

Bilateral Osseous Interclinoid Bridges Associated with Foramina of Vesalius: A Case Report

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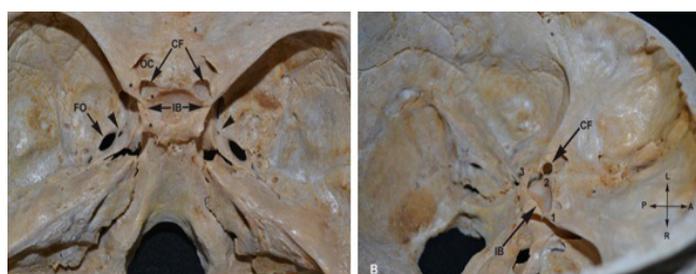
ABSTRACT

The current study displays a very rare combination of ossified interclinoid ligaments at the sella turcica region associated with bilateral foramina of Vesalius. In a macerated skull four osseous bars interconnecting the clinoid processes bilaterally were detected. Specifically, two bilateral osseous bars were observed bridging the gap between the anterior and middle clinoid processes forming the so called caroticoclinoid foramen on each side and two additional osseous bridges linked the anterior and posterior clinoid processes, bilaterally. Furthermore, two distinct bilateral foramina of Vesalius were documented just anterior and medial to the foramen ovale. The awareness of the osseous sellar bridges is crucial for the physician and especially the neurosurgeon since their presence may complicate the removal of clinoid processes and induce damage of the internal carotid artery and oculomotor nerves. Furthermore, the likely existence of the foramen of Vesalius may lead to transfer of an infected thrombus into the cranial cavity and complicate a percutaneous trigeminal rhizotomy.

Keywords: Clinoid processes, Cranial foramina, Osseous bridges, Turcica sella, Variations

CASE REPORT

During the routine osteology demonstration course in our Department of Anatomy, in a dry human skull of unknown gender and age we came across a combination of osseous variants located at the intracranial aspect of the middle cranial fossa. Particularly, on either side an osseous bar extended between the anterior and middle clinoid process forming the caroticoclinoid foramen (CF). The transverse diameter of CF was 6.14 mm on the right side and 5.85 mm on the left side. In addition, on each side an interclinoid bridge (IB) was present in which a suture like joint was detected. Its length was estimated as 7.58 mm on the right side and 7.56 mm on the left side. Furthermore, a Foramen of Vesalius (FV) was noted bilaterally situated anterior and medial to the foramen ovale with the maximum diameter being 1.12 mm on the right side and 2.14 mm on the left side. The distance of FV from the anterior edge of the foramen ovale was estimated as 3.97 mm on the right side and 1.45 mm on the left side [Table/Fig-1A,B]. The morphometric study was conducted with the aid of a digital vernier caliper with an accuracy of 0.01 mm, whereas photographic documentation was taken by Nikon D3100 digital camera.



[Table/Fig-1A,B]: A) Photograph demonstrating the internal view of the skull base. Note the bilateral presence of caroticoclinoid foramina (CF), as well as the bilateral interclinoid bridges (IB) interconnected with a suture-like joint. In addition a foramen of Vesalius (arrow heads) is located just anterior and medial to the foramen ovale (FO), on each side (asterisks: clinoid processes, OC: optic canal). B. Right view of the skull base demonstrating the turcica sella area with the osseous bridges extending between the clinoid processes (1: anterior clinoid process, 2: middle clinoid process, 3: posterior clinoid process, CF: caroticoclinoid foramen, IB: interclinoid bridge, A: anterior, P:posterior, R:right, L:left)

DISCUSSION

The anterior and middle clinoid processes are united by the so called caroticoclinoid ligament that occasionally becomes ossified forming the CF, whereas the anterior and posterior clinoid processes are rarely fused giving rise to the so-called IB [1]. FV is a small variable foramen of the floor of the middle cranial fossa situated between the foramen ovale and the foramen rotundum [2]. Keyes very early in 1935 classified the CF into the complete type with a distinct bony ring, the contact type with a line or suture at the site of junction between the anterior and middle clinoid process and the incomplete type where the two previous processes do not touch each other [3]. The bilateral documentation of CF of the complete type is very rare, with its incidence ranging between 1.75% and 2.5% [1,4]. Nevertheless, Ozdogmus et al., reported a high incidence (18%) for the bilateral CF without providing an explanation whether such CF belongs to complete or contact type [5]. As regards the presence of bilateral IB of contact type an incidence of 1.17% [1] or 0% [6] was mentioned. Kanjiya et al., noticed the bilateral complete type of IB with a frequency of 4.5% [6], or 6% according to research work of Ozdogmus et al., [7]. Moreover, the bilateral occurrence of the FV is ranged between 5% [8] and 35% [9].

The combination of bilateral CF and IB was detected in 0.8% [10], 2.68% [11] or 3.5% [6] of the investigated material, as well as in some single case reports [12,13]. Those ossified interclinoid ligaments are laid down in cartilage at an early stage of development and ossify in early childhood [14], whereas Kier mentioned that these ossified ligaments constitute a developmental anomaly [15]. Removal of the anterior clinoid process could be hazardous for the internal carotid artery, especially in the case of an aneurysm [16] or lead to iatrogenic injury of the adjacent oculomotor nerves [17].

Our case report constitutes a very infrequent osseous variant since such a combination of bilateral CF and IB associated with a bilateral FV, to the best of our knowledge has never been documented in the literature. FV is located between the foramen rotundum and the foramen ovale on its medial side. It is traversed by a small vein, the so-

called emissary vein of Vesalius anastomosing the cavernous sinus with the pterygoid plexus [18]. The awareness of FV's appearance is crucial for the operating neurosurgeon since an infected thrombus can reach the interior of cranial cavity from outside it, through the emissary vein of Vesalius [2,19]. Furthermore, during percutaneous trigeminal rhizotomy for treatment of trigeminal neuralgia, the needle could be inserted into the FV puncturing the cavernous sinus or the emissary vein of Vesalius [20].

CONCLUSION

Such a rare combination of osseous variants located at the sphenoid bone should be highlighted to the physician dealing with pathology of the central base of the skull. Especially, the neurosurgeon should be aware of these bony abnormalities in order to proceed on more cautious and effective surgical interventions taking into account the adjacent vital anatomical structures, such as the internal carotid artery, the cavernous sinus, the hypophysis cerebri and the oculomotor nerves.

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