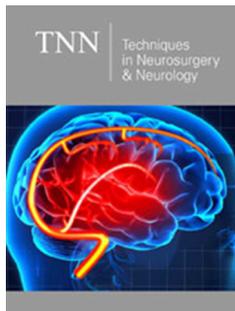


# Surgical Anatomy of The Foramen Magnum

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## Introduction

Foramen magnum comprises a channel of bones which are formed by clivus, atlas, jugular tubercle, occipital condyle, odontoid process, occipital bone and intervertebral spaces. The fourth ventricle, inferior vermis, cervicomedullary junction and the cerebellar tonsils are located at the foramen magnum. The C1 and C2 roots, cranial nerves IX, X, XI, spinal and vertebral arteries are enclosed by the foramen magnum. Jugular bulb, venous sinuses and veins surround the foramen magnum. It is important for the surgeon to have knowledge about these anatomical structures and try to avoid retraction or manipulation of these structures while approaching the lesions of this area. Chondromas, meningiomas, and neurinomas are the main lesions of the foramen magnum which relate about one percent of them to intracranial lesions and almost five percent to spinal ones. It takes about 30.8 months on average for the symptoms of the foramen magnum until they can be diagnosed. It is because of various reasons like wide subarachnoid space at the foramen magnum level and the indolent behavior and a slow pattern of growing in the tumors of the foramen magnum. Occipital headache and cervical pain which is deep and aggravated by straining, coughing and neck motion are the early symptoms. Sensory and motor deficits will be occurred later on as the tumor continues to grow. Diplopia and headache are the common symptoms of the extradural tumors specifically chondromas. Anteriorly located meningiomas show an asymmetrical deficit which its clinical picture includes spasticity, paresthesia and weakness, first in ipsilateral arm, then in leg, then in contralateral leg and then in arm. This would be a classical syndrome related to the foramen magnum tumors. Hands intrinsic muscles atrophy, deficits in lower cranial nerves, respiratory problems and spastic quadriplegia would be other findings.

Meningiomas of the foramen magnum are classified as intradural or extradural or intra and extradural. Foramen magnum meningiomas can be located in both sides, above and below the vertebral arteries. The most common types of meningiomas of the foramen magnum are the intradural meningiomas which most of the time arise anterolaterally and followed by posterolateral tumors. Based on the relationships of the tumors with some important anatomical structures, the surgical approach to extradural tumors will be done. Some surgical aspects related to these are the articulation and its complexity between C1 and C2 and the occipital bone, relationship with the vertebral arteries and their branches and the location with regard to the cervicomedullary junction. The nature, position and size of the tumors would be important in selecting the appropriate surgical approach. Surgical corridor which is defined as the space between the lateral wall of the foramen magnum and cervicomedullary junction, is an important point in approaching the foramen magnum tumors [1-6].

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