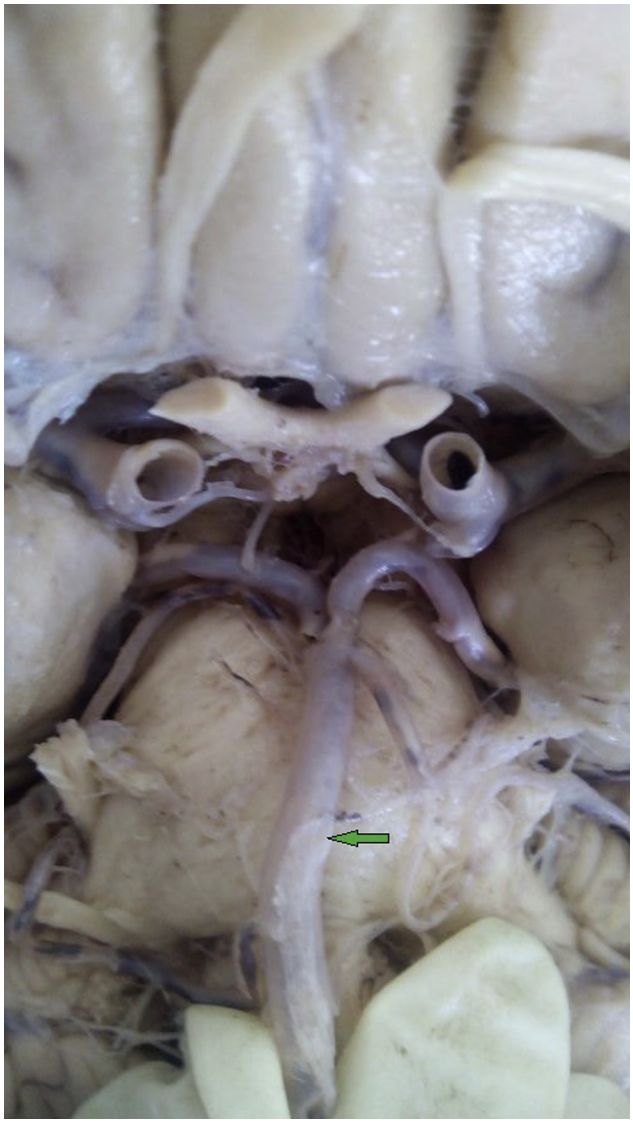

Fig. 1 – Normal basilar artery. Basilar artery normal variant (Green arrow).

Cerebrovascular diseases are the leading illness affecting the modern world with a high mortality rate. The posterior circulation of the brain consists of vertebrobasilar system, shows a high incidence of anomalies in the form of hypoplasia, fenestrations and asymmetry of the vessels, which precipitate the development of vertebrobasilar insufficiency and posterior circulation stroke. A detailed knowledge of the vertebrobasilar variants is essential in the diagnosis, treatment as well as in educating the patients suffered from posterior circulation stroke.[4]

Basilar artery related clinical condition such as posterior circulation stroke, migraine, aneurysm, atherosclerotic changes are very common throughout the world. Knowledge of anatomy of the basilar artery and its branches are necessary for neurosurgeons, neurologists for proper diagnoses and treatment of cerebrovascular diseases, aneurysm, tumor, epilepsy, migraine and other form of vascular anomalies.[5]

The surgical importance lies in its application during the exposure of the basilar artery and a thorough knowledge of the vascular variants will increase the success of the procedure. The inference obtained from this work is also useful for the sonologists in improving their diagnostic skills and for anatomists in enhancing their knowledge in teaching.

Various types of variations exist in different populations, but the variations of the basilar artery in Indian population have been reported only by few authors previously, based on cadaveric analysis. The present study is aimed to analyze the size, asymmetry and anomalies of the basilar artery.

2. Materials and methods

Sixty human formalin fixed brain specimens obtained from cadavers donated for the study purpose were under examination in the Dept. of Anatomy, Gov. Medical College, Baroda and other Medical Colleges of Gujarat from April 2013 to March 2014.

The study was approved by Scientific Review Committee and Ethical Committee (IECHR, Medical College Baroda & SSG Hospital).

The brain was removed by dissection method mentioned in Cunningham Manual of Practical Anatomy.[6] Dissections were done by Assistant Professor of Anatomy Department. Before dissection, the specimen was washed in running tap water for half an hour. The arachnoid and pia mater over the pons, medulla oblongata and the interpeduncular cistern was removed carefully in order to expose and visualize the basilar artery and its branches with the post part of circle of Willis.

In situ examination of the formation, termination, branches and the length was carried out. The dimensions of the component vessels were measured using Digital vernier calipers (sensitivity: 0.1 mm). Site of formation and termination of basilar artery were examined carefully by hand magnifying glass and noted. We focused on the basilar artery. The results obtained were recorded and tabulated.

Water was removed from the dependent areas and the grooves using filter paper.

Inclusion criteria: Undamaged specimens of the brain with intact circulas arteriosis and basilar artery.

Exclusion criteria: Damaged circulus arteriosis.

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