

Morphometric Study Of Parietal Foramen In South Indian Skulls

Review Article

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Abstract

A morphometric study of parietal foramen was done in South Indian dry human skulls. A total 40 dry human adult aged skull of unknown sex were studied. A 0-150 mm digital electronic calliper was used for Morphometric measurements. The results were tabulated using Microsoft Excel. Results were tabulated using Microsoft excel. Charts for various types of parietal foramen such as unilateral, bilateral, triple foramen, or absent parietal foramen were obtained. This article throws light on the importance of parietal foramen. It is considered important as it traverses the loose areolar tissue of the scalp by parietal emissary veins. And these veins being valve less, help in spread of infection quite easily into the intracranium.

Keywords: Parietal Foramen; Morphometries; Parietal Emissary Veins; Parietaliapermagna.

Introduction

The parietal bone foramina is usually minor. Two of them are located on either side of the sagittal suture which are asymmetrical, oval openings in the skull vault [1]. They are seen in the posterior aspect of the parietal bone and on Norma Occipitalis and Norma Verticalis.

They are separated from each other by a narrow bridge of bone. Obelion is a bony structure present over the sagittal suture medial to the parietal foramen [1]. The parietal foramina have sharply delineated margins and they do not have the surrounding sclerosis. Radiologist should be able to distinguish this foramen from the lytic lesions of the skull [2]. The parietal foramen is smaller than the burr hole of the neurosurgeon [2]. An emissary vein passes through it which connects the extracranial scalp veins with the superior sagittal dural venous sinus. Occasionally, a small branch of occipital artery passes through it. Its topography, size, number and shape is subjected to anatomical variations [2, 3].

The parietal foramen is considered important as it transmits a parietal emissary vein which traversed the loose areolar tissue which is considered as the dangerous area of the scalp. All the emissary foramina are considered important as they are the main channels of transmission of infections into the cranial cavity [4]. The parietal foramen may vary, sometimes being one on only one side, may be three, two, four on one side and one on the opposite side. [5].

Depending on the population studied the parietal foramen may be present on both sides between 43.2 and 62.7%; between 22.2 and 62%; 40%. [5, 6]. The aim of the study was to evaluate the parietal foramen in dried adult skulls. Our research experience has prompted us in pursuing this study [7-16].

Materials And Methods

This study was done on 40 human dry skulls obtained from the Department of Anatomy, Saveetha Dental College, Chennai, Tamil Nadu. The crania which exhibited the pathological changes of

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Received: May 28, 2021

Accepted: June 16, 2021

Published: July 01, 2021

Citation: Edala Venkata Gana Karthik, Thenmozhi, Dhanraj Ganapathy. Morphometric Study Of Parietal Foramen In South Indian Skulls. *Int J Dentistry Oral Sci.* 2021;8(7):2968-2971. doi: <http://dx.doi.org/10.19070/2377-8075-21000603>

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the skull cap were not included. They were not considered on the basis of race, age, sex. A0-150 mm digital electronic calliper was used to measure the morphometrics of parietal foramen from the parietal tuber and inter-parietal foramen distance. The results were obtained and were tabulated using Microsoft Excel.

Results

Enlarged parietal foramina is also called foramina Permagapari-tallia. The prevalence of enlarged foramina is in the range of 1: 15,000 or 1: 25,000 [6, 17]. There are only a few Indian studies done regarding the parietal emissary foramina. This was the stimulus to perform this present investigation from the anatomical specimens. The objectives of this article was to study the prevalence of the parietal emissary foramen and its morphometrics in adult South Indian population and to study their distance from the Parietal tube and the inter parietal foramen distance in case of two parietal foramen. This approach might be easier to locate the parietal foramen for neurosurgeons and dental surgeons.

The results shown in FIG.2.1 are the parietal foramen present only on the left side. The readings from the left parietal tuber are 8 cm for series 1, 6.8 cm for series 2, 7.8 cm for series 3, 8.2 cm for series 4, 7.7 cm for series 5, and 7.9 cm for series 6.

The results shown in FIG.2.2 are the parietal foramen present only on the right side. The readings from right parietal tuber are 6.3cm for series 1, 8.1cm for series 2, 8.3cm for series 3, 8.3cm for series 4, 7.9cm for series 5, 9.2cm for series 6, 8.9cm for series 7, 8.1cm for series 8, 9.5 cm for series 9, 8.6cm for series 10, 7cm for series 11, 7.8cm for series 12.

The results shown in FIG.2.3 are the parietal foramen present on both the sides. The readings are shown as below.

The results in FIG.2.4 represents the presence of the parietal foramen in the subjects.

The results below is showing the presence of three foramen are shown in FIG.2.5

Discussion

The parietal bone develops in the 8th week of intrauterine life from the intramembranous ossification [2, 6, 17]. The ossification centre is located near the parietal eminence and later it radiates towards the periphery in a sunburst pattern. The parietal bone ossification may vary and is essential to know about it to learn the

Figure 1. Represents prevalence the parietal foramen in 40 skulls.

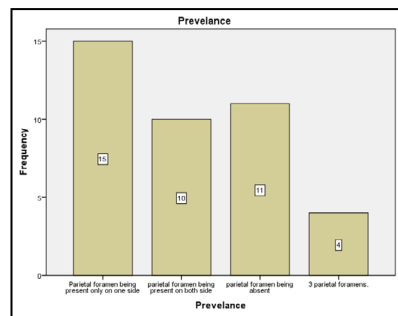


Figure 2.1. Represents the parietal foramen only on the left side.

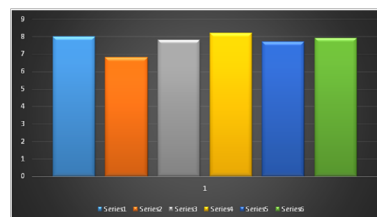


Figure 2.2. Represents parietal foramen present only on the right side.

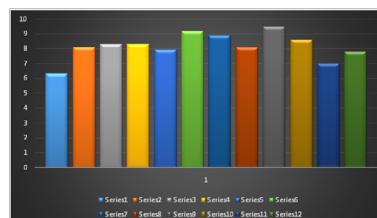


Figure 2.3. Parietal foramen present on both sides. Blue as left and orange as right parietal foramen respectively.

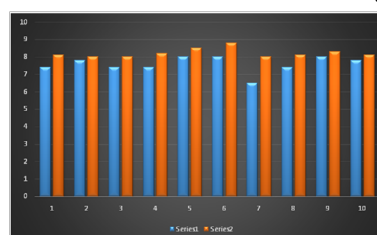
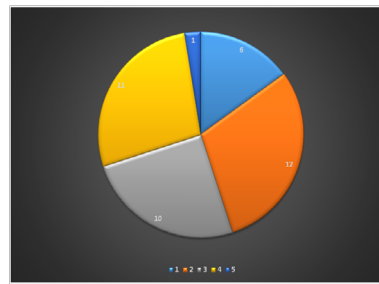


Figure.2.4 Results in cm.



From left parietal tuber	Between the parietal foramen	From right parietal tuber
7.4cm	1.5cm	8.1cm
7.8cm	2.0cm	8.0cm
7.4 cm	0.9cm	8.0cm
7.4 cm	1.7cm	8.2cm
8.0 cm	0.4cm	8.5cm
8.0 cm	0.8cm	8.8cm
6.5 cm	1.5cm	8.0cm
7.4cm	0.9cm	8.1cm
8.0 cm	1.3 cm	8.3cm
7.8 cm	1.2cm	8.1cm

Figure 2.5

Left Parietal tuber distance	Inter-parietal distance between middle and left PF	Inter-parietal distance between middle and right PF	Right Parietal tuber distance
7.8cm	0.8cm	0.9cm	7.6cm

Figure 3. Research carried out by various authors.

Author	Unilateralforamen	Bilateralforamen	Absent foramen
Yoshioka et al	20%	40%	40%
Boyd	40.50%	19.90%	39.60%
B. V. Murlimanju et al	32.70%	55.20%	12.10%
Present study	42%	25%	30%

architecture of the sagittal suture near the obelion [2].

The formation of sagittal suture is achieved by the closure of 3 fontanelles. The third fontanelle is known as the sagittal fontanelle and is present in 50%–80% of cases, leading to the formation of unilateral or bilateral parietal foramina. It has been described that the third fontanelle usually closes within the first two years of life. The variations in the closure of the third fontanelle would lead to formation of accessory parietal emissary foramen, enlarged parietal foramen and the parietal fissure. [2, 18]

The main function of the parietal foramen is transmitting the emissary vessels. These emissary veins being valve less is the main cause for the spread of infection. It is believed that the emissary foramina are typically a character of the humans, they are less frequent in lower animals and in some species they are absent. It has been reported that, there exists an important relationship between the emissary foramina and the diploic veins of the skull, which are involved in the spread of infection to the intracranium.[19]

The research carried out by various authors are given below In FIG.3

The clinical pathology associated with parietal foramen are called parietaliapermagna. Foraminaparietaliapermagna or enlarged parietal foramina are a rare variant estimated to be less than 1 in 25,000 cases. These foramina have variable gross features like size, site, and number. It has a familial transmission due to heterozygous mutations of the homeobox of a totally useless rather an injurious character genes. This transmission is not only useless but also injurious in nature [20, 21].

Conclusion

This article puts light on the importance of parietal foramen. It is considered important as it traverses the loose areolar tissue of the scalp by parietal emissary veins. And these veins being valve less, help in spread of infection quite easily into the intracranium. The clinical pathology associated with parietal foramen is called parietaliapermagna being present in 1 in 25,000 cases.

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