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A Study on Unusual Foramen in the Middle Cranial Fossa in Adult South Indian Dry Skulls

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ABSTRACT

Foramen Vesalius is present in anteromedial side of the foramen ovale. It connects the pterygoid plexus with the cavernous sinus and transmits a small emissary vein which drains the cavernous sinus . The main importance of this foramen is that it offers a path for the spread of an infection from the extracranial source to the cavernous sinus. Foramen innominatus is found between foramen spinosum and foramen ovale if present it transmits the lesser petrosal nerve. Neurosurgeons should be very precautious about these unusual foramina. The main aim of this study is to analyse the presence of foramen vesalius and foramen innominatus in the middle cranial fossa. For the present study,30 dry human cranial fossa of unknown sex from the Department of Anatomy, Saveetha Dental College and Hospitals, Chennai was examined. From the study, the incidence of unusual foramina was 23.3%. Foramen vesalius was present in 10% of the total skulls and foramen innominatus was present in 13.3% of the total skulls studied. Knowledge about this unusual foramina will be useful for neurosurgeons while conducting surgeries.

KEY WORDS: CAVERNOUS SINUS, FORAMEN INNOMINATUS, FORAMEN VESALIUS, MIDDLE CRANIAL FOSSA.

INTRODUCTION

This study deals with the unusual foramina present in the middle cranial fossa. Foramina are the openings that are present in the base of the skulls that allow passage of important structures such as nerves and blood vessels. The greater wing of the sphenoid contains three consistent foramina and other small variable foramina. The consistent foramina are the foramen rotundum, foramen

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NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728) A Society of Science and Nature Publication, Bhopal India 2020. All rights reserved. Online Contents Available at: http://www.bbrc.in/ Doi: http://dx.doi.org/10.21786/bbrc/13.8/118 ovale and foramen spinosum, accessory foramina includes foramen vesalius and foramen innominatus, these are present close to foramen ovale (Raval, Singh and Rajguru, 2015). Foramen vesalius connects the pterygoid plexus with cavernous sinus . The importance of this foramen is that it provides a path for infections to spread from the extracranial source to the cavernous sinus (Kumar, Sehgal and Roy, 2016). This foramen is also called as the emissary sphenoidal foramen.

The emissary sphenoidal foramen differs in size among different individuals, and is not always present on both the sides of the sphenoid bone (Mazengenya and Ekpo, 2017). Many studies were conducted to evaluate the importance of this emissary vein passing through this foramen ,this provides a better understanding of the morphology of this particular structure that has significance in the spreading infections from extracranial origin into the skull and also in neurological techniques such as



radio frequency(Chaisuksunt et al., 2012). Foramen innominatus is found between foramen spinosum and foramen ovale, this helps in the transmission of lesser superficial petrosal nerve, a very small tympanic branch of the glossopharyngeal and also several branches of the facial nerve .

Various studies are done on usual and unusual foramina present in the middle cranial fossa and its clinical importance (Paraskevas, Nitsa and Koutsouflianiotis, 2015), (Maina, Ducati and Lanzino, 2007). (Khairnar and Bhusari, 2013). (Prakash et al., 2019). From the previous studies we come to a conclusion that several studies were conducted on foramen ovale and foramen spinosum which are present in the middle cranial fossa but our study mainly focuses on unusual foramina such as foramen vesalius and foramen innominatus and its clinical significance.

Previously our department has published extensive research on various aspects of dentistry (Begum et al, 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about study of unusual foramina in middle cranial fossa in adult south indian dry skulls and its clinical significance.

MATERIAL AND METHODS

For the present study, 30 dry adult human cranial fossa of unknown sex from the Department of Anatomy, Saveetha Dental College and Hospitals, Chennai, India was used. Each skull was studied for the presence of foramen vesalius and foramen innominatus and the records were tabulated accordingly.

RESULTS AND DISCUSSION

Unilateral right foramen vesalius was present in 2 out of 30 skulls (6.7%). Bilateral foramina vesalius was present in 1 out of 30 skulls (3.3%) (Figure 1). Unilateral right foramen innominatus was present in 3 out of 30 skulls (10%). Unilateral left foramen innominatus was present in 1 out of 30 skulls(3.3%) (Figure 2).Both the foramina were not present in 23 skulls out of 30 skulls (77%).

Table 1. Incidence of Foramen Vesalius and Foramen Innominatus in 30 cranial cavity examined									
Right unilateral foramen vesalius	Left unilateral foramen vesalius	Right unilateral foramen innominatus	Left unilateral foramen innominatus	Bilateral foramina vesalius	Bilateral foramina innominatus	Both the foramina not present			
2/30	0/30	3/30	1/30	1/30	0/30	23/30			

Figure 1: Red arrows shows bilateral foramen Vesalius



Foramen vesalius is an inconsistent foramen located between foramen rotundum and foramen ovale. In newborn's, the foramen is about 1.0mm in length, in the adults at the right side about 2mm in length and on the left side 1.4mm in length. The width increases from 1.0 to 1.14mm at the right side and from 1.0 to 1.3 mm at the left side (Lang, Maier and Schafhauser, 1984).

In most of the cases foramen vesalius is symmetrical in nature but in few cases it is asymmetrical, this is caused Figure 2: Red arrow shows unilateral foramen Innominatus on Left side



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Table 2. Comparison 0f incidence of abnormal foramen in currentand previous studies									
Author	Year of study	Incidence	Bilateral	Unilateral					
Gupta N et al	2014	34%	14%	20%					
Nayak et al	2015	30%	32% 20%	10%					
Present study	2020	23.3%	3.3%	20%					

due to invasion by nasopharyngeal melanoma, a rare type of head and neck mucosal melanoma, angiofibroma which is a benign tumour that is made up of blood vessels and fibrous tissue, carotid -cavernous fistula with drainage through the emissary vein ais a result from an abnormal communication between the arterial and venous systems within the cavernous sinus in the skull or neurofibromatosis which is a genetic neurological disorder that can affect the brain, spinal cord, nerves and skin (Lanzieri et al., 1988) . Regarding the differences between the male and female gender , no remarkable differences were observed , although the occurrence of this foramen was more common in females compared to males (Gupta, Ray and Ghosh, 2005).

Nauma Hafeez et al states that the occurrence of foramen vesalius and foramen innominatus were 20% and 13% respectively (Hafeez and Thenmozhi, 2016). Neha Gupta et al , states that foramen vesalius was found to be present in 68 skulls out of which it was found bilaterally in 28 skulls and unilaterally in 40 skulls (Gupta N et al., 2014). Nayak et al , states that the foramen vesalius is a common anatomical variation and the incidence of the foramen vesalius was found to be 30% (20% bilateral and 10% unilateral) (Nayak et al., 2018) [Table 2]. The recognition of anatomical structures and their possible structures will be helpful to differentiate between normal from potentially abnormal structures during computed tomography and Magnetic resonance imaging.

CONCLUSION

In our study, the incidence of these foramina was 23.3%, which is considerably lower than other previous studies. The exact cause of these variations that were observed in our study might be due to genetic, nutritional, environmental or other unknown reasons. The incidence of Foramen vesalius and Foramen innominatus were 10% and 13.3% respectively. Knowledge about these unusual foramina would be useful to neurosurgeons while conducting surgeries .

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Conflict of Interest: The author declares that there is no

conflict of interest in the present study.

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