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Original Research Article

Anatomical Variations of Posterior Condylar Canal in Adult Human Dry Skulls

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ABSTRACT

Background: The posterior condylar canal is located on Base of skull just posterior to the occipital condyles.

Objective: The objective of the study is to assess the variation of the posterior condylar canal.

Methods: The study was carried out in 38 skulls of human beings obtained from the department of Anatomy at Heritage Institute of Medical Sciences, Varanasi.

Results: Posterior condylar foramen is present in 29(76.31%) of total human skulls. Patent posterior condylar canal was found in 16 skulls (55.17%).

Conclusion: The present work provides the information to clinicians, radiologists, anatomists and surgeons in operative procedure which involves in the base of skull.

Keywords: Posterior condylar foramen, Posterior condylar canal, Bilateral, Unilateral, Variations.

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INTRODUCTION

Posterior condylar canal is the largest emissary foramina in posterior cranial fossa and is present in the base of skull.[1] The canal is open through foramen into the fossa. The emissary vein passes through posterior condylar canal is posterior condylar vein. This canal transmitting the posterior condylar vein and meningeal branches of the occipital artery and nerves which supply the meninges of posterior cranial fossa. The posterior condylar vein originates from the anterior condylar confluence, the jugular bulb, or the sigmoid sinus at the most medial portion.[2,3] It drains through the posterior condylar canal into the suboccipital cavernous sinus or the paravertebral vein.[2,3] Posterior condylar canal is a communication between the jugular foramen and condylar fossa which is present behind the occipital condyles on the occipital bone.[4] Posterior condylar canal is present in the posterior cranial fossa posteroinferior to the jugular foramen and behind the occipital condyle. Of course, any destructive lesion of the jugular fossa could extend to involve posterior condylar canal. The emissary vein which passes through this canal connects the extracranial vein to intracranial venous sinus. The extracranial vein present in suboccipital triangle is suboccipital plexus to intracranial venous sinus i.e. sigmoid sinus.[2]

The patency of the channel depends upon the condylar emissary vein which runs along its path. When the venous drainage of brain occurs by normal route, the role of emissary vein is limited. When the venous outflow of the brain is compromised due to thrombosis of bulb of jugular vein than these emissary veins become important alternative pathway of venous drainage of brain.[5,6] The knowledge of anatomic structure at the base of skull is important to prevent the misinterpretation during the time of MRI because it can be confused with glomus tumour or calcified lymphnode.[7,8] The lateral transcondylar surgical approach for skull base surgery involves extensive dissection and may cause injury to the neurovascular structures.[4] The posterior condylar canal and the veins are the anatomical landmark for the surgical approaches through the lateral foramen magnum. Lateral approach of the foramen magnum. Occasionally on contrast-enhanced magnetic resonance imaging, prominent posterior condylar canals may enhance and could be misinterpreted as a neuroma. The present study was done to observe the variation of posterior condylar canal in dry human adult skulls because it has a clinical importance.

MATERIALS AND METHODS

We collected 38 dry adult skulls from the Department of Anatomy, Heritage Institute of Medical sciences Varanasi, to study the unilateral or bilateral presence or absence of the posterior condylar canal. The occipital foramen were examined carefully to the posterior of occipital condyle .The patency of the foramen is checked by passing a probe into the bilateral and unilateral foramen. Also note down their position either retrosinus (if opened behind the sigmoid sulcus) or intrasinus (if opened into sigmoid sulcus).

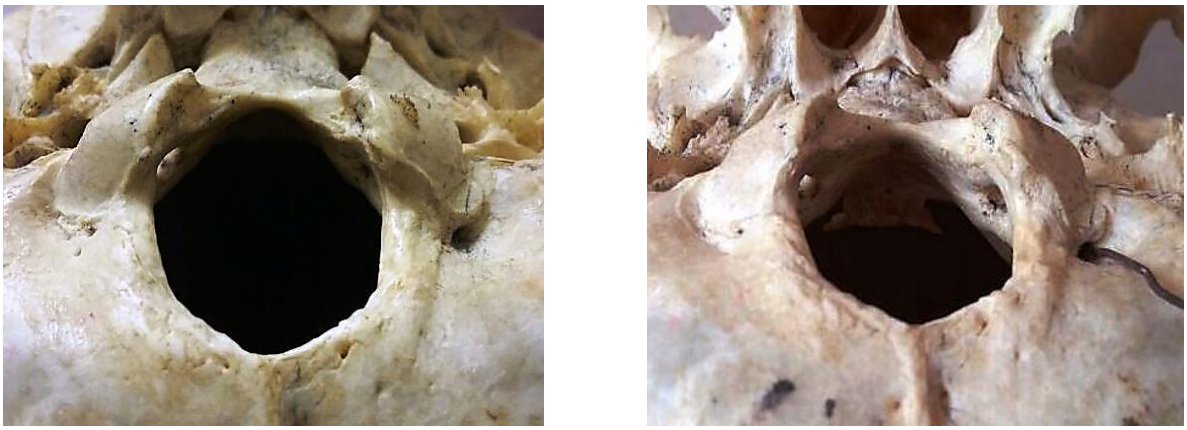

Fig 1: Unilateral posterior condylar foramina with and without probe

Fig 2: Bilateral posterior condylar foramina

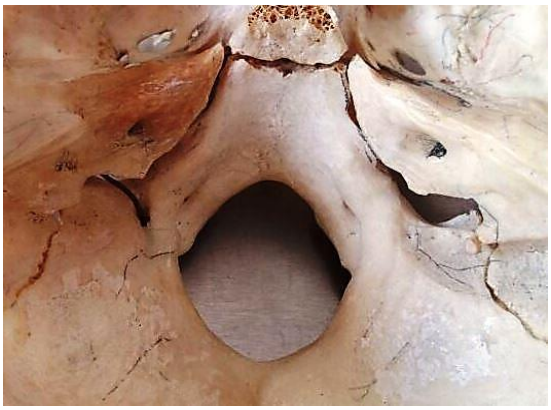

Fig 3: Posterior condylar foramina in relation with sigmoid sinus: retrosinus form (RS)

Fig 4: posterior condylar foramina in relation with sigmoid sinus: intrasinus from (LEFT) and retrosinus from (RIGHT)

Table 1: Presence of posterior condylar foramina in human dry skulls

Presence of foramina	Absence of foramina
29 (76.31%)	9 (23.68%)

Table 2: Laterality of the posterior condylar foramen

Variation	Bilateral (55.26%)	Unilateral (21.05%)	
	21	8	
Laterality		Left	Right
		5	3

Table 3: Patency of foramen

Patency	Present (55.17%)	Absent (44.82%)
	16	13
Laterality	10 (Bilateral)	6 (Unilateral)
Total number of Patent foramen	26	

Table 4: Location of the posterior condylar canal in relation with sigmoid sinus

Intrasinus	8 (Bilateral)	Unilateral-4	
		Left	Right
		3	1
Retrosinus	2 (Bilateral)	Unilateral-2	
		Left	Right
		2	-

OBSERVATIONS AND RESULTS

Out of 38 skulls we observed posterior condylar foramina present in 29 skulls (76.31%) and absent in 9 skulls (23.68%). Bilateral foramen was present in 21 skulls (55.26%) and unilateral in 8 skulls (21.05%) Out of 8 unilateral foramen 3 right sided and 5 left sided. Out of 29 skulls in which foramen present the patency were seen only in 16 skulls (55.17%) (intrasinus B/L-8,U/L-4, retrosinus B/L-2,U/L-2). Out of 50 foramen present in 29 skulls (bilateral foramen-21, unilateral foramen- 8) only 26 patent foramen were

seen. The patent foramens were either intrasinus and retrosinus. Intrasinus was bilateral in 8 skulls and unilateral in 4 skulls. Retrosinus opening of the foramen was seen in two skulls bilateral and two skulls unilateral.

DISCUSSION

During embryonic period the posterior condylar canal is the route for venous circulation connecting intracranial venous sinuses with extracranial venous system.[1] This venous system atrophies from foetal to neonatal circulation leading to the closure of bone tunnel.[9]

If the closure does not occur will lead to persistence of the posterior condylar canal in adult skulls. Intracranial dural venous sinuses receive valveless emissary veins which regulate the blood flow and maintain the equilibrium of venous pressure within and outside the skull. The posterior condylar canal opens in the posterior cranial fossa just posterolateral to the jugular foramen. In the present study out of 38 skulls posterior condylar foramen is present in 29 skulls (76.31%) and absent in 9 skulls (23.68%). Bilateral foramen was present in 21 skulls (55.26%) and unilateral in 8 skull (21.05%). Out of 8 unilateral foramen 3 right sided and 5 left sided.

In the study by Jatin Goda and Kavitha et al the presence of foramen was 90.6% and 94.2% respectively.[6,11] The presence of unilateral foramen was 30.8% of the skulls by Galarza[9] and 20.3% of the skulls by Boyd[10],17.6% of the skulls by Ginsberg[12], and 21.1% of the skull by Kavitha.[11]

In the present study unilateral presence of the foramen were noted is 21.05% of the skulls which is similar to that of Kavitha. Kavitha[11] found patent foramen in 62.58% of the skulls and it was more on the right side (69.5%) than the left side (30.4%). In the present study patent foramen were 55.17% of skulls.

Galarza et al. found that the intrasinus form of the posterior condylar canal in 24.6% bilaterally, 17.8% on the right side and 13.5% on the left side, while retrosinus form of the posterior condylar canal is in 1.2% bilaterally and 1.2% unilaterally on the right side.

According to Krause, the posterior condylar canal was present bilaterally in 21% cases and unilaterally in 38% cases. In the present study, we have seen that posterior condylar canal is in 29 skulls of the 38 dry skulls.

CONCLUSION

The variation of posterior condylar canal also accompanies with variation in posterior condylar vein. So the Knowledge of the anatomical relationships and variations of posterior condylar canal is important for radiological diagnosis, and lateral transcondylar approach of surgical or endovascular treatment of skull base diseases to avoid the injuries to neurovascular structure.

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