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Meningo-Orbital Foramen-In South Indian Dry Skulls and Its Incidence.

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ABSTRACT

The study on the incidence of Meningo-orbital foramen-in south Indian dry skulls which is having surgical significance. Meningo-orbital foramen is found on the roof or the lateral wall of orbit, lateral to superior orbital fissure. This foramen transmits a branch from middle meningeal artery to the orbit. The present study is conducted on 51 adult dry human skulls (102 orbits). In which Meningo-orbital foramen was found to be present in 26 skulls (50.98%), it was unilateral in 15 skulls (29.4%) and found bilaterally in 11 skulls (21.56%). The incidence of this foramen will be of surgical significance for neurosurgeons operating on the base of anterior or middle cranial fossa, the surgeons operating for the reconstruction of the-anterior base of the skull and ophthalmologists.
Keywords: Meningo orbital foramen, Middle meningeal artery, Orbit, Anastomosis.

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INTRODUCTION

Meningo-orbital foramen is a small bony canal in the orbit. It is found on the roof or the lateral wall of orbit related to the lateral end of superior orbital fissure. It creates a link between the orbit and the middle cranial fossa. It may be single or multiple. It transmits a branch from the middle meningeal artery hence an accessory blood supply to the orbit. The text books of Anatomy (1-7) have not given any significance about this foramen. But Scholars of literature called this foramen as spheno-frontal foramen, Lacrimal foramen, sinus canal foramen in Yuvaraj BK et al (2011), and cranio-orbital foramen in Erturk M et al (2005), stapedial ophthalmo lacrimal foramen in Georgiou C et al (1992).The abnormal origin of middle meningeal artery, lacrimal artery and ophthalmic artery may lead to arterial anastomosis between cranial cavity and orbit through this foramen. The knowledge on anatomy of Meningo-orbital foramen will be of surgical significance to the ophthalmologists, Neurosurgeons and for the reconstruction surgery of the anterior base of the skull to avoid the accidental injury to the vessel and its complications.

Figure 1: Arrow pointing at the meningo-orbital foramen seen in the Left orbit, lateral to superior orbital fissure

MATERIALS AND METHODS

The incidence of Meningo-orbital foramen in the right and left orbit was studied in 51 adult dry human skulls (102 orbits) of unknown sex, in the Department of Anatomy, Malabar medical college and Research centre, Modakkallur, Calicut, Kerala, India. In each skull both orbits were observed carefully under good illumination. The presence of Meningo-orbital foramen was noted. The patency of these minute foramina was confirmed by passing fine metallic wire.

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Figure 2. Arrow pointing at the meningo-orbital foramen seen bilaterally

RESULTS

Meningo-orbital foramen was present in 26 skulls (50.98%) out of 51 adult dry human skulls. The single foramen was present unilaterally in total of 15 skulls (29.4%), (on right orbit of 8 skulls [15.68%] and on left orbit of 7 skulls [13.72%]. Foramen was Present Bilaterally in 11 skulls [21.56%] in which bilaterally single foramen was found in 9 skulls [17.6%] and bilaterally double foramina were found in 2 skulls [3.9%]. In 25 skulls Meningo-orbital foramen was not found.

Table-1. The incidence of the Meningo-orbital foramen-in 51 south Indian adult dry skulls.

Total no. Skulls in which foramen was Present. [Figure-1]	Presence of Single Foramen - Unilaterally in 15 skulls. [29.4%] [Figure-1]		Presence of Foramen- Bilaterally in 11 skulls [21.56%]	
	Right-side	Left-side	Single [Figure-2]	Double* [Figure-3]
26	8	7	9	2
(50.98%)	[15.68%]	[13.72%]	[17.6%]	[3.9%]

*In 2 skulls foramen was found to be double bilaterally.

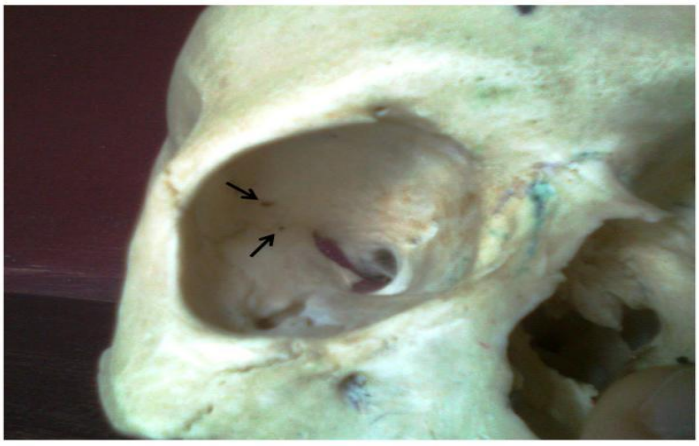

Figure 3. Arrow pointing at the two meningo-orbital foramen seen in the right orbit.

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DISCUSSION

The standard textbooks of anatomy have not described significance of this foramen. (1-7). But the Study by scholars indicates a more frequent incidence of this foramen in the skulls. The present study examined the incidence of Meningo-orbital foramen in 51 adult dry skulls, in which Meningo-orbital foramen was present in 26 skulls (50.98%). On comparing the present study with the study conducted by other authors, wide range of variation was observed. In Some studies authors have reported relatively fewer incidence of this foramen. But some studies recorded even higher level of incidence of this foramen. It can be listed as follows (Table -2).

Table -2. Incidence of Meningo orbital foramen in various studies.

Study / year	Region / population	Sample size	Total incidence	Unilateral	Bilateral
K. Yuvaraj babu et al. [2011] (8)	South Indian	97 skulls.	43 skulls [44.32%]	27 skulls [27.83%]	16 skulls. [16.49%]
Ashwin krishnamurthy et al. [2008] (9)	South Indian	138 skulls.	80.4%	-	-
Renu chauhan et al. [2013] (10)	North Indian	50 skulls	32 skulls [64%]	31 skulls	1 skull.
Arvind kumar pankaj et al. [2013] (11)	North Indian	136 orbits	49orbits [36%]	21 orbits	28 orbits
O'Brien A. et al. (2007) (12)	Scottish Population	60 skulls	22 skulls (36%)	-	-
Mysorekar et al. (13)	Indian	100 skulls	70 skulls (70%)	-	-
Santo et al. (1984) (14)	Brazalian population	50 skulls	6%	-	-

The result of current study is almost equal to the incidence in the study by K. Yuvaraj babu et al [2011] in South Indian Population (8). This study has been reported presence of foramen in 44.32% of skulls out of 97 skulls. Relatively less incidence (6%) of this foramen Santo et al (1984) to even higher level of incidence (80.4%) of this foramen by Ashwin krishnamurthy et al [2008] can be seen in the table-2. The geographical, racial or regional variation could be a possible factor for this difference.

In the present study the Meningo orbital foramen communicating the orbit with anterior cranial fossa near posterior margin of lesser wing of sphenoid bone was observed in 3 skulls and in the remaining 48 skulls it was found to be communicating the orbit with middle cranial fossa. Similar observations were reported in literature by Arvind kumar pankaj et al (2013).

The meningo orbital foramen represent an embryonic conduit between the supra orbital division of the stapeadial artery and the permanent stem of ophthalmic artery. In adult this may be represented by a connecting vessel between the orbital branch of anterior division of middle meningeal artery and the lacrimal branch of the ophthalmic artery, hence it has been proposed by the authors to call this foramen as 'stapedialophthalmolacrimal' foramen. (15).

The anatomical knowledge of Meningo-orbital foramen is of clinical significance for the surgeons operating for the reconstruction of the-anterior base of the skull (16).The Ophthalmologists aware of the presence of Meningo-orbital foramen can easily avoid injury to the vessel passing through this foramen and its complications while performing any surgical procedure on the lateral wall of the orbit (Georgiou C et al 1992). It is helpful for neurosurgeons operating on the base of anterior or middle cranial fossa to avoid vascular complication. This simple study is an attempt to provide information regarding occurrence of Meningo-orbital foramen in south Indian population. The lack of clarity regarding reasoning for the incidence for wide range of variation in the presence and number of foramen is the limitation of this study. Hence it needs further research.

CONCLUSION

The present study reveals valuable insights on the incidence of Meningo-orbital foramen in South Indian skulls. It was found to be present in 26 skulls (50.98%) out of 51 skulls. This knowledge will be clinically significant for ophthalmologists and neurosurgeons. It will be useful in avoiding complications during surgical procedures.

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