Original Article

Double hypoglossal canal: Study on crania of South Indian population and its clinical significance

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ABSTRACT

Background: Hypoglossal canal is a permanent component of skull of human and animal. Situated anterior to occipital condyles, transmits hypoglossal nerve and meningeal branch of ascending pharyngeal artery and emissary vein.

Aim: To find the incidence of double hypoglossal canal in crania of South Indian population and its clinical importance.

Materials and methods:84 macerated dry skulls of unknown age and sex were collected from Department of Anatomy, ESIC Medical College Gulbarga and from Sharavathi Dental College Shivamogga Karnataka, India. Each skull was observed for doubling of hypoglossal canal.

Results: Out of 84 skulls, 29 skulls showed doubling of hypoglossal canal. Among them 10 showed bilateral duplication and 19 unilateral (10 on right and 9 on left side). Incidence calculated as 34.5%.

Conclusion: Double hypoglossal canal is important clinically, it may trap the hypoglossal nerve during ossification of occipital bone and useful for surgeons and radiologists and anthropologists.

Key words: Double hypoglossal canal, emissary vein, hypoglossal nerve, neoplasms, occipital bone

INTRODUCTION

Hypoglossal canal is present in the condylar part of occipital bone, just above the anterior part of occipital condyles also called as anterior condylar canal. Canal may be partly or wholly divided by a spicule of bone [1]. Hypoglossal canal transmits hypoglossal nerve, an ample venous plexus, a small emissary vein and a branch of the ascending pharyngeal artery [2, 3, 4]. The venous plexus is a dominant component of this canal and creates a link between the marginal sinuses and the superior jugular bulb and indirectly with the vertebral veins [4, 5]. Hypoglossal canal important clinically considering pathological symptoms like fracture of the occipital bone, intracranial and extra cranial neoplasm and congenital defects [2,4,6].

Variations in the ossicles, foramina and ridges of the cranium have aroused the curiosity of anatomists for many decades [7]. Differing incidences of these minor variants in different races might be useful in anthropological studies [8]and can be used to calculate a distance statistic between population samples [9]. Our study provides detailed information about such variations and it will be useful for anthropologists, surgeons and radiologists.

MATERIALS AND METHODS

Sample size and study area: 84 macerated dry skulls of unknown age and sex were collected from Department of Anatomy at ESIC Medical College Gulbarga, and Sharavathi dental college Shivamogga, Karnataka, India.

Methods: Observed each cranium for double hypoglossal canal macroscopically and noted down the incidence of variations and photographed.

RESULTS

Out of 84 skulls 29(34.5%) skulls showed doubling of hypoglossal canal as shown in **Fig 1&2.** Among them 10 (11.9%) showed bilateral duplication and 19(22.61%) unilateral of which 9 (10.7%) on left side as shown in **Fig 1** and 10 (11.9%) on right side as shown in **Fig 2**.

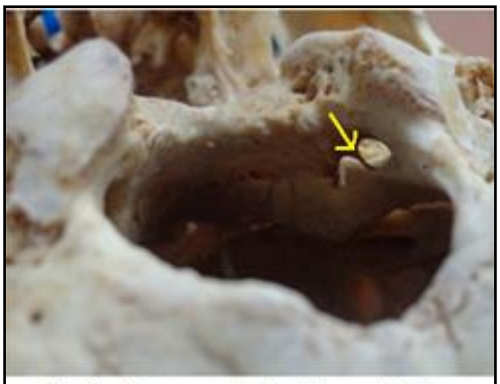

Fig 1 : shows a spicule of bone dividing hypoglossal canal into two on left side [arrow]

Fig 2 : shows duplication of hypoglossal canal on right side [arrow]

DISCUSSION

The hypoglossal canal is a permanent component of the skull in both man and animals [10]. In this study, found incidence of 34.5% hypoglossal canal in skull of south Indian population, these findings are very close to the study of Wysocki et al., found 43% cases of double hypoglossal canal in both human and other mammalian species [11]. In one of the study, Zaidi et al., reported incidence of 12.5% in north Indian crania [12]. Berge JK et al found duplication, unilaterally on right in 8% skulls, left in 20% skulls and bilaterally in 4% skulls [13]. Compared to these studies our study shows more incidences of 34.5 % than U.P India (12.5%) [12], Nigeria (11.6%), Palestine (7%), Palestine modern (8.3%), Burma (9.8%), Egypt (16.6%), India (Punjab, 17.9%), North America (24%) and South America (27.4%) [9] . Our study showed duplication of hypoglossal canal more in south Indian population than other region. In one of the study prevalence of double hypoglossal canal was more in female and frequent on left side [14]. But our study showed duplication more on right side of 11.9%.

Clinically double hypoglossal canal is important in diseases involving the hypoglossal nerve and canal at the skull base, include benign tumours such as large glomusjugulare neoplasms and other skull base neoplasms include, metastases and myeloma, as well as tumors of neural origin (neuromas, schwannomas), meningiomas also can occasionally occur in this region. Extension of extracranial malignant neoplasms such as squamous cell carcinoma of the head and neck and infection also may involve the hypoglossal canal and also during arteriovenous fistula [14, 15].

Embryologically the nerve originates from several segments and this may result in the canal being divided into two for part or all of its length [9]. In one of the study B. Nayak [16] found that, nerve passing as two roots in to the occipital bone and emerging out as one. The nerve roots might get trapped during the ossification process in the occipital bone unilaterally or bilaterally, may result in minor degrees of alterations in movements of the tongue. Though this might not produce any major problems in movements of the tongue, they are good enough to change the quality of the words pronounced by the individual.

CONCLUSION

In this study we found incidence of 34.5% of double hypoglossal canal, clinically it is important, hypoglossal nerve roots might get trapped during the ossification process of occipital bone may lead to disturbance in speech. Knowledge about these may be useful for anthropologists, radiologists and neurosurgeons.

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