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Research Article

ANATOMICAL OBSERVATIONS OF FORAMEN VESALI AND ITS CLINICAL SIGNIFICANCE

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A R T I C L E I N F O

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A B S T R A C T

Aim:To observe and analyze the presence, laterality and shape of Foramen Vesali in South Indian adult human dry skulls and to correlate it with clinical considerations.

Background: Foramen Vesali is also known as the Sphenoidal emissary foramen.It is present in the greater wing of the sphenoid bone medial to the foramen ovale.It is occasionally present in the skull. If it is present it opens near the scaphoid fossa. It forms the passageway between the pterygoid plexus and the cavernous sinus.It plays a minor role in the blood circulation.

Materials And Methods:A total of 50 dry human skulls of unknown sex and without any gross abnormality were collected and evaluated. In each skull the presence, the shape and laterality of Foramen Vesali was analyzed.

Results:Out of the total 50 skulls observed the foramen Vesali was present in 32 skulls(64%) and absent in 18 skulls(36%). Of the total 32 skull containing the foramen Vesali, in 10 skulls(20%) it was present bilaterally, in 13 skulls(26%) it was present on right side and in 9 skulls (18%) it was present on left side.

Conclusion:Variations, number and laterality of foramen Vesali is variable and therefore recognition of this anatomical structure is important in radiography and surgical procedures.

INTRODUCTION

The skull is the bony skeleton of the head which contains numerous openings termed as foramina. These foramina transmit neurovascular structures in and out of the cranium. In addition to the named foramina of the cranium some named and unnamed emissary foramina are also present. The emissary foramina transmit emissary veins, the veins which connects the extracranial veins to intracranial veins. The spread of infection along these routes can have serious clinical consequences. One such named emissary foramina is the Sphenoidal emissary foramen (SEF). The sphenoidal emissary foramen is also known as Foramen Vesali (FV) or the foramen of Vesalius, foramen of venosum and sphenoidal canalicus, is a small, variable and an inconstant foramen present in the greater wing of sphenoid bone in the middle cranial fossa located antero-medial to the foramen ovale (Kale A *et al*., 2009).When present, it transmits a small emissary vein
(vesalius vein), connecting the pterygoid venous plexus in the infratemporal fossa with the cavernous sinus in the middle cranial fossa. Hence it plays a minor role in the venous blood circulation. It also has clinical significance because through this foramen, an extracranial infection or thrombus may reach to cavernous sinus creating thrombosis of cavernous sinus (Rossi. AC *et al*.,2010).The neurosurgical procedure for treatment of trigeminal neuralgia is performed via the foramen ovale and while approaching this foramen the needle for microvascular decompression can be misplaced to foramen Vesali or can accidentally rupture the vesalius vein, due to the proximity of these two foramina can produce serious complications (Binita.B.Raval *et al*., 2015). Thus the present study was aimed to observe variations in the presence, laterality and morphology of foramen Vesali in the middle cranial fossa.

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MATERIALS AND METHOD

The study was conducted in the Department of Anatomy, Saveetha Dental College and Hospitals, Chennai. A total of 50 intact dry human skulls of unknown sex and without any gross abnormality were collected and evaluated. All skulls were serially numbered from 1 to 50. The skulls were macroscopically observed with naked eye. In each skull the presence, the shape and laterality i.e., present unilaterally or bilaterally and the side of unilateral presence of foramen Vesali was observed, noted and photographed. The results

obtained were analysed, tabulated and represented in percentages.

RESULT

All the observations were compiled, analysed and the following results were obtained which are arranged in tabular column. Out of the total 50 skulls observed the foramen Vesali was present in 32 skulls (64%) and absent in 18 skulls (36%). These results are shown in Table-1 and Figure-1.In 10 skulls (20%) it was present bilaterally, in 13 skulls (26%) it was present on right side and in 9 skulls (18%) it was present on left side. These results are shown in Table-2 and Figure-2. Two types of shapes were noted, such as roundandoval. Irregularly shaped foramen was not observed. Details of distribution of shapes offoramen Vesali were given in Table 3&Figure-3. Confluence between the foramen Vesali and foramen ovale was not observed in the study. Also, septum inthe foramen Vesali was not observed.

Table 1 Incidence of Foramen Vesali

Total Skulls Examined	Number of Skulls with Foramen Vesali		Number of Skulls without Foramen Vesali	
	Number	Percentage (%)	Number	Percentage (%)
50	32	64	18	36

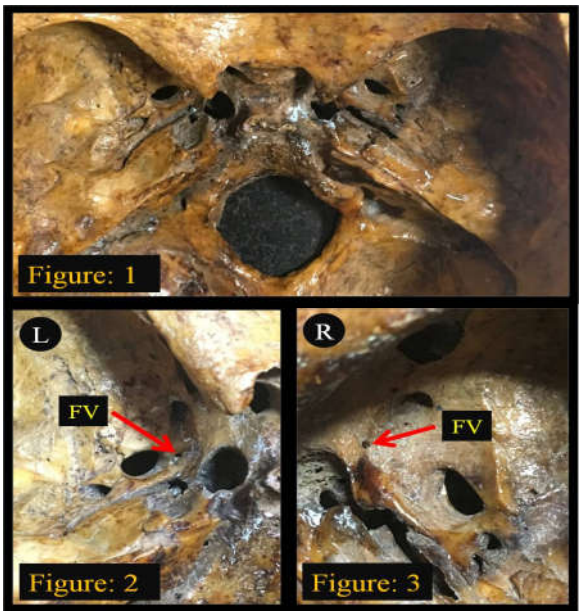
Table 2 Distribution of Foramen Vesali

Distribution	Right Side	Left Side	Distribution In 32 skulls (Showing Presence of FV out of 50 skulls)
Unilateral	03	09	12 (37.5%)
Bilateral	10		10 (31.25%)
Total	13	19	32 (64%)

Table 3 Shapes of Foramen Vesali

Shape	Distribution of Shapes of Foramen Vesali (n = number of foramina)		
	Right Side n =13	Left Side n =19	Total n = 32
Round	11 (85%)	10 (53%)	21 (66%)
Oval	02 (15%)	09 (47%)	11 (34%)
Irregular	0	0	0

Photograph of superior view of the skull showing Foramen Vesali (FV) in left side (L) and right side (R) in Figure-1, 2 & 3 respectively.



DISCUSSION

The skull has several important foramina which transmit vital neurovascular structures. Many research studies were done on the variations of foramina and concluded that these variations are associated with several diseases. These anatomical variations of FV can be understood by the embryological basis. Most of the part of central skull base develops from endochondral type of ossification and to a minor extent byintramembranous type of ossification. Sphenoid bone ossifies by pre-sphenoidal part and post-sphenoid part with little contribution from alisphenoid and orbitosphenoid centres.The greater wings of sphenoid bone develop from alisphenoid centres (Gray *et al*., 2008). The FV is the point of fusion between the membranous part and medial cartilaginous part, i.e., alatemporalis part (Murlimanju BV*et al*., 2015). This juncture of fusion of two types of ossification centres makes the foramen variable in different forms like its presence, unilateral presence and variation in shape.

Identification of foramina of skull is important for understanding the regional neurovascular anatomy since neurovascular structures passes through these foramina. FVserves as a passageway for Vesalius vein, the connection between pterygoid plexus and cavernous sinus.Anyinfection or thrombus of extracranial origin may reach cavernous sinus and can create thrombophlebitis of cavernous sinus.Small nerve called nervoulussphenoidalislateralis may pass through FV and into cavernous sinus and in 20% of cases it transmit accessory meningeal artery therefore identification of this foramen is important to prevent iatrogenic injury during various surgical procedures (Surekha D. Jadhav*et al*., 2016). It also plays role in the equalization of intracranial venous pressure because emissary veins are valve less and may act as safety valves in certain clinical conditions (Freire AR*et al*., 2013).The surgical procedure for treatment of trigeminal neuralgia is performed through foramen ovale and while approaching this foramen the needle for microvascular decompression can be misplaced to FV or can accidentally rupturethe vesalius vein lodged in it, due to the proximity of these two foramina can produce serious complications (Binita.B.Raval *et al*., 2015).

CONCLUSION

Variations, number and laterality of FV is variable and therefore recognition of this anatomical structure is an important criteria. Thorough knowledge of their anatomy, morphology and variations will be helpful not only in distinguishing abnormal structures during various radiological procedures, but also the knowledge of an accessory FVwill be helpful for radiologists and clinicians in the diagnosis and management of different micro-vascular and micro-neurosurgical approaches at the base of skull, thereby avoiding several detrimental conditions.

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