

INCIDENCE OF INTRA-ORBITAL GROOVE IN PAKISTANI ADULTS

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ABSTRACT

Presence of intra-orbital groove was studied in two hundred and twenty orbits of Pakistani population. It was found present in 135 (61.4%) cases as compared to the people of Asiatic origin (34.4%) and Brazilians (45%). In 35 (25.9%) cases, it was present bilaterally. The groove was found accompanied by single or double foramen meningo-orbitale in some cases. Foramen spinosum was found present in 218 orbits giving origin to the groove for middle meningeal artery.

INTRODUCTION

Groove in the lateral wall of human orbit was discovered in a case of an anomalous middle meningeal artery¹. Presence of intraorbital groove in 22 out of 64 orbits (34.4%) was observed in 32 skulls of Asiatic origin². This groove was said to arise from the lateral extremity of the superior orbital fissure, crossing the orbital surface of the greater wing of the sphenoid bone and terminated at the posterior extremity of the inferior orbital fissure. It may arise occasionally from a foramen (meningo-orbitale) located lateral to the lateral extremity of the superior orbital fissure. The orbital groove is continuous with the groove of the orbital branch of the middle meningeal artery in the middle cranial fossa. This groove probably lodges an anastomosis between the middle meningeal and infra-orbital vessels. The groove was reported to be present bilaterally in 15 skulls³. Presence of this groove in the human orbits has not been mentioned in most of the textbooks^{4,5,6}. Therefore, it was decided to investigate the presence of the groove in Pakistani skulls.

MATERIAL AND METHODS

Two hundred and twenty, dried, well preserved, adult Pakistani orbits of both sexes were examined in the department of Anatomy, King Edward Medical College, Lahore, from 1986 to 1994.

The vaults of all skulls were sawn off to expose the cranial fossae. Presence of the groove

was observed in day light with the help of a hand lens.

DISCUSSION

Groove in the lateral wall of the orbit was not mentioned as normal or anomalous in the anatomical texts⁷⁻¹¹, until it was observed in a study of 64 orbits of Asiatic origin².

It was observed in 22 (34.4%) orbits and was bilaterally present in 16 of the 22 cases (72.7%)(Table 2). The groove lodges blood vessels taking part in an anastomosis between the middle meningeal and infra-orbital blood vessels.

Bilateral absence of foramen spinosum and presence of a groove in the lateral wall of orbit on both sides arising from a foramen meningo-orbitale to the inferior orbital fissure has been reported in a single skull. Author deduced that in this single skull the middle meningeal artery arose bilaterally from infraorbital artery¹. In the present study foramen spinosum was found present in 218 cases. It was absent bilaterally in one skull and missing unilaterally on left side of one skull as compared to the previous study on 64 orbits in which it was present in all cases².

The groove arose from the foramen meningo-orbitale unilaterally in 5 orbits. It was not found bilaterally in any orbit of the present study whereas it was found present bilaterally in one skull and unilaterally in one orbit of Asiatic origin.²

The marking of the middle meningeal vessels on the inside of the skull are made by veins but they indicate the position of both veins and arteries¹².

The intra-orbital grooves were found to be continuous with those of the orbital branches of middle meningeal vessels in the middle cranial fossa so that the intra-orbital groove indicates the presence of anastomotic vessels joining middle meningeal and infra-orbital vessels. Anastomosis between the middle meningeal artery and the recurrent meningeal branch of lacrimal artery has been proved previously^{13,14}. The anastomotic vessel passed either through foramen meningo-orbitale or superior orbital fissure. Anastomoses between the lacrimal artery and infra-orbital artery and between the infra-orbital artery and muscular branches of ophthalmic artery may lie in this groove.

Number of anastomotic vessels and their origin varies as proved by the presence of single or double foramen meningo-orbitale unilaterally or bilaterally in the presence of intraorbital groove.

Incidence of presence of intraorbital groove was maximum (61.4%) in Pakistanis as compared to the people of Asiatic origin (34.4%) and Brazilians (45%) (Table 1).

Bilateral presence of the groove was lower (25.9%) in Pakistanis compared with 72.7% of people of asiatic origin and 33.3% of Brazilians. Ratio of presence of the groove was almost same on right and left orbits in other populations but it was significantly high in Pakistanis on right side (65.5%) as compared to the left side (57.2%). High incidence of the presence of a groove in the orbit and its continuation to the groove present in the middle cranial fossae through foramen meningo-orbitale or superior orbital fissure in the present study fully support the findings of studies conducted on other populations. Presence of the groove indicates the location of an anastomosis between the infra-orbital and middle meningeal blood vessels. Further studies are also required to see the presence of the groove and its relations to foramen meningo-orbitale in other racial groups.

RESULTS

The examination of 110 right orbits showed presence of a groove in the lateral wall in 72 cases (65.5%) (Table 1) (Fig 1). In 110 right middle cranial fossae the groove of the orbital branch of middle meningeal artery was present in 52 cases (Fig.2). The examination of 110 left orbits showed presence of intra-orbital groove in 63 cases (57.2%) (Table.1, Fig.3) and the presence of groove of the orbital branch of middle meningeal artery in 40

middle cranial fossae. Thus in total of 220 orbits examined, intra-orbital groove was found in 135 (61.3%) cases. It was bilaterally present in 35 (25.9%) of the 135 cases (Table 1, Fig. 4). Intra-



Fig. 1. A Groove in the Lateral Wall of Right Orbit.

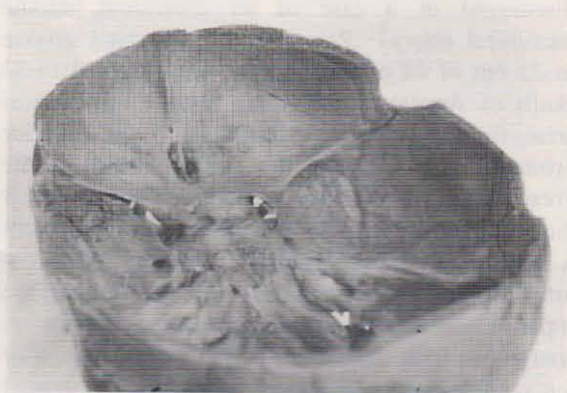


Fig. 2 Groove for the orbital branch of middle meningeal artery in the right middle cranial fossa.



Fig. 3 A Groove in the lateral wall of Left Orbit.

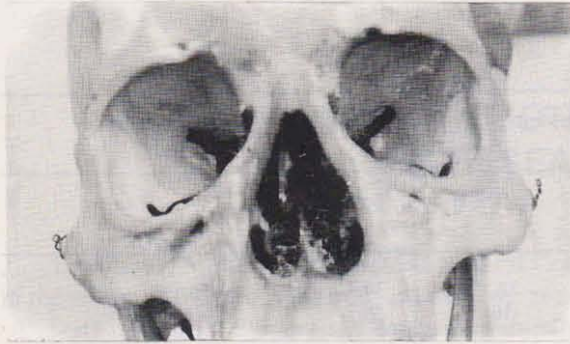


Fig. 4. Intra orbital groove present bilaterally in both orbits.

orbital groove was found absent in 85 (38.6%) orbits. In 2 right and 3 left orbits, the intra-orbital groove emerged from the lateral extremity of the superior orbital fissure. The intra-orbital groove may be deep and well marked (fig. 5) or shallow and poorly marked (Fig. 6). The groove was found bilaterally accompanied by bilateral single foramen meningo-orbitale in 6 skulls (Fig. 6). In 2 skulls, bilateral groove was accompanied by bilateral

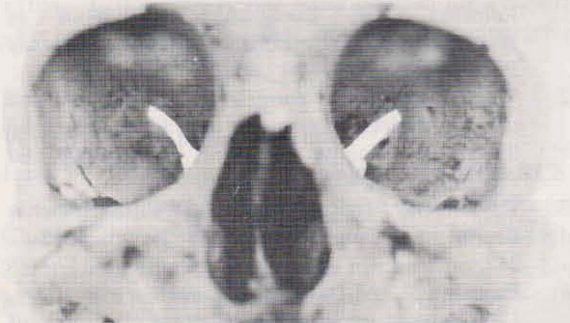


Fig. 5 Deep and well marked intra-orbital grooves



Fig. 6. Shallow and poorly marked intra-orbital groove in the left orbit.

double foramen meningo-orbitale (Fig. 7). In one skull, bilateral groove was found with single foramen meningo-orbitale on left side and double on right side (Fig.5).



Fig. 7 Bilateral intra-orbital groove with single foramen meningo-orbitals on left and double in the right orbit.

The groove for the orbital branch of the middle meningeal artery was found present in 7 hemi skulls on the right side, in 8 hemi skulls on the left side and in 38 skulls on both sides (Fig. 8). The foramen spinosum was found present in 218 orbits and the groove for middle meningeal artery arose from it following its usual course (Fig. 8). It was absent on both sides in one skull and on left side in one skull.

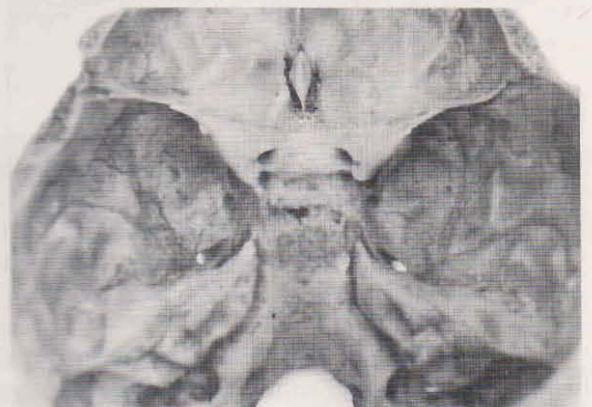


Fig. 8. Groove for the orbital branch of middle meningeal artery present bilaterally in middle cranial fossa.

Table 1. Incidence of intra-orbital groove in different populations

| Population | No. of orbits examined | Groove present | | | Groove absent | |
|-----------------------------------|------------------------|----------------|----------------------------------|---------------|----------------|---------------|
| | | Right + Left | Unilateral Right Left | Bilateral | Total | |
| Asiatic origin (Royal 1973) | 64 (32 + 32) | | 34.4% (11) 34.4% (11) | 72.7% (16) | 34.4% (22) | 65.6% (42) |
| Brazilian (Santo Neto 1984) | 100 (50 + 50) | | 48% (24) 42% (21) | 33.3% (15) | 45% (45) | 55.0% (55) |
| Pakistani (Present study 1994) | 200 (110 + 110) | | 65.5% (72) 57.2% (63) | 25.9% (35) | 61.4% (135) | 38.6% (85) |

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