



INCIDENCE OF CRANIO (MENINGO)-ORBITAL FORAMEN IN THE DRY HUMAN SKULL AND ITS CLINICAL RELEVANCE – A CASE REPORT

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ABSTRACT

The cranio-orbital foramen is an additional link between the cranial cavity and the orbital cavity. This foramen lies in the postero-superior aspect of the lateral wall of the orbital cavity, adjacent to the superior orbital fissure. This bony canal, not always present in the human skull, when it is present it contains a branch from the middle meningeal artery, providing an accessory blood supply to the orbit. This vessel, like the foramen, is characterised by great variability. Although some anatomy textbooks suggested that this foramen is of a rare occurrence. It is a potential source of hemorrhage that surgeons should be aware of when operating along the lateral orbital wall, because it is the location of an anastomosis between the lacrimal artery and middle meningeal artery. The knowledge of this foramen and structure related with it has a great significance for ophthalmologist and neurosurgeons.

INTRODUCTION

The meningo-orbital foramen forms an additional connection between the orbital cavity and the cranial cavity. The position of this foramen is not constant but usually lies on or around the superior-lateral suture leading from superior orbital fissure. The foramen may occur in the postero-superior part of the lateral wall of the orbital cavity or in the posterolateral part of the roof of the orbital cavity. The meningo-orbital foramen may be single or multiple. The presence of the foramen is variable from our review of literature. The meningo-orbital foramen usually transmits the anastomosing branch of middle meningeal artery and lacrimal artery. This bony canal may contain a branch from the middle meningeal artery, providing an accessory blood supply to the orbital cavity. The abnormal origin of middle meningeal artery, lacrimal artery and ophthalmic artery may lead to communication between cranial cavity and orbital cavity through this meningo-orbital foramen. The anatomy of the cranio-orbital foramen and the course of the orbital branch should be well known by surgeons

reconstructing the anterior base of the skull, the orbit after orbital base surgery, and during excision of meningiomas. The knowledge of this foramen and structure related with it has a great significance for ophthalmologist and neurosurgeons.

CASE REPORT

During routine osteology demonstration class for undergraduate medical students in an adult Indian skull, an unusual foramen (cranio-orbital or meningo-orbital) that would transmit a fine probe was found in the upper part of the lateral wall of the right orbital cavity (Figure 1). This unusual foramen was found connecting the right orbital cavity with the middle cranial fossa; and was positioned in the upper part of the lateral wall of the orbital cavity nearer to the fronto-zygomatic suture. However, such unusual foramen was not found in the opposite orbital cavity. There were no other abnormalities in the skull.



DISCUSSION

The meningo-orbital foramen is a small opening in the orbit lateral to the lateral end of the superior orbital fissure. It is widely reported to contain an orbital branch of the middle meningeal artery. The foramen may be single or multiple and may occur in the postero-superior part of the lateral orbital wall or in the posterolateral part of the orbital roof. There is a lack of clarity in the literature as to whether foramina occurring in the orbital roof are the same entity as those occurring in the lateral wall. The disposition of the lesser wing of the sphenoid at the anterior limit of the middle cranial fossa makes it difficult to see how a foramen communicating with the anterior cranial fossa could transmit a branch of the middle meningeal artery [1]

The recent literature by Arvind Kumar Pankaj et al., [2] revealed that position, incidence, and morphogenesis of meningo-orbital foramen are highly variable. The meningo-orbital foramen creates an additional link between the orbit and the cranial cavity. The location of this foramen is not very definite, may occur in the postero-superior part of the lateral orbital wall. The meningo-orbital foramen may be single or multiple. The meningo-orbital foramen usually provides the passage for anastomosing branch of middle meningeal artery and lacrimal artery. This bony canal may contain a branch from the middle meningeal artery, providing an accessory blood supply to the orbit. The abnormal origin of middle meningeal artery, lacrimal artery and ophthalmic artery may lead to communication between cranial cavity and orbit through this foramen.

According to the study conducted by Abed et al., [3] the cranio-orbital foramen is an osseous anatomical landmark located adjacent to the superior orbital fissure. The presence of the cranio-orbital foramen and other accessory foramina represents a source of hemorrhage that surgeons should be aware of when operating along the

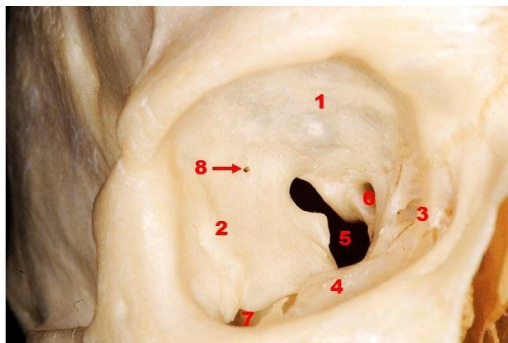
lateral orbital wall.

The cranio-orbital foramen is a potential source of hemorrhage during deep lateral orbital dissection, since it functions as an anastomosis between the lacrimal artery and the middle meningeal artery. Celik et al., [4] measured the distances between the cranio-orbital foramen and the fronto-zygomatic suture, supraorbital notch, lateral angle of the superior orbital fissure and Whitnall's tubercle and recommended that the fronto-zygomatic suture and Whitnall's tubercle are the most reliable navigational landmarks for identifying the cranio-orbital foramen. The aim of their study was to guide and facilitate the surgical procedures in the orbit, so as to determine a navigational area and the precise location of the cranio-orbital foramen. Hence, the transversal and vertical orientation of the cranio-orbital foramen should be mastered by the surgeons reconstructing the anterior base of the skull and the orbit.

The so-called meningo-orbital foramen creates an additional link between the orbit and the cranial cavity. This bony canal, contains a branch from the middle meningeal artery, providing an accessory blood supply to the orbit. This vessel, like the foramen, is characterized by great variability. Although the incidence of the meningo-orbital foramen in the material as a whole was 28%, the foramen in female skulls was observed to be 40.5%, compared to 18% in male skulls. This difference was statistically significant. A double foramen was encountered in three orbits, and in one orbit there was a triple foramen. The minimal distance between the supraorbital notch (or foramen) and the meningo-orbital foramen was 35.0 (28-44) mm. The minimal distance from the cross-point of the entrance to the orbit and the fronto-zygomatic suture was (21.3-35.5) mm. This indicates that the meningo-orbital foramen can be present near an operating field in some surgical interventions through the lateral orbital wall [5].

Figure 1

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|-----------------------------------|-----------------------------|
| 1. Roof of orbital cavity | 7. Inferior orbital fissure |
| 2. Lateral wall of orbital cavity | 8. Cranio-orbital foramen |
| 3. Medial wall of orbital cavity | |
| 4. Floor of orbital cavity | |
| 5. Superior orbital fissure | |
| 6. Optic canal | |



CONCLUSION

The presence of the cranio-orbital foramen and other accessory foramina represents a source of hemorrhage that surgeons should be aware of when operating along the lateral orbital wall. The so-called cranio-orbital foramen creates an additional link between the orbit and the cranial cavity. Finally we conclude that

the anatomy of the cranio-orbital foramen and the course of the orbital branch should be well known by surgeons reconstructing the anterior base of the skull, the orbit after orbital base surgery, and during excision of meningiomas. The knowledge of this foramen and structure related with it has a great significance for ophthalmologist and neurosurgeons.

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