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**МОРФОЛОГИЧЕСКИЕ И МОРФОМЕТРИЧЕСКИЕ ОСОБЕННОСТИ
КАНАЛА ПОДЪЯЗЫЧНОГО НЕРВА У ВЗРОСЛОГО ЧЕЛОВЕКА**

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**MORPHOLOGICAL AND MORPHOMETRIC FEATURES
OF THE HYPOGLOSSAL NERVE CANAL IN AN ADULT**

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Резюме. В результате изучения строения канала подъязычного нерва (КПН) у взрослого человека в 27% случаев установлено наличие костной шпоры внутреннего отверстия КПН, в 40% случаев наблюдалось отсутствие костных шпор или перегородок в КПН, в 27% случаев была обнаружена перегородка, разделяющая КПН на 2 отдела, 6% случаев была выявлена полная перегородка, разделяющая КПН на 2 канала. Шпоры и перегородки чаще встречаются в левом КПН.

Ключевые слова: подъязычный канал, затылочный мыщелок, остеотические варианты.

Resume. As a result of studying the structure of the hypoglossal nerve canal (HNC) in an adult, in 27% of cases, the presence of a bone spur of the internal opening of the HNC was found, in 40% of cases, there was no bone spurs or partitions in the HNC, in 27% of cases, a septum was found dividing the HNC into 2 divisions, 6% of cases, a complete septum was detected, dividing the HNC into 2 channels. Spurs and partitions are more common in the left HNC.

Keywords: hypoglossal canal, occipital condyle, osteotic variations.

Relevance. Establishing the anatomical and morphometric features of the hypoglossal nerve canal in an adult is important when performing surgical interventions on the base of the skull. The hypoglossal nerve canal (HC) is located at the base of the occipital condyles of the same-named bone, passing perpendicular to the longitudinal axis of the condyles. It contains the hypoglossal nerve.

Hypoglossal canal is directed anterolaterally at the junction of the anterior third and the posterior two thirds superior to the occipital condyles. It gives rise to the hypoglossal nerve (supplying the tongue muscles), the meningeal branch of the ascending pharyngeal artery, and the emissary vein (connecting the basal plexus to the internal jugular vein).

The venous plexus is considered very important because it is the main source of drainage through the retrosellar cranial vena cava.

Additionally, it enables the hypoglossal nerve's meningeal branches, which actually carry fibers from the sensory spinal ganglion of the C2 spinal nerve rather than hypoglossal nerve fibers, to re-enter the skull.

Lesions involving HC are rare and usually benign. These include hypoglossal schwannomas, posterior fossa meningiomas, and jugulotympanic paragangliomas. The decision to perform surgery for these lesions depends not only on the size and type of the tumor, but also on the anatomical variation of HC.

Second, epidural and intradural tumors are commonly found in the base of the skull near the foramen magnum, which presents challenges for the surgeon due to their deep location. In the modern era of technological advancements, the transcondylar approach has become popular, allowing a shorter, more direct path to the anterior portion of the pontine junction while minimizing brain stem constriction. The critical points of this procedure include the drilling of the posterior part of the occipital condyle, threatening the permeability of the HC.

Therefore, neurosurgeons need to understand the morphological changes of HC and their relationship to occipital condyle. While reviewing the literature, we found little information on skeletal variants of HC.

Purpose: to establish the morphological and morphometric features of the hypoglossal nerve canal in an adult.

Material and methods. The material for the study was 14 skulls of an adult (36-78 years old) from the collection of the Department of Normal Anatomy of the Belarusian State Medical University. Macro-microscopically measured the anterior-posterior, transverse and vertical dimensions of the hypoglossal nerve canal, revealed the features of the internal and external openings of the canal.

Research results. As a result of the study, the hypoglossal nerve canal was studied on the skulls of an adult. The morphological variability of HC was investigated in relation to the presence of spurs, partial and full septa. We divided HC into several categories based on these morphological changes (classification proposed by Singh V et al., and Paraskevas GK et al.) (table 1).

Tab. 1. Classification of morphological variations in the HC into different types

| Type | Characteristics | | Abbreviation | Types of the HC obtained during the study |
|--------|--|---|--|---|
| Type 1 | No evidence of bony spur or septum | | Type 1 HC | 40% |
| Type 2 | Spur in HC | A | Spur present near external opening of HC | Type 2a HC |
| | | B | Spur present near internal opening of HC | Type 2b HC |
| | | C | Spur present in the middle part of HC | Type 2c HC |
| Type 3 | Incomplete septa dividing a portion of HC into two parts | A | Septa present near external opening dividing it into double external opening | Type 3a HC |
| | | B | Septa present near internal opening dividing it into double internal opening | Type 3b HC |
| | | C | Septa present in the middle part dividing a portion of HC into two | Type 3c HC |
| Type 4 | Complete septa dividing whole HC into two parts | | Type 4 HC | 6% |

The absence of bone spurs or septa in the hypoglossal canal was observed in 40% of cases Type 1 HC Normal type of the canal (fig. 1a, b). Highest size $L=0,9$ cm $B=0,5$ cm, lowest size $L=0,5$ cm $B=0,5$ cm.

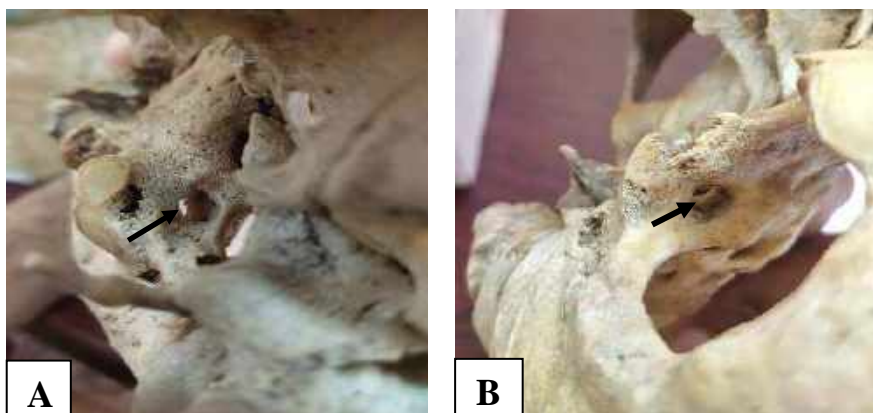


Fig. 1 – Holes of hypoglossal nerve canal (Type 1 HC): A – external, B - internal

The presence of a bone spur of the internal opening of the hypoglossal nerve canal was found in 27% of cases (Type 2b HC) (fig. 2a, b). Highest size $L=1,1$ cm, $B=0,7$ and lowest size $L=0,5$ cm $B=0,5$ cm.

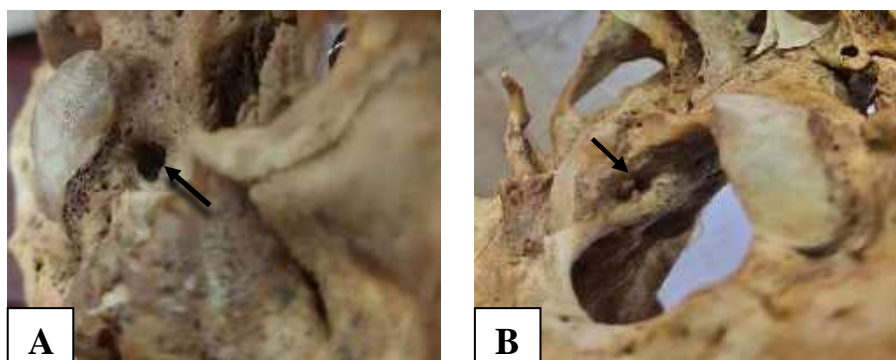


Fig. 2 – Holes of hypoglossal nerve canal (Type 2b HC): A – external, B - internal

A septum was found dividing only one side (left side) the hypoglossal nerve canal into two sections in 27% of cases Type 3b HC (fig. 3a, b). Highest size $L=1$ cm, $B=0,6$ cm, lowest size $L=0,5$ cm, $B=0,3$ cm.

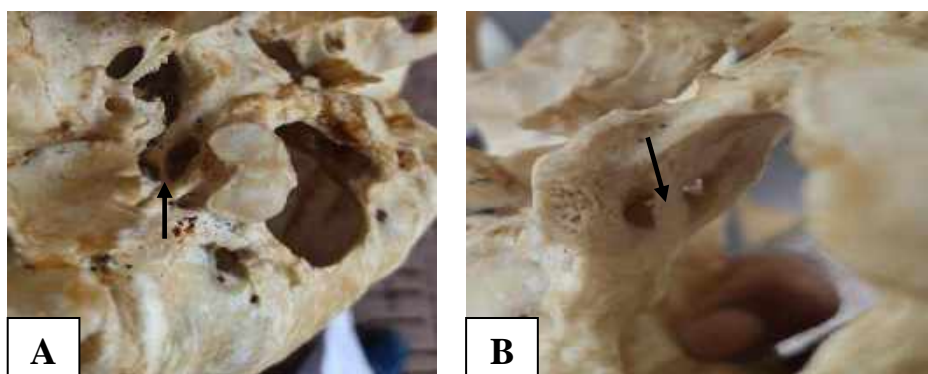


Fig. 3 – Holes of hypoglossal nerve canal (Type 3b HC): A – external, B – internal

In 6% of cases, a complete septum was found, dividing the hypoglossal canal into two canals Type 4 HC (fig. 4a, b). Highest size L=0,9 cm, B=0,6 cm, lowest size L=0,5 cm, B=0,4 cm.

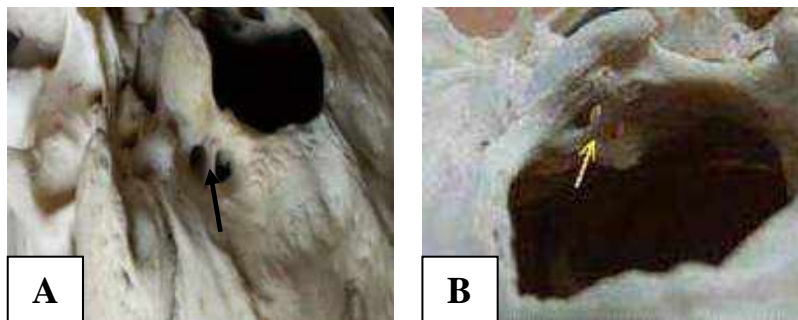


Fig. 4 – Holes of hypoglossal nerve canal (Type 4b HC): A – external, B - internal

Conclusions: as a result of the study of the structure of the hypoglossal nerve canal in an adult:

1. The presence of a bone spur of the internal opening of the hypoglossal nerve canal was found in 27% of cases.

2. The absence of bone spurs or septa in the hypoglossal canal was observed in 40% of cases.

3. A septum was found dividing the hypoglossal nerve canal into two sections in 27% of cases.

4. In 6% of cases, a complete septum was found, dividing the hypoglossal canal into two canals.

5. The morphometric characteristics of the hypoglossal nerve canal were established for different variants of its structure. Spurs and septa are more commonly found in the left canal.

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