

Spinal Cervical Meningioma

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Abstract

Case Report

Cervical spinal tumors, particularly meningiomas, are a significant subset of primary spinal cord tumors. These tumors are generally benign, slow-growing, and predominantly intradural, though a minority may exhibit extradural extension, complicating surgical resection due to invasiveness involving bone and adjacent neurovascular structures. Classification based on dural and ligamentous relationships is crucial in guiding surgical strategies and understanding tumor behavior. Despite generally favorable long-term outcomes and tumor-free survival, there is a potential for recurrence. Effective management relies on comprehensive classification systems and continued advancements in surgical techniques to optimize patient prognosis and enhance treatment efficacy.

Keywords: Meningioma, cervical meningioma, spinal tumor.

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INTRODUCTION

Spinal meningiomas represent 25% to 46% of primary spinal cord tumors [1]. They are generally benign, slow-growing, and occupy the intradural extramedullary space. Between 15% and 30% of them are located in the cervical region [2]. Numerous classifications of spinal meningiomas have been proposed to help surgeons choose the best surgical approach and understand the relationship between the tumor and critical anatomical structures. Although spinal meningiomas are generally associated with long tumor-free survival, they can still recur.

CASE REPORT

A 52-year-old female patient with no prior medical history consulted for cervical pain that has persisted for 2 years and worsened by the onset of

heaviness on the left side of the body. Clinical examination shows the patient is conscious, with pupils equal, round, and reactive to light, and stable hemodynamically and respiratorily, afebrile. Neurological examination: Standing is possible, walking is possible with assistance. Motor strength: can perform Barré and Mingazzini tests. Muscle strength: 3/5 distal in the left upper limb, 4/5 in flexion-extension of the left elbow, 4/5 in the left lower limb, 4/5 in the right hemibody. Deep tendon reflexes are brisk on the left side, plantar reflex shows a positive Babinski sign bilaterally and a positive Hoffman sign on the left. Cervical MRI shows a meningioma at the C3 and C4 levels (Figure 1), which was surgically removed via a posterior approach. The histopathological examination results indicate a grade 1 meningioma (Figure 2). The patient's condition improved neurologically post-surgery.

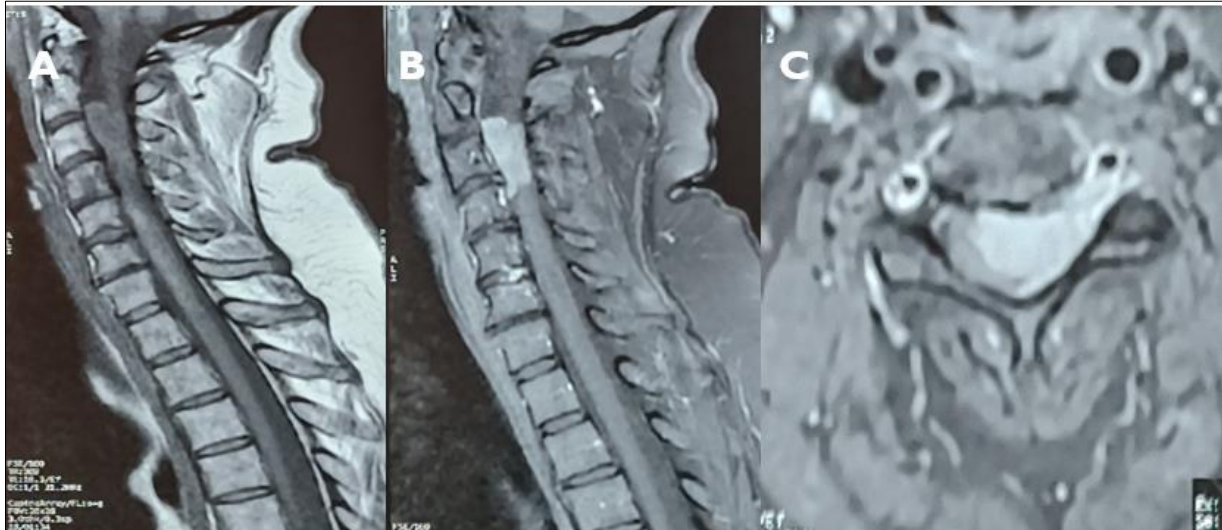


Figure 1: Initial cervical MRI showing an extra-axial lesion at the C3 level with superior and inferior extension. (A) T1-weighted sagittal sequence shows isointense collections, (B) T1-weighted sequence after contrast injection shows intense and homogeneous enhancement, (C) T1-weighted axial sequence with contrast injection shows the lesion with a "dumbbell" shape

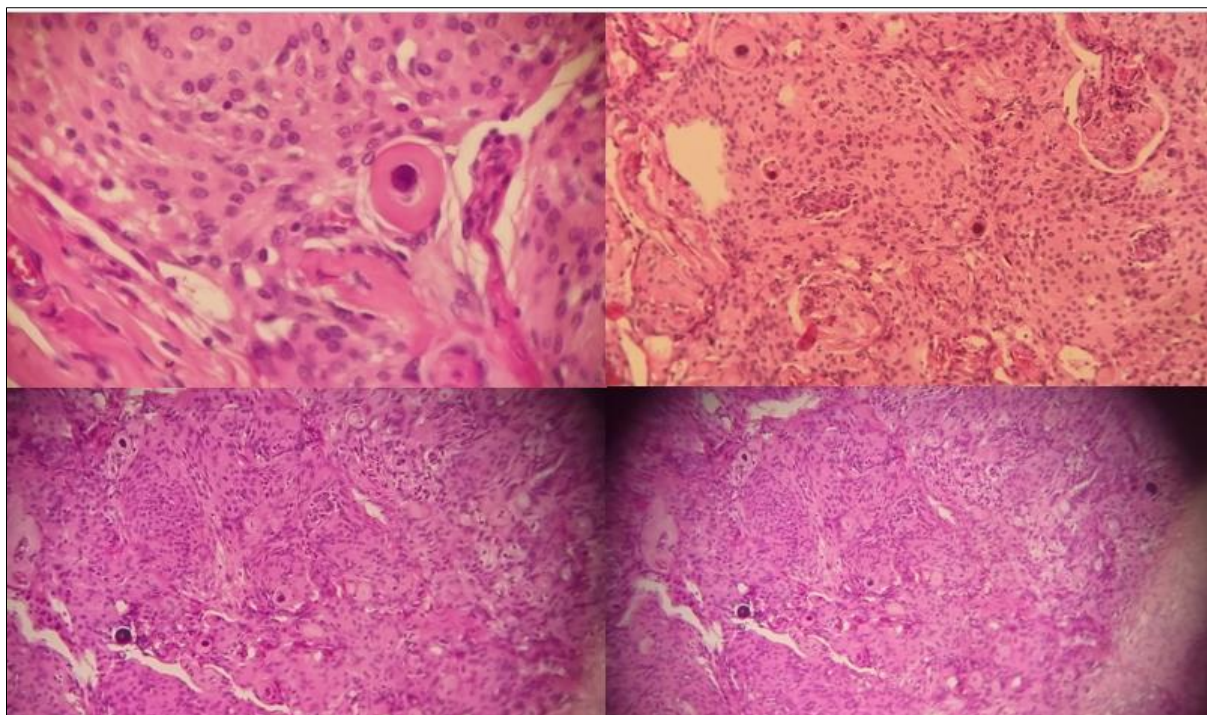


Figure 2: Microscopic images showing a transitional and psammomatous meningioma, classified as Grade I according to the WHO 2021 classification

DISCUSSION

Cervical meningiomas can be classified based on their dural relationship: they are normally intradural; about 10% may have an extradural extension, presenting as both intra- and extradural tumors; rarely, they are completely extradural [3]. Those with extradural extension are more challenging to resect completely because they are more invasive and affect the bone and adjacent neurovascular structures. Spinal meningiomas can also be classified based on their relationship with the

dentate ligament. The dentate ligament of the spinal column delineates the anterior and posterior compartments, with most lesions (68% to 98%) appearing anterolaterally, followed by posterolateral, purely posterior, and, more rarely, purely anterior. MRI is the imaging modality of choice for the diagnosis and evaluation of virtually all intradural pathology. Computed tomography (CT) may provide important complementary information, especially for mineralized or calcified tumors [4, 5]. Spinal meningiomas are usually iso- to hypointense to the spinal cord on T1- and

iso- to hyperintense on T2-weighted sequences with generally avid contrast enhancement. They are usually well circumscribed and often demonstrate a telltale dural “tail.” Significant intratumoral mineralization or calcification alters the MRI characteristics [5]. The differential diagnosis of spinal meningiomas predominantly includes nerve sheath tumors which more commonly show cystic regions or heterogeneous enhancement—and ependymomas [6]. The appropriate approach varies depending on the level of the tumor, the location of the tumor in relation to the spinal cord, and surgeon preference. Tumor vascularity and consistency can also influence the choice of operative exposure, particularly for ventrally located lesions, although these characteristics are difficult to determine preoperatively [7]. Approaches described in the literature for the cervical region include posterior, posterolateral, and anterior cervical corpectomy and fusion [8]. The primary treatment of spinal meningiomas remains surgery. Complete resection of spinal meningiomas is the goal, however preserving and improving neurological status has priority over complete tumor resection. Morbidity and mortality is relatively low [9].

CONCLUSION

Cervical spinal tumors, such as meningiomas, present unique challenges due to their location and relationship with critical anatomical structures. While these tumors are typically benign and slow-growing, their management requires careful consideration of their dural and ligamentous relationships to ensure effective surgical resection. Despite generally favorable outcomes and long tumor-free survival, there remains a risk of recurrence, particularly in cases with extradural extension. Comprehensive classification systems aid in the selection of the best surgical approaches, enhancing the potential for complete resection and improving patient outcomes. Continued research and refinement of surgical techniques are essential to further improve the management and prognosis of patients with cervical spinal tumors.

Declarations

Ethics Approval and Consent to Participate

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of this review.

Consent for Publication: All authors consent to publication

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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