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Cervical Spinal Cord Astrocytoma Mimicking Degenerative Cervical Disease: A Diagnostic Pitfall Revealed on Preoperative MRI

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ABSTRACT

Abstract Cervical spinal cord astrocytomas are rare intramedullary tumors that can present with insidious symptoms, mimicking degenerative cervical disease. We report a 64-year-old female with medically refractory neuralgia, admitted for presumed degenerative root compression. Preoperative MRI revealed an intramedullary lesion centered at C5–C6, surrounded by extensive perilesional edema from C4 to C7. Subsequent surgical exploration and intraoperative frozen section analysis confirmed a spinal cord astrocytoma. Careful preoperative imaging review, specifically identifying disproportionate cord expansion and intramedullary enhancement, is critical to differentiate neoplasms from common degenerative lesions.

KEYWORDS :

Intramedullary spinal cord tumor ;Cervical spinal cord astrocytoma ;Magnetic resonance imaging ;Cervical neuralgia ;Diagnostic pitfall ;Spinal cord neoplasm ;Degenerative cervical disease mimic

MAIN ARTICLE

INTRODUCTION

Primary spinal cord tumors represent less than 10% of central nervous system tumors, with astrocytomas being the most frequent intramedullary lesions in adults [1,2]. These tumors often present with insidious neurological symptoms, including motor weakness, sensory deficits, or poorly localized neuralgia, which can easily mimic common cervical spondylosis or disc herniation. Misdiagnosis can result in inappropriate surgical interventions. This case emphasizes the role of detailed preoperative MRI evaluation to differentiate atypical presentations of spinal cord astrocytomas from benign degenerative conditions.

CASE PRESENTATION

A 64-year-old female with a history of severe, medically refractory cervical neuralgia was admitted for surgical evaluation. Her symptoms were initially presumed to be secondary to degenerative cervical spine disease. As part of the standard preoperative workup, a high-field cervical MRI was performed.

Unexpectedly, MRI demonstrated no significant degenerative compressive abnormality accounting for the patient's symptoms. Instead, the sagittal T2-weighted sequence (**Figure 1**) showed a focal fusiform cord expansion centered at the C5–C6 level. This was accompanied by a longitudinally extensive hyperintense signal spanning from C4 to C7, representing disproportionate perilesional edema. Following gadolinium administration, the sagittal T1-weighted sequence (**Figure 2**) demonstrated patchy, ill-defined contrast enhancement localized to the C5–C6 cord segment, highly suggestive of an infiltrative glial neoplasm.

Given the radiological evidence, an anterior cervical surgical exploration was performed. Direct macroscopic visualization (**Figure 3**) revealed an abnormal, diffusely swollen, and hyperemic spinal cord. Recognizing the infiltrative nature of the lesion, an intraoperative frozen section biopsy was obtained. The histopathological analysis confirmed the proliferation of atypical glial cells, establishing the definitive diagnosis of a cervical spinal cord astrocytoma.

DISCUSSION

Intramedullary spinal cord astrocytomas account for approximately 6–8% of all spinal cord tumors in adults [1]. Their clinical presentation is characteristically insidious, frequently involving non-specific myelopathic symptoms or localized neuralgia that overlap with radiculopathy [2].

MRI remains the gold standard for characterizing intramedullary spinal lesions. The classic signature of a spinal astrocytoma includes a multisegmental T2 hyperintensity reflecting both the tumor bulk and surrounding reactive edema, coupled with an asymmetric or fusiform cord expansion [3,5]. In our patient, while the enhancing tumor core was localized to C5–C6, the presence of severe, longitudinally extensive T2 hyperintense edema extending from C4 to C7 constituted a major red flag. This finding correctly redirected the surgical strategy toward an oncological biopsy.

This symptomatic overlap has been documented in the literature, describing patients who underwent decompression for presumed disc herniation before the intramedullary tumor was recognized [4]. Key imaging clues include a longitudinally extensive intramedullary T2 signal exceeding the expected segment of mechanical compression, disproportionate cord swelling, and intramedullary contrast enhancement. Such extensive signal abnormalities spanning multiple vertebral levels are rarely explained by ischemic changes secondary to spondylosis [4,5].

The neuroradiological differential diagnosis of a longitudinally extensive intramedullary T2 hyperintensity requires meticulous pattern recognition. The primary differential lies between an astrocytoma and an ependymoma. Ependymomas arise from the ependymal lining of the central canal; they are typically centrally located, well-circumscribed, and often associated with polar cysts and a T2-hypointense hemosiderin cap [5]. In contrast, astrocytomas arise from the cord parenchyma itself [1]. They are typically eccentric in the axial plane, exhibit poorly defined margins that blend into the adjacent edema, and rarely display hemorrhagic features [5]. Following gadolinium administration, ependymomas typically show intense, homogeneous enhancement, whereas astrocytomas display a patchy, heterogeneous, and ill-defined enhancement pattern reflecting an irregular disruption of the blood-spinal cord barrier [5]. Inflammatory or demyelinating etiologies must also be excluded; however, these typically present with acute clinical exacerbations rather than an insidious course.

From a management standpoint, the infiltrative biology of astrocytomas dictates the surgical approach. Complete gross total resection is often precluded by their diffuse growth and the lack of a discernible anatomical cleavage plane with healthy neural tissue [1,2]. Subtotal resection or biopsy followed by adjuvant therapy remains the mainstay in most adult cases to preserve the patient's neurological baseline. Correlating high-resolution MRI semiology with intraoperative frozen section analysis is essential to safely confirm the glial nature of the lesion.

CONCLUSION

This case emphasizes that persistent cervical neuralgia should not automatically be attributed to degenerative cervical disease. Careful analysis of preoperative MRI, particularly the presence of disproportionate cord expansion, longitudinally extensive T2 hyperintensity, and intramedullary enhancement, should prompt consideration of an underlying spinal cord neoplasm and prevent inappropriate surgical management.

FIGURES:

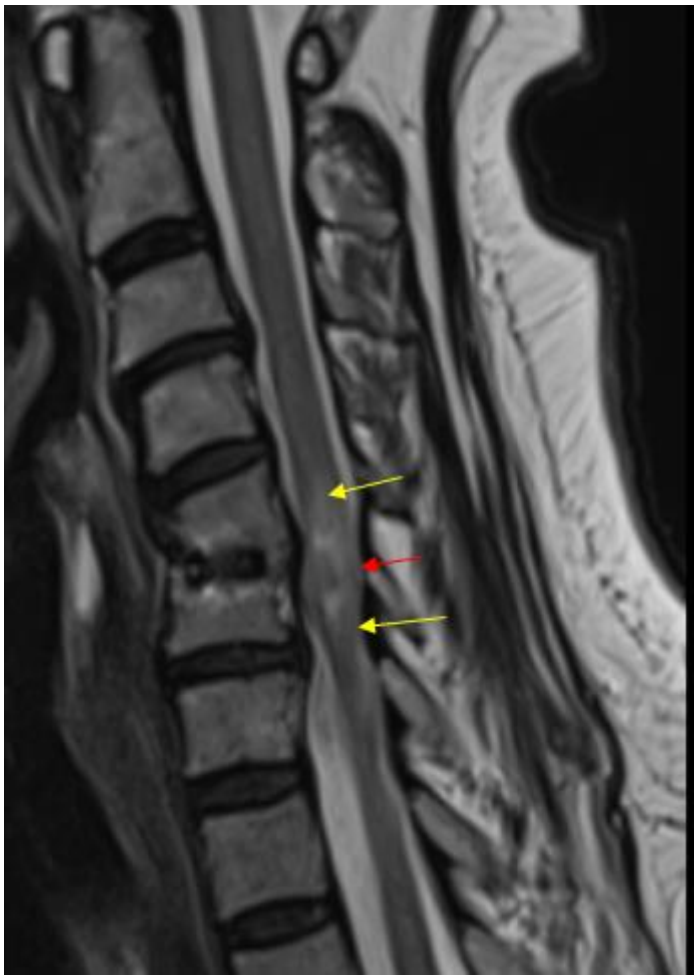

Figure 1: Sagittal T2-weighted MRI of the cervical spine. The image demonstrates a fusiform cord expansion centered at the C5–C6 level, (red arrow surrounded by severe, longitudinally extensive T2-hyperintense perilesional edema (yellow arrows) extending from C4 to C7.

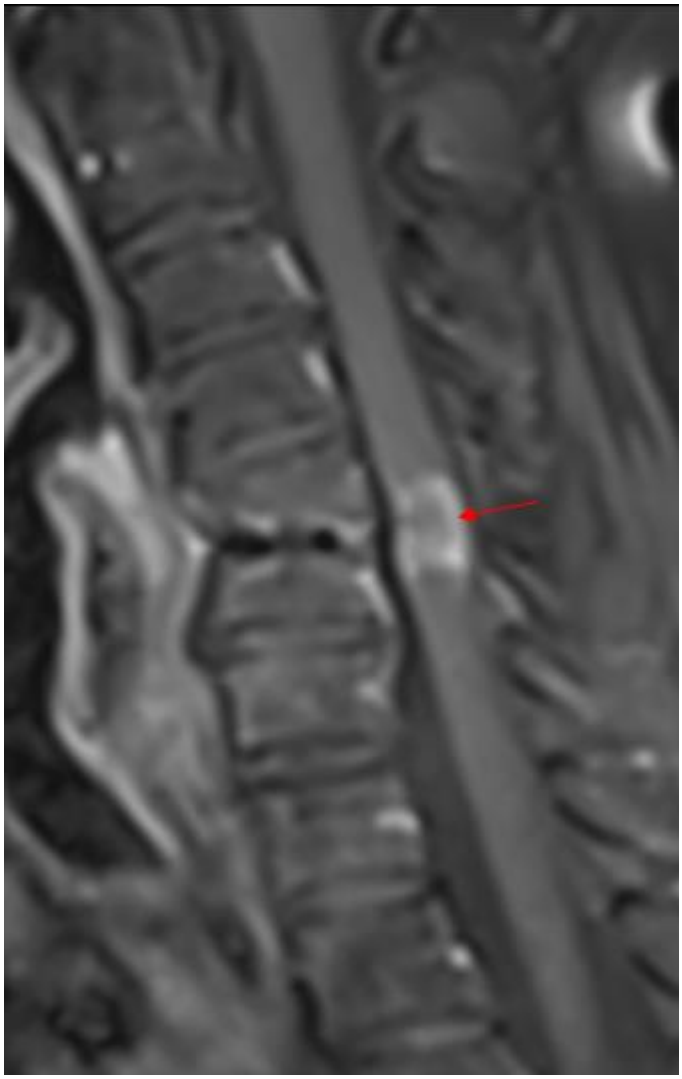

Figure 2: Sagittal T1-weighted post-gadolinium MRI. The sequence reveals patchy, ill-defined contrast enhancement localized at the C5–C6 level (red arrow) corresponding to the active tumor core of the intramedullary neoplastic lesion..

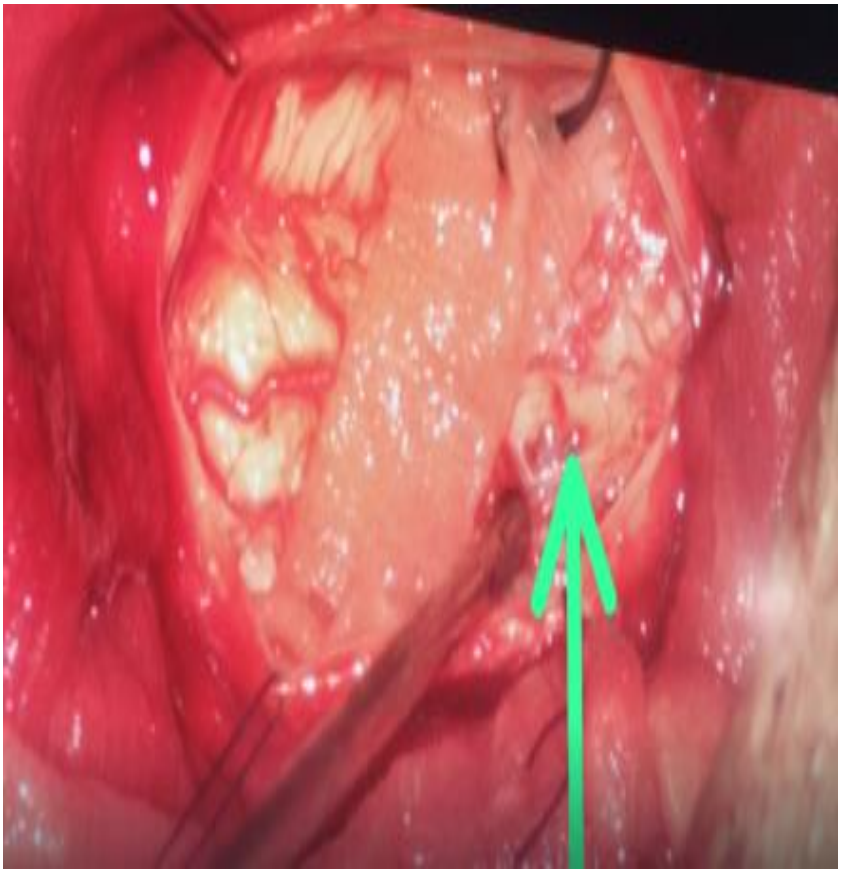

Figure 3: Intraoperative photograph of the surgical field. Direct visualization confirms the macroscopic swelling and tumefaction of the spinal cord. The arrow indicates the biopsy site of the highly infiltrative tumor at the C5–C6 level.

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The authors declare that they have no conflicts of interest.

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