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Variations in the Number of Different Branches of Basilar Artery in Relation to Different Age Group

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Abstract

Context: *Basilar artery is one of the main arteries that supplies the posterior portion of brain. Anatomy of basilar artery and its branches are very complex and variable. So, detailed morphological knowledge on basilar artery is essential for proper diagnosis and treatment of related neurological disorders.*

Materials and Methods: *A cross-sectional descriptive type of study was carried out in the Department of Anatomy, Dhaka Medical College, Dhaka, from January 2010 to December 2010. 70 postmortem basilar arteries with its branches were collected from unclaimed dead bodies and variations in the number of different branches of basilar artery in relation to different age group were observed.*

Results: *The mean ± SD of number of anterior inferior cerebellar artery (AICA) was found 1.94 ± 0.24 in group A, 1.95 ± 0.31 in group B & 2.00 ± 0.00 in group C. The mean ± SD number of labyrinthine artery (LA) was found 1.67 ± 0.59 in group A, 1.74 ± 0.54 in group B & 1.90 ± 0.32 in group C. The mean ± SD number of pontine artery (PA) was found 5.11 ± 1.08 in group A, 5.21 ± 1.14 in group B & 4.80 ± 1.23 in group C. The mean ± SD number of superior cerebellar artery (SCA) was 2.00±0.00 in group A, 2.10 ± 0.30 in group B, & 2.10 ± 0.32 in group C. The mean ± SD number of posterior cerebral artery (PCA) was 2.00 ± 0.00 in group A, 2.00 ± 0.00 in group B & 2.00 ± 0.00 in group C.*

Conclusion: *Statistically non-significant variation was found in the number of different branches of basilar artery in relation to different age group.*

Key Word: *Basilar artery, anterior inferior cerebellar, labyrinthine, pontine, superior cerebellar, posterior cerebral artery*

Introduction

Basilar artery is one of the main arteries that supplies the posterior portion of brain; the area supplied by basilar artery is also called posterior cerebral circulation.[1] Basilar artery is the most important artery in the posterior circulation.[2] Basilar artery is formed by the union of right and left vertebral arteries at the lower border of the pons or mid medullary level.[1,3,4] It courses upwards along 'basilar groove' on the anterior surface of the pons, and ends at the upper border of pons by bifurcating into two posterior cerebral arteries.[5] The posterior cerebral artery, branch of basilar artery completes an arterial polygon called the 'circle of Willis', which is the principal arterial anastomotic trunk of brain.[1] If one major vessel of it is occluded then communicating arteries may allow critically important anastomotic flow and prevent neurological damage.[6] The most frequent

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and severe atherosclerotic (degenerative proliferative) change occur in upper and lower part of basilar artery and in the first part of the posterior cerebral artery. Anatomical variation occasionally occurs in basilar artery and its branches. Most frequent anatomical variation of basilar artery is short segments of duplication or island formation. The superior cerebellar artery may be multiple.[7] Aneurysm often develops at the site of branching of basilar artery and near the arterial circle and they can rupture or leak causing subarachnoid hemorrhage.[8] Cerebrovascular disease was found 22% in the year 2004 in Mymensingh Medical College Hospital.[9] Structures commonly affected by basilar artery infraction are the brain stem and cerebellum. Basilar artery related clinical condition such as posterior circulation stroke, migraine, aneurysm atherosclerotic changes are very common throughout the world. The knowledge of anatomy of the basilar artery and its branches in Bangladeshi people is necessary for proper diagnosis and treatment of cerebrovascular disease, aneurysm, tumour, epilepsy, migraine and other form of vascular anomalies.

Materials and Methods

This study was carried out in the department of Anatomy, Dhaka Medical College, Dhaka, Bangladesh, from January 2010 to December 2010. Seventy post mortem basilar arteries of different age groups were collected from unclaimed dead bodies that were under examination in the morgue of department of Forensic medicine, Dhaka Medical College. During collection of the samples appropriate age, sex and the cause of death were noted from morgue's record book and the samples were tagged bearing code numbers for subsequent identification. The whole brains were collected within 24-36 hours of death. Soon after collection, each specimen was gently washed with tap water on a dissection tray. Blood and blood clots were removed. 100ml of 40% formaldehyde solution was injected by using a 50cc syringe into the brains through the surfaces (superolateral and inferior surfaces) & were preserved in 40% formaldehyde solution for 15 days. After 15 days the present study was done with those fixed specimens.

Grouping of the samples: The collected samples were divided into three groups according to Khalil.[10]

Table- I

Grouping of the sample of the present study (n = 70).

Group	Age limit	Number of samples
A	16-30years	18
B	31-45 years	42
C	46- 60 years	10

Observation of number of branches of basilar artery

Formalin fixed brain was washed with plain tap water to remove excess formalin and was kept on metallic tray. The basilar artery and its branches along with right and left vertebral arteries were collected by the following steps. The base of the brain along with brain stem of each specimen was cleaned. Basilar artery with its branches and vertebral artery were identified. Arachnoid mater was removed from artery and area around it to observe the basilar artery more accurately. The moisture over the arteries was removed by using filter paper. The arteries were painted with red enamel paint for better visualization of branches. The number of different branches were noted and finally photographed by a digital camera.

Ethical clearance

The study was approved by the Ethical Review Committee (ERC) of Dhaka Medical College, Dhaka.

Results

Table – II

Number of different branches of basilar artery in different age groups

Age groups	AICA (Mean±SD) (Range)	LA (Mean±SD) (Range)	PA (Mean±SD) (Range)	SCA (Mean±SD) (Range)	PCA (Mean±SD) (Range)
A	1.94±0.24	1.67±0.59	5.11±1.08	2.00±0.00	2.00±0.00
(n=18)	(1.00-2.00)	(0.00-2.00)	(3.00-7.00)	(2.00-2.00)	(2.00-2.00)
B	1.95±0.31	1.74±0.54	5.21±1.14	2.10±0.30	2.00±0.00
(n=42)	(0.00-2.00)	(0.00-2.00)	(3.00-8.00)	(2.00-3.00)	(2.00-2.00)
C	2.00±0.00	1.90±0.32	4.80±1.23	2.10±0.32	2.00±0.00
(n=10)	(2.00-2.00)	(1.00-2.00)	(3.00-7.00)	(2.00-3.00)	(2.00-2.00)
	P value	*P value*	*P value*	*P value*	*P value*
A vs B	$>0.50^{ns}$	$>0.50^{ns}$	$>0.50^{ns}$	$>0.10^{ns}$	$>0.50^{ns}$
A vs C	$>0.50^{ns}$	$>0.10^{ns}$	$>0.10^{ns}$	$>0.10^{ns}$	$>0.50^{ns}$
B vs C	$>0.50^{ns}$	$>0.10^{ns}$	$>0.10^{ns}$	$>0.50^{ns}$	$>0.50^{ns}$

AICA = Anterior inferior cerebellar artery SCA = Superior cerebral artery
LA = Labyrinthine artery PCA = Posterior cerebral artery
PA = Pontine artery
Figures in parentheses indicate range.
Comparison between age groups done by One way ANOVA (PostHoc), ns = not significant
Group A : Age 16 30 years
Group B : Age 31 45 years
Group C : Age 46 60 years

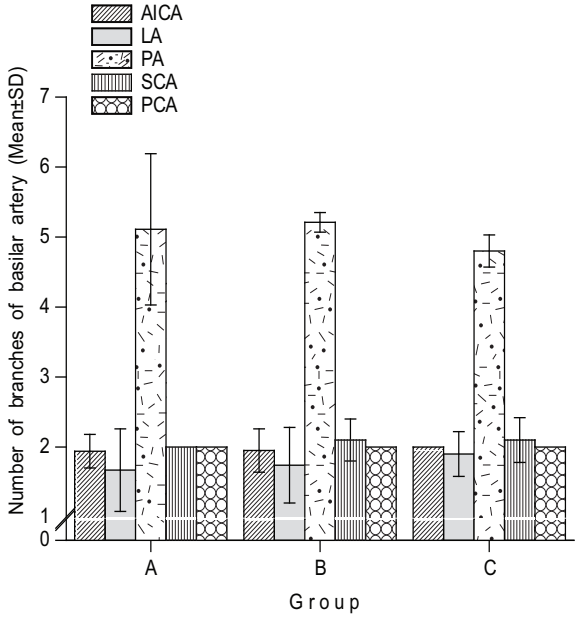

Fig.-1: Number of branches of basilar artery in different age groups

During observation it was found that some specimens did not have all the branches of basilar artery in both sides. AICA was found absent in one side in one of the specimens of both group A and group B.

LA was found absent in one side in four, seven and one specimens in group A, group B and group C respectively.

Discussion:

The mean ± SD number of anterior inferior cerebellar artery (AICA) was found 1.94 ± 0.24 in group A, 1.95 ± 0.31 in group B & 2.00 ± 0.00 in group C. The mean ± SD number of labyrinthine artery (LA) was found 1.67 ± 0.59 in group A, 1.74 ± 0.54 in group B & 1.90 ± 0.32 in group C. The mean ± SD number of pontine artery (PA) was 5.11 ± 1.08 in group A, 5.21 ± 1.14 in group B & 4.80 ± 1.23 in group C. The mean ± SD number of superior cerebellar artery (SCA) was 2.00 ± 0.00 in group

A, 2.10 ± 0.30 in group B, 2.10 ± 0.32 in group C. The mean ± SD number of posterior cerebral artery (PCA) was 2.00 ± 0.00 in group A 2.00 ± 0.00 in group B & 2.00 ± 0.00 in group C. Number of different branches of basilar artery were found similar to the findings of Barcovitz and Moxham.[7]

Conclusion:

In the present study, statistically non-significant variation was found in the number of different branches of basilar artery in relation to different age group. Moreover, it was found out that some branches of basilar artery were absent in one side in different age group. Further studies to find out the cause and functional / clinical correlations of this variation are recommended.

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