

## Morphometric Study of Posterior Horn of Lateral Ventricle by Computerised Tomography and Dissection Method

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### Abstract

*Aims and Objectives:* To analyze morphometrically the length of posterior horn of normal lateral ventricle of human brain and to study, if any, sex difference and/ or side difference in the length. *Material and Methods:* Five hundred (500) normal CT scans of patients in the age group of 20-79 years were taken. The study group included 250 males and 250 females. Length of posterior horn of right lateral ventricle in millimeters were taken from trigone to the end of posterior horn on both sides. *Results:* The data analysis showed that the length of posterior horns were found to be more in males and on left side. *Conclusion:* The present study defined the length of posterior horn of lateral ventricles of brain by CT which could have clinical correlations in diagnosis, treatment and management of neurological conditions.

**Keywords:** Posterior Horn; Lateral Ventricle.

### Introduction

The ventricular system of brain consists of two lateral ventricles, midline third and fourth ventricles connected by interventricular foramen of monro and aqueduct of sylvius respectively. The lateral ventricles are located in the cerebrum, the third ventricle in the diencephalon of the forebrain between the right and left thalamus; and the fourth at the back of the pons and upper half of medulla oblongata of the hindbrain [2]. Morphometric studies of lateral ventricles have been the focus by many scholars recently due to its relation with pathologies evidences such as hydrocephalus, schizophrenia, tumors, trauma... etc., as well as gender and aging which could lead to dementia and or brain geriatric [3]. The posterior horn of the lateral ventricle is usually diamond shaped or square in outline and it has been often observed that the two ventricles may be asymmetrical [1]. The ventricles

of the brain are well visualized, and their overall configuration can be reconstructed from a series of contiguous slices [4]. The evaluation of the normal measurements of the cerebral ventricles in the living human has great importance in the diagnosis and monitoring of several pathologies [5]. Computerised Axial tomography is a safe non-invasive technique which utilizes X-rays. It is developed by Hounsfield GN and provides images of transverse slices of brain with or without the use of contrast media [6].

Gross anatomy of cerebral ventricles can also be studied either by dissection or making casts of ventricular system of human cadaveric brain [7]. Understanding the normal and abnormal anatomy of the ventricular system of the brain is helpful for clinicians, neurosurgeons and radiologists in day-to-day practice [8]. Very few such anatomical studies of ventricular system has been done so far. The present work was undertaken to study the posterior horn of lateral ventricles of brain, both by CT scan and dissection method.

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Received | 28.07.2017, Accepted | 01.09.2017

### Materials and Methods

Data for the present study was collected from the CT scans performed in the Department of Radiology, Government Medical College and

Hospital, Aurangabad. CT scans reported as normal by radiologists were selected. Five hundred (500) normal CT scans of patients in the age group of 20-79 years were taken. The study group included 250 males and 250 females.

Twenty-five (25) brain specimens were obtained from the cadavers belonging to the Department of Anatomy, Government Medical College Aurangabad.

#### Inclusion Criteria

CT scans of patients between 20-79 years age group with normal radiological findings.

- Dissected brain specimens without any visible gross abnormality .

#### Exclusion Criteria

CT scans of patients, with history of head injuries, previous intracranial surgeries or showing local mass lesion or cerebral infarctions.

- Dissected brain specimens with history of head injuries, local mass lesions and cerebral infarctions .

1. *For Dissection:* Each brain was divided in the midsagittal plane. The arachnoid and pia mater were removed carefully. A parasagittal section was taken about 2cm lateral to the midsagittal plain, to measure the length of posterior horn from the centre of trigone (Trigone is a point where posterior horn, inferior horn and body meet).



Fig. 1: Measuring length of posterior horn from trigone to the end of posterior horn

Two needles were placed, one at trigone (4), another at end of posterior horn (5). The length of the posterior horn was measured from trigone (4) to the end of posterior horn (5) on both sides.

*For CT scan:* The computerised tomography films were taken and measurements were taken at the level above the interventricular foramen of Monro. Length of posterior horn of right and left lateral ventricles in millimeter were taken from collateral trigone/atrium to tip of the posterior horn.

## Observation and Results

### Length of Posterior Horn

#### By CT Scan

The mean length of posterior horn in male was found to be 26.9 mm and 28.4 mm on right and left sides respectively. While in female it was found to be 25.2 mm and 26.8 mm on right and left sides respectively (Table 1). Though the mean length of posterior horn was found to be more in males than in females and more on left side as compared to the right side, the differences were not statistically significant.

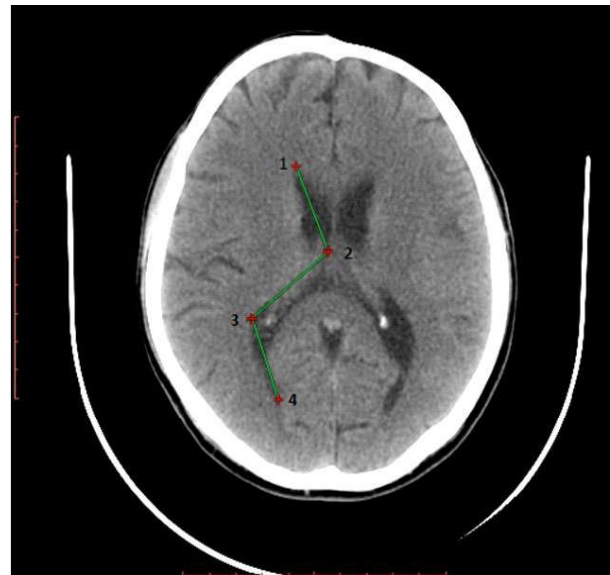


Fig. 2: CT scan at the level of interventricular foramen showing parts of lateral ventricle  
3-4: Length of Posterior horn of Lateral ventricle

Table 1: Showing genderwise mean length and standard deviation of posterior horn on right and left sides

Side	Male(250)		Sex	Female(250)	
	Mean(mm)	SD		Mean(mm)	SD
Right	26.9	1.6		25.2	1.4
Left	28.4	1.5		26.8	1.4

Age wise analysis showed that mean length of the posterior horn to increased in the age group of 50-59 yr and 60-69 yr, while it decreases in the age group of 70-79 yr (Table 2). The mean length of left posterior horn was more as compared to that on right side and length of both left and right posterior horn showed variation with increasing age. However no statistically significant difference was found. (p>0.05) (Table 2.1).

*By Dissection Method*

In present study, the mean length of posterior horn in male was found to be 22.8 mm and 23.7

mm on right and left sides respectively. While in female it was found to be 20.1 mm and 22.8 mm on right and left sides respectively. Though the mean length of posterior horn was more in males as compared to that in females and more on left side as compared to that on right side, the differences were not statistically significant (Table 3).

*Comparison of Length of Posterior Horn Taken By CT and Dissection Method*

The mean length of posterior horn by CT scan was found to be 26.1 mm and 27.6 mm on right and left sides respectively while by dissection

**Table 2:** Showing mean length and standard deviation of posterior horn on right and left sides in various age groups by ct scan

Parameter Side Age group	Posterior Horn			
	Right(500)		Left(500)	
	Mean(mm)	Standard Deviation	Mean(mm)	Standard Deviation
20 to 29	26.1	1.69	26.1	1.69
30 to 39	25.9	1.75	25.8	1.75
40 to 49	26	1.88	25.9	1.88
50 to 59	26.4	1.69	26.4	1.69
60 to 69	26.3	1.72	26.3	1.72
70 to 79	26.2	1.47	26.2	1.47

**Table 2.1:** Showing anova test for posterior horn on right and left sides

		Anova				
		Sum of Squares	Degree of freedom (DF)	Mean Square	F Value	P Value
Right Post Horn (mm)	Between Groups	15.46	6	2.6	0.817	0.557
	Within Groups	1555.56	493	3.2	0.870	0.500
	Total	1571.03	499	5.8	0.168	1.057
Left Post Horn (mm)	Between Groups	31.30	6	5.2	1.849	0.088
	Within Groups	1390.96	493	2.8	1.900	0.070
	Total	1422.27	499	7.1	3.749	0.158

**Table 3:** Showing genderwise mean length and standard deviation of posterior horn on right and left sides

	Sex			
	Male(10)		Female(15)	
	Mean(mm)	SD	Mean(mm)	SD
Right	22.8	6.1	20.0	3.5
Left	23.7	7.1	22.8	3.2

**Table 4:** Comparison of length of posterior horn of the lateral ventricle by ct and dissection method

	CT Scan(500)			Dissection (25)		
	Mean (mm)	SD	P- value	Mean	SD	P-value
Right	26.1	1.81	0.001	21.2	4.83	0.001
Left	27.6	1.49	0.001	23.1	5.02	0.001

**Table 5:** Showing comparison of the length of posterior horn

Parameter	Torkildsen study				Present study			
	Cast method (11)		Ventriculogram (13)		Dissection method (25)		CT method (500)	
	Right	Left	Right	Left	Right	Left	Right	Left
Mean length of posterior horn (mm)	14.5	13.9	11	9	21.1	23.1	26	27.6
Range (mm)	0-36	0-36	0-25	0-30	12-32	10-30	21-33	23-32

method it was found to be 21.2 mm and 23.1 mm on right and left sides respectively. A statistically significant difference ( $p=0.001$ ) was observed when the measurements obtained by CT and dissection method were compared (Table 4).

## Discussion

### *Length of Posterior Horn*

#### • *By Ct Scan*

In present study, the mean length of posterior horn in males was found to be 26.9 mm and 28.4 mm on right and left sides respectively. While in females it was found to be 25.2 mm and 26.8 mm on right and left sides respectively. The mean length of posterior horn was found to be more in males as compared to females and also more on the left side as compared to the right side.

#### • *By Dissection*

In present study, the mean length of posterior horn in male was found to be 22.8 mm and 23.7 mm on right and left sides respectively. While in female it was found to be 20.1 mm and 22.8 mm on right and left sides respectively. The mean length of posterior horn was found to be more in males as compared to females and also more on the left side as compared to the right side.

Torkildsen in his study conducted in 1934, found the mean length of posterior horn to be 14.5mm and 13.9mm on right and left sides respectively by Cast method where as by Ventriculogram it was found to be 11mm and 9mm on right and left sides respectively [7].

The finding obtained by Torkildsen did not correlate with the findings of present study possibly because the paraffin which was used to make cast has a tendency to shrink when solidified, while incomplete filling of posterior horn with air occurs in ventriculogram.

## Conclusion

The present study defined morphometric measurements of posterior horn of lateral ventricles of brain by both CT and dissection method. The findings of study could have clinical correlations in diagnosis, treatment and management of neurological conditions.

Differences were observed between the mean lengths of posterior horn on right and left sides and also between males and females. The length was more in males and on left side by both CT and Dissection methods, but the differences were not statistically significant. Age wise analysis showed the mean length of posterior horn to increase in the age group of 50-59 years and 60-69 years with a decrease in age group of 70-79 years on right and left sides by CT Scan, but there was no statistically significant difference between any age group. However a statistically significant difference was observed, when we compared the results of CT and dissection measurements.

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