

Original Article

Determination of size and variation in shape of occipital condyles

Rajeev Kumar

Associate professor, Dept. of Anatomy, Career Institute of Medical Science & Hospital Lucknow, U.P., India

Abstract

Background: The human occipital condyles are unique bony structures connecting the cranium and the vertebral column. The present study was conducted to determine the size of occipital condyles and variation in skulls. **Materials & Methods:** The present study was conducted 80 human skulls. In all skulls, the length of the condyle was measured from tip of the condyles in vertical direction, breadth was measured from tip of the condyle in horizontal direction and shape was determined. Left and right was measured and compared. **Results:** on right side, the length of occipital condyles was 21.14 mm and on left side was 20.19 mm. The difference was non-significant (P- 0.51). On right side, the breadth of occipital condyles was 13.25 mm and on left side was 14.10 mm. The difference was significant (P- 0.01). On left side, the shape was oval in 28, oblong in 20, crescent in 18 and rhomboid in 14. On right side, it was oval in 26, oblong in 22, crescent in 20 and rhomboid in 12. **Conclusion:** Breadth of occipital condyle showed significant difference on left and right side. **Key words:** Condyle, Occipital, Skull

Corresponding author: Dr. Rajeev Kumar ,Associate professor, Dept. of Anatomy, Career Institute of Medical Science & Hospital Lucknow, U.P., India

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INTRODUCTION

The measurements of skeletal bones mainly neuro-cranium and viscerocranium are often used for human population morphological studies of age estimation, sex determination, stature, ethnicity which are relevant aspects of forensic investigations and anthropological examination of unknown individuals. The human occipital condyles are unique bony structures connecting the cranium and the vertebral column. It is the only articulation between the occipital bone and the atlas hence an important part of the cranio-vertebral junction.¹ The occipital condyles are oval in shape and placed in an oblique manner so that its anterior end lies closer to the midline than its posterior end. Occipital condyles are

important element to maintain the head vertically. It is necessary for the stability of the craniovertebral junction. Occipital condylar fractures are a dangerous proposition due to the intimacy of the occipital condyles to the neurovascular structures abutting it.² Understanding the anatomical basis of craniovertebral anomalies is important when carrying out surgery in the region. A lateral approach during craniovertebral surgery requires resection of the occipital condyles. Hence, the morphology of the occipital condyles and their facets is important clinically. The anatomy and analyzing the morphometric aspects of occipital condyles is extremely important as it will help the neurosurgeon in the planning of surgical

intervention involving the skull base safe and easier.³ The present study was conducted to determine the size of occipital condyles and variation in skulls.

Length (mm)	Right Side	Left side	P value
	21.14	20.19	0.51

MATERIALS & METHODS

The present study was conducted in the department of Anatomy. It comprised of 80 human skulls. The study protocol was approved from the institutional ethical committee. In all skulls, the length of the condyle was measured from tip of the condyles in vertical direction, breadth was measured from tip of the condyle in horizontal direction and shape was determined. Left and right was measured and compared. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

Table I shows that on right side, the length of occipital condyles was 21.14 mm and on left side was 20.19 mm. The difference was non-significant (P- 0.51).

Table II Comparison of breadth of occipital condyles on both sides

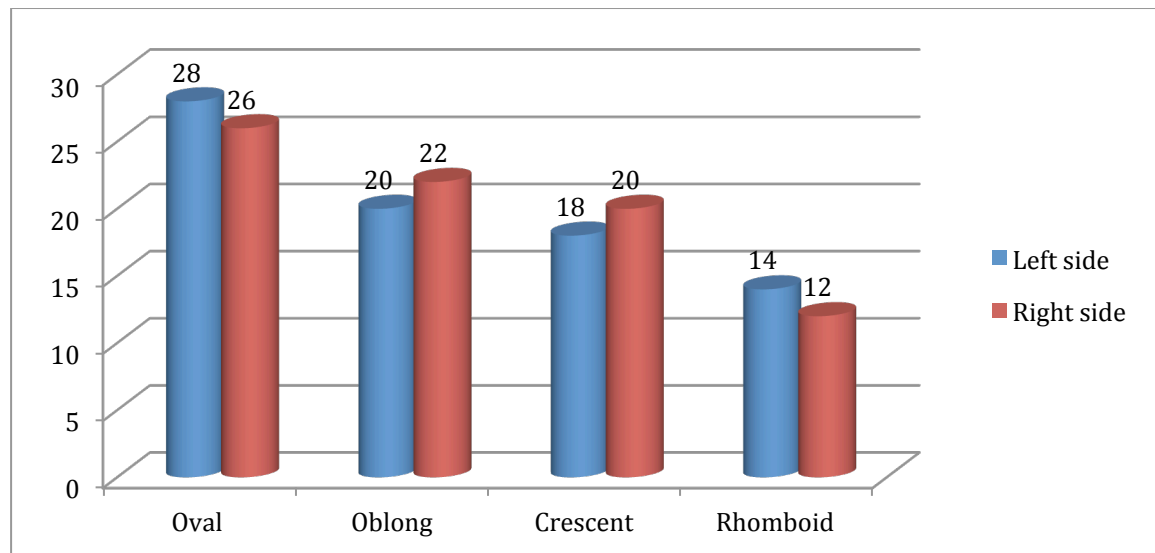
Breadth (mm)	Right Side	Left side	P value
	13.25	14.10	0.01

Table II shows that on right side, the breadth of occipital condyles was 13.25 mm and on left side was 14.10 mm. The difference was significant (P- 0.01).

RESULTS

Table I Comparison of length of occipital condyles on both sides

Graph I Shapes of occipital condyles



was oval in 28, oblong in 20, crescent in 18 and rhomboid in 14. On right side, it was oval in 26, oblong in 22, crescent in 20 and rhomboid in 12. The difference was non-significant (P> 0.05).

DISCUSSION

The occipital condyles have been described as bone structures with an oval outline that are arranged obliquely in such a way that the anterior extremity is more medial than the

posterior extremity, thus presenting a convex antero-posterior surface. The condylar canal is located posteriorly to the occipital condyles. In some cases, the occipital condyles may project significantly towards the foramen magnum. The canal of the hypoglossal nerve is located at the anterolateral margin of this foramen.⁴ The present study was conducted to determine the size of occipital condyles and variation in skulls. We found that on right side, the length of occipital condyles was 21.14 mm and on left side was 20.19 mm. On right side, the breadth of occipital condyles was 13.25 mm and on left side was 14.10 mm. This is similar to Wang et al.⁵ Susan et al⁶ in their study to document the dimensions of occipital condyles and its variations which are of paramount importance to neurosurgeons, orthopedic surgeons and radiologist when dealing with transcondylar surgical approaches and condylectomies. The shapes of the occipital condyles were observed and the measurements like length, and breadth were measured. The shape of occipital condyle varied from oval to crescent. Some shapes did not fit text book description. The mean length of occipital condyle of right side was 21.97 mm and left side was 22.34 mm. The documented parameters of the occipital condyles and its variations will serve as a guide line for surgeons in future. We observed that on left side, the shape was oval in 28, oblong in 20, crescent in 18 and rhomboid in 14. On right side, it was oval in 26, oblong in 22, crescent in 20 and rhomboid in 12. This is similar to Sait et al.⁷ Mehmat et al⁸ in their study on fifty dry skulls (dried specimens, 100 sides) and determined condyle measurements. The mean length, width and height of occipital condyle were found to be 19.43±3.27 (right), 19.28±3.57 (left), 9.21±1.97 (right) 9.40±1.87 (left), 7.21±1.9 (right) and 7.33±2.74 mm (left), respectively. There were significant differences between right and left occipital condyles. The mean anterior intercondylar distance and posterior intercondylar distance were measured as 15.39±7 and 35.60±8.4 mm, respectively. Variations of occipital condyle shapes were kidney like (34.4%), S-like (25.6), triangular (13.3%) oval (10.0%), ring like

(7.8%), eight like (6.7%) and deformed (2.2%) respectively. The condylar fossa presented in 60% of dry skull, 24% in right side and 36% in left side and also the condylar foramen was found in 60% of the specimens studied. There was no relation between the circumference of the head and the length of OC but we found relation between the circumference of the head and the width of OC (0.527) and foramen magnum circumference (0.433). The OC and FM are the main bony structures obstructing the surround of the brainstem. The differences in the size and the shape of occipital condyle have some differences and also similarities among racial subgroups. The posterior condylar vein may act asymmetrically. The correlation of the size of foramen magnum with the width of occipital condyles shows the importance of occipital condyle for lateral movements besides antero-posterior movements.

CONCLUSION

Breadth of occipital condyle showed significant difference on left and right side.

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