A Morphometric Study of Foramen Ovale and Foramen Spinosum in Dried Indian Human Skulls

Kulkarni Saurabh P.[1], Nikade Vrushali V.[2]

[1]Assistant Professor, Department of Anatomy, Government Medical College, Aurangabad, Maharashtra, INDIA.

[2]Assistant Professor, Department of Anatomy, T. N. Medical College and B. Y. L. Nair Hospital, Mumbai, Maharashtra, INDIA.

[*]Corresponding Addess:

spk2184@gmail.com

Research Article

Abstract: **(a) Background and aims**: Variations of Skull base foramina are always found to be associated with vascular and nervous malformations as implicated by various clinical symptoms. **(b) Materials and Methods**: This study measured dimensions of important of those i.e. foramen ovale and foramen spinosum in 100 Indian human skulls and data compared with the similar studies with racial differences. **(c) Results**: Foramen ovale was always complete and common measurements were 7mm in length and 4mm in breadth. One case showed its length 14mm. one showed abnormal bony bar dividing it into two. Foramen spinosum was found with variable dimensions. It was absent in 2 cases on right side and 3 cases on left. Some cases showed it divided or incomplete. **(d) Conclusion**: This study carries anthropometric significance for racial variations. It may help in radiologists, distinguishing abnormal bony growth at skull base. Medically cause of trigeminal neuralgia may correlate with abnormalities of these foramina.

Introduction

Foramina ovale and spinosum are important openings on the infratemporal surface of the greater wing of the sphenoid bone. Variations in number, size, symmetry leads to vascular compromise. Early division of the middle meningeal artery into an anterior and posterior division may result in the duplication of the foramen spinosum. Wood-Jones found the foramen spinosum to be more or less incomplete. The region of the foramen ovale was found in some cases to be covered by an osseous lamina, which was continuous with the lateral pterygoid plate and thus formed a wall of an apparent canal, which opened on the lateral side of the pterygoid process.

Aim and Objectives

- Determining the exact range of measurements i.e.anteroposterior (length) and transverse (breadth) of the foramina ovale and spinosum
- Determination of asymmetry
- Determination of inequality

Material and Methods

Study conducted on 100 skulls with Dividers and Meter Rule. Measurements of the foramina ovale and spinosum will be taken by placing a pair of dividers on the anteroposterior (length) and transverse (width) diameters of the foramina and then carefully transferring to a meter rule for the readings. Results compared and data analyzed statistically.

Results

Table 1: Length of Foramen Ovale

Frequncy (mm)	Right	Left
5	3	3
5.5	6	2
6	23	24
6.5	14	13
7	32	33
7.5	4	3
8	8	11
8.5	1	0
9	4	5
14	0	1

Table 2: Length of Foramen Spinosum

Frequency (mm)	Right	Left
2	29	33
2.5	30	9
3	30	30
3.5	7	8
4	7	10
AB	2	3
DIV	0	1

AB – Absent
DIV - Divided

Table 3: Breadth of Foramen Ovale

Frequency (mm)	Right	Left
2.5	5	0
3	5	3
3.5	12	7
4	45	53
4.5	10	14
5	11	14
5.5	3	1

Table 4: Breadth of Foramen Spinosum

Frequency (mm)	Right	Left
1	3	5
1.5	19	23
2	26	19
3	26	27
3.5	4	4
AB	2	3
IC	5	5

AB- ABSENT
IC - INCOMPLETE

Discussion

Maximal length of foramen ovale was 9mm and minimal length was 5mm which is comparable with study of Arun et al from Nepal. 31% foramina ovale had length 7mm, which is comparable with studies of Lang et al and Yanagi separately. 49% foramina ovale had breadth 4mm. In one case foramen ovale was absent on right side. Shapes of foramina ovale varied, few had very thick walls. One was divided by bony spur into two. Statistical analysis revealed that there was no significant difference between the means of lengths and widths of both right and left sides of foramina ovale. Length of foramen spinosum was ranging from 2 to 4 mm (maximum no. i.e. 30%) with 3mm, in similar study on Nigerian skulls by Osunwoke et al it was ranging from 1 to 4mm. Study by Lang et al shows this range as 1.5 to 2.1 mm. Foramen spinosum was absent in 2 cases on right and in 3 cases on left. 54% cases foramen spinosum had breadth 3mm, which means in our study foramen spinosum was round, whereas Nigerian study notes asymmetry in shape and sides. While measuring breadth foramen spinosum was incomplete in 5 cases of either side. Only one foramen spinosum was divided by bony spur into two. Statistical analysis revealed that there was no significant difference between the means of lengths and widths of both right and left sides of foramina spinosum.

The range of measurements of foramina ovale and spinosum of Indian skulls, when compared with results of Nigerian study, are not at significant variance.

Conclusions

- Knowledge of variations of foramina ovale and spinosum will help in distinguishing potentially abnormal foramina from normal during computed tomography and magnetic resonance imaging.
- This study is of clinical and anatomical significance for treating trigeminal neuralgia and diagnosing tumors and abnormal bony growth in this region.

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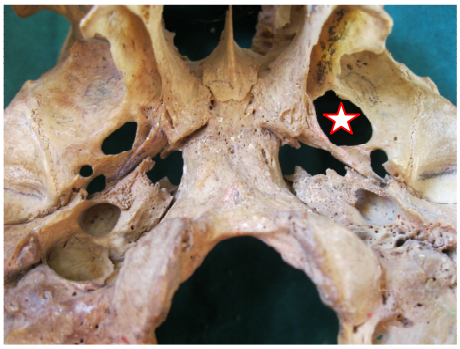

Asymmetrical Foramen Ovale

Abnormal Bony Bar Dividing Structures Passing Through Foramen Ovale