

OCCURRENCE OF POSTERIOR CONDYLAR FORAMEN AND ANATOMICAL VARIATION WITH RELATION TO SIGMOID SINUS

Type of study: Research article

Running Title – Occurrence of Posterior Condylar Foramen and Anatomical Variation With Relation To Sigmoid Sinus

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ABSTRACT:

BACKGROUND: The posterior condylar canal opens at the base of the skull just behind the occipital condyles in the posterior condyloid fossa. The posterior condylar foramen is the largest emissary foramen of the posterior cranial fossa.

OBJECTIVE: To determine the occurrence of posterior condylar foramen and anatomical variation with relation to sigmoid sinus with respect to occurrence and laterality.

MATERIALS AND METHOD: An observational study was carried out on 60 dry adult human skulls which were used from the Department of Anatomy, Saveetha Dental College, Chennai, India, to study the posterior condylar canal and its variations.

RESULT: The posterior condylar foramen was found to be present in 88.33% of the skulls. The incidence of bilateral presence was more than the unilateral presence. The incidence of intra sinus was more than the retro sinus.

CONCLUSION: During the treatment of dural arteriovenous fistula, anatomical variations of the posterior condylar foramen is important for clinicians and neurosurgeons.

KEYWORDS: Posterior condylar foramen, unilateral, bilateral, neurosurgeons.

INTRODUCTION:

The condylar canal (or condyloid canal) is a canal in the condyloid fossa of the lateral parts of occipital bone behind the occipital condyle. The anterior condylar canal is present at the anterior part of the occipital condyle which presents a canal called as hypoglossal canal or anterior condylar canal whereas posterior to the occipital condyle, a depression is present known as the posterior condylar canal [1]. In the posterior cranial fossa the posterior condylar foramen is the largest emissary foramen. The emissary foramina include the inferior and lateral rotunda canals [2]. The rectus capitus posterior major and minor muscles are situated posteriorly and lateral to the occipital condyles which represents the bony recess leading to the condylar foramen. The posterior condylar foramen joins the rim of the foramen magnum as the anteromedial wall of the posterior condylar foramen starts to thicken which connects it to the occipital condyle. The posterior condylar vein exits the skull through the posterior condylar (or condyloid) canal, which is a communication between the jugular foramen and the condylar fossa, situated just posterior to the occipital condyles on either side of the foramen magnum [3]. The posterior condylar foramen can be both bilateral as well as unilateral and sometimes not present. The posterior condylar canal opens as a groove into the sigmoid sinus, which in the posterior cranial fossa is posterolateral to the jugular foramen. The sigmoid sinus opens as intra sinus and retro sinus. This canal transmits the emissary vein to the sigmoid sinus which supplies the dura matter. The posterior condylar foramen allows for venous anastomosis between the jugular bulb and the sub occipital venous plexus. The lateral trans-condylar surgical approach may cause injury to the neurovascular structures as it is a skull based surgery and involves extensive dissection [3]. The purpose of this research was to study about the anatomical variation of the posterior condylar canal with relation to the sigmoid sinus.

MATERIALS AND METHODS:

A total of 60 dry human skulls (20 cut skulls and 40 full skulls) were used from the Department of Anatomy of Saveetha Dental College, Chennai for this observational study to determine and the study about the prevalence or absence of bilateral or unilateral posterior condylar foramen. It was observed by passing a probe through the foramen to find their opening into the posterior condylar fossae and to the sigmoid sinus in their entire course. The occipital condyles were examined carefully for the condylar foramina and considered complete foramina as variation for the present study. The data collected was tabulated using Microsoft excel worksheet. Photographs were taken of the posterior condylar foramen.

RESULT:

Results of the present study of incidence and laterality has been shown in table 1:

INCIDENCE	Presence of foramina – 53 (88.33%)	Absence of foramina - 7 (11.66%)
LATERALITY	Bilateral - 38 (63.33%)	Unilateral - 15 (25%) Left sided - 9 (60%) Right sided - 6 (40%)

BILATERAL



UNILATERAL (RIGHT)

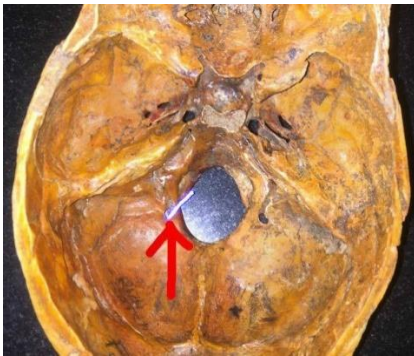
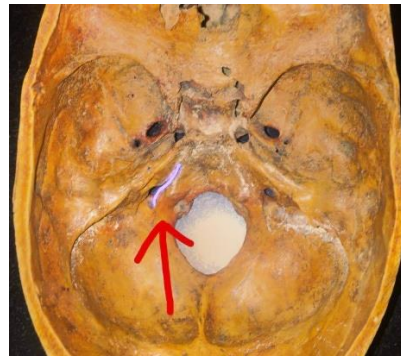


UNILATERAL (LEFT)



Table 2: Incidence of posterior condylar foramina in relation with sigmoid sinus:

TYPE	INTRASINUS (35%)		RETROSINUS (15%)	
	RIGHT	LEFT	RIGHT	LEFT
POSTERIOR CONDYLAR FORAMINA	5	2	1	2

INTRASINUS**RETROSINUS****DISCUSSION:**

The posterior condylar canal opens into the groove of the sigmoid sinus. The posterior condylar foramen connects the intracranial venous sinuses to the extracranial venous system as it acts as an important path for venous circulation. Boyd found the posterior condylar canal occurrence was 77% unilateral. Ginsberg observed the posterior condylar canal was bilateral in 55.9% and unilateral in 17.6% [2]. Galarza et al. found intra sinus form in 24.6% bilaterally, 17.8% on the right side and 13.5% on the left side, whereas retro sinus form of the posterior condylar foramina in 1.2% bilaterally and 1.2% unilaterally on the right side.[4] Krause discovered that condylar canal occurrence was bilateral in 21% and unilateral in 38%. [5]. In this study, 60 dry skulls were analysed for posterior condylar foramen and 88.33 % had prevalence of the posterior condylar foramina of which 63.33% were bilateral and 25% are unilateral, right sided – 60%, left sided – 40% .The incidence of posterior condylar foramina in relation to the sigmoid sinus, 35% of which was intra sinus in the skulls and 15% of retro sinus in the skulls. Failure of closure of the posterior condylar canal leads to persistence of the posterior condylar foramen in adult skulls [6]. Recognition of posterior condylar foramen and other variant emissary foramina allows a deeper appreciation of the alternative channels of venous drainage from the brain [7] [8].

CONCLUSION:

The posterior condylar canal is one of the larger emissary foramina. The condylar emissary veins can be used as access routes to hypoglossal dural arteriovenous fistulas [9]. During the treatment of dural arteriovenous fistula, anatomical variations of the posterior condylar foramen is important. This study gives basic knowledge to clinicians and surgeons before planning a surgery in the posterior condylar region.

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