eISSN 1308-4038

International Journal of Anatomical Variations (2010) 3: 188–190

Case Report

Partial closure of right superior orbital fissure with narrow optic foramen

Published online November 26th, 2010 © http://www.ijav.org

Shankreppa Doddappa DESAI ✦
Sunkeswari SREEPADMA

Department of Anatomy, Blde University, Shri B. M. Patil Medical College, Bijapur, Karnataka State, INDIA.

✦ Dr. S. D. Desai
Professor & Head
Department of Anatomy
Blde University
Shri B. M. Patil Medical College
Bijapur-586103, Karnataka, INDIA.
☎ +91 8352 262770 ext.:2211
✉ dr.desaisd@gmail.com

Received April 7th, 2010; accepted October 31st, 2010

ABSTRACT

Superior orbital fissure is situated between the greater and lesser wings of sphenoid, with the optic strut at its superomedial margin. It lies between the roof and lateral wall of the orbit. The superior orbital fissure is divided by the common tendinous origin of the recti muscles. Compression of the neurovascular structures due to variations in the superior orbital fissure may result in signs and symptoms due to involvement of cranial nerves III, IV, V1, and VI. We report here a variation of the superior orbital fissure. Superior orbital fissure was partly closed by a thin plate of bone on the right side, and on the same side there was a narrow optic foramen. It is essential to know such variations to understand the underlying cause for the clinical conditions and operate in those areas. © **IJAV. 2010; 3: 188–190.**

Key words [superior orbital fissure] [neurological deficits] [superior orbital fissure syndrome] [optic canal] [optic foramen]

Introduction

Superior orbital fissure is an oblique cleft and connects the middle cranial fossa with the orbit. It is bounded above and medially by the lower surface of the lesser wing, below and laterally by the medial margin of the orbital surface of the greater wing, medially by the body of sphenoid. It is divided into 3 parts by common tendinous ring. Superolateral compartment transmits: lacrimal nerve, frontal nerve, trochlear nerve, lacrimal branch of meningeal artery, recurrent meningeal branch of ophthalmic artery and superior ophthalmic vein or veins. Intermediate compartment transmits: upper and lower divisions of the oculomotor nerve, nasociliary nerve between the two divisions of oculomotor nerve and abducens nerve. Inferomedial compartment transmits inferior ophthalmic veins. The optic canal lies in the lesser wing of the sphenoid bone between the orbit and the cranial cavity and contains the optic nerve covered by three meningeal layers, ophthalmic artery and the sympathetic nerves.

Case Report

During the routine osteology demonstration classes, we found partial closure of superior orbital fissure on right side. The superolateral and the intermediate compartments were closed by a thin plate of bone (Figures 1, 2). Only the inferomedial part was open to transmit the neurovascular structures. The superior orbital fissure on right side measured 0.9 cm vertically and 0.6 cm transversely. On the left side the fissure appeared normal in shape and measured 0.9 cm vertically and 1.4 cm transversely (Figure 4).

On the right side, we observed that there was a narrow optic foramen 0.2 cm in diameter. On the left side the optic foramen appeared normal and was 0.6 cm in diameter (Figures 3, 4). The specimen was photographed in different aspects.

Discussion

Superior orbital fissure is an important cleft which transmits vital neurological structures. Neurological deficits occur due to the compression or damage to these structures in the fissure. The abducens nerve is most likely to show signs of damage first, with the most common complaints of retro-orbital pain and the involvement of cranial nerves III, IV, V1, and VI without other neurological signs or symptoms. This presentation indicates compression of structures in the superior orbital fissure [1]. In our case, the superolateral part and the intermediate part were closed with a thin plate of bone, therefore, only the inferomedial part was open to transmit all the structures passing through the superior orbital fissure. This extra plate of bone could compress the neurovascular structures leading to signs of symptoms (Figures 1, 2). Superior orbital fissure syndrome, also known as Rochon-Duvigneaud's syndrome, is a neurological disorder that occurs if the superior orbital fissure is injured and due to the involvement of the cranial nerves that pass through the superior orbital fissure, may lead to diplopia, paralysis of extraocular

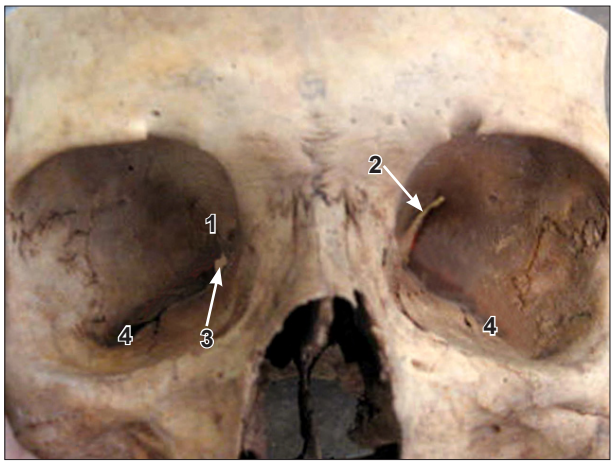

Figure 1. Front view of skull showing both orbits. *(**1:** thin bony plate; **2:** superior orbital fissure; **3:** open infero-medial quadrant; **4:** inferior orbital fissure)*

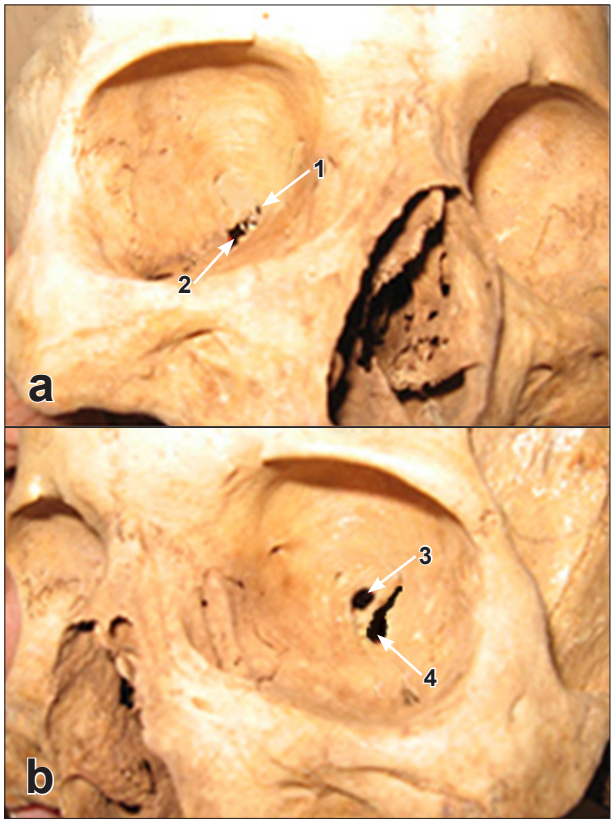

Figure 2. a) Right orbit showing optic foramen and superior orbital fissure. **b)** Left orbit showing optic foramen and superior orbital fissure. *(**1:** narrow optic foramen; **2:** open infero-medial quadrant; **3:** normal optic foramen; **4:** superior orbital fissure)*

motions, exophthalmos, and ptosis. Blindness or loss of vision indicates involvement of the orbital apex, which is more serious, requiring urgent surgical intervention.

In the study of 100 orbit preparations by Reymond et al., nine various morphological types of the superior orbital fissure were distinguished. Among those were two main categories: type "a" characterized by a clear narrowing within the fissure and type "b" which lacked such narrowing. Position of soft tissue structures in superior orbital fissure depended on its morphological type [2].

Two pathogenesis mechanisms are identified by Deda and Demirci; the direct, in which the nerves traversing the fissure are interrupted or compressed by displaced bone fragments. The second is indirect mechanism, in which the orbital walls behave like a non-expendable box, so every increase in internal pressure caused at the moment of the injury by posterior displacement of the eyeball or later by edema and bleeding may compress the nerves against the rims of the fissure [3].

In their study, Fujiwara et al. considered the narrow superior orbital fissure as a risk factor for superior orbital fissure syndrome, and the syndrome is resulted from damage to the nerves passing through the superior orbital fissure. Narrow superior orbital fissure may reduce the tolerance to compression of the nerves by edema. When the superior orbital fissure is congenitally narrow, the surgeons should try to avoid excessive pulling of the bone fragment and compression of the orbital tissue during repair of the facial bone fractures [4].

In our case, we observed narrow optic canal on right side, 0.2 cm in diameter. Neuro-arterial relations in the region of the optic canal have commanded increasing attention from the practical medical point of view (Figures 2, 3). Since injury to any part of the optic pathway results in visual defects, knowledge of the micro-anatomic features of the optic canal and related structures is very important for surgeons approaching vascular lesions of this area [5].

Traumatic cases, tumors of posterior orbit such as angioma, malignant tumor, tumors of lesser and greater wings of sphenoid bone are operated at the posterior part of the orbit, optic canal or superior orbital fissure. Hence this case report may be of interest for neurosurgeons, ophthalmologists and radiologists to approach the superior orbital fissure in order to prevent inadvertent damage to the intra-orbital structures.

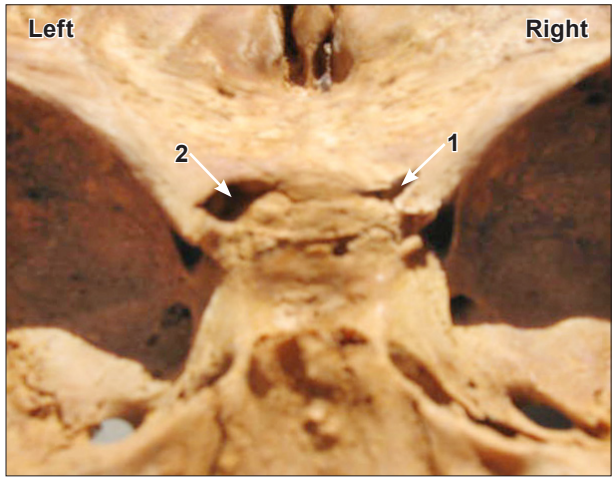

Figure 3. Interior view of skull focussing middle cranial fossa. *(**1:** narrow optic foramen; **2:** normal optic foramen)*

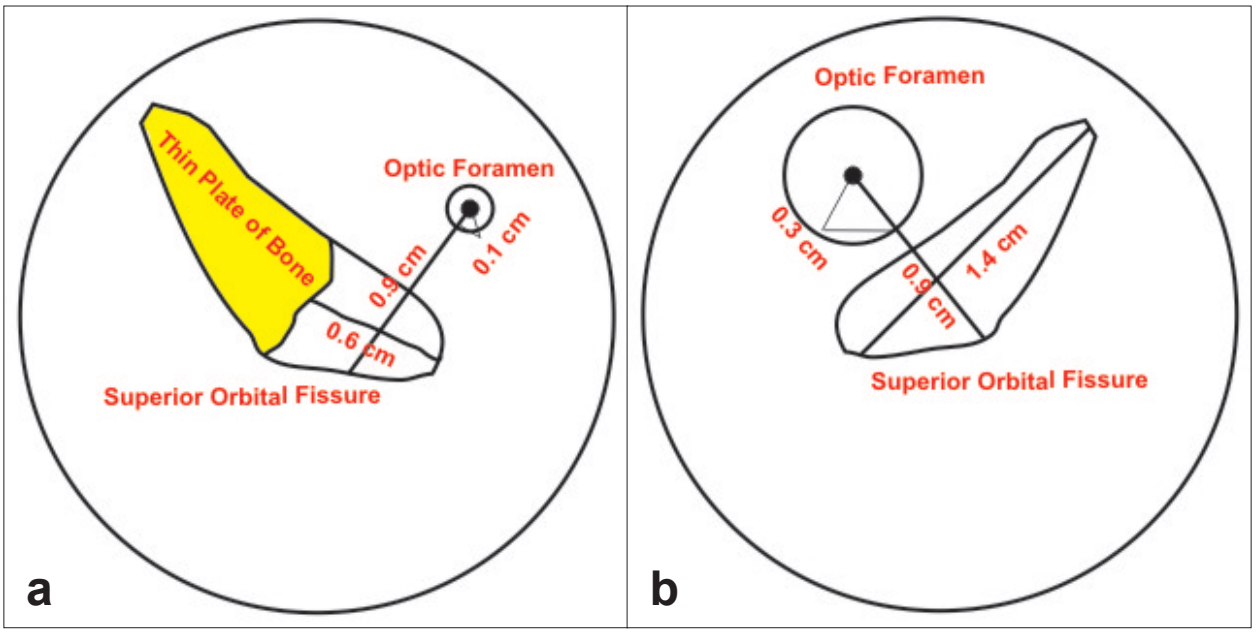

Figure 4. a) Schematic diagram of right orbit. **b)** Schematic diagram of left orbit.

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