Original article:

Morphometric study of hypoglossal canal of occipital bone in dry skulls of two states in southern nigeria

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Abstract:

Background: It is observed that the morphologic and morphometric variability of the occipital bone structures may coexist in the same individual or among different subjects of the same or different populations and thus, a sound knowledge of the morphometry of this area can provide important benefits in determining safe surgical zones during surgical procedures. **Aim:** The present study was aimed at measuring the length (right and left) and width (right and left) of the hypoglossal canal among adult dry skulls of two states in southern Nigeria. ***Materials and Method:*** This study adopted the cross sectional study design. A total of eighty (80) hypoglossal canal; right and left were selected by simple random sampling and their length and width were measured with the aid of the digital vernier caliper. ***Results:*** The hypoglossal canal length on the right side was seen to be higher compared to the left length of the hypoglossal canal while the right hypoglossal canal width was seen to be higher compared to the left hypoglossal canal width and also observed differences between the right and left sides were statistically significant (P=0.01). ***Conclusion:*** There was a statistical significant difference with regard to hypoglossal canal length (right and left) and width (right and left) among the studied population. .

Keywords: Occipital bone**,** hypoglossal canal, morphology, variation

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Introduction

Variation is one of the most important phenomena occurring in humans and it is therefore attributed to many factors and therefore, the morphologic and morphometric variability of the occipital bone structures may coexist in the same individual or among different subjects of the same or different populations, as a result of genetic and heritable epigenetic interactions. [1] The variations observed therefore may be regarded as part of a pathological process such as (tumors, aneurysms, congenital or acquired malformations and trauma) [2] and their surgical approach is technically demanding and therefore requires a good understanding of anatomy. [3] The hypoglossal canal is surrounded by cortical bone and therefore transmits hypoglossal nerve, meningeal branch of ascending pharyngeal artery and an emissary vein from the basilar plexus internally to internal jugular vein externally [4] and knowing the precise location of the hypoglossal canal is important in understanding the spatial relationships of surrounding structures and in the resection of tumors lying close to or within the canal itself.

The study therefore was aimed at studying the hypoglossal canal length and width of dry adult human skulls among two southern states in Nigeria and also to create a data base which will be useful to anthropologists and clinicians for future researches.

Materials and Methods

This study adopted a cross-sectional study design. This study involved eighty (80) dry human adult skulls of both right and left sides, which were

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selected from (2) different anatomy museums in two (2) universities in the southern region of Nigeria; these universities includes; the Delta state university, Abraka, and the university of Benin. The skulls were confirmed to belonging to the above named institutions and skulls with gross deformities that involved difficulty in measurement were excluded from the study. Measurements were taken with the aid of the digital vernier caliper and a data sheet. Careful observations during measurement of the hypoglossal canal dimensions were ensured. The research and Ethics Committee of the Institutions approved the research method. The following measurements were taken:

- Right hypoglossal canal length
- Left hypoglossal canal width
- Right hypoglossal canal length
- Left hypoglossal canal width

The data obtained were subjected to statistical analysis using descriptive statistics; student's t-test with the aid of Statistical Package for Social Sciences (SPSS), version 20.0 to test for any statistical differences.

Results

Result depicts the mean hypoglossal canal length and width on both sides to be 12.35±2.60 and 14.24±3.74 for the right side and 12.57±2.70 and 10.56±2.03 for the left side respectively with hypoglossal canal length having larger values on the left side compared to the right side and with hypoglossal canal width having larger values on the right compared to the left side. A statistical significant difference was observed between the right and left sides of the hypoglossal canal length and width (P=0.01), [Table 1, 2 and 3].

Discussion

Anthropometric studies on the hypoglossal canal among different populations around the globe have shown variability in each studied dimension, [5,7] with our study not been an exceptional case.

Table 1: Hypoglossal canal length as regard the right and left side

Variables	N	Minimum (mm)	Maximum (mm)	Mean (mm)	Std. Dev.(mm)
HC_{RL}	80	10.24	12.36	12.35	2.60
HC_{LL}	80	12.43	14.86	14.24	3.74

Source: SPSS Output, 2017

Key: HC_{RL} = Hypoglossal Canal Right Length;
HC_{LL} = Hypoglossal Canal Left Length

Table 2: Hypoglossal canal width as regard the right and left side

Variables	N	Minimum (mm)	Maximum (mm)	Mean (mm)	Std. Dev. (mm)
HC_{RW}	80	11.34	14.23	12.57	2.70
HC_{LW}	80	10.22	8.56	10.56	2.03

Source: SPSS Output, 2017

Key: HC_{RW} = Hypoglossal Canal Right Width;
HC_{LW} = Hypoglossal Canal Left Width

Table 3: Paired Samples of hypoglossal canal length and width of both sides

Variables	N	Minimum (mm)	Maximum (mm)	Mean (mm)	Std. Dev.(mm)
HC_{RL}	80	10.24	12.36	12.35	2.60
HC_{LL}	80	12.43	14.86	14.24	3.74
HC_{RW}	80	11.34	14.23	12.57	2.70
HC_{LW}	80	10.22	8.56	10.56	2.03

Source: SPSS Output, 2017

In the present study, the mean value for hypoglossal canal length and width of both sides was (12.35±2.60 and 14.24±3.74 for the right side) and (12.57±2.70 and 10.56±2.03 for the left side) respectively. The mean values of hypoglossal canal length and width obtained from our study differed from those of other studies and noted significant differences on both sides. [8] In a study on the hypoglossal canal length showed mean value of 12.6mm which was closer to our obtained value. In dry adult skulls of Indians, Vinay et al. [5] found statistical significant differences between the right and left sides of the hypoglossal canal dimensions. Roopali et al. [9] also found the mean length of the right and left hypoglossal canal as 12.16±0.23mm and 13.35±0.25mm respectively, while the mean width of the right and left jugular foramen as 9.44±0.17mm and 6.54±0.40mm respectively and further stated that there was a significant difference between the right and the left hypoglossal canal.

Our study however is in accordance with the results on studies of hypoglossal canal dimensions conducted by Muthukumar et al. [7] Vinay et al. [5] and Roopali,

et al.[8] all of which found a statistical significant difference between both sides of the hypoglossal canal length and width. This result depicts the thought that there are significant differences in the right and left hypoglossal canal length and width of dry adult human skulls.

Conclusion

This study has investigated on the hypoglossal canal of occipital bone in dry skulls of two states in southern Nigeria and has obtained mean values of the hypoglossal canal length and width on both sides for the studied skulls. The study has also depict a statistically significant difference exists in the right and left hypoglossal canal length and also in the right and left hypoglossal canal width.

The data obtained from this present study, will provide a data baseline which will be useful to anthropologists and clinicians for future researches. The data achieved here so far will also serves as additional information on the complex morphology of dimensions of hypoglossal canal dimensions.

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Authors's contribution: All authors in the study read the manuscript and made great input.

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References:

1. Uysal S, Gokharman D, Kacar M, Tuncbilek I, Kosa U. Estimationof sex by 3D CT measurements of the foramen magnum. J Foren Sci 2005; 50:1310-1322.
2. Boulton MR, Cusimano MD. Foramen magnum meningiomas: concepts, classifications and nuances. J Neurosurg 2003; 14:10-13.
3. Radhakrishna SK, Shivarama CH, Ramakrishna A, Bhagya B. Morphometric analysis of foramen magnum for sex determination in South Indian population. J Med 2012; 2:20-22.
4. Bulsara KR, Katsuyuki A, Aliabadi H, Kanaly C, Friedman A, Fukushima, T. Morphometric three-dimensional computed tomography anatomy of the hypoglossal canal. Neurosurg Rev 2008; 31:299-301.
5. Vinay KV, Swathi, Denia MY, Sachin KS, Morphometric study of hypoglossal canal of occipital bone in dry skulls of South India. Int J Anatomy Res 2016; 4:3016-3019.
6. Hadley KS, Shelton C. Infratemporal fossa approach to the hypoglossal canal: practical landmarks for elusive anatomy. Laryngoscope 2004;114:1648- 1651.
7. Muthukumar N, Swaminathan R, Venkatesh G et al., A morphometric analysis of the foramen magnum region as it relates to the transcondylar approach. Acta Neurochir (Wien) 2005;147:889-895.
8. Roopali, T, Dhiraj, B. (2013). A morphological study of hypoglossal canal and its anatomical variation. Indian Journal of Medicine. 3(6):54-58.