

# A groove in the lateral wall of the orbit and its relation to the orbital branch of the middle meningeal artery

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*The presence of a groove on the lateral wall of the orbit which is not mentioned in classical anatomy textbooks and its relation to other structures of the orbit and middle cranial fossa was investigated on 30 dried adult skulls. This intraorbital groove was found to be present bilaterally in 17%, and unilaterally in 34 % of the skulls. It was continuous with a groove in the middle cranial fossa in 13.3% of the skulls. We suggested that the groove in the lateral wall of the orbit can be the site where the middle meningeal artery anastomoses with the infraorbital artery. [Turk J Med Res 1993; 11(5): 210-212]*

Key Words: Orbit, Middle meningeal artery, Middle cranial fossa

The middle meningeal artery is the largest branch of the maxillary artery. It enters the cranium through the foramen spinosum, and courses anteriorly and superiorly between the dura mater and the bone. After it reaches the cranium, the main stem gives off the anterior and posterior branches. These branches also give off small branches which form the sulci arteriosi on the bone structure. A branch arising from the frontal ramus of this artery proceeds the anterior cranial fossa and divides into fine branches to reach the orbit and the nasal cavity (1,2).

The orbital ramus, which is derived from the frontal ramus of the middle meningeal artery passes along a groove and enters the orbit either through the superior orbital fissure or through a foramen called the meningo-orbital foramen. Sometimes, a groove continuous with the groove of the orbital ramus is noted in the lateral wall of the orbit (3). In classical anatomy textbooks, no information about this intraorbital groove is present (4). This groove arises from the lateral extremity of the superior orbital fissure, crosses the orbital surface of the greater wing of the sphenoidal bone, and terminates at the posterior extremity of the inferior orbital fissure (3,5).

Such a groove was first referred by Low (6) in a case of the anomalous middle meningeal artery. He

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noted that an artery coursed in this groove. Also interesting in his case was the bilateral absence of the foramen spinosum.

This groove on the lateral wall of the orbit is important, because it can be the site where the middle meningeal artery anastomoses with the infraorbital artery (3,5). We therefore investigated the incidence of this groove, its relation to the groove in which the orbital branch of the middle meningeal artery courses in the middle cranial fossa and to the foramen meningo-orbitale.

## MATERIALS AND METHODS

Sixty orbits of the thirty dried adult skulls of both sexes selected randomly from the collection of the Department of Anatomy, Medical School of Ankara University constituted the material of this study. In order to expose the groove in which the orbital branch of the middle meningeal artery courses, the part of calvaria above a plane which passes through the lambda posteriorly, and the stephanion laterally, was removed.

## RESULTS

We found the groove on the lateral wall of the orbit bilaterally in 5 skulls (17%), and unilaterally on the left in 1 skull (3.4%) (Figure 1). In all orbits we have examined, this groove arose from the lateral extremity of the superior orbital fissure, crossed the orbital surface of the greater wing of the sphenoid bone, and terminated at the posterior end of the inferior orbital fissure.

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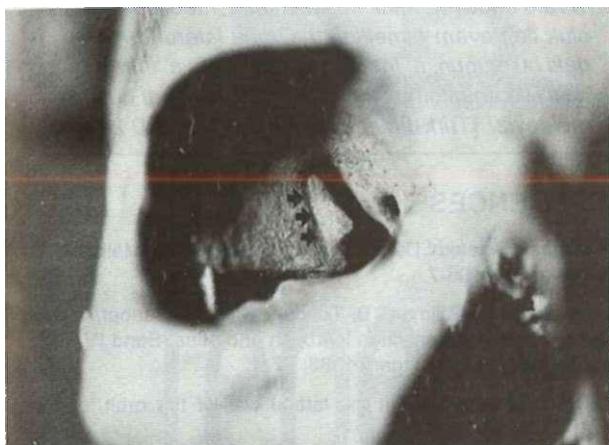


Figure 1. The groove on the lateral wall of the right orbit.

The foramen meningo-orbitale was found to be present bilaterally in two skulls (6.6%) and unilaterally in six (3 on the right, 3 on the left).

The foramen spinosum was present in all skulls. Groove of the middle meningeal vessels extended from this foramen anteriorly and superiorly towards the squamous part of the temporal bone. It, then, divided into two branches which coursed anteriorly and posteriorly. After dividing from the groove for frontal branch of middle meningeal vessels, the groove of orbital branch of the middle meningeal vessels coursed anteriorly to reach the superior orbital fissure or the foramen meningo-orbitale. This groove was present unilaterally in 3 orbits on the right (10%) and in 5 orbits on the left (15%). It was present bilaterally in 8 skulls (26.6%). No double groove was noted in any of the skulls. In two orbits we also found that the groove of the orbital branch of the middle meningeal artery extended towards the foramen meningo-orbitale. In four skulls (13.3%), the groove in the middle cranial fossa was continuous with the groove on the lateral orbital wall. One of them was bilateral and two of them was unilateral at left.

## DISCUSSION

In the present study, we found the groove in the lateral wall of the orbit in 20% of the preparations. This finding is consistent with Royle's (3) findings who reported a 17.18% incidence. Neto et al (5) in 100 orbits, reported a higher incidence (45%). We observed the foramen meningo-orbitale in 16.6% of the orbits. This rate is higher than those reported by Neto et al. and Royle (6% and 4.6%, respectively) (3,5).

After dividing from the groove for the frontal branch of middle meningeal vessels the groove of the orbital branch of the middle meningeal artery coursed superiorly towards the superior orbital fissure or the foramen meningo-orbitale. This groove was present in 80% of the skulls we have examined. Royle (3)

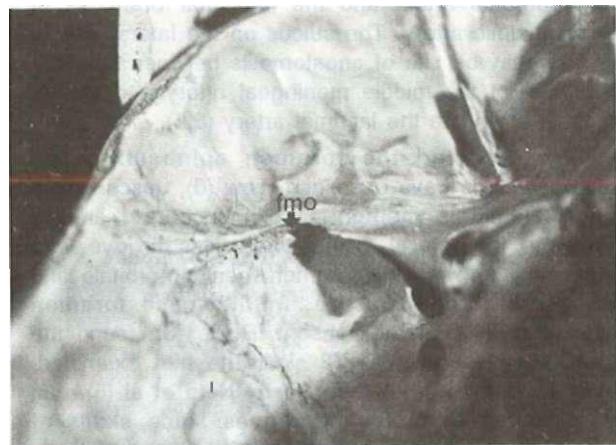


Figure 2. Unilaterally located foramen meningo-orbitale in middle cranial fossa, fmo: foramen meningo-orbitale.

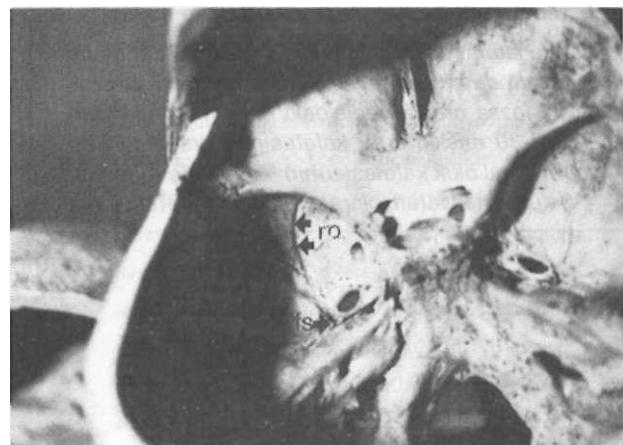


Figure 3. The groove of the orbital branch of middle meningeal artery on left in middle cranial fossa, fs: foramen spinosum, ro: the groove of the orbital branch of middle meningeal artery.

reported this groove to be present in 100% of the orbit whereas Neto et al (5) reported a 48% incidence.

In four orbits (13.3%), the groove of orbital branch of the middle meningeal artery in the middle cranial fossa was continuous with the groove in the lateral orbital wall originating from the superior orbital fissure. One of them was bilateral and two of them were unilateral. Neto et al. (5) reported the two sulci were continuous in 24% of the orbits. Royle (3) reported a 34.37% incidence.

Hayreh (7), and Hayreh and Dass (8) investigated the ophthalmic artery and its branches in a series of study. In these studies, they found anastomoses between the orbital branch of the middle meningeal artery and the meningeal branch of the lacrimal artery. These anastomoses joined each other via the foramen meningo-orbitale or the superior orbital fissure. They also reported anastomoses between the lacrimal artery and the infraorbital artery, and between

the infraorbital artery and the muscular branches of the ophthalmic artery. The sulcus on the lateral wall of the orbit may be site of anastomosis between the orbital branch of the middle meningeal artery and the infraorbital artery via the lacrimal artery (3,5).

We detected the foramen spinosum in all preparations we have examined. Low (6), described an abnormal middle meningeal artery coursed in the groove in the lateral orbital wall. This groove was proceeding between the foramen meningo-orbitale and the inferior orbital fissure. In this case foramen spinosum was bilaterally absent. Royle (3), found the foramen spinosum in all 32 skulls he had examined. Lower incidence (48%) reported by Neto et al (5), can be attributed to racial differences since skulls of negroes and mulattoes were included in his material.

#### Orbita lateral duvarındaki bir oluk ve a. meningea media'nın orbital dalı ile ilişkisi

*Orbita lateral duvarında bulunan ve klasik anatomi kitaplarında zikredilmeyen bir oluşun varlığı ve orbita ile fossa cranii media'daki diğer yapılarla olan ilişkisi 30 erişkin kuru kafatasında araştırıldı. Bu intraorbital oluk kafataslarının %17'sinde iki taraflı, %34'ünde tek taraflı olarak bulundu. Kafataslarının*

%13.3'ünde bu oluk fossa cranii media'daki bir oluk ile devam etmekteydi. Orbita lateral duvarındaki bu oluşun, a. meningea media'nın a. infraorbitalis'i ile anastomozlaştiği yer olabileceğini düşünmektedir. [Turk J Med Res 1993; 11(5):210-212]

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