THE JUGULAR FORAMEN: COMPARTMENTALISATION

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ABSTRACT

The study was designed to measure the diameters of jugular foramen and correlates the measurements with clinical importance. The bony bridging of the jugular foramen is established by the contact of the intrajugular process of the temporal bone with the bony process of the occipital bone projecting either from just above the hypoglossal canal or from posterior to the hypoglossal canal. If both the processes of the occipital bone reach the intrajugular process of the temporal bone simultaneously, it is divided into three compartments. As observed during the study, a lot of variation in measurements of jugular foramen was seen. Even among Indians there was difference noted, so the operating surgeon should keep in mind the differences in measurements.

KEYWORDS

Jugular Foramen, Diameters, Skull Base.

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INTRODUCTION

The skull base is a platform at the bottom of the cranium that cradles the brain, provides support, protection and serves as the entrance and exit for major vascular and neural structures.^[1]

One of the important foramen in the norma basalis is jugular foramen, which is the main route of venous outflow from the skull and is characterized by laterality based on the predominance of one of the sides. Ligat of the IJV is sometimes performed during radical neck dissection with the risk of various interaction, which some adduce to be due to ligation of the dominant IJV.^[2]

Advancements in microsurgical techniques have made possible the removal of advanced jugular foramen lesions, which were one assumed to be inoperable. As neurosurgeons become bolder in approaching this region, so the need for familiarity with the detailed anatomy of this region becomes greater. The difficulties in exposing this foramen are created by its deep location and the surrounding vital structures, such as the carotid artery anteriorly, the hypoglossal nerve medially, the facial nerve laterally and the vertebral artery inferiorly. All these important structures require careful dissection during access to this foramen.^[3]

Modern surgical procedure, anaesthesia as well as acupuncture practice require more precise understanding of the surrounding anatomy of various foramina.^[4] Many important nerves and vessels pass in and out of the skull via openings termed foramina.^[5] Recent advances in CT have produced a growing need for precise information about optimal scanning positions for examining the morphological and metrical details of the foramina and canals in the base of the skull. Knowledge of the normal and variant positions of the canals and foramina of the skull base is important for radiologists, neurosurgeons and anatomists, because of the increasingly refined techniques available.^[6]

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MATERIALS AND METHODS

Thirty human skulls available in the Department of Anatomy, Dayanand Medical College and Hospital, Ludhiana, were studied after approval of Hospital Ethics Committee. All the skulls selected were dry, complete and showed normal anatomical features. Skulls showing pathological changes, evidence of any previous trauma or skeletal disorders were excluded from this study.

RESULTS

Parameter	Side	Mean	SD	Range	SEM
MAPD	R	18.61	2.43	13.14-24.12	0.44
	L	17.76	2.2	13.22-23.90	0.40
MTD	R	11.38	1.85	8.18-15.10	0.34
	L	9.99	1.76	6.36-14.52	0.32

Table 1: Measurements of Jugular Foramen (In mm)

Range of MAPD of Jugular Foramen	Right		Left	
	No. of Specimens	% Age of Specimens	No. of Specimens	% Age of Specimens
12.01-14.00	1	3.33	1	3.33
14.01-16.00	3	10	4	13.33
16.01-18.00	6	20	10	33.33
18.01-20.00	11	36.67	12	40
20.01-22.00	7	23.33	2	6.67
22.01-24.00	-	-	1	3.33
24.01-26.00	2	6.67	-	-
Total	30	100	30	100

Table 2: Distribution of Range of MAPD of Jugular Foramen (In mm)

Maximum number of cases in each part is highlighted.

Range of MTD of Jugular Foramen	Right		Left	
	No. of Specimens	% Age of Specimens	No. of Specimens	% Age of Specimens
6.01-8.00	-	-	2	6.67
8.01-10.00	6	20	14	46.67
10.01-12.00	10	33.33	10	33.33
12.01-14.00	11	36.67	3	10
14.01-16.00	3	10	1	3.33
Total	30	100	30	100

Table 3: Distribution of Range of MTD of Jugular Foramen (In mm)

Maximum number of cases in each part is highlighted.

JF DOME		Right		Left	
		No. of specimen	% Age of specimen	No. of specimen	% Age of specimen
	Absent	10	33.33	16	53.33
	Present	20	66.67	14	46.67

Table 4: Presence or Absence of Jugular Foramen Dome

Maximum number of cases in each part is highlighted.

Parameter		Right		Left	
Septation		No. of Specimen	% Age of Specimen	No. of Specimen	%age of Specimen
	Absent	17	56.67	16	53.33
	Partial septation	13	43.33	13	43.33
	Complete septation	0	0	1	3.33

Table 5: Presence or Absence of Jugular Foramen Septation

Maximum number of cases in each part is highlighted.

R=L		R>L		L>R	
No. of Specimen	% of Specimen	No. of Specimen	% of Specimen	No. of Specimen	% of Specimen
4	-13.33	18	60	8	26.67

Table 6: Showing Symmetry of Jugular Foramen

Maximum number of cases in each part is highlighted.

Para-meter	Shape	Right		Left	
		No. of Specimen	% Age of Specimen	No. of Specimen	% age of Specimen
JF	Circular	1	3.33	-	-
	Ovale	4	13.33	3	10
	Elongated ovale	2	6.67	3	10
	Irregular	23	76.67	24	80

Table 7: Shape of Jugular Foramen

Maximum number of cases in each part is highlighted.

DISCUSSION

1. MAPD of JF in our study is 18.61 ± 2.43 mm (Range 13.14-24.12 mm) on right side and $17.76 \pm 2.20 \pm 2.20$ mm (Range 13.22-23.90 mm) on left side. Higher results as compared to others. [7,8]
2. MTD of Jugular Foramen in our study is 11.38 ± 1.85 mm (Range 8.18-15.10 mm) on right side and 9.99 ± 1.76 mm (Range 6.36-14.52 mm) on left side. MTD lower as compared to previous studies. [9,10]
3. Septa within some rare difference exists. [11,12,13]
4. Jugular foramen dome variation is due to the dissimilarity in the racial and the geographical source of study material.
Dominance 01 - RT sided 14.60. [14,15]

SUMMARY

Abnormal enlargement of jugular foramen is seen in glomus jugulare tumour, metastatic tumour, reticulo endo helices and

neuronal of IX, X, XI cranial nerves. A lot of variation in measurements of JF were seen. Even among Indians there was difference noted, so the operating surgeon should keep in mind the differences in measurements.

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