

Anatomical variations of foramen spinosum in South Indian dry skulls

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Abstract:

Foramen spinosum is an important opening on the infratemporal surface of the greater wing of the sphenoid bone and lies posterolateral to foramen ovale. It transmits the middle meningeal vessels and the nervous spinosus. The aim of the study was to determine the exact size of the foramen spinosum in 50 dry human skulls, on the extra cranial view and in the middle cranial fossa. The study was conducted on 50 dry human skulls of South Indian origin. The skulls used for the research belong to the department of Anatomy in Saveetha Dental College. The foramen were measured using a pair of dividers and a ruler. In our research the length of the foramina that were measured are as follows, , 88% of the foramen lying on the right side are of the sizes between 2.0 and 3.0mm. Whereas, only 12% of the foramen on the right side are of the sizes between 3.1 to 3.5mm.

76% of the foramen lying on the left side are of sizes between 2.0 and 3.0mm. And only 24% of the foramen lying on the left side are of sizes between 3.1 and 3.5mm. Only one foramen on the right side was of size 4.0 mm, while no foramen on the left side was 4.0 mm.

Keywords: Foramen spinosum, sphenoid bone, middle meningeal artery, middle meningeal vein.

I. INTRODUCTION:

Foramen spinosum is an important opening on the infratemporal surface of the greater wing of the sphenoid bone and lies posterolateral to foramen ovale. It transmits the middle meningeal vessels and the nervous spinosus . [1,3]. Developmental studies have shown that the perfect ring-shaped formation of the foramen spinosum is observed by the 8th month after birth and the latest by 7 years after birth. The foramen may be absent in which case the middle meningeal artery enters the cranial cavity through the foramen ovale, the foramen spinosum and ovale may be continuous and the foramen spinosum may be duplicated, the foramen spinosum may be more or less incomplete. The foramen spinosum was small or altogether absent, this is in case of when the middle meningeal artery arises from the ophthalmic artery,

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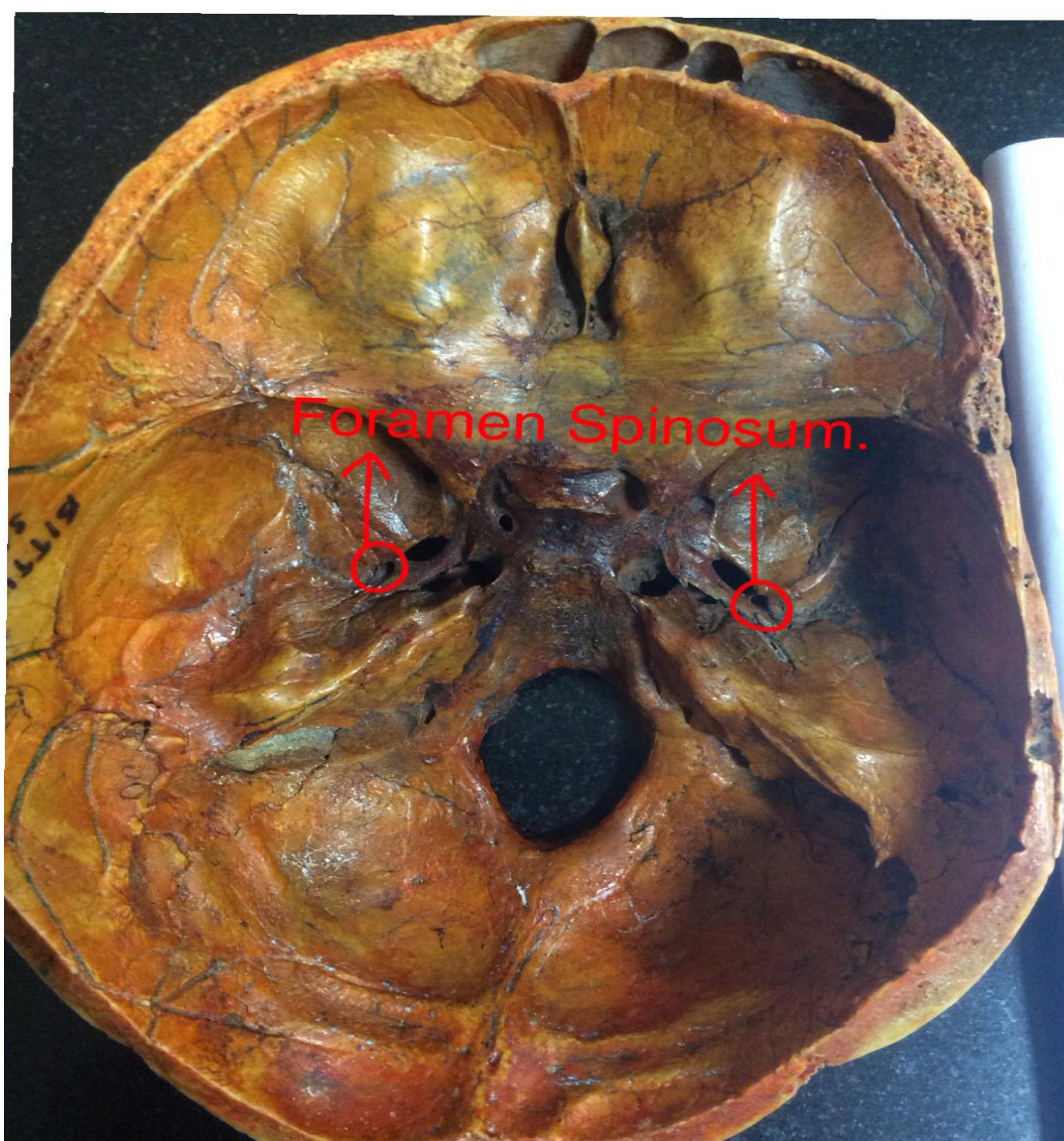
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in some cases early division of the middle meningeal artery into a posterior and anterior division may result in a duplication of the foramen spinosum [1]. In the newborn, the foramen spinosum is about 2.25 mm. The foramen is very small compared to foramen ovale and is usually round in shape. The study aims to determine the exact range of measurements including sizes, variations and asymmetry using 50 skulls of South Indian origin.

II. MATERIALS AND METHODS:

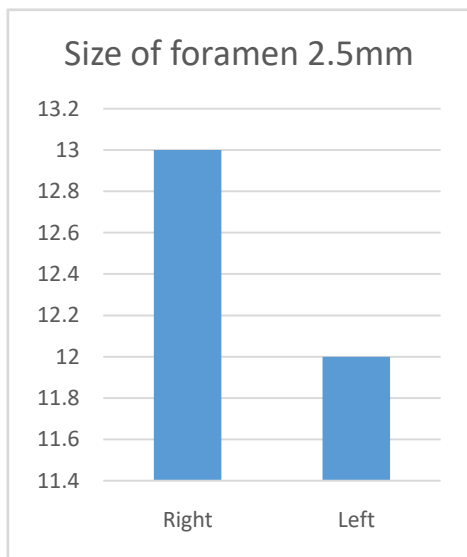
The study will be conducted on 50 dry human skulls of South Indian origin. The skulls used for the research belong to the department of Anatomy in Saveetha Dental College. The foramen were measured using a pair of dividers and a ruler.



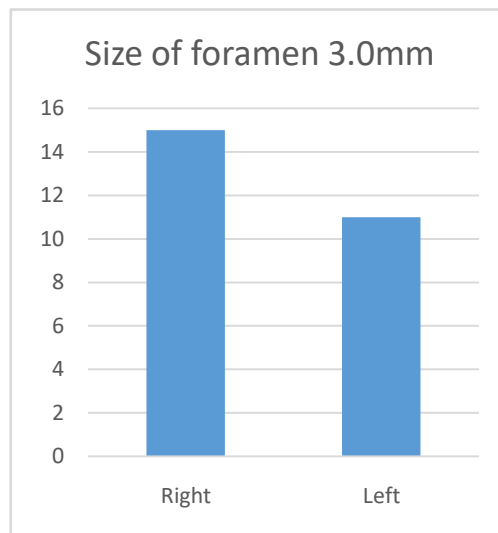
III. RESULT:

In our research the length of the foramina that were measured were as follows, , 88% of the foramen lying on the right side are of the sizes between 2.0 and 3.0mm.[Graph 1&2]. Whereas, only 12% of the foramen on the right side are of the sizes between 3.1 to 3.5mm. [Graph 3& Graph 4].

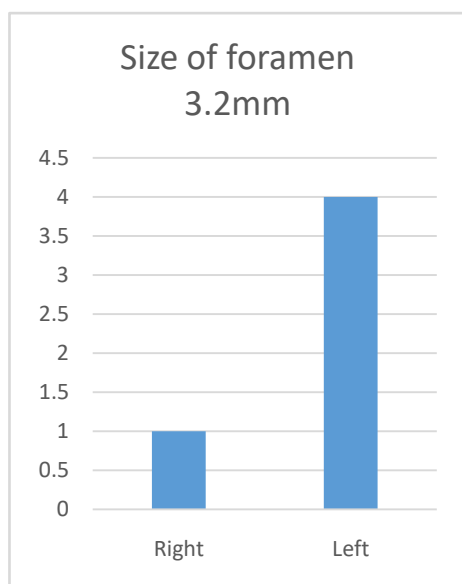
Graph:1.



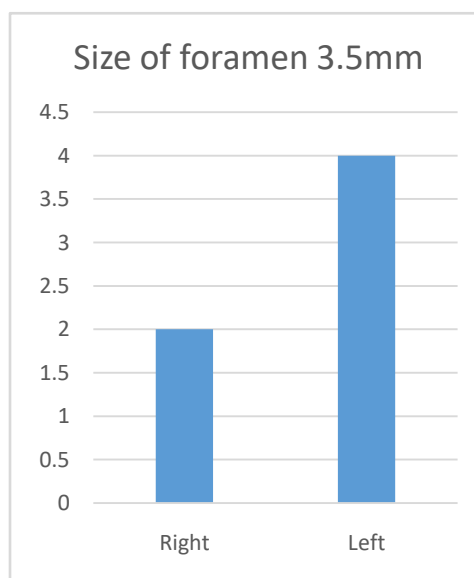
Graph:2



Graph:3.



Graph:4



76% of the foramen lying on the left side are of sizes between 2.0 and 3.0mm.[Graph1& Graph 2]. And only 24% of the foramen lying on the left side are of sizes between 3.1 and 3.5mm. [Graph 3&Graph 4]. Only one foramen on the right side was of size 4.0 mm, while no foramen on the left side was 4.0 mm.

IV. DISCUSSION:

The Foramen Spinosum is one of important foramina that lies in the greater wing of the sphenoid bone and provides communication between the infratemporal fossa and middle cranial fossa.[2,6]. The Foramen Spinosum also Transmits middle meningeal artery, it contains a venous component, the middle meningeal vein which connects the cavernous sinus with the pterygoid plexus, this is an important factor for clinical evaluation of radiological images of the diseased region.[3,7]. Different authors have been reported in their studies that the Foramen Spinosum was present in the human skulls at the percentage of 99.6%[4], 99.2%[5], and 98.5%[2].

In the present study considerable variations were seen in the anatomy of foramen spinosum. In this study the characteristics of the foramen spinosum was analyzed both from the extracranial view of the skull base and the middle cranial fossa. Our results show that, 88% of the foramen lying on the right side are of the sizes between 2.0 and 3.0mm. Whereas, only 12% of the foramen on the right side are of the sizes between 3.1 to 4.0mm.

76% of the foramen lying on the left side are of sizes between 2.0 and 3.0mm. And only 24% of the foramen lying on the left side are of sizes between 3.1 and 4.0mm. Only one foramen on the right side was of size 4.0 mm, while no foramen on the left side was 4.0 mm.

Similarly, in researches done by the other researchers the results were, as follows, The length of right and left foramen spinosum was 1.5 - 3.5mm and 1.0 - 4.0mm, respectively. The mean of the length of the right foramen spinosum was 2.34 ± 0.05 mm while that of the left was 2.36 ± 0.05 mm.[1,5]. The mean length of foramen spinosum in the dry skull was 3.31 ± 0.84 mm on left side and 3.73 ± 0.63 mm on right side.[2].

The maximum diameter of foramen spinosum was 2.92 ± 0.65 mm and 2.12 ± 0.45 mm was minimum.[3]. Length of foramen spinosum was ranging from 2 to 4 mm (maximum no. i.e. 30%) with 3mm. [4]. In a 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.[1,4,5].

V. CONCLUSION:

By identifying the variations in the Foramen Spinosum it is helpful in clinical and anatomical significance to medical practitioners in cases of trigeminal neuralgia and in diagnostic detection of tumors. And abnormal bony outgrowths that may lead to ischaemia, necrosis and possible paralysis of the parts of the body being supplied, drained or innervated by the contents of these foramina.

REFERENCE:

- 1) Osunwoke E.A, Mbadugha C.C, Orish C.N, Oghenemavwe E.L. and Ukah, A morphometric study of foramen ovale and foramen spinosum of the human sphenoid bone in the southern Nigerian population. *Elewa Biosciences*, 2010. 1321-25.
- 2) Nirupma Gupta, Rachna Rohatgi, Anatomical variations of Foramen Spinosum. *Innovative Journal of Medical and Health sciences*, 2012. 86-88.
- 3) S.D Desai, Hussain Saheb Shaik, Muralidhar P Shepur, Thomas ST, Mavishettar GF, Haseena S, Morphometric analysis of Foramen Spinosum in south Indian skulls. *Journal of pharmaceutical research and sciences*, Vol.4(12), 2012, 2022 - 2024.
- 4) Lanaprai Kwathai, Krisana Namonta, Thanaporn Rungruang, Vipavadee Chaisuksunt, Wandee Apinhasmit, Supin Chompoopong. Anatomic and Morphometric Consideration for External Landmarks of Foramen Spinosum in Thai Dry Skulls. *Siriraj Med Journal* .2012; 64;26-29.
- 5) Osunwoke EA, Mbadugha CC, Orish CN, Oghenemavwe EL, Ukah CJ. A morphometric study of foramen ovale and foramen spinosum of the human sphenoid bone in the southern Nigerian population. *J Appl Biosci*. 2010;26:1631-5.
- 6) Reymond J, Charuta A, Wysocki J. The morphology and morphometry of the foramina of the greater wing of the human sphenoid bone. *Folia Morphol (Warsz)*. 2005 Aug;64(3):188-93.
- 7) Wood-Jones F, 1931. The non-metrical morphological characters of the skull as criteria for racial diagnosis. par 1: General discussion of the morphological characters employed in racial diagnosis. *J. Anat*. 65: 179-495.
- 8) Ginsberg LE, Pruett SW, Chen MY, Elster AD. Skull-base foramina of the middle cranial fossa: reassessment of normal variation with highresolution CT. *Americal Journal of Neuroradiology*. 1994;15(2): 283–91.