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Original Research Article

Morphometric Analysis of Basilar Artery in Karaikal Populaltion

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Abstract: Basilar artery is formed by the fusion of right and left vertebral artery and terminates as right and left posterior cerebral artery. The aim of the study is to observe and record the length of the basilar artery from the level of formation to level of termination and the diameter of basilar artery at three different levels. The study was done in 50 adult human cadaveric brains from Department of Anatomy, Vinayaka Missions Medical College, and Karaikal. The length and diameter was measured using Digital Vernier calipher. The mean length is 30.98mm and the range is 21-45mm in our study. And the mean diameter at three different levels is 3.55mm. These variations in the length and diameter of basilar artery is of diagnostic importance for the neurosurgeons and radiologists for clinical investigation and surgery.
Keywords: vertebral artery, basilar artery, formation of basilar artery, termination of basilar artery, length of basilar artery, diameter of basilar artery

INTRODUCTION:

Morphologically basilar artery is formed as a result of fusion of two vertebral arteries at the level of the Ponto-medullary sulcus. It follows an ascending course along the shallow groove on the ventral surface of pons. This artery is found within the Pre pontine cistern posteriorly to the clivus. The distal part of the artery usually bends posteriorly and divides into two posterior cerebral arteries just after passing in between the two oculomotor nerves. The aim of the study is to document the morphometry of basilar artery. As the basilar artery plays a significant factor in the posterior circulation of the brain.

METHODS:

The research was conducted in 50 cadaveric brain specimens from the Department of Anatomy, Vinayaka Missions Medical College, and Karaikal for a period of eight years. The brain is removed as per the Cunnighams Manual of practical anatomy volume -3. The specimens are washed in clear tap water, and the excess water is removed using filter paper. The length and diameter of artery was measured using Digital vernier calipher. The data obtained are tabulated. Institutional ethical committee of Vinayaka Missions Medical College and Hospital approved the study.

RESULTS:

The normal formation of basilar artery was at the level of Ponto-medullary (P-M) junction and termination at the level of Midbrain – Pons (MB-P) junctions. The normal formation of basilar artery is shown in Fig.1.

The mean length of basilar artery is 30.98±5.06 mm (Table-1) and the range is 21 – 45mm in our study. The diameter of basilar artery was measured at 3 different levels. At the level of origin, mean diameter is 3.60mm, at Mid-level is 3.52mm and at the termination is 3.55mm (Table-2). The formation of basilar artery at the normal position or at the Ponto-medullary junction is 62% and above the PM junction is 16% and below the junction is 22%. And the termination of basilar artery at Ponto-Midbrain junction or normal position is 85% and above the junction is 10% and below the junction is 5%.

Table 1: Length of the basilar artery

Length of the basilar artery in cm	Number of specimens
2.1 – 2.5	07
2.6-3.0	18
3.1-3.5	16
3.6-4.0	07
4.1-5.0	02

Fig-1: Branching of basilar artery
AICA- Anterior inferior cerebellar artery, PICA- Posterior inferior cerebellar artery, VA-Vertebral artery, BA-Basilar artery, SCA-Superior cerebellar artery, PCA-Posterior Cerebral Artery

Table 2: Diameter of the basilar artery

Diameter in mm	Maximum	Minimum	Mean
At Origin	4mm	3.1mm	3.60
At Mid-level	4mm	2.9mm	3.52
At Termination	4mm	2.7mm	3.55

DISCUSSION:

The basilar artery in its dimensions and course shows a wide range of variability in our present study. The average length is 30.98mm and the diameter is between 3.55mm. The variation in the length and position of basilar artery which is mainly caused by haemodynamic and ageing factors and is mainly congenital with embryological background.

Many studies have done regarding the lengths of basilar artery in the previous studies are given in the TABLE 3.

The Mean length of basilar artery is 30.98±5.06mm

Table-3: length of basilar artery

Studies done by	Range
Adachi (1928)[1]	25-30mm
Kamath(1979)[2]	22-45mm
Padmavathi(2011)[3]	25-48mm
Present study	21-45mm

Our lengths were similar to the studies done by Kamath 1979 and close to the studies done by Padmavathi 2011. The Diameter of basilar artery gradually diminishes its size as it approaches the termination.

The Formation of basilar artery

The level of formation of basilar artery determines the length of basilar artery. In our study it the normal formation was same as the studies done by Harish Wakhede *et al.;* [4] and formation above the junction is same as Padmavathi and formation below the junction is close to the studies done by H. Mamatha [5].

Table 4: Variation in the level of formation of basilar artery

Level of formation	Vare A.M and Bansal[6]	Padmavathi.G [3]	Hosapatna Mamatha [5]	Harish A Wankhede [4]	Present study
At Ponto-medullary junction(P-M Junction)	79.4%	44.4%	65%	62.50%	62%
Above P-M junction	4.5%	16.6%	10%	25%	16%
Below P-M Junction	16%	38.8%	25%	12.25%	22%

Table 5: Variation in the level of termination of basilar artery

Level of termination	Percentage
At MB-P junction	85%
Above MB- P junction	10%
Below MB- P junction	05%

Table 6: Level of Termination of Basilar artery in the previous studies

Level of termination	Padmavathi[3]	Harish wakhede[4]	Shilpa patel[7]	Present study
MB-P Junction	44.4%	62.5%	95%	85%
Above MB-P Junction	29.6%	25%	3.33%	10%
Below MB-P Junction	25.9%	12.5%	1.67%	5%

In Table: 5 and 6, the Level of Termination at the normal position or at MB-P junction is 85% but in the studies done by Shilpa patel it is 95%. And termination above the junction is 10% in our present study but it is 29.6% in Padmavathi. The termination below the junction is 5% and it is 2% in case of Shilpa. The termination of basilar artery shows wide range of variation in the present study and in the earlier studies, which should be taking into account for the Neurosurgeons in the approach of basilar artery.

CONCLUSION:

The morphometry of basilar artery is highlighted in the local population in this cadaveric study. Variations in the dimensions, formation and termination of basilar artery are very common. The knowledge and understanding of the course of the arterial supply of the brain are very important for Neurosurgeons, Radiologists for providing competent prognosis of the disease in the affected area of brain [8].This will help the Neurosurgeons and Interventional Radiologist to neatly plan and execute various surgical procedures, vascular bypass and shunting operations for the treatment of stenosis, aneurysms, and dolichoectasia leading to neuralgia.

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