Endoscopic-Assisted Resection of Anterior Foramen Magnum Meningiomas through a Midline Suboccipital Subtonsillar Approach

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Abstract

Objective This study was aimed to demonstrate the resection of anterior foramen magnum meningiomas through an endoscopic-assisted posterior midline suboccipital subtonsillar approach.

Design This study was designed with illustration of the surgical steps and safety of this approach.

Setting Evidence of cerebrospinal fluid (CSF) cleft between the tumor and brainstem on MRI was studied (►**Fig. 1A** and **B**). Preoperative tracheotomy was considered in cases of preoperative dysphagia to prevent any further neurological deterioration due to the bilateral access through the lower cranial nerves corridors. Semisitting position with extensive electrophysiological neuromonitoring and transesophageal echocardiogram was adopted. A standard midline incision with bilateral suboccipital craniotomy and C1-laminotomy was performed (►**Fig. 2A**). After partial resection and elevation of the tonsils, tumor was debulked unilaterally around the lower cranial nerves and the vertebral artery, devascularized from the clival dura and then dissected from the

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brainstem (►**Fig. 2B, C**). Endoscopic-assisted removal of its anterior portion followed. The same procedure was repeated from the opposite site for the contralateral portion, before approaching the purely anterior part with endoscope assistance (►**Fig. 2D**).

Participants Four consecutive patients were included in the study.

Main Outcome Measures Grade of tumor resection and outcome (mRS) were primary measurement of this study.

Results Clinical outcome and grade of resection are comparable to other series of patient treated with other foramen magnum approaches (►**Fig. 1C** and **D**).

Conclusion Anterior foramen magnum meningiomas can be safely removed through this relatively faster midline suboccipital approach with bilateral exposure of lower cranial nerves (CNs) and vertebral arteries and lower approach-related morbidity (no condyle drilling). The surgical corridor is created by the tumor during debulking reducing need for brain retraction and the removal of the anterior dural attachment coagulated under the microscope is verified and completed endoscopically with pituitary curettes (Simpson's grade II) (►**Fig. 1C** and **D**).

The link to the video can be found at: https://youtu.be/9eACAJVwQBs.

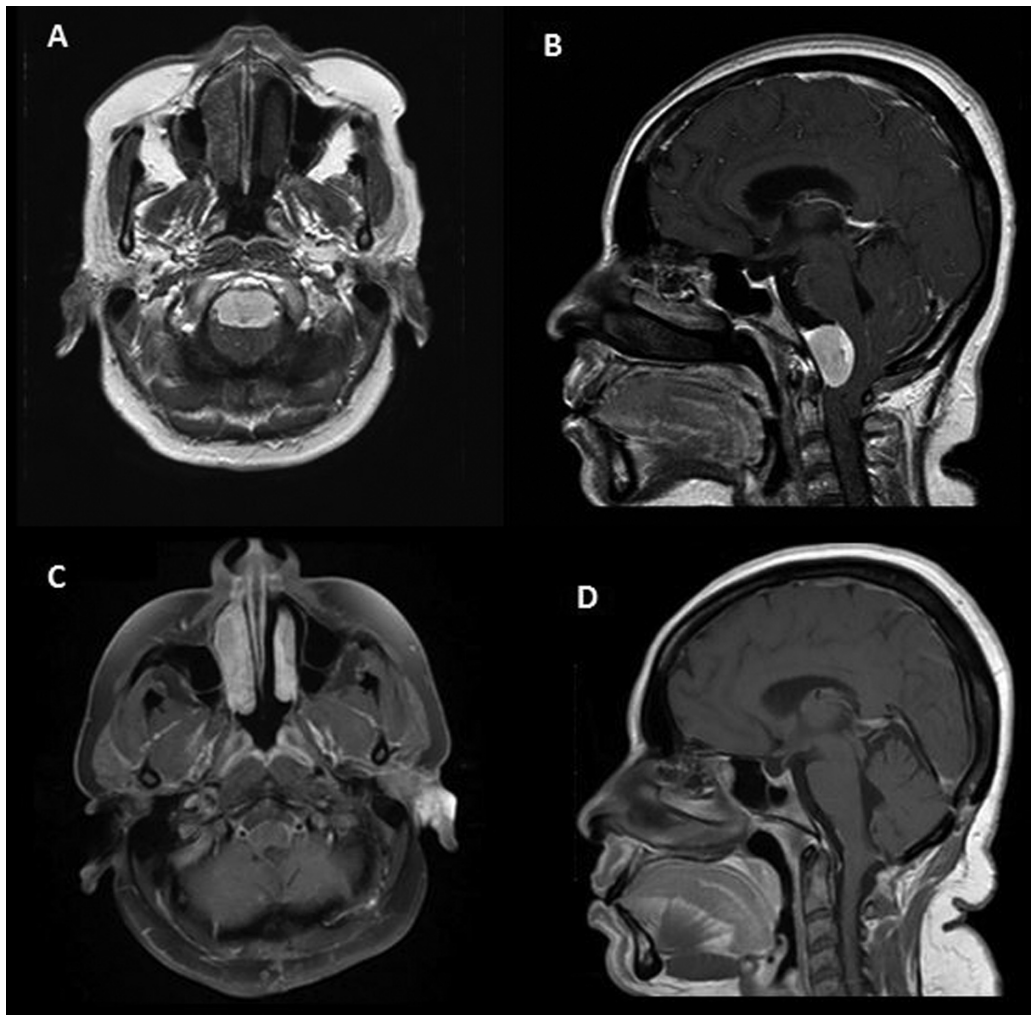

Fig. 1 Preoperative (**A**) axial and (**B**) sagittal view T1 with gadolinium MRI showing a large anterior foramen magnum meningioma with close relationship with bilateral vertebral arteries. Postoperative (**C**) axial and (**D**) sagittal view T1 with gadolinium MRI showing complete tumor removal through an endoscope-assisted midline suboccipital subtonsillar approach. MRI, magnetic resonance imaging.

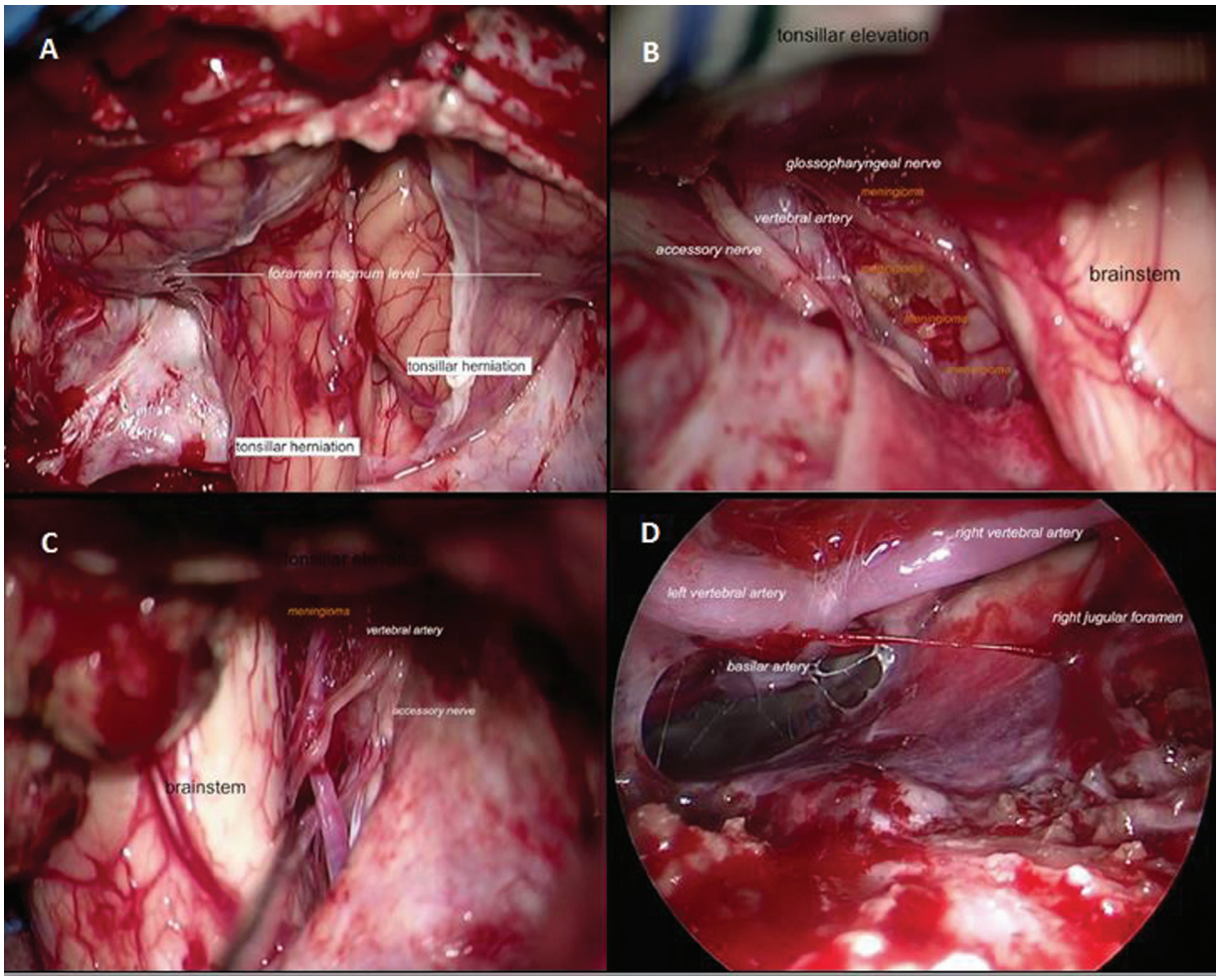

Fig. 2 Intraoperative microscopic view: (**A**) midline posterior view of cerebellar tonsils after dura opening at the foramen magnum level; (**B**) left-sided and (**C**) right-sided view of the anterior foramen magnum meningioma with surrounding structures: brainstem, vertebral arteries, lower cranial nerves. (**D**) Intraoperative endoscopic view showing complete tumor removal from its anterior foramen magnum implant.

Conflict of Interest

None declared.