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Research Article

Morphometric Study of Human Occipital Condyles in Reference to Condylar Resection during Transcondylar Approach

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I N F O

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A B S T R A C T

Introduction: Knowledge of the anatomy of occipital condyles is very useful for the surgeon during condylar drilling to avoid injury to neural structures.

Material and Methods: This study was conducted on occipital condyles in 100 dried human skulls of unknown age and sex. The morphometric analysis was performed for the length, width, height, anterior intercondylar distance and posterior intercondylar distance of occipital condyles on both sides.

Results: The mean values were found to be 24.6 mm (right) and 22.65 mm (left) for the length, 12.48 mm (right) and 13.32 mm (left) for the width and 9.37 mm (right) and 9.49 mm (left) for the height. The mean anterior and posterior intercondylar distances were found to be 21.48 mm and 42.3 mm respectively.

Conclusion: The knowledge of morphometric parameters can be used for the planning of the extent of condylar resection during transcondylar approach without damaging the neurological structures.

Keywords: Foramen Magnum, Morphometry, Occipital Condyles

Introduction

The articular surfaces of the occipital condyles are convex antero-posteriorly and from side to side which form an important joint of the neck; the atlanto-occipital joint. The margins of condyles give attachment to the capsules of the atlanto-occipital joints and the medial side provides attachment to the alar ligament.[1] The knowledge of the anatomy of occipital condyles is very useful for the surgeon during condylar drilling to avoid injury to the neural structures. For transcondylar extension during lateral approach, the condylar drilling is done on the basis of the length of the occipital condyle along its long axis and width of the condyle. This knowledge helps safe resection of the posterior 1/3rd of the occipital condyle.[2] The other important factors are overriding of the occipital condyle in the foramen magnum and the relationship of condyles to the hypoglossal canal.[3] The study was conducted to document some important morphometric measurements useful for the far lateral transcondylar approach. This knowledge is useful for not only for surgeons but also for anatomists, forensic and anthropological experts.[4]

Material and Methods

This study was conducted on occipital condyles in 100 dried human skulls of unknown age and sex collected from the bone bank of medical college. The morphometric analysis was performed for the length, width and height of occipital condyles on both sides. The height was measured at the center of the condyle. The other parameters examined were anterior intercondylar distance and posterior intercondylar distance (Figure 1). All parameters were measured with the help of digital Vernier caliper. Deformed and damaged skulls with any pathology were excluded from the study. All the data was tabulated and the difference between the measurements for the right side and left side was analysed statistically using the test.

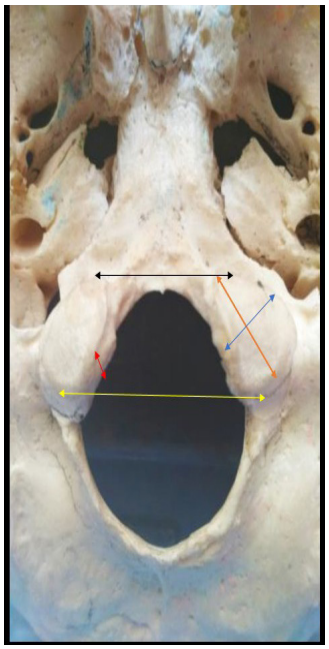

Figure 1.Showing measurements of length (orange line), width (blue line) and height (red line) of occipital condyles, anterior intercondylar distance (black line) and posterior intercondylar distance (yellow line)

Table 1.Showing the different parameters of occipital condyles

Parameter	Side	Mean	SD	Range	t-test
Length of occipital condyle	Right	24.6 mm	2.34	17-30	0.45
	Left	22.65 mm	2.62	16-29	
Width of occipital condyle	Right	12.48 mm	1.71	8-17	0.12
	Left	13.32 mm	1.63	10-16	
Height of occipital condyle	Right	9.37 mm	1.52	6-14	0.43
	Left	9.49 mm	1.54	6-15	
Anterior intercondylar distance	------ ------	21.48 mm	2.44	12-25	
Posterior intercondylar distance	------ ------	42.3 mm	3.54	35-45	

Observation and Results

The mean length, width and height of the measured occipital condyle were found to be 24.6 mm (right) and 22.65 mm (left) for the length, 12.48 mm (right) and 13.32 mm (left) for the width and 9.37 mm (right) and 9.49 mm (left) for the height. The mean anterior and posterior intercondylar distances were found to be 21.48 mm and 42.3 mm respectively.

The table 1 shows the mean measurements of all parameters on right and left side.

Discussion

Many surgical access routes are available for resection of pathology in the area of the craniocervical junction. But all of them are extremely challenging for neurosurgeons.[5] The different approaches are anterior approach, posterolateral approach, lateral transcondylar approach and far lateral approach.[6] The lateral approach to the craniocervical junction is affected by the location of internal and external openings of hypoglossal canal. Other factors include the morphometric parameters of occipital condyle7. The range of length of the occipital condyle was 16-30 mm, which was in line with previous studies. The width of occipital condyle was found to range from 8 to 17 mm, comparable with the results obtained by Kizilkanat, Muthukumar et al and Naderi et al 8, 9. The height of the occipital condyle was found to range from 6 to 15 mm. This measured height is comparable to the result obtained by Naderi et al and Oliver. 10, 11 The anterior and posterior intercondylar distances were found to be in the range of 12-24 mm and 35-45 mm respectively. These measured distances are comparable to the results obtained by Naderi et al and Kizilkanat12, 13. There is a wide difference between the anterior and posterior intercondylar distances due to a convergence in the anterior part of occipital condyle 14.

Conclusion

The knowledge of morphometric parameters can be used for the planning of the extent of condylar resection during a transcondylar approach without damaging the neurological structures. These parameters can be measured

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preoperatively by using radiological techniques like CT scans.

Conflict of Interest: None

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