Multiple Myeloma Presenting as Spinal Cord Compressive Plasmacytoma in Young Adults: A Case Series

Ryan T. Shields, MD, MS; Nathan B. Rose, BS; Charlotte E. Ball, MD

ABSTRACT

Introduction: Multiple myeloma is a hematologic malignancy characterized by clonal proliferation of plasma cells. It is rare in young adults and may present in atypical forms, complicating timely diagnosis.

Case Presentations: Patient 1 was a 23-year-old female who presented with subacute onset of leg pain, progressive weakness, and urinary retention. Lumbar spine magnetic resonance imaging (MRI) revealed a sacral mass causing cauda equina syndrome. Biopsy confirmed the diagnosis of plasmacytoma. At discharge, she exhibited gait abnormalities, neuropathic pain, and persistent urinary retention. She functioned at a modified independent level, using a manual wheelchair for mobility and performing intermittent self-catheterization. Patient 2 was a 28-year-old female who presented with acute onset of leg pain, weakness, and urinary retention. MRI of the spine revealed an epidural mass extending from T1 to T11, resulting in spinal cord compression. She underwent thoracolumbosacral laminectomies, and biopsy confirmed plasmacytoma. At discharge, she had motor complete paraplegia, neuropathic pain, and urinary retention managed with intermittent self-catheterization. She was modified independent, using a manual wheelchair for mobility.

Discussion: Despite advances in diagnosis and treatment, multiple myeloma remains a complex disease that poses diagnostic and therapeutic challenges. These cases emphasize the importance of standardized treatment protocols in management of spinal cord compressive plasmacytoma.

Conclusions: Early diagnosis, coordinated multidisciplinary care, and comprehensive rehabilitation are essential for improved management and outcomes.

INTRODUCTION

Multiple myeloma (MM) is a hematologic malignancy characterized by the clonal proliferation of plasma cells. It predominantly affects older adults, with a median age at diagnosis of 65 to 74 years.[1] The disease is exceedingly rare in younger individuals, with those under 30 years of age accounting for less than 0.3% of all MM cases.[2] Despite advances in diagnosis and treatment, MM remains a clinically complex disease with diverse presentations, often posing significant diagnostic and therapeutic challenges.

The hallmark of MM involves the overproduction of monoclonal immunoglobulins, which can lead to various systemic manifestations, including renal dysfunction, anemia, hypercalcemia, and lytic bone lesions. Patients often present with bone pain, fractures, and other skeletal-related pathology due to the disease's predilection for the bone marrow. However, the clinical presentation of MM can be highly variable—particularly in younger patients, where the disease may manifest in atypical forms that are not immediately recognized as being related to plasma cell dyscrasia.[3]

The current standard of care treatment for MM typically involves a multi-phase treatment approach. This begins with high-dose induction chemotherapy, followed by autologous stem cell transplant for eligible patients. Consolidation therapy is then administered to further reduce disease burden, and maintenance therapy is used to help sustain remission and prevent disease relapse.[4] Newly diagnosed MM patients are stratified using the Revised International Staging System (R-ISS), a prognostic tool based on serum biomarkers that effectively categorizes patients according to the relative risk to their survival.[5]

In addition to its rarity in young adults, MM can present with unusual and severe complications, such as spinal cord compression

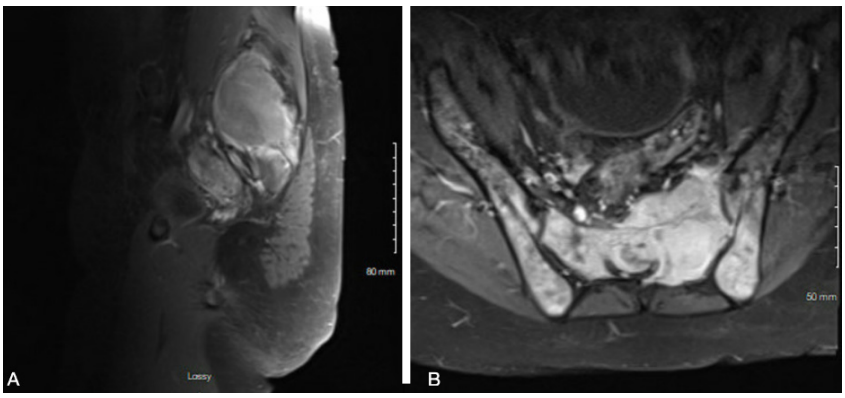
• • •

Author Affiliations: Department of Physical Medicine and Rehabilitation, Medical College of Wisconsin, Milwaukee, Wisconsin (Shields, Rose, Ball).

Corresponding Author: Ryan Shields, MD, 8701 W Watertown Plank Rd, Milwaukee, WI 53226, email shieldsmu@gmail.com; ORCID ID 0000-0001-7177-3316

and cauda equina syndrome. These conditions may lead to significant neurological deficits and functional impairments,[6] underscoring the need for increased clinical awareness. Such complications may arise from the formation of plasmacytomas–localized masses of neoplastic plasma cells–that can exert pressure on the spinal cord or nerve roots. Such manifestations are uncommon in MM and may be misdiagnosed initially, further complicating the clinical course.[7] Patients diagnosed with plasmacytoma may be treated with corticosteroids to achieve both a plasmacytolitic and an anti-edema effect. Most patients with neurologic symptoms can be treated with conventional external beam radiotherapy due to the tumor's radiosensitive nature. Surgical intervention is typically reserved for cases involving spinal instability or bowel and bladder dysfunction.[8]

Figure 1. T1-weighted Fat-saturated Images Demonstrating Infiltrative Mass Involving S1-S3 Vertebral Bodies



A. Sagittal sequence with extension into the left greater than right sacral ala.
B. Axial sequence with ventral extraosseous extension into the presacral soft tissues anterior to the left sacral ala displacing the left lumbosacral plexus anteriorly.

CASE PRESENTATIONS

Case 1

Patient 1 was a 23-year-old female with no significant past medical history who presented initially with acute onset low back pain, left lower extremity weakness with associated muscle spasms, and urinary retention over the preceding 2 days. Notably, she reported similar symptoms 1 year prior, which had resolved spontaneously, except for persistent neuropathic pain attributed to sciatic nerve dysfunction. Her symptoms had been managed conservatively in the interim with nonopioid analgesics and intermittent chiropractic adjustments. She had previously been ambulatory without assistive devices and was independent in all activities of daily living.

Physical examination was notable for 4/5 strength at bilateral hip flexors, with intact light touch and pinprick sensation in S3-5 dermatomes. Rectal examination revealed an intact anal wink reflex. Magnetic resonance imaging (MRI) of the lumbar spine showed an expansile 7-cm sacral mass resulting in narrowing of the sacral spinal canal and neural foramina, raising concern for cauda equina syndrome (Figure 1A-B). The initial differential diagnosis included metastasis, chordoma, lymphoma, aggressive giant cell tumor, plasmacytoma, or sarcoma. Neurosurgery was consulted but did not recommend emergent surgical intervention, as the expansile nature of the sacral mass was not amenable to resection. Computed tomography-guided biopsy of the mass confirmed plasmacytoma. Bone marrow biopsy demonstrated IgG kappa MM, categorized as R-ISS stage II, which correlates with a 5-year overall survival rate of 62%.[5] High-dose intravenous dexamethasone was initiated for its plasmactolytic effect. Medical and radiation oncology were consulted for radiation therapy and subsequent chemotherapy, with consideration of autologous stem cell transplantation. Physical medicine and rehabilitation was consulted for assistance with complications from nontraumatic spinal cord injury.

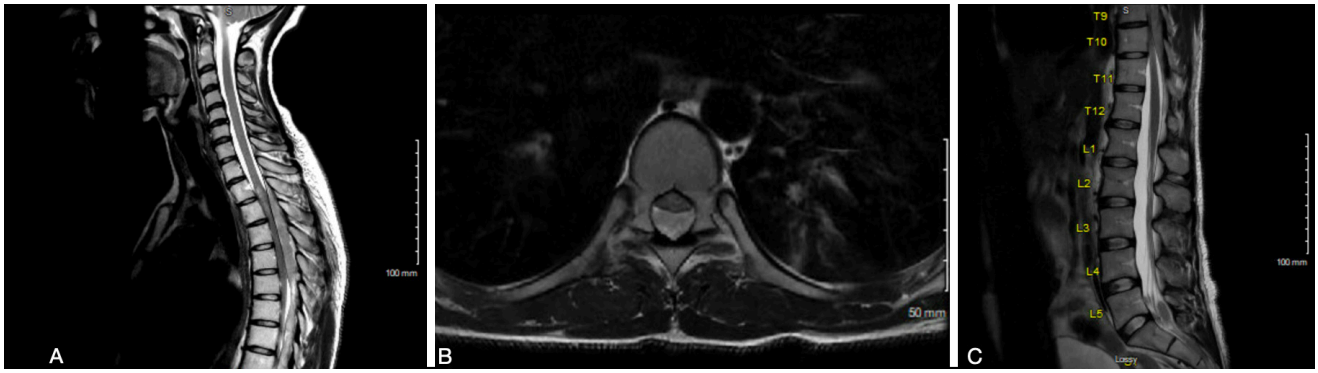
The hospital course was complicated by severe pain and neurogenic bladder with urinary retention requiring an indwelling foley catheter and intermittent straight catheterizations (ISC), and was further complicated by a urinary tract infection. Candidacy for inpatient rehabilitation was limited by intravenous chemotherapy and limited participation in therapy due to pain. The patient was uninsured, which restricted access to subacute rehabilitation services. After a prolonged acute care hospitalization, she was discharged directly home.

At discharge, impairments included gait abnormalities, neuropathic pain, and urinary retention managed with ISC. The patient functioned at a modified independent level (MOD-I), defined as the ability to safely perform functional tasks with the use of assistive device–in this case, a manual wheelchair.[9] She ambulated short distances with a 2-wheeled walker, requiring minimal assistance, defined as performing 75% of the mobility task while a caregiver assists with 25%.[9]

Case 2

Patient 2 was a 28-year-old female with a medical history of asthma and MM, who presented with acute onset low back pain, paraplegia with associated paresthesia, and urinary retention over the preceding 3 days. She had previously been ambulatory without the use of an assistive device and was independent in all activities of daily living. MM had been diagnosed 3 years prior via bone marrow biopsy (IgG lambda R-ISS stage II). However, she did not complete induction chemotherapy due to missed appointments, and attempts at stem cell harvesting for transplant were similarly

Figure 2. T2-weighted Images Demonstrating Longitudinally Extensive Soft Tissue Enhancement in the Dorsal Epidural Space



A. Sagittal sequence with dorsal epidural mass extending from the T1-T11 levels.
B. Axial sequence demonstrating moderate to severe narrowing at the T3-T4 level.
C. Severe narrowing of the thecal sac at the level of the sacrum compressing the cauda equina nerve roots.

unsuccessful. At that time, numerous attempts to contact the patient were unsuccessful, and she was lost to follow-up.

On examination in the emergency department, she demonstrated 1/5 strength in bilateral hip flexors and 0/5 strength distally. Sensory testing revealed no perception to light touch or pinprick below the T5 dermatome. MRI of the entire spine revealed an extensive dorsal epidural mass extending from T1-T11, causing compression of the spinal cord and cauda equina (Figure 1C-E). She underwent emergent T2-T12 and L5-S1 decompression with tumor excision. Surgical pathology confirmed plasmacytoma with morphologic and immunophenotypic features consistent with her known plasma cell myeloma.

Medical and radiation oncology were consulted, and spinal radiation therapy was planned following sufficient wound healing. Physical medicine and rehabilitation was consulted to assist with complications related to spinal cord injury. Her hospital course was complicated by significant pain, urinary tract infection, neurogenic bowel, *Clostridioides difficile* infection, and neurogenic bladder.

The patient was subsequently transferred to inpatient rehabilitation with persistent impairments, including paraplegia, neuropathic pain, and urinary retention managed with ISC. She successfully completed a rehabilitation program; however, she experienced minimal recovery of lower extremity motor and sensory function. She was discharged home at a MOD-I level, using a manual wheelchair for mobility.

DISCUSSION

This case series describes 2 unique presentations of MM manifesting as discrete spinal cord compressive plasmacytomas in young adult females. MM typically affects older individuals, making these cases unusual and emphasizing the importance of identifying MM in younger patients. Both cases illustrate the aggressive nature of MM and its potential for extra-skeletal dissemination, with spinal cord compression complicating the clinical course. Diagnosis required integration of imaging studies, laboratory testing, and biopsy confirmation.

Despite the significant impact on functional status and quality of life, there are currently no definitive guidelines for the treatment of spinal cord compressive plasmacytomas secondary to MM.[7] Ultimately, management remains complex and requires a multidisciplinary approach, including urgent intervention to address spinal cord compression through surgical decompression and/or radiation therapy to limit further neurological deficits. Radiotherapy is particularly effective for pain control and local disease management.[10] Prior research has shown that surgical decompression followed by radiotherapy can improve neurological outcomes and reduce the need for retreatment.[11] However, complete neurological recovery is extremely rare, regardless of treatment modality.[6]

In both cases, the patients' experienced significant functional status impairment, with persistent neurological deficits despite aggressive treatment—consistent with studies indicating that recovery of motor and sensory function in MM-related spinal cord compression is often limited, even with prompt intervention.[12] Several factors influenced outcomes, including the extent and anatomical level of spinal cord involvement at presentation, treatment modality, medical complications after presentation, and, social determinants, such as insurance coverage. Both patients experienced substantial declines in mobility and independence, requiring assistive devices for ambulation and modifications to activities of daily living. Integration of oncological treatment with comprehensive rehabilitation is essential to maximize functional outcomes and optimize quality of life, given the high likelihood of devastating sequelae involving motor function, sensory deficits, bowel and bladder control, and sexual function.

CONCLUSIONS

These cases highlight the critical importance of identifying "red flags" in young patients with acute low back pain and unexplained neurological symptoms, and the necessity of maintaining a broad differential diagnosis – including consideration of MM in patients presenting with spinal cord compression due to mass effect from epidural tumor. Moreover, these cases also emphasize the need for standardized treatment protocols and the significant gap that remains in current clinical management of spinal cord compressive MM.

Financial Disclosures: None declared.

Funding/Support: None declared.

Ethical Approval: Ethical approval was not required for this case series as no personal identifiable data was included.

REFERENCES

1. Kyle RA, Gertz MA, Witzig TE, et al. Review of 1027 patients with newly diagnosed multiple myeloma. *Mayo Clin Proc*. 2003;78(1):21-33. doi:10.4065/78.1.21

2. Bladé J, Kyle RA. Multiple myeloma in young patients: clinical presentation and treatment approach. L*euk Lymphoma*. 1998;30(5-6):493-501. doi:10.3109/10428199809057562

3. Bladé J, Kyle RA, Greipp PR. Presenting features and prognosis in 72 patients with multiple myeloma who were younger than 40 years. *Br J Haematol*. 1996;93(2):345-351. doi:10.1046/j.1365-2141.1996.5191061.x

4. Rafae A, van Rhee F, Al Hadidi S. Perspectives on the treatment of multiple myeloma. *Oncologist*. 2024;29(3):200-212. doi:10.1093/oncolo/oyad306

5. Palumbo A, Avet-Loiseau H, Oliva S, et al. Revised International Staging System for multiple myeloma: a report from International Myeloma Working Group. *J Clin Oncol*. 2015;33(26):2863-2869. doi:10.1200/JCO.2015.61.2267

6. Ha KY, Kim YH, Kim HW. Multiple myeloma and epidural spinal cord compression: case presentation and a spine surgeon's perspective. *J Korean Neurosurg Soc*. 2013;54(2):151-154. doi:10.3340/jkns.2013.54.2.151

7. Trivedi RJ. Spinal cord compression as a consequence of spinal plasmacytoma in a patient with multiple myeloma: a case report. *Clin Pract*. 2021;11(1):124-130. doi:10.3390/clinpract11010018

8. Chen B, Cai L, Zhou F. Management of acute spinal cord compression in multiple myeloma. *Crit Rev Oncol Hematol*. 2021;160:103205. doi:10.1016/j.critrevonc.2020.103205

9. Open Resource for Nursing (Open RN). Mobility. In: Ernstmeyer K, Christman E, eds. *Nursing Fundamentals*. WisTech Open; 2021. Accessed December 5, 2024. https://wtcs.pressbooks.pub/nursingfundamentals/

10. Rades D, Conde-Moreno AJ, Cacicedo J, Segedin B, Rudat V, Schild SE. Excellent outcomes after radiotherapy alone for malignant spinal cord compression from myeloma. *Radiol Oncol*. 2016;50(3):337-340. doi:10.1515/raon-2016-0029

11. Zijlstra H, Crawford AM, Striano BM, et al. Neurological outcomes and the need for retreatments among multiple myeloma patients with high-grade spinal cord compression: radiotherapy vs surgery. *Global Spine J*. 2025;15(2):341-352.

12. Qian J, Jing J, Tian D, Yang H. Partial tumor resection combined with chemotherapy for multiple myeloma spinal cord compression. *Ann Surg Oncol*. 2014;21(11):3661-3667. doi:10.1245/s10434-014-3754-y

advancing the art & science of medicine in the midwest

WMJ

WMJ (ISSN 2379-3961) is published through a collaboration between The Medical College of Wisconsin and The University of Wisconsin School of Medicine and Public Health. The mission of *WMJ* is to provide an opportunity to publish original research, case reports, review articles, and essays about current medical and public health issues.

Visit www.wmjonline.org to learn more.