CASE STUDY

Spinal Trauma Revealing a Metastatic Medullary Lesion: A Case Report

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ABSTRACT

Introduction and Importance: Intramedullary spinal cord metastases (ISCM) are a rare and devastating complication of malignant disease with a poor prognosis. Prompt and accurate diagnosis is necessary for effective treatment, and magnetic resonance imaging (MRI) is the preferred imaging technique. In this article, a rare case of an ISCM presenting with motor weakness after trauma is described.

Case Presentation: The patient showed progressive severe paraplegia and urinary retention, and a thoraco-abdomino-pelvic scan showed a mediastinal pulmonary process and mediastinal adenopathies with adrenal lesions. He was admitted and a total resection of the processus was performed. After surgery, the patient showed partial neurological improvement, but two weeks later, he had a consciousness impairment. A cerebral CT scan showed multiple round lesions, with perilesional edema, and the patient died one month later.

Discussion: The article discusses the pathogenic mechanisms of ISCM and its diagnosis, treatment, and management, which are controversial due to the multitude of clinical circumstances and the lack of controlled studies on the efficacy of the different therapeutic approaches.

Conclusion: In conclusion, this rare case of Intramedullary Spinal Cord Metastases (ISCM) offers several important take-away lessons for clinicians and researchers alike.

Keywords: Brain metastases, Intramedullary spinal cord metastases (ISCM), Trauma, Tumor resection.

1. INTRODUCTION

Intramedullary spinal cord metastases (ISCM) are a rare and devastating complication of malignant disease. While the prognosis is poor, with a median survival of 4 months from the time of diagnosis [1], the incidence of ISCM is increasing due to advancements in imaging and therapies that prolong survival in cancer patients. Prompt and accurate diagnosis is crucial for effective treatment, and magnetic resonance imaging (MRI) is the preferred imaging technique.

Despite the multitude of clinical circumstances and the lack of controlled studies on the efficacy of different therapeutic approaches, increased awareness of this rare condition may lead to earlier diagnosis and more effective palliation [2].

The following is a rare case of an ISCM presenting with motor weakness after trauma admitted in our institution.

2. BACKGROUND

Intramedullary spinal cord metastasis (ISCM) is a rare condition, representing 8.5% of central nervous system (CNS) metastases [2]. It affects 0.1%–0.4% of all cancer patients and comprises 1%–3% of all intramedullary spinal cord neoplasms.

The most common primary cancer source for ISCM is small cell lung carcinoma, followed by breast, colon, kidney, melanomas, and lymphomas [2], [3].

Metastatic intramedullary spinal cord tumors frequently lead to spinal cord parenchymal edema, distortion, and compression, resulting in a range of neurological symptoms such as pain, sensory disturbances, weakness, and sphincter dysfunction. In some rare cases, patients may remain asymptomatic.

Distinguishing intramedullary spinal cord metastases (ISCM) from more commonly encountered extradural...
spinal cord metastases, primary intramedullary tumors, radiation myelopathy, and paraneoplastic necrotizing myelopathy can be challenging without radiographic imaging. The rapid progression of neurological symptoms within days to weeks in ISCM contrasts with the slower development of symptoms in primary intramedullary tumors [4–6].

Intramedullary spinal cord metastasis (ISCM) can result from various pathogenic mechanisms. The predominant pathway is believed to be hematogenous spread, accounting for the majority of cases, as supported by the co-occurrence of pulmonary and brain metastasis. This suggests dissemination via the arterial route, although another hematogenous route involves Batson's venous plexus, which allows retrograde transportation of cancer cells to the spinal cord via the cranial venous sinuses [7], [2], [8–10]. A second mechanism relates to meningeal carcinomatosis, whereby tumor cells infiltrate the Virchow-Robin spaces of vessels and penetrate the spinal cord parenchyma via the pial membrane. Finally, direct invasion from contiguous structures, such as spinal extradural space, cerebrospinal fluid, or nerve roots, through the dura and into the cord, has also been proposed, potentially spreading along perineural space to the subarachnoid space and cord parenchyma [11–13].

Patients with intramedullary spinal cord metastasis (ISCM) often have additional CNS diseases. Brain metastases and systemic metastases are commonly diagnosed in a majority of patients with ISCM at the time of initial diagnosis. Both brain metastasis and ISCM may be diagnosed concurrently, or ISCM may develop either before or after the emergence of brain metastasis. Asymptomatic brain metastasis was identified in several patients, underscoring the need for brain imaging for all patients with ISCM [11].

Advanced diagnostic techniques such as high-resolution magnetic resonance imaging (MRI) are expected to enhance the detection of intramedullary spinal cord metastasis (ISCM) in vivo. Timely diagnosis and prompt treatment have been identified as crucial factors in enhancing the survival rate of cancer patients.

Currently, there is no conclusive evidence to guide the selection of optimal therapy for patients with intramedullary spinal cord metastasis (ISCM), as current recommendations are largely based on anecdotal experience derived from retrospective studies. In patients with rapidly deteriorating neurological symptoms, preservation of motor function should be prioritized, whereas palliation may be appropriate for those with minimal or no cord function. Conservative approaches, such as radiation and chemotherapy, are commonly employed due to the frequent co-occurrence of other systemic illnesses. The use of radiation treatment, with or without concurrent administration of steroids, is often reported in the literature [13].

Surgical intervention for intramedullary spinal cord metastasis (ISCM) is aimed at preserving neurological function and achieving optimal decompression. Like intracranial metastases, ISCM typically presents as a well-circumscribed focal mass that can be amenable to gross total resection. However, some neurosurgeons prioritize the preservation of neurological function over complete tumor removal, favoring less aggressive subtotal resection, particularly when the tumor’s spinal cord interface is unclear, and peripheral dissection may jeopardize viable yet infiltrated spinal cord tissue. The appearance of intramedullary metastases is generally an unfavorable prognostic sign, often indicating late-stage disease with widespread systemic involvement. Agha et al. [14] reported a median overall survival of 7.3 months, with surgical patients surviving almost twice as long (9.4 months) as nonsurgical patients (5 months). Okamoto et al. [11] also found that survival was strongly correlated with the aggressiveness of therapy. While some smaller studies have yielded different overall survival results, patients treated with surgery alone or in combination with adjuvant therapy typically exhibit a better prognosis.

3. Methods

We report a clinical case study of patients admitted to our department in January 2023 and operated in our operation room in our institution. The work has been reported in line with the SCARE criteria [14].

4. Clinical Presentation

A male patient, aged 44 years with no significant medical history, presented to the emergency department following a dorsal impact due to an accidental fall of the trunk door of his car. The patient initially exhibited no limb weakness and had an American Spinal Injury Association Score E.

CT scan of the spine revealed a stable T12 fracture that was managed with orthopedic immobilization (see Fig. 1). On day 15 after trauma, the patient developed progressive and severe paraplegia with an American Spinal Injury Association Score E. Surgical intervention for intramedullary spinal cord metastasis (ISCM) is aimed at preserving neurological function and achieving optimal decompression. Like intracranial metastases, ISCM typically presents as a well-circumscribed focal mass that can be amenable to gross total resection. However, some neurosurgeons prioritize the preservation of neurological function over complete tumor removal, favoring less aggressive subtotal resection, particularly when the tumor’s spinal cord interface is unclear, and peripheral dissection may jeopardize viable yet infiltrated spinal cord tissue. The appearance of intramedullary metastases is generally an unfavorable prognostic sign, often indicating late-stage disease with widespread systemic involvement. Agha et al. [14] reported a median overall survival of 7.3 months, with surgical patients surviving almost twice as long (9.4 months) as nonsurgical patients (5 months). Okamoto et al. [11] also found that survival was strongly correlated with the aggressiveness of therapy. While some smaller studies have yielded different overall survival results, patients treated with surgery alone or in combination with adjuvant therapy typically exhibit a better prognosis.

A thoraco-abdomino-pelvic scan revealed a mediastinal pulmonary process and mediastinal adenopathies with a hypointense and hyperintense lesion that extended from the bulbo-medullary junction to the T2-T3 level. The Gadolinium injected sequence showed a hypointense and hyperintense lesion that extended from the bulbo-medullary junction to the T2-T3 level. The Gadolinium injected sequence showed a hyperintense round lesion at T2 level (see Fig. 2).

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Fig. 1. Initial imaging showing a stable T12 margin body fracture.
Spinal Trauma Revealing a Metastatic Medullary Lesion: A Case Report

Fig. 2. Spine MRI. T2 (a) and Gadolinium (b) sequences showing nodular tumor on T2 with cervical syrinx.

Fig. 3. Peroperative aspect of a reddish grayish medullary lesion before (a) and after (b) resection.

adrenal lesions. A T2 bilateral laminectomy and dural opening were performed, revealing a large, reddish-grayish firm mass that was hyper vascularized and approximately 1 cm in diameter. The tumor was carefully dissected, and a total resection was achieved (see Fig. 3).

The surgical specimen received in formalin consisted of a grayish, nodular lesion. Histology study revealed a poorly differentiated tumor proliferation. Immunohistochemical study showed that the cells expressed cytokeratin AE1/AE3 and EMA (see Fig. 4). The patient exhibited partial neurological improvement immediately after surgery, with better mobilization of the inferior limbs. However, urinary sphincter function did not improve. Two weeks later, the patient exhibited consciousness impairment. A cerebral CT scan revealed multiple round lesions with perilesional edema (see Fig. 5). Biopsy of the most accessible lesion and histopathology confirmed the diagnosis of liver metastasis. The patient regained consciousness post operatively, but one month later, he died.

5. Discussion

The study described a rare case of Intramedullary Spinal Cord Metastases (ISCM) presenting with motor weakness following trauma, shedding light on the challenges associated with its diagnosis and treatment. One of the strengths of the study is its contribution to the understanding of ISCM, which is a rare and often devastating complication of malignant disease. By presenting a unique case, the study highlights the need for considering ISCM as a potential diagnosis in patients with neurological symptoms, even if they have a history of trauma. The use of magnetic resonance imaging (MRI) as the preferred imaging technique for diagnosis is another strength, emphasizing the importance of accurate and timely diagnostics in improving treatment outcomes. Additionally, the surgical intervention performed to resect the processus is a noteworthy strength as it provides insights into potential treatment options for ISCM. However, there are several weaknesses in the study. First, the rarity of ISCM means that findings from a single case may not be generalizable to a broader population. The lack of controlled studies on the efficacy of different therapeutic approaches, as mentioned in the abstract, is a significant limitation. This highlights the need for more research in this area to establish evidence-based guidelines for ISCM treatment.

Furthermore, the case's outcome, with the patient experiencing a consciousness impairment and ultimately passing away, underscores the poor prognosis associated with ISCM, which is another limitation. A larger sample size and long-term follow-up data would provide a more comprehensive understanding of the treatment's effectiveness and prognosis for ISCM patients.

In conclusion, while the study provides valuable insights into the diagnosis and treatment of ISCM, its limitations, including the rarity of the condition and the lack of controlled studies, underscore the need for further research and a more extensive evidence base to guide clinical practice in managing this devastating complication of malignant disease.
6. Conclusion

In conclusion, this rare case of Intramedullary Spinal Cord Metastases (ISCM) offers several important takeaway lessons for clinicians and researchers alike. Firstly, it underscores the critical role of magnetic resonance imaging (MRI) in the prompt and accurate diagnosis of ISCM, particularly in patients presenting with neurological symptoms following trauma. Secondly, the study highlights the challenges associated with the management of ISCM due to its rarity and the lack of controlled studies on treatment efficacy. This emphasizes the need for further research and collaborative efforts to develop evidence-based guidelines for ISCM treatment. Lastly, the unfortunate outcome of the case serves as a stark reminder of the generally poor prognosis associated with ISCM, necessitating a comprehensive and multidisciplinary approach to care, with 188 a focus not only on treatment but also on palliative care and patient support. Overall, this study underscores the importance of awareness, early detection, and a multidimensional approach in managing ISCM, with the ultimate goal of improving the quality of life and outcomes for affected patients.

Informed Consent

Informed consent has been obtained from the involved patient who has given approval for this information to be published in this case report.

Conflict of Interest

Authors declare that they do not have any conflict of interest.

References