

## CASE REPORT

# Clinical significance of a mysterious clival canal

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### Abstract

During routine osteology demonstration of the posterior cranial fossa we noticed a transverse bony canal in the middle third of the clivus of an adult male skull. The canal was situated 1.8 cm in front the anterior border of the foramen magnum. The length of the canal was 0.6 cm long. The possible embryological basis and clinical significance of the variation was discussed.

**Keywords:** clival canal, cranial fossa, bony canal, clinical significance.

### Introduction

Postnatal age up to 11 years of life is the crucial time of the development of the clivus, when the final adult width of the clivus is first reached, followed by the finalization of its growth in length [1].

Jalovec D and Vinter I (1999) described a clival canal in the posterior third of the clivus [2].

The canal was longitudinally placed in the clivus and the width of the canal was 1.2 mm. The boundary of the head and neck corresponds to the boundary between the fifth and sixth somites. The first true somite disappears early and somites 2–5 (occipital 1–4) fuse to form the basioccipital bone [3].

A more likely possibility is that the present canal of the clivus is a remnant of true first sclerotome. As in the present case, the canal was found in a dry human skull, so we could only speculate about the contents and significance of the canal. Taking into consideration of the location of the canal, we considered two possible explanations:

1. During life the canal contained a vein connecting, the inferior petrosal sinuses (IPS).
2. The canal is a remnant of the first true somite.

### Material and methods

During routine osteology demonstration of the posterior cranial fossa, in the Department of Anatomy, Kasturba Medical College, Mangalore, India, we noticed a transverse bony canal in the middle third of the clivus of an adult male skull.

### Results

The canal was situated 1.8 cm in front the anterior border of the foramen magnum. The length of the canal was 0.6 cm (Figures 1 and 2).

The bony canal of clivus, continued on both sides with the groove for inferior petrosal sinus (IPS).

### Discussions

Knowledge of anatomic variations of the dural venous sinuses, are of importance in cases of thrombophlebitis, not only for determining the surgical management but also for understanding unusual symptoms and signs [4].

In this case, the bony canal of clivus, continued on both sides with the groove for IPS (Figure 1), which suggest a vein in the clival canal connecting the IPS of both sides. The IPS develops from the, dwindling caudal part of the primary head vein and anterior dural stem of the respective half of the head [5].

The chordal chondrocranium is composed of parachondral cartilages that form by fusion of the base of the skull in the 3<sup>rd</sup> fetal month. It is possible that these two systems interfered [2], so that the communication between the IPS of both side was surrounded by ossifying elements, which then resulted in its enclosure.

In the present case, the clival canal was located in the middle third of the clivus, the fused portion of basiocciput and basisphenoid, which constitute clivus. The canal might be the remnant of the first true sclerotome, which has not disappeared during course of development. A shallow fossa is occasionally found on the ventral surface of the basilar portion anterior to the pharyngeal tubercle, which has been interpreted as a vestige of the canal of the notochord [6].

The possibility of a remnant of the notochord in the present case is vague, due to the transverse orientation of the canal and higher location of the canal. In the present case, the right transverse sulcus was absent and the confluence of sinuses was present to the left of the internal occipital protuberance (Figure 1).

This will put more load on the left internal jugular vein, it is also possible that the communication between the IPS of both side, through the clival canal is a natural way to neutralize the pressure on both internal jugular veins.

The finding of a canal of the clivus might interfere with neurosurgical operations in the clival region and possibly provoke symptoms of the basilar artery, as well as of the basilar plexus [2].

### ☒ Conclusions

The present variant may give an elusion for a transverse fracture of clivus during cervical trauma in CT-scan. Knowledge of its topography and potential presence in the adult may aid the clinician in interpretation of imaging of this region. Furthermore, misinterpretation of this canal might cause emotional and legal complications for the clinician.

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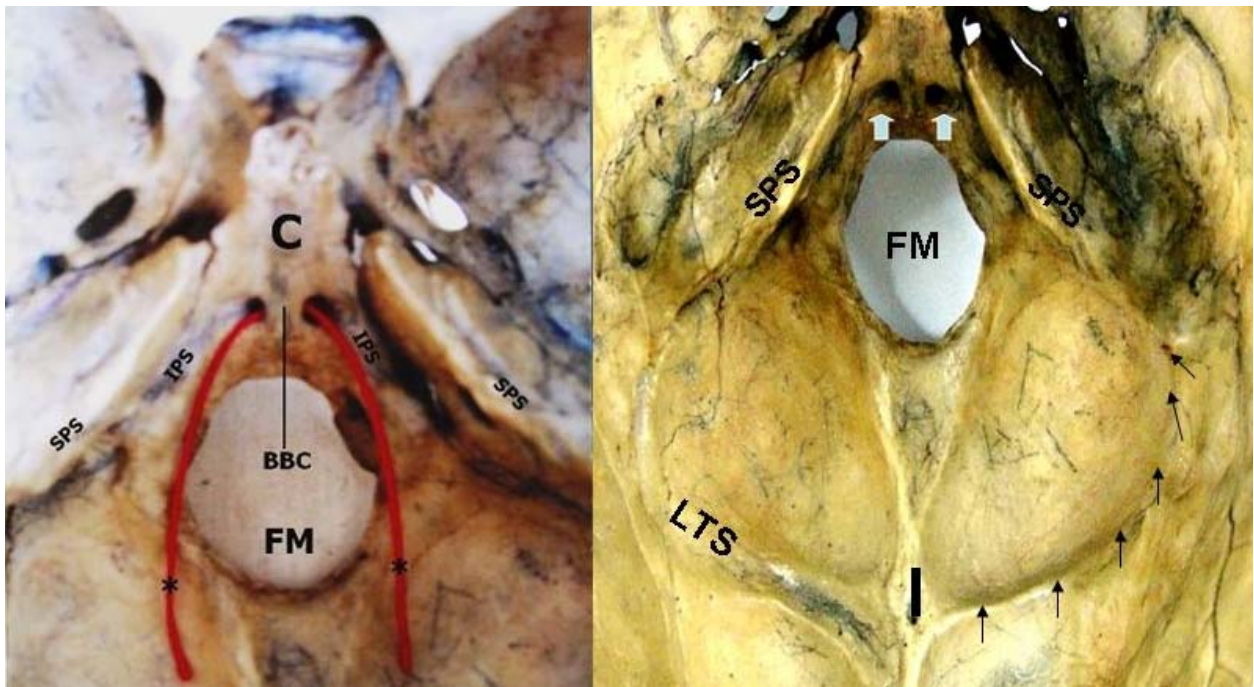
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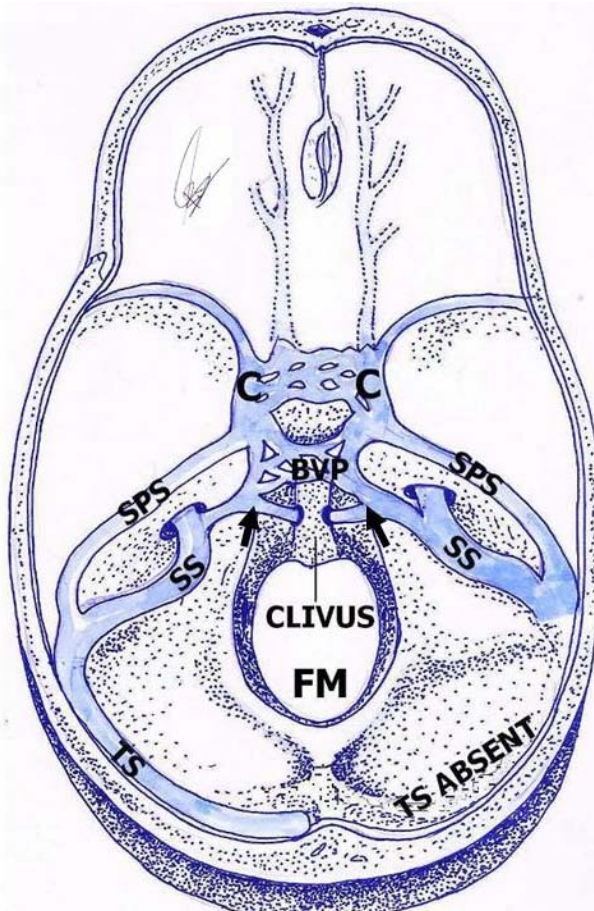
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*Received: April 10<sup>th</sup>, 2007*

*Accepted: August 5<sup>th</sup>, 2007*



**Figure 1 – Interior of cranial cavity: SPS – superior petrosal sinus; IPS – inferior petrosal sinus; C – clivus; BBC – bony bar over the clivus; \* – Thread passes through the clival canal; FM – foramen magnum; LTS – lateral transverse sinus, black arrows indicates the absence of right transverse sinus; I – internal occipital protuberance, white arrows indicates the opening of the clival canal**



**Figure 2 – Schematic diagram of the interior of the skull: SPS – superior petrosal sinus; SS – sigmoid sinus; C – cavernous sinus; BVP – basilar venous plexus; TS – transverse sinus; FM – foramen magnum; black arrows indicates the inferior petrosal sinus**