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Morphological variation in structurespassing from jugular foramen in human skulls of West India

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ABSTRACT:

Introduction:

The knowledge of Jugular foramen is important to neurosurgeons while performingsurgeries related to Jugular foramen because, in case of tumor invasion, all structures are not clearly seenand hence correct knowledge is required when approachingsuch tumors or other related diseases. The diameters of Jugular foramen are different in different sex, races, and age.

Objective:

This osteological study was to provide complete knowledge of Jugular foramen in Indian population with some other characteristics like dome and separation in Jugular foramen.

Material and Methods:

68 skulls were obtained from anatomy department, NHLMMC and BJMC. Anteroposterior and transverse diameter of jugular foramen was measured using vernier calipers. The presence of dome shaped bony roof and septa was observed using magnifying glass.We did not include bones with broken or damaged Jugular foramen.

Results:

We found dome in 4 skulls on right side and in 1 skull on left side.Separationwas found complete in 11 skulls, partial in 81 skulls and absent in 44 skulls. In 55.8%, size of the foramen was greater on right side than left. Average anteroposterior diameter was0.82cm and average transverse diameter was 1.10 cm.

Keywords: Skull, Jugular Foramen

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INTRODUCTION

Jugular foramen is one of the important foramen of the skull. Looking at its surgical importance and its relations to important structures such as the carotid artery anteriorly, facial nerve laterally, hypoglossal nerve medially and vertebral artery inferiorly, all of which are in the way so they can block access to the foramen and require careful management.

For the study of Jugular foramen, its precise location, variations in size and shape even at two sides of the cranium, from its intracranial and extracranial end in the same foramen is needed. Also, study of measurement of jugular foramen is required because of its complex irregular shape, its curved course, its formation by two bones, numerous nerves and venous channels that pass through it[1]. Its variation in size and shape in different race and sex has been reported [6].

In different tumors such as glioma, schwannomas, metastatic lesions, infiltratory and inflammatory lesions may produce variation in size and shape. Therefore, detailed study of morphology of jugular foramen is required.

MATERIAL AND METHOD

Analysis of 68 human skulls was carried out. Skulls were obtained from anatomy department, NHLMMC and BJMC. Anteroposterior and transverse diameter of jugular foramen was measured using vernier calipers. The presence of dome shaped bony roof and septa was observed using magnifying glass.

RESULTS

Jugular foramen was examined with respect to size, presence of doomed bony roof and bony septation. In 69 skullsPresence of dome was found bilaterally in 58, only on left in 5, only on right in 4 and absent in 1.

I. **Presence of Dome**

	Bilateral	Left side	Right side	Absent
No	58	5	4	1
Percentage	85.2%	7.3%	5.8%	1.4%

II. Size of foramen

	R>L	R=L	R<L
No	38	18	12
Percentage	55.8%	26.4%	17.6%

The right side was found larger than left in 38 skulls, both were found equal in 18 and left was larger than right in 12.

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III. Diameter(in cm)

	Right	Left	Both Average
Antero/Posterior	0.79	0.86	0.82
Transverse	1.02	1.19	1.10

IV. Separation of compartment

	Complete		Partial		Absent	
	R	**L**	**R**	**L**	**R**	**L**
No	5	6	41	40	22	22
Percentage	7.3%	8.8%	60.2%	58.8%	32.3%	32.3%

Complete separation on right was found in 5 skulls, on left in 6 skulls, partial separation on right was found in 41 skulls, on left in 40skulls and separation was absent on both right and left in 22 skulls.

DISCUSSION

In Hatiboglu(1991), dome was present bilaterally in 147 skulls (49 %), unilaterally on the right in 108(36.6%) and unilaterally on the left in 14 (4.6%). A domed roof was not found in the remaining 31 skulls (10.3%) [1].

In Hussain(2012), dome was present bilaterally in all 55 skulls [3].

In the present study, dome was found bilaterally in 58 skulls, only on right side in 4skulls, only on left side in 5 skulls and absent in 1 skull.

In Hatiboglu, in 185 skulls (61.6%) the right jugular foramen was larger and in 78(26 %) the left was larger, in 37 casesthe right and left were almost the same size [1].

In Sturrock (1998), the rightside was greater in 107 skulls, left side was greater in 36 skulls,and both are equal in 13[5].

In Hussain (2012), the right side was greater in 32 skulls, left side was greater in 12 skulls,and both were equal in 11skulls [2].

In the present study, 38 had larger right foramen, 18 had equal foramen on both sides and 12 had larger left foramen.

In the present study, the anteroposterior diameter on right side was 0.79 cm and on left side was 0.86 cm and transversediameteron right side was 1.02 cm and on leftside was 1.19 cm.

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Sturrock R.R observed complete separation on right side in 3.2%, left side in 3.2% and partial separation on the right side in 1.3% and on left side in 10.9% [5].

Hatiboglu observed complete separation on the right side in 5.6%, on the left side in 4.3% and partial separation on the right side in 2.6%, on the left side in 19.6% [1][4].

In Hussain (2010), Complete or partial separation or non-separation of compartments of jugular foramina were observed as follows: Complete separation was present in 26(20.8%) on the right side and 21(16.8%) on the left side. Partial separation was present in 57(45.6%) on the right side and in 73(58.4%) on the left side. No separation was present in 42 (33.6%) on the right side and in 31(24.8%) on the left side [4].

In the present study, complete septa on right side were observed in 7.3%, on left side in 8.8%, partial septa on right side in 60.2% and on left side in 88.8%.

CONCLUSION

In the present study we found morphological variation in shape and size of Jugular foramen as in other studies. These have surgical influences and will be helpful to the surgeons for assessment of jugular foramen.

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