Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Radiology

Spinal Magnetic Resonance Imaging of Multiple Myeloma: A Case of Plasmacytoma

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DOI: https://doi.org/10.36347/sjmcr.2025.v13i09.045 | **Received:** 10.07.2025 | **Accepted:** 18.09.2025 | **Published:** 22.09.2025

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Abstract | **Case Report**

Multiple myeloma (MM) is a malignant hemopathy characterized by clonal proliferation of plasma cells, predominantly affecting the axial skeleton. Neurological complications, particularly spinal cord compression, represent a severe and urgent manifestation. We report the case of a 70-year-old patient with known MM, maintained on immunomodulatory therapy, who presented with progressive paraparesis, saddle anesthesia, and urinary retention. Spinal MRI demonstrated diffuse marrow infiltration, a compression fracture of D11, and an infiltrating plasmacytoma of D4 causing spinal cord compression. These findings corresponded to stage III disease according to the Salmon and Durie classification. This case highlights the essential role of MRI in diagnosing and monitoring MM, given its superior sensitivity for detecting marrow infiltration, vertebral fractures, plasmacytomas, and complications such as cord compression. Early and accurate imaging evaluation is indispensable to guide urgent management and improve patient prognosis.

Keywords: Multiple myeloma, Plasmacytoma, Spinal cord compression, MRI, Vertebral fracture, Salmon-Durie classification.

INTRODUCTION

Multiple myeloma (MM) is a malignant hemopathy characterized by monoclonal proliferation of plasma cells within the bone marrow. It is a rare condition, accounting for about 10–12% of hematologic malignancies and around 1% of all cancers, making it the most frequent hematologic malignancy after lymphomas. The most common clinical manifestations include bone pain, pathological fractures—particularly vertebral ones- and metabolic complications such as hypercalcemia, as well as renal or neurological involvement. Spinal cord compression represents the most frequent and severe neurological complication of MM, and several mechanisms have been implicated. Our study reports a case of spinal cord compression due to a vertebral plasmacytoma in a patient with MM.

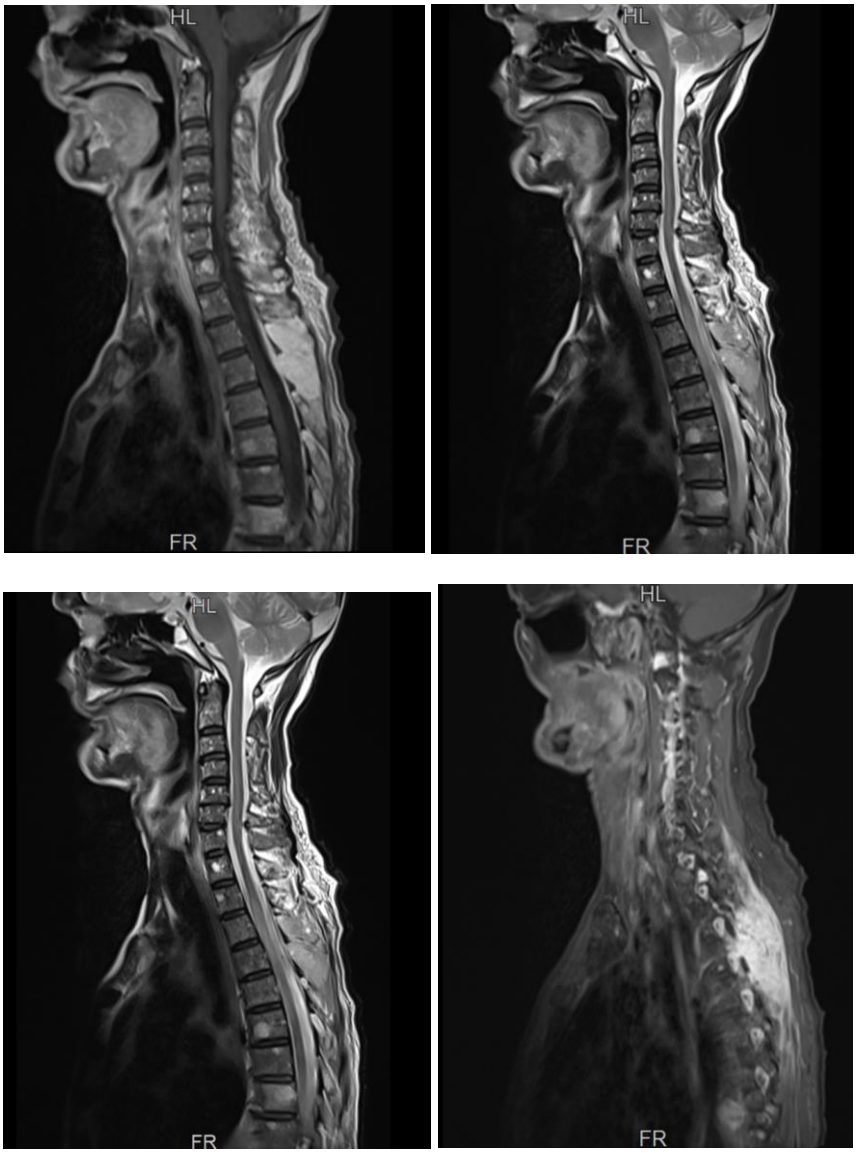
CASE STUDY

We report the case of a 70-year-old patient with a history of multiple myeloma, initially treated with chemotherapy and maintained on immunomodulators, presenting with progressive paraparesis associated with saddle anesthesia and urinary retention for 48 hours. No recent trauma was reported.

Neurological examination revealed:

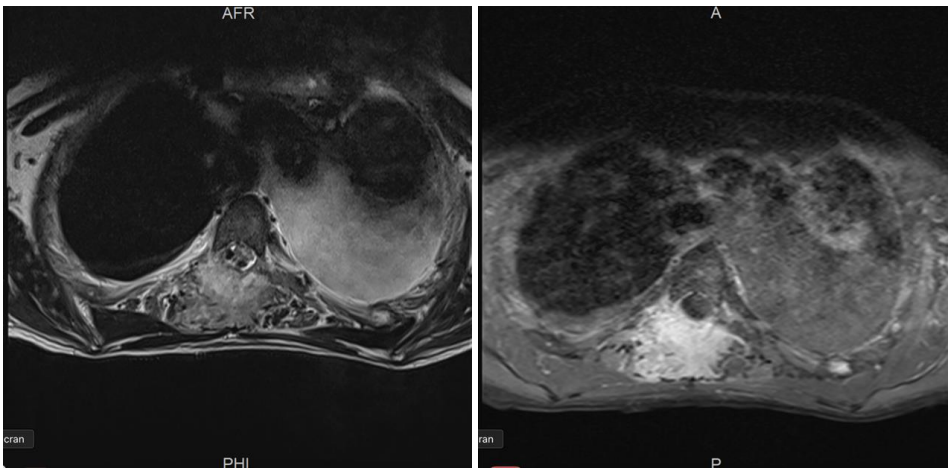
- Asymmetric paraparesis, more pronounced on the left, with a motor score of 2/5 in the left lower limb and 3/5 in the right lower limb.
- Decreased muscle tone and abolition of deep tendon reflexes in the lower limbs.
- Tactile and thermal anesthesia below the T10 level, associated with saddle anesthesia.

Spinal magnetic resonance imaging (MRI) showed:



- **Images 1–4: Sagittal T1, T2, and diffusion sequences**

Diffuse infiltration of the axial skeleton and ribs is suggestive of myeloproliferative disease, complicated by compression fracture of the D11 vertebral body. (images 1-4)



•Image 5 : Axial STIR sequence at D4 • Image 6 : Axial diffusion sequence at D4

An infiltrating mass at the spinous process of D4, hypointense on T1, hyperintense on T2, and showing homogeneous enhancement after gadolinium injection, compatible with an active plasmacytoma, causing spinal cord compression at this level.

• Overall, the findings correspond to stage III according to the Salmon and Durie classification.

DISCUSSION

- **Definition**

Multiple myeloma is a malignant hemopathy resulting from clonal plasma cell proliferation, with predominant skeletal involvement of the spine. It may be suspected based on characteristic clinical, biological, or radiological findings, but it can also be discovered incidentally through imaging revealing osteolytic or tumoral lesions.

In its symptomatic presentation, multiple myeloma most often manifests with persistent bone or spinal pain, unrelieved by rest and resistant to analgesics, including strong opioids. Less commonly, it may present as a medical emergency such as acute renal failure or hypercalcemia, and more rarely as hyperviscosity syndrome.

MM can initially evolve asymptomatically, with clinical signs and symptoms appearing at a more advanced stage of the disease.

Three main forms are distinguished:

1. **Solitary bone plasmacytoma** – a localized variant presenting as a single bone lesion.
2. **Extramedullary plasmacytoma** – located in soft tissues, without diffuse bone involvement.
3. **Disseminated multiple myeloma** – systemic form, associated with multiple bone lesions, hyperproteinemia, and bone pain due to bone infiltration. The most frequent sites include vertebrae, skull, pelvis, ribs, humerus, and femur.

MM is more frequent in men, with a sex ratio of 4:1, and occurs mainly between ages 50 and 80, peaking around 60 years [1].

- **Role of MRI** [2]

MRI is an essential tool in the evaluation of multiple myeloma, offering greater sensitivity than conventional radiography. It provides precise imaging of the axial skeleton, a clear differentiation between normal and infiltrated bone marrow, and reliable detection of complications such as spinal cord compression and extramedullary masses.

Beyond diagnosis and therapeutic follow-up, MRI also has important prognostic value: studies have shown that a high number of lytic lesions (>7) and diffuse infiltration on MRI are associated with poor prognosis, often more predictive than cytogenetic analyses. MRI also allows visualization of comorbidities such as cardiac amyloidosis, further emphasizing its key role in the overall management of patients.

- **Spinal cord compression:**

Among neurological complications, spinal cord compression is the most frequent and severe, occurring in 5–24% of cases [3]. This condition requires urgent management because of its potential to cause irreversible neurological deficits.

Most cases of spinal cord compression result from osseous causes such as pathological fracture of the affected vertebral body or extension of a localized myeloma lesion within the vertebra. [4]

It is often due to vertebral plasmacytomas, which are tumoral masses resulting from malignant plasma cell proliferation within the vertebrae. On MRI, these lesions typically appear hypointense on T1 and hyperintense on T2/STIR sequences, with homogeneous enhancement after gadolinium administration, reflecting significant tumor activity. [4]

CONCLUSION

In summary, MRI is not only an essential diagnostic tool in multiple myeloma but also a valuable guide for management, therapeutic follow-up, and prognostic evaluation. Its ability to detect lesions early and provide detailed visualization of complications makes it an indispensable modality in this disease.

[1] Plasmocytome mandibulaire révélateur d'un myélome multiple. Présentation d'un cas Claudia Araceli Torres Urbina1, Agueda Marisol Arellano Flores2, José Luis Vazquez Salvador1, Arlette Araceli Barbosa Ibarra3, Rocío Gloria Fernandez Lopez2, Beatríz Catalina Aldape Barrios4

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[3] *Blood, Journal of Clinical Oncology*

[4] Myélome multiple (Myélome; myélome à plasmocytes) par James R. Berenson, MD, Institute for Myeloma and Bone Cancer Research