https://doi.org/10.33472/AFJBS.6.5.2024.4008-4011

African Journal of Biological Sciences

A Study On Morphological And Morphometric Study Of Foramen Vesalius And Its Clinical Importance.

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Article History
Volume 6, Issue 5, 2024
Received: 02 Apr 2024
Accepted: 20 May 2024
Doi: 10.33472/AFJBS.6.5.2024.4008-4011

Abstract

Background: Foramen Vesalius also called as the emissary sphenoidal foramen is an inconstant foramen located anteromedial to the foramen ovale opening near the scaphoid fossa. An emissary vein passes through this foramen and communicates with the cavernous sinus. The importance of this foramen is that it offers a path to the spread of an infection from the extracranial source to the cavernous sinus, this foramen is considered as an inconstant channel.

Materials and Methods: The present study was conducted with 118 intact adult dry skulls from multiple medical and dental institutions. The incidence of occurrence of foramen was noted in the floor of the middle cranial fossa. A thin probe was used to confirm patency of foramina. The probes having diameter of 0.25 mm, 0.50 and 0.75 mm were used to measure minute foramina. Shapes of this foramen were observed and categorised in to three types, round, oval and irregular.

Result: In present study found foramen Vesalius on 50(21.18%) sides. Out of 50 foramen Vesalius, 27 were found on right side and 23 on left side. Out of 50 foramina 37(74%) were round shape, 10(20%) were Oval and 3(6%) were Irregular. The size foramen on 1.02+0.31mm on right side and 0.89+0.26mm on left side.

Conclusion: The present conducted evaluate the frequency of occurrence and the morphometry of the Foramen Vesalius and these anatomical considerations may assist the surgeon to a better planning and a safer execution of percutaneous approach to the middle cranial fossa through the Foramen oval.

Keywords: Foramen Ovale, foramen Lacerum, Foramen Ovale, Foramen Vesalius, Emmisery vein.

Introduction

There are many foramina on the floor of the middle cranial fossa, which are important because they allow the passage of essential structures such as nerves and blood vessels. The permanent apertures of the sphenoid bone are foramen rotundum, foramen ovale, and foramen spinosum, whereas the foramen of Vesalius and meningo-orbital foramen represent non-permanent foramina. The foramen of Vesalius is a small, variable foramen located anteromedial to foramen ovale and posterolateral to foramen rotundum in the middle cranial fossa. The foramen vesalius was first described and drawn by the anatomist Andreas Vesalius, after whom the foramen was named. The foramen vesalius can be unilateral or bilateral. The mean diameter of this foramen in the adult is 1.4-2 mm[1]. This foramen is also known as emissary sphenoidal foramen. It opens below and lateral to scaphoid

fossa1. It transmits an emissary vein, "Vein of Vesalius", through which the cavernous venous sinus and pterygoid venous plexus communicate. The sphenoidal emissary foramen varied in size among different individuals, and is not always present on both sides of the sphenoid bone. Numerous studies were conducted to assess the importance of the presence of the emissary vein in this foramen, promoting a better understanding of the morphology of this structure that has importance in the spread of infection from extracranial origin into the skull and also in neurosurgical techniques such as radiofrequency rhizotomy[2,3,4]. The present study conducted to find morphological variations and size of foramen Vesalius.

Materials and Methods

The present study was conducted with 118 intact adult dry skulls from multiple medical and dental institutions. We have collected skulls with departments of anatomy, forensic medicine and with 1st year students. The skulls were cleaned properly, unhygienic and damaged skulls were excluded from study. The skulls with broken floor of middle cranial cavity were excluded from this study. We have observed the base of skull carefully and identified the foramen Vesalius. The incidence of occurrence of foramen was noted in the floor of the middle cranial fossa. A thin probe was used to confirm patency of foramina. Digital vernier caliper`s scale used to measurement of foramen Vesalius with a precision of 0.01 mm. The probes having diameter of 0.25 mm, 0.50 and 0.75 mm were used to measure minute foramina. Shapes of this foramen were observed and categorised in to three types, round, oval and irregular. Measurements were expressed in Mean + SD and P- Value also calculated[2,5].

Result

We have conducted this study with 118(236 sides) intact adult dry skulls. We have found foramen Vesalius on 50(21.18%) sides. Out of 50 foramen Vesalius, 27 were found on right side and 23 on left side. Out of 50 foramina 37(74%) were round shape, 10(20%) were Oval and 3(6%) were Irregular. Out of 27 foramen Vesalius on right side round shape was 19(70.37%), Oval shape was 6(22.22%) and irregular was 2(7.41%). Out of 23 foramen Vesalius on left side round shape was 18(78.23%), Oval shape was 4(17.39%) and irregular was 1(4.34%). The size foramen on 1.02+0.31mm on right side and 0.89+0.26mm on left side.

Table 1. Showing Distribution of shapes of Foramen Vesalius and Morphometry.

Shape	Right side (n=27)	Left side (n=23)	Total (n=50)
Round	19(70.37%)	18(78.23%)	37(74%)
Oval	6(22.22%)	4(17.39%)	10(20%)
Irregular	2(7.41%)	1(4.34%)	3(6%)
Foramen Vesalius	Right Side (mm)	Left side(mm)	P - Value
	1.02+0.31mm	0.89+0.26mm	<0.423

Figure 1. Skull with Foramen Vesalius.

Discussion

The foramen Vesalii also known as the foramen of Vesalius, sphenoidal emissary foramen**,** foramen venosus **or** canaliculus sphenoidal**,** is a tiny variably present foramen in the greater wing of the sphenoid bone. It transmits a sphenoidal emissary vein linking the pterygoid venous plexus in the infratemporal fossa to the cavernous sinus. The foramen is located on the sphenoid bone, anteromedial to the foramen ovale, lateral to the foramen rotundum and Vidian canal. Andreas

Vesalius[6] has been called "the founder of modern anatomy", and amongst extensive investigations and writings he published the fi1st extensive study of the sphenoid bone. In present study we found foramen Vesalius in 21.18% of sides, we have been observed round, oval and irregular shape foramina. The size foramen on 1.02+0.31mm on right side and 0.89+0.26mm on left side. The all results were presented in table form(Table.1).

The study conducted by K G Prakash and S Viveka[7] in twenty-two dry skulls found foramen Vesalius in 40.9% of 44 sides examined. Six skulls had this foramen bilaterally. Three specimens had foramen Vesalius unilaterally and six specimens had it bilaterally. Average diameter of foramen was 1.35 (±0.56) mm from extra cranial aspect. The average diameter and perimeter of foramen in males were significantly lower than females. The average distance between foramen Vesalius and foramen ovale was significantly more in females than in males.

In study conducted by Jadhav SD[8] two hundred and fifty (right 250; left-250) dry Indian adult skulls of unknown age. Middle cranial fossa of each skull was macroscopically observed for the presence, absence of sphenoidal emissary foramen. Patency was confirmed by inserting a bristle through each probable foramen and only patent foramen were calculated. They observed that sphenoidal emissary foramen was present in 72 (28.8%) skulls. Unilaterally it was present in 17.6% and bilaterally in 11.2% skulls.

Gupta N and Ray B[9] studied 70 sides of 35 dried adult dry skull. Variation in number and incidence of foramen Vesalius were noted. Foramen Vesalius was present in 23 sides (14 right, 9 left) out of the 70 sides observed, the incidence being 32.85% (20.0% right side, 12.85% left side) of all the sides observed. Incidence of bilateral and unilateral foramen vesalius was 22.85% (8 out of 35 skulls) and 20% (7 out of 35 skulls) respectively. Foramen vesalius was found in 10 sides in males and in 13 sides in females. No remarkable differences were observed in the incidence of foramen vesalius between the sides within same sex but the incidence was more in females compared to male skulls. Murlimanju BV et al[10] study comprised 78 human adult dried skulls. The greater wing of the sphenoid bone was macroscopically observed for the presence of foramen of Vesalius. It was observed that the foramen was present in 29 skulls (37.2%). It was seen bilaterally in 13 (16.7%) skulls and unilaterally in 16 (20.5%) specimens. Neha Gupta[11] study, foramen Vesalius was found to be present in 68 skulls (34%); out of which it was bilaterally in 28 skulls (14%) and unilaterally in 40 skulls (20%)- in 16 skulls on right side and in 24 skulls on left side. In study of G Priya [11] conducted in 200 sides of 100 skulls. Among them 20% of the skull showed presence of foramen of Vesalius bilaterally, 25% unilaterally and one particular skull showed doubled opening on the left side with the presence of a bony septum. In study of Vipavadee C[12] of 377 dry skulls, there were 25.9% and 10.9% of foramen Vesalius were found at the extracranial view of the skull base and in the middle cranial fossa, respectively. Total patent foramen Vesalius were 16.1% (11.9% unilaterally and 4.2% bilaterally). Most foramen Vesalius were found in male and on the left side. Comparatively, foramen Vesalius at the extracranial view of the skull base had a larger maximum diameter. The distance between FV and the foramen ovale was as short as 2.05 ± 1.09 mm measured at the extracranial view of the skull base. In the study of Raval BB[5] One hundred and fifty dry adult human skulls were studied. In their study they found mean maximum dimension of foramen Vesalius was 0.98±0.67 mm on right side and 1.12±0.73 mm on left side. Foramen Vesalius was present in 90 (60%) skulls out of 150 observed. The incidence was 41(27.33%) on right side and 49 (32.67%) on left side. Foramen Vesalius was present unilaterally in 32 (35.56%) and bilaterally in 29 (32.23%) out of 90 skulls. Duplication of this foramen was observed in two skulls (one right side and one on left side). Foramen Vesalius was round in 72%, oval in 24% and irregular in 4% of total foramina present.

Conclusion: Foramen Vesalius is a very important anatomical variation, due to its clinical importance. The observations of present study would help the neurosurgeon and neuroscientists in their practice during surgeries in base of skull. This knowledge also helps anthropologists and forensic experts.

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