

Bilateral carotico-clinoid foramen and inter-clinoid bars

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Abstract

The carotico-clinoid foramen is the result of ossification either of the carotico-clinoid ligament or of a dural fold extending between the anterior and middle clinoid processes of the sphenoid bone. It is anatomically important due to its relations with the cavernous sinus and its content, sphenoid sinus and pituitary gland. In this study the presence of carotico-clinoid foramen and inter-clinoid bars has been studied on 25 dry skulls. In 25 dry skulls, authors have reported one skull, in which, a bilateral: foramen clinoideo caroticum and interclinoid bars are seen as a consequence of fusion of anterior, middle and posterior clinoid processes. The existence of a bony carotico-clinoid foramen may cause compression, tightening or stretching of the internal carotid artery. Further, removing the anterior clinoid process is an important step in regional surgery; the presence of a bony carotico-clinoid foramen may have high risk. Therefore, detailed knowledge of the type of ossification between the anterior and middle clinoid processes can be necessary to increase the success of regional surgery.

Keywords: Foramen Clinoideo Caroticum, Interclinoid bar, Clinoid process

INTRODUCTION

For the purpose of study, cranial cavity can be divided into 3 fossae viz. anterior, middle and posterior cranial fossae. The anterior cranial fossa, extending from frontal bone anteriorly to lesser wing of sphenoid posteriorly lodges the frontal lobe of cerebral hemispheres. The lesser wings of the sphenoid which form the posterior border of this fossa end medially to form eminences termed as anterior clinoid processes. To these are attached anterior end of free margin of tentorium cerebelli¹.

The middle cranial fossa is butterfly shaped and formed in the centre by superior or cerebral surface of body of the sphenoid. Anteriorly this surface is smooth and is termed jugum sphenoidale. Traced posteriorly, it presents, sulcus chiasmaticus, tuberculum sellae, sella turcica and dorsum sellae. Anterior boundary of sella turcica is completed laterally by 2 small eminences, the middle clinoid processes. It also forms the anterior end of the medial boundary of the groove for internal carotid artery. Ossification of the ligaments around the sella turcica may give rise to bony ridges that connect clinoid processes and other surrounding structures. These sella bridges can develop unilaterally or bilaterally and vary in frequency². The superolateral angles of dorsum sellae end in 2 tubercles of varying size, the posterior clinoid processes which give attachment to the fixed margin of tentorium cerebelli¹. The posterior cranial fossa is deep lying posterior to petrous part of temporal bone, formed greatly by squamous part of occipital bone and lodges the cerebellar hemispheres¹.

The presence of carotico clinoidal foramen and interclinoid bars may manifest clinical symptoms, depending on its size.

The aim of this study was to present the presence of carotico clinoidal foramen and ossified interclinoid ligament morphologically and to consider its possible impact on the surrounding neurovascular structures.

MATERIALS AND METHODS

This study has been conducted in 25 dry skulls at the Department of Anatomy, Sree Balaji Dental College and it was observed in a skull belonging to that, bilateral carotico clinoid foramen and interclinoid bars are seen as a consequence of fusion of anterior, middle and posterior clinoid processes. This skull was studied and scrutinised for any other variation and photographed.

OBSERVATIONS

In the skull, clinoid processes were linked by a bony bridge between the anterior, middle and posterior clinoid processes on both sides thus forming foramen termed foramen clinoideo-caroticum on both sides. (Photograph-1) It is seen fusion between anterior and posterior or between middle and posterior clinoid processes on either side forming inter clinoid bars (Photograph -2).



Photograph 1-showing the skull with bilateral Carotico Clinoid Foramen (CCF) and Interclinoid Bar (ICB).

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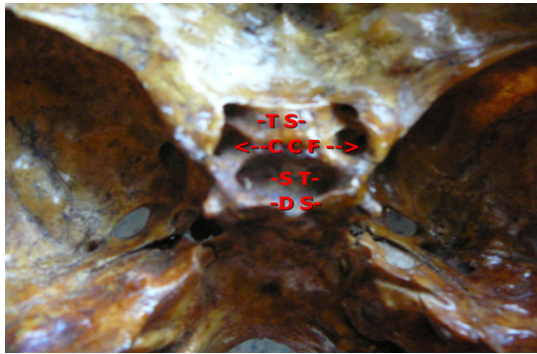
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Photograph 2- showing the skull with Bilateral Fusion of Anterior clinoid process (ACP) with Posterior clinoid process. (PCP). There is an attempt to form foramen clinoideo-Caroticum (FCC) on both sides. It also shows Tuberculum sellae (TS), Sella Turcica (ST), Dorsum Sella (DS).

DISCUSSION

Anterior and middle clinoid processes in the living are normally linked by a ligament which is not seen in the dry skulls. However, sometimes if this ligament ossifies a foramen is formed through which internal carotid artery passes as it courses upwards medial to the anterior clinoid process to supply the brain. This foramen is known as "Foramen Clinoideo Caroticum."³ This is the only mention made by Dubrul, 1996 and Williams et al, 1999. Even Dubrul, 1996 and Williams et al, 1999 are silent about its prevalence and about its bilateral presentation. A bilateral complete foramen clinoideo-Caroticum observed in 1st photograph seems to be extremely rare and merits reporting.

Interclinoid bar of bone present between anterior and posterior clinoid processes as observed in 2nd photograph may be a continuation of ossification in duramater extending between these two processes. Again on review of literature no reference to this entity, its prevalence or bilateral presentation could be traced. So a need was felt to report this rare bilateral presentation of interclinoid bar^{4,5,6}. The carotico-clinoid foramen results from an ossified ligament that unites the anterior with middle clinoid process. Ossification of the ligament that connects the tips of the anterior and posterior clinoid processes produces a solid inter clinoid bar⁷. In our case the ossified inter clinoid bar unites with the anterior and

posterior clinoid processes and it was bilaterally present. It could therefore affect surrounding neurovascular structures causing clinical symptoms. This bar might influence the blood flow in the internal carotid arteries or cause dysfunction of the muscles of eyes owing to possible compression of oculomotor nerve. The internal carotid artery passes through the foramen clinoideo-caroticum as it turns upwards to supply brain. While on one hand, the foramen gives a safety cover to the artery, on the other hand, it may confuse the radiologist doing carotid arteriogram⁸.

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