

MORPHOMETRIC STUDY OF HYPOGLOSSAL CANAL IN HUMAN ADULT DRY SKULLS

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ABSTRACT

Background: The hypoglossal canal is a bony canal in the occipital bone of the skull. The hypoglossal nerve is the twelfth cranial nerve passes through the hypoglossal canal (HC) that supplies motor innervations to the tongue

Materials and Methods: A total of 50 adult dry skulls were examined from the department of anatomy, Stanley Medical College, Chennai, Tamilnadu.

Results: Out of 50 skulls studied, double hypoglossal canal was seen in 10 (20%) skulls, in which 7 (14%) specimens had unilateral while 3 (6%) specimens had bilateral double hypoglossal canal. Double hypoglossal canal was more common in right side. The mean length of hypoglossal canal on the right and left were 12.45mm and 12.51mm. The mean diameter of intra and extracranial end of hypoglossal canal were 7.48mm and 7.59mm respectively.

Conclusion: Hence, the knowledge about its morphometric dimensions of hypoglossal canal is very important for neurosurgeons & radiologists.

KEY WORDS: Hypoglossal canal, Skull, hypoglossal nerve.

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INTRODUCTION

Hypoglossal canal also called as anterior condylar canal is a paired bony passage in the occipital bone of the skull. It lies above the occipital condyle at its junction of anterior one third and posterior two thirds and extends antero laterally from lateral margin of foramen magnum and transmits the twelfth cranial nerve (hypoglossal nerve), meningeal branch of ascending pharyngeal artery and emissary veins which connect the basilar plexus internally to the internal jugular vein externally [1]. The venous plexus of the

hypoglossal canal creates a connection between the marginal sinuses and the superior jugular bulb and indirectly with the vertebral veins [2]. In some cases, this canal is divided by a bony spicule leading to a variant known as double hypoglossal canal [1,3]. Such partition of hypoglossal canal predisposes to entrapment of hypoglossal nerve in the occipital bone during ossification which subsequently may leads to an alteration in the movement of tongue as well as speech. Hypoglossal canal is of great clinical significance in different pathological conditions

like occipital bone fractures, intracranial and extracranial neoplasms and in congenital defects [4,5]. The lesions located anterior to the craniocervical junction have posed a surgical challenge. The lesions that are located ventral to craniocervical junction are accessed through transcondylar approach [6]. Thus, a preoperative morphometric analysis of hypoglossal canal is of immense significance during interventions in skull base area.

MATERIALS AND METHODS

The present study was done on 50 human adult dry skulls obtained from the Department of Anatomy, Stanley Medical College, Chennai, Tamil nadu. The skulls were observed for the incidence of double hypoglossal canal, whether it was unilaterally or bilaterally present. A digital vernier caliper was used to take measurements of the length and the mean diameter of the intra & extracranial ends of the hypoglossal canal. The parameters were measured separately on right & left side.

RESULTS

Out of 50 skulls studied double hypoglossal canal was seen only in 10 skulls. Among them 3 showed bilateral duplication and 7 unilateral. Incidence of the double hypoglossal canal was 20%. Out of these it was present bilaterally in 6% and unilaterally in 14 % case. The mean length of hypoglossal canal was 12.48 mm. The mean diameter of hypoglossal canal at its intracranial and extracranial end was 7.48 and 7.59mm respectively.

Fig. 1: Unilateral double hypoglossal canal (Right side).



Fig. 2: Unilateral double hypoglossal canal (Right side).



Fig. 3: Unilateral double hypoglossal canal (Right side).

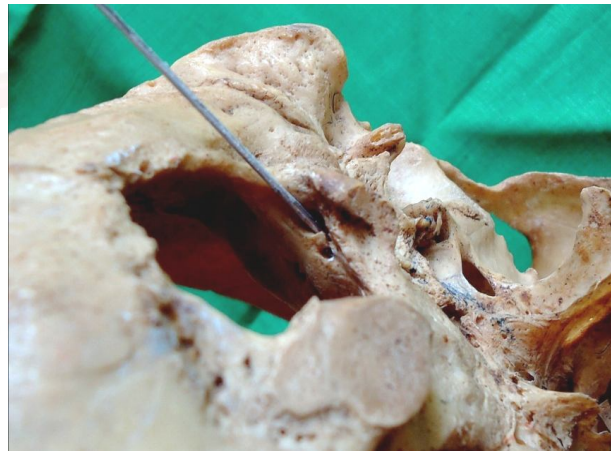


Fig. 4: Unilateral double hypoglossal canal (left side).



DISCUSSION

Adequate anatomical knowledge of hypoglossal canal and its related bony, neural, and vascular structures is essential for surgery of lesions involving skull base area. Hypoglossal canal is related superiorly to jugular tubercle, superolaterally to jugular foramen, laterally to sigmoid sinus & inferiorly to occipital condyle

[7]. The morphometric study of hypoglossal canal will be helpful for the planning of surgical intervention around the base of skull during surgical procedures such as transcondylar, supracondylar & lateral suboccipital approaches [8]. It is important for the surgeon to anticipate the depth of HC when drilling into OC during surgical procedures [9].

In the present study, bilateral double hypoglossal canal was found in 6% and unilateral in 14% of dry skulls. So the incidence of double canal in present study was 20%. Zaidi SHH et al³ studied 40 adult dry skulls of North Indian population and found that the incidence of double hypoglossal canal was 12.5%. They reported bilateral double hypoglossal canal in only 5% cases and unilateral in 7.5% cases. Wysocki J et al [10] found double hypoglossal canal in 43% of human skulls. Karur et al [11] studied 100 adult dry skulls of North Indian population and found that the incidence of double hypoglossal canal was 10.5%. Jacob M et al [12] studied 60 skull bones of South Indian population and reported double hypoglossal canal only in 12 skulls. In 20% of cases 4 were bilateral and 8 were unilateral. Bhuller et al [13] observed that the hypoglossal canal was divided into two canals by a small bony spicule in 28.12% of cases, Osunwoke EA et al [14] studied 79 dry skulls of Nigerian origin and reported that the incidence of double hypoglossal canal was 25.31% cases. Various studies compared with present study. the incidence of double hypoglossal canal of present study was 20% which was closer to Jacob M et al [12] (20%), Osunwoke EA et al [14] (25.31%) and Bhuller et al [13] (28.12%) but more in Wysocki J et al [10] (43%) and less in Zaidi SHH et al [3] (12.5%) and Karur et al [11] (10.5%) studies.

In the present study, the mean length of hypoglossal canal was 12.48mm which was closer to other studies done by Muthu kumar et al. [15], (12.6mm) but more when compared with study done by Hadley KS et al. [16], (11.2mm). The study done by Kizilkanat ED et al [17] on adult Turkish skulls reported that the mean intracranial & extracranial diameter of HC were 6.5 and 6.6mm respectively. Berge JK et al [18] showed a intracranial & extracranial diameter were 4.66 & 5.51 mm respectively. These diameters were

less when compared to the present study

CONCLUSION

The knowledge about the dimensions of hypoglossal canal is very essential for neurosurgeons and radiologists for the planning of the surgeries around the posterior cranial fossa which will be helpful in reducing the mortality and morbidity during surgical intervention.

Conflicts of Interests: None

REFERENCES

- [1]. Standring S. Head and Neck in grays anatomy: the anatomical basis of clinical practices, S. Standring, H. Ellis, J. C. Healy, D. Jhonson and A. Williams, Eds.; Churchill Livingstone, New York, USA, 40th ed; 2008:415-460.
- [2]. Gisel A. Die venen im Canalis nervi hypoglossi zeitschr f Anat u Entwickl 1956;19:257-258.
- [3]. Zaidi SHH, Gupta R, Usman N. A study of hypoglossal canal in north Indian crania. J Anat Soc India. 2011;60(2):224-6.
- [4]. Canalis RF, Martin N, Black K, Ammirati M, Cheatham M, Bloch J, et al. Lateral approach to tumors of the craniovertebral junction. Laryngoscope. 1993;103:343-9.
- [5]. Tanzer A. Roentgen diagnosis of hypoglossal nerve canal. Radiol. 1975;18:42-8.
- [6]. Gapert R, Black S, Last J. Sex determination from the foramen magnum: Discriminant function analysis in an eighteenth & nineteenth century British sample. Int J Legal Med. 2009;123:25-33.
- [7]. Karasu A, Cansever T, Batay F, Sabanci PA, AlMefty O. The microsurgical anatomy of the hypoglossal canal. Surg Radiol Anat. 2009;31:363-7.
- [8]. Wanebo JE, Chicoine MR. Quantitative analysis of the transcondylar approach to the foramen magnum. Neurosurgery. 2001;49:934-943.
- [9]. Katsuta T, Matsushima T, Wen HT et al., Trajectory of the hypoglossal canal: significance for the transcondylar approach. Neurol Med Chir (Tokyo). 2000;40:206-210.
- [10]. Wysocki J, Kobryn H, Bubrowski M, Kwiatkowski J, Reymond J, Skarzyska B. The morphology of the hypoglossal canal and its size in relation to skull capacity in man and other mammal species. Folia Morphol. (Warsz). 2004;63:11-17.
- [11]. Kaur J, Srivastava D, Singh D, Raheja S. The study of hyperostotic variants: significance of hyperostotic variants of human skulls in anthropology. Ana Cell Biol. 2012;45:268-73.
- [12]. Jacob M, Avadhani R, Nair B, Nallathamby R, Soman MA. An original study on anatomical variations of hypoglossal canal. Int J Health Sci Res. 2014;4(12):339-41.
- [13]. Bhuller A, Sanudo JR, Choi D, Abrahams PH. Intracranial course and relations of the hypoglossal nerve: an anatomic study. Surg Radiol Anat. 1998;20:109-12.

- [14]. Osunwoke EA, Okoseimiema SC, Yorkhum KL, Uzomba GC. A study on the dimensions of hypoglossal canal in Southern Nigerian Crania. J Biol Agricult Health. 2014;4(4):78-81.
- [15]. 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.
- [16]. Hadley KS, Shelton C. Infratemporal fossa approach to the hypoglossal canal: practical landmarks for elusive anatomy. Laryngoscope. 2004;114:1648-1651.
- [17]. Kizilkanat ED, Boyan N, Soames R, Oguz O. Morphometry of the Hypoglossal Canal, Occipital Condyle & Foramen Magnum. Neurosurg Q. 2006;16(3):121-125.
- [18]. Berge JK, Bergman RA. Variations in size and in symmetry of foramina of the human skull. Clin Anat. 2001;14:406-413.

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