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Spinal astrocytoma with secondary cerebral metastasis: A case report

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Abstract

Intracranial dissemination of spinal tumours is rare, particularly for low-grade lesions such as pilocytic astrocytoma. We report a 65-year-old man who presented with progressive limb weakness, sensory loss, and bladder dysfunction. Spinal MRI showed a large intramedullary lesion at C7-T1 with normal brain imaging, and an inflammatory myelitis was initially suspected; corticosteroids were ineffective, and he became wheelchair dependent. Two years later, he developed seizures and reduced consciousness. Brain MRI revealed a new right frontal haemorrhagic mass with oedema and hydrocephalus, while the spinal lesion remained radiologically stable. Biopsy of the intracranial mass confirmed pilocytic astrocytoma (WHO grade I). Despite plans for radiotherapy, he deteriorated and died before treatment. Spinal pilocytic astrocytomas are usually benign, and intracranial spread is extremely uncommon. This case, notable for the patient's age and lack of malignant transformation, highlights the need for brain imaging when new neurological symptoms arise in patients with known spinal astrocytoma.

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Introduction

Primary intracranial tumours often spread to the spinal cord via cerebrospinal fluid pathways, while intracranial dissemination from spinal tumours is extremely rare, with only 96 cases reported[1]. Spinal astrocytomas, seen in 6-8% of spinal tumours, have an annual incidence of 4.8 per million and mainly affect children[2]. We present a rare case of a spinal pilocytic astrocytoma with intracranial spread in a 65-year-old male.

Case Report

A 65-year-old male patient with no previous medical history presented with a progressive history of numbness and weakness in his four limbs associated with bladder and bowel function impairment. The first spinal cord MRI of June 2021 with gadolinium injection showed a large intramedullary mass extending from C7 to T1, heterogeneously contrasted after Gadolinium injection with important surrounding oedema, while no abnormalities were detected on the brain MRI. (Figure 1). Given the chronic evolution, the patient's age, associated sicca symptoms, and a lumbar puncture showing elevated protein (10 g/L) with fewer than 3 white cells, a diagnosis of inflammatory myelitis possibly linked to Sjögren's syndrome was initially suspected, although full diagnostic criteria were not met. The patient was treated with corticosteroids, but showed no clinical improvement

The evolution has been characterized by a continued deterioration of symptoms leading to wheelchair dependence and the appearance of new clinical signs like headaches, vomiting, consciousness disturbances, and an episode of generalized seizures, which led to his hospitalization.

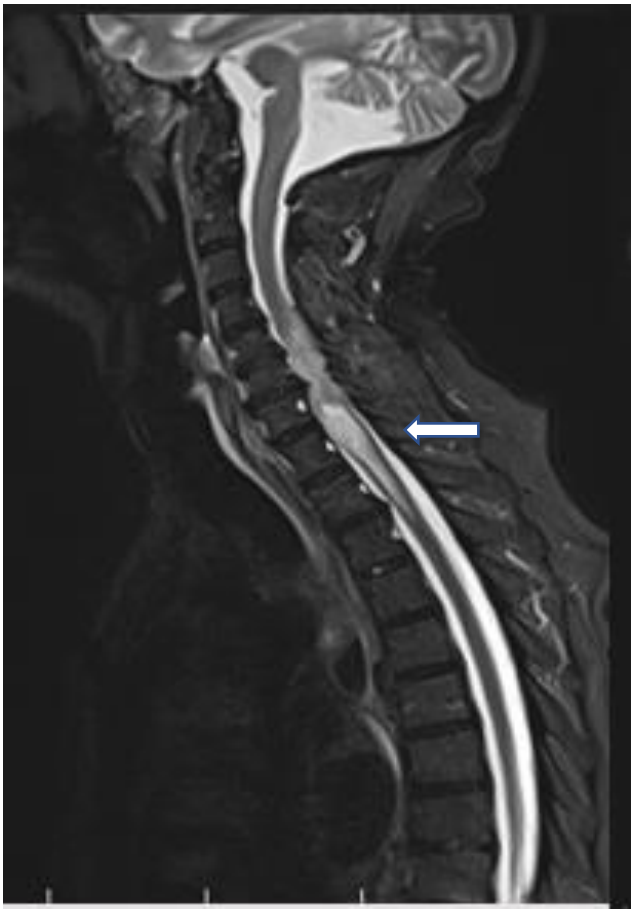

Figure 1: Spinal MRI in Sagittal T2-weighted sequence showing an elongated hyperintense lesion from C7 to T1 and surrounded by oedema (white arrows)

Neurological exam showed motor weakness in all limbs, predominant in the lower limbs, with pyramidal signs and sensory loss below C5. Another brain, including the following sequences (T1, T2, DWI, ADC, T2*/SWI, T1 postcontrast) and spinal MRI, was performed in December 2022 and demonstrates, on cerebral MRI, a cortical ill-defined mass with heterogeneous signal on T2-weighted and FLAIR images, exhibiting intense contrast enhancement. There is evidence of important surrounding oedema on T2 WI and a significant haemorrhagic component on susceptibility weighted imaging (SWI). Adjacent meningeal enhancement is also evident (Figure 2).

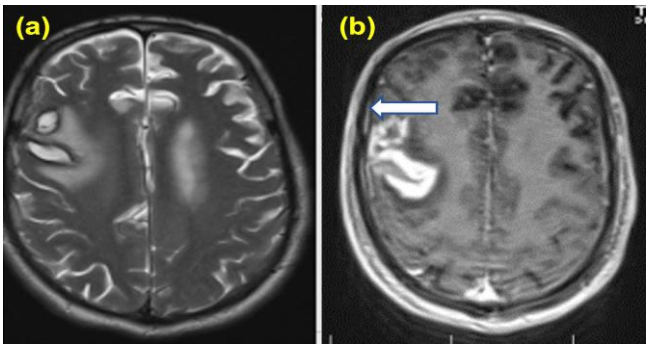

Figure 2: Brain MRI (a) Axial T2-weighted image showing a heterogeneous cortical II-defined lesion in the right frontal lobe with perilesional oedema. (b) Axial plane of post-contrast T1-weighted image showing intense cortical enhancement and adjacent meningeal enhancement (white arrow).

Biopsy of the cervical lesion revealed moderate glial proliferation with a microcystic pattern on a fibrillary background. Immunohistochemistry showed GFAP-positive and Ki-67-negative tumour cells (figure 3). A diagnosis of WHO Grade I pilocytic astrocytoma with intracranial metastasis was made. Focal radiotherapy was planned, but the patient died before treatment.

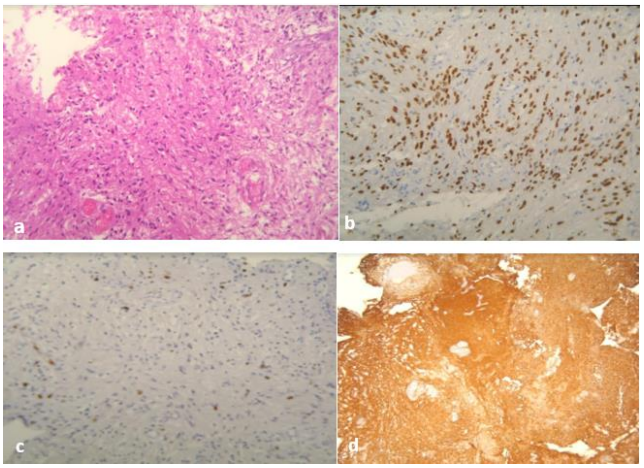

Figure 3: Histopathological analysis of the spinal tumour. (a) H&E staining (×20): Microcystic glial proliferation in a fibrillary background. (b) Ki-67 (×20): Low proliferative index. (c) Olig2 (×20): Nuclear expression confirming glial origin. (d) GFAP (×5): Diffuse cytoplasmic expression in tumour cells.

Discussion

Pilocytic astrocytoma of the spinal cord represents a rare entity, accounting for 2-4% of all central nervous system tumours and approximately 6-8% of spinal cord neoplasms[2]. While PA is generally considered a low-grade tumour with a favourable prognosis, adult patients, especially those with spinal localization, have more variable outcomes. In a retrospective series of 50 adult patients with PA,

Theeler et al[2] reported that although the overall prognosis remains relatively good, progression and mortality rates were higher than typically seen in paediatric populations, particularly when complete surgical resection was not feasible. Our case, involving a 65-year-old man with a cervical spinal pilocytic astrocytoma and delayed intracranial dissemination, illustrates an exceedingly rare clinical presentation, both in terms of age and metastatic behaviour.

According to Munshey et al, this spinal seeding of intracranial tumours is possible through CSF pathways, and multiple risk factors are described, such as hypothalamic location of the primary tumour, partial resection after surgical treatment, and age less than 3 years at initial diagnosis[3].

Retrograde spread from spinal to intracranial sites is rare, with only 96 reported cases between 1908 and 2020, mostly in patients under 40 years[1]. This mainly involves high-grade tumours like anaplastic astrocytoma or Glioblastoma multiforme, as confirmed by Santi et al[1,4].

The mechanism of intracranial metastasis of spinal tumours is a debatable issue, and many hypotheses have been proposed: The First one is related to malignant transformation, which is a key factor in intracranial dissemination. Most reported cases involved high-grade gliomas or prior malignant transformation[1,5]. Potential predisposing factors include irradiation and genetic conditions like Neurofibromatosis type 15. Furthermore, genetic factors play a role in this transformation, with certain genes, such as H3K27M mutations, being linked to more aggressive forms of gliomas that have the potential to metastasize intracranially[1]. The Second hypothesis that can explain this spread is surgical manipulation of the primary tumour, which may expose tumour cells to CSF and enhances the chances of dissemination[3,5]. The third hypothesis is the overexpression of epidermal growth factor receptor by some low-grade spinal tumours, which allows them to act more aggressively and lead to leptomeningeal dissemination[6].

Spinal pilocytic astrocytoma is a histologically benign tumour with excellent survival. Only 3 of the 96 spinal tumours responsible for intracranial metastasis, reported by Vadhan in his systematic review[1], were pilocytic astrocytomas, emphasizing the rarity of our case. Reported cases include a 5-month-old boy with a C1–C5 lesion metastasized to the pons, a 9-year-old girl with a C5–C7 lesion spreading to the Sylvian fissures, brainstem, and cerebellar sulci, and a 39-year-old man with a conus medullaris tumour and metastases to the subarachnoid space, ventricles, and cerebellum[7,8,9].

This case highlights several important learning points. Intracranial spread of low-grade spinal astrocytomas is extremely rare, especially in older patients and without malignant transformation, but should still be considered. New neurological symptoms should prompt repeat brain imaging regardless of tumour grade. A major limitation is the lack of histopathological confirmation of the intracranial lesion due to rapid deterioration, underlining the value of sampling secondary lesions whenever possible. This unusual course adds to the sparse literature and emphasises the need for greater awareness and reporting of such rare presentations.

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References

1. Vadhan JD, Eichberg DG, Di L, Manzano G, Ivan M, Komotar RJ. Primary Low-Grade Astrocytoma of the Spine With Secondary Cerebral Metastasis: A Case Report and Comprehensive Review of the Literature. *Cureus*. 2020 Aug 25;12(8).

2. Theeler BJ, Ellezam B, Sadighi ZS, Mehta V, Tran MD, Adesina AM, Bruner JM, Puduvalli VK. Adult pilocytic astrocytomas: clinical features and molecular analysis. *Neuro oncol*. 2014 Jun 1;16(6):841-7.

3. Munshey A, Moore J, Maclean C, Longano A, Goldschlager T. Cranial pilocytic astrocytoma with spinal drop metastasis in an adult: case report and literature review. *World Neurosurg*. 2017 Feb 1;98:883-e7.

4. Santi M, Mena H, Wong K, Koeller K, Olsen C, Rushing EJ. Spinal cord malignant astrocytomas: clinicopathologic features in 36 cases. *Cancer*. 2003 Aug 1;98(3):554-61.
5. Jang SY, Kong MH, Song KY, Frazee JG. Intracranial metastases of cervical intramedullary low-grade astrocytoma without malignant transformation in adult. *J Korean Neurosurg Soc*. 2009 Jun 30;45(6):381.
6. Peraud A, Herms J, Schlegel J, Müller P, Kretzschmar H, Tonn JC. Recurrent spinal cord astrocytoma with intraventricular seeding. *Childs Nerv Syst*. 2004 Feb;20(2):114-8.
7. Galarza M, Peretta P, Gazzeri R, Cinalli G, Forni M, Morra I, Ragazzi P, Sandri S. Spinal cord gliomas and hydrocephalus: Utility of neuroendoscopy. *Minim Invasive Neurosurg* . 2006 Dec;49(06):347-52.
8. Ng HK, Leung CH, Boet R, Poon WS. Spinal cord pilocytic astrocytoma with cranial meningeal metastases. *J Clin Neurosci*. 2001 Jul 1;8(4):374-7.
9. Schlereth T, Nguyen-Huu BK, Müller H, Sommer C, Müller-Forell W, Zipp F. Intracranial spreading of a spinal anaplastic astrocytoma. *J Neurol*. 2012 Apr;259(4):768-70.
10. GAIT 2024 Collaborative Group. Generative artificial intelligence transparency in scientific writing: the GAIT 2024 guidance. *Impact Surg* 2025;2:6. https://doi.org/10.62463/surgery.134.