ORIGINAL RESEARCH PAPER

Volume-7 | Issue-11 | November-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# STUDY OF VARIATIONS OF CAROTICO-CLINOID FORAMEN AND SELLA TURCICA BRIDGES IN HUMAN FULLY OSSIFIED SKULLS

Anatomy

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## ABSTRACT

The carotico-clinoid foramen is formed due to ossification of carotico-clinoid ligament between anterior and middle clinoid process and bony ridge between anterior and posterior clinoid processes formed by ossified dural extension connecting these two processes is known as sella turcica bridge. Presence of the foramina and bridge may cause compression, tightness or stretching of internal carotid artery and also causes endocrinological problems affecting hypothalamus or hypophysis cerebri or neurological problems through oculomotor or optic nerve.

## KEYWORDS

Foramen, Hypothalamus, Process, Ridge

## INTRODUCTION

The sella turcica is a saddle shaped depression on the intra cranial surface of the body of sphenoid bone. It consists of three clinoid processes: anterior, middle and posterior. The anterior clinoid processes are formed by the medial and anterior prolongations of the lesser wing of the the sphenoid bone. The posterior clinoid processes are present at the end of the dorsum sellae. The middle clinoid processes are present on either side of tuberculum sellae.[1]

The anterior and middle clinoid processes are connecting by carotico-clinoid ligament which sometimes get ossified forming the carotico-clinoid foramen which transmits one of the segments of internal carotid artery. Ossification of interclinoid ligaments that connects anterior and posterior clinoid processes is termed as interclinoid osseous bridge or sella turcica bridge which are related to internal carotid artery, cavernous sinus and pituitary gland. Formation of carotico-clinoid foramen may cause compression or stretching of the internal carotid artery and may also causes many complications during surgery in the region of sphenoid bone. Due to these clinical significance in the neurosurgeries, the present study was done to determine the prevalence and morphology of the carotico-clinoid foramen in human skulls.[2]

## MATERIALS AND METHODS:

The present study was conducted on 30 adult human skulls in the Department of Anatomy, SGT Medical College, Gurugram. The fully ossified human skulls with intact clinoid processes were included in the present study.

The parameters of skull studied were –

- Presence or absence of foramen
- Complete or incomplete foramen
- Unilateral or bilateral foramen
- Diameter of foramen

Interclinoid bars classification method was followed which was described by Rani Archana et al3. interclinoid bars were classified into 4 types:

**Type 1:** Bridge present between anterior and middle clinoid process (cartico-clinoid foramen)
**Type 2:** Bridge between anterior, middle and posterior clinoid process
**Type 3:** Sella turcica bridge (bridge between anterior and posterior process)
**Type 4:** Bridge between the middle and posterior clinoid process

The morphomertry of each foramen and bridge was done by using digital vernier caliper.

## RESULT:

1. Presence or absence of carotico-clinoid foramen: Out of 30 skulls, carotico-clinoid foramen was present in 2 (6.66%) skull bones.
2. Complete or incomplete carotico-clinoid foramen: In 1 skull (3.33%) complete carotico-clinoid foramen and in 1 skull (3.33%) incomplete carotico-clinoid foramen.
3. Bilateral or unilateral carotico-clinoid foramen: Bilateral carotico-clinoid foramen was found in 1 skull (3.33%) and unilateral was found in 1 skull (3.33%) bone on the right side.
4. Parameters of carotico-clinoid foramen in human skulls:

**TABLE 1: Parameters of carotico-clinoid foramen in skull 1**

| Parameters | Right side | Left side |
|---|---|---|
| Antero-posterior diameter | 12.06mm | 11.05mm |
| Transverse diameter | 4.57mm | 5.53mm |
| Sphenoid bridge length | 7.01mm | 7.66mm |

**TABLE 2: Parameters of carotico-clinoid foramen in skull 2**

| Parameter | Right | Left |
|---|---|---|
| Diameter | 4.52mm | 4.54mm |

## DISCUSSION

The carotico-clinoid foramen (CCF) was first described by Henle in 1855. The carotico-clinoid foramen can be complete or incomplete and unilateral or bilateral. The incidence of incomplete unilateral foramen varies from 8-35% while a bilateral and complete foramina are very rare found in 0.2-4% of population. Ozdogmus et al reported that in the area of skull, the diameter of internal carotid artery is larger than the diameter of carotico-clinoid foramen, which causes high possibility of headache caused by compression of internal carotid artery in the presence of carotico-clinoid foramen.4 The incidence of the sella turcica bridge ranges from 1.54% to 5.9%. The only way of diagnosing the calcification of sella turcica is with a lateral skull cephalometric radiography by Das and Paul.[5]

In the present study, bilateral carotico-clinoid foramen was found in 1 (3.33%) skull bone and unilateral carotico-clinoid foramen was found in 1 (3.33%) skull bones. Erturk M et al observed bilateral carotico-clinoid foramen in 20 (11.69%) skulls and 41 (23.98%) for unilateral.6 Azeredo RA et al7 observed bilateral carotico-clinoid foramen in 11 bones (4.05%). Desai SD et al8 observed bilateral carotico-clinoid foramen in 30 (13.45%) skull bones and unilateral carotico-clinoid foramen was found in 53 (23.74%) skull bones.

Detailed anatomy of the carotico-clinoid foramen and its contents can increase the success of diagnostic evaluation and surgical approaches to the region.

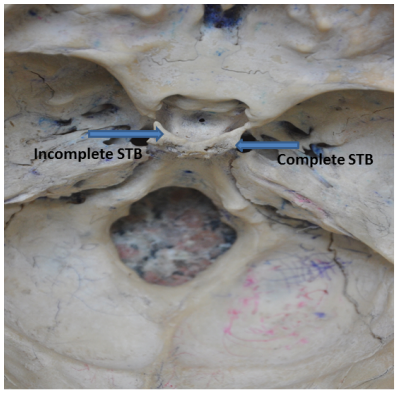
## CONCLUSION

These variations of carotico-clinoid foramen and sella turcica bridge have significant clinical importance and anatomical knowledge of these foramina may be helpful for neurosurgeons, neurophysicans, endocrinologists, radiologist, anatomists and biological anthropologists. Variations in sellar region like the interclinoid bar and the carotico-clinoid foramen may cause difficulty for clinoidectomy

procedures especially in the presence of an aneurysm and in surgical management while dealing with the vascular, neoplastic or traumatic lesions of the central skull base.

**FIGURE 1.** Showing bilateral complete carotico-clinoid foramina (CCF) in human skull.


**FIGURE 2:** Showing complete carotico-clinoid foramina (CCF) and sella turcica bridge (STB) on right side and incomplete carotico-clinoid foramina (CCF) and sella turcica bridge (STB) on left side in human skull.

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