

A Study on Incidence of Caroticoclinoid Foramen

Sivakumar M.

Abstract

Background: The caroticoclinoid foramen is an inconstant structure, which is located in the middle cranial fossa composed by the ossification of a fibrous ligament that begins on the anterior clinoid process and binds to the middle clinoid process. Carotico-clinoid foramen allows the passage of one of the six segments of the internal carotid artery, the clinoidal segment [1]. The fibrous ossification of ligament is considered a normal physiological process. **Materials and Methods:** This study was conducted in different medical colleges in South India. 300 skulls were collected from 1 MBBS students and the incidence of caroticoclinoid foramen was studied. **Results:** Out of 300 skulls of unknown sex, 2 skulls showed bilateral caroticoclinoid foramen and 5 skulls had unilateral caroticoclinoid foramen, the total incidence was 2.33%. **Conclusion:** The present study concludes that the knowledge about caroticoclinoid foramen will be helpful in brain surgeries and CT scan studies of intracranial haemorrhage.

Keywords: Carotico Clinoid Foramen; Intracranial; Internal Carotid Artery; Brain.

Introduction

The anterior and middle clinoid processes of sphenoid bone are connected by a ligament called caroticoclinoid ligament, which may be ossified forming the caroticoclinoid foramen. Ossification of some normally occurring ligaments of the human skull produces the bony bridges that connect to the clinoid processes with other surrounding structures. The ligaments are related to many anatomical structures and when ossified may cause compression of these structures. The carotico clinoid foramen, first described by Henle, formed due to ossification of the ligamentous structures of the skull may result in clinical problems such as compression of neighbouring structures or complications in regional surgery. Research studies have also reported the fact that an ossified carotico clinoid ligament makes the removal of anterior clinoid process more difficult, especially in the presence of aneurysm [1,2].

Author's Affiliation: Additional Professor of Anatomy, Jawaharlal Institute of Postgraduate Medical Education & Research, Puducherry 605006, India.

Corresponding Author: Sivakumar M., Additional Professor of Anatomy, Jawaharlal Institute of Postgraduate Medical Education & Research, Puducherry 605006, India.
E-mail: sivakumar96@yahoo.com

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Study by Hochstetter [3] revealed the presence of this foramen in 14.1% of skulls. The caroticoclinoid and interclinoid ligaments are related to the internal carotid artery and oculomotor nerve. In the presence of caroticoclinoid foramen, it is impossible to retract or mobilise the cavernous segment of internal carotid artery even after releasing the proximal and distal carotid rings [4].

Preoperative recognition of caroticoclinoid foramen is important because undue retraction of cavernous segment of internal carotid artery may tear or rupture it and cause fatal cerebral infarction [5].

The caroticoclinoid bridge could cause pressure on the internal carotid artery that lies in the cavernous sinus changing the morphology in the terminal end of the groove of internal carotid artery. Due to greater calibre of internal carotid artery in this region compared to the diameter of caroticoclinoid foramen, the possibility of headache due to compression by the foramen is high. Caroticoclinoid foramen is an important structure due to its relations with cavernous sinus and its contents, sphenoid sinus, and pituitary gland [6].

The present study is conducted to find out the incidence of carotico clinoid foramen in the skulls obtained from south india as the knowledge about this foramen may be helpful to neurosurgeons in their practice.

Materials and Methods

This study was conducted in different medical colleges in South India. 300 skulls were collected from I MBBS students and the incidence of caroticoclinoid foramen was studied. The collected skull bases were clearly observed to find out the carotico clinoid ligament ossification.

Results

Out of 300 skulls of unknown sex, 2 skulls had bilateral carotico clinoid foramen and 5 skulls had unilateral carotico clinoid foramen, the total incidence was 2.33% (Table 1).

Table 1: Showing the incidence of caroticoclinoid foramen

	Number of skulls	Total number skulls observed	Incidence (%)
Unilateral caroticoclinoid foramen	5	300	1.66%
Bilateral caroticoclinoid foramen	2	300	0.66%
Total	7	300	2.33%



Fig. 1: Showing bilateral caroticoclinoid foramen



Fig. 2: Showing unilateral caroticoclinoid foramen

Discussion

Certain parts of the sphenoid bone are connected by ligaments which occasionally ossify such as the pterygospinous, the interclinoid and the carotico clinoid. The carotico clinoid foramen is the result of ossification either of the caroticoclinoid ligament or of a dural fold extending between the anterior and middle clinoid processes of the sphenoid bone. The existence of a bony caroticoclinoid foramen may cause compression, tightening or stretching of the internal carotid artery. Parasellar interclinoid bars are significant in surgical management while dealing with the vascular, neoplastic or traumatic lesions of the central skull base and can also compress the surrounding structures giving rise to various clinical symptoms. Removal of the anterior clinoid process is one of the most critical procedures to the successful and safe management of ophthalmic segment aneurysms

and tumors located in the paraclinoid region and cavernous sinus. Special attention should be paid to the anatomic landmarks indicating the relationship between the anterior clinoid process and adjacent structures. Pneumatization of the anterior clinoid process should be evaluated preoperatively with computed tomography to avoid complications such as rhinorrhea and pneumocephalus [1,2].

In the present study, total 300 skulls were studied and the caroticoclinoid foramen was present in 2.33% of skulls. In a study involving 119 dry skulls and 52 cadaveric heads of Turkish population, Erturk et al [1] found the incidence of caroticoclinoid foramen in 35.67%. S.D Desai [2] reported the same as 37.19% out of 223 skulls. The study of Rani Archana [7] observed, out of the 250 dried Indian human skulls 30 (12%) skulls showed caroticoclinoid foramen. Keyers [8] observed 34.84% incidence of caroticoclinoid foramen in American population.

In the present study bilateral caroticoclinoid foramen was found in 0.66% of skulls and unilateral caroticoclinoid foramen was found in 1.66% of skulls. In a study by S. D Desai [2], complete bilateral caroticoclinoid foramen was found in 10.31% and complete unilateral carotico clinoid foramen was found in 7.16% of skulls. In the study of Erturk [1], 11.69% of skulls were with bilateral caroticoclinoid foramen and 23.98% of skulls were with unilateral caroticoclinoid foramen. In a study on 270 dry human skulls by Azeredo [9], the fusion between the anterior and middle clinoid processes occurred bilaterally in 4.05% of skulls. A racial variation in the incidence of this foramen has been reported by Erturk et al [1]. A high incidence has been noted in Turkish (35.67%) and Caucasian Americans (34.84%) while a low incidence was found in Koreans (15.7%) and Japanese (9.9%). Hasan [10] reported bilateral caroticoclinoid foramen and absent mental foramen in an adult Asian female's dry skull. High incidence (15-38%) of this foramen has been associated with the idiots, criminals, epileptics, and those with hormone disturbances [11]. Since the incidence of caroticoclinoid foramen varies in different races and their geographical location, knowledge about its details will be helpful in surgeries of internal carotid artery and CT scan studies of skulls.

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