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Case Report

Multiple myeloma presenting with acute bony spinal cord compression and mechanical instability successfully managed nonoperatively

Kishan Gokaraju, BMedSci MBChB MRCS*, Joseph S. Butler, PhD FRCS (Tr&Orth), Adam Benton, MBChB, Maria L. Suarez-Huerta, MD, Susanne Selvadurai, BSc MCSP, Sean Molloy, MSc FRCS (Tr&Orth)

Spinal Deformities Unit, Royal National Orthopaedic Hospital, Brockley Hill, Stanmore, Middlesex, HA7 4LP, UK

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Abstract

BACKGROUND CONTEXT: Multiple myeloma (MM) with spinal involvement may present with spinal cord or cauda equina compression, with or without neurological impairment. This occurs when a soft-tissue myelomatous mass extends into the epidural space (Barron et al., 1959 [1]). The mainstay of management for such lesions in patients with normal neurology is chemotherapy and radiotherapy or radiotherapy alone, but those with neurological compromise require surgical decompression with adjuvant therapy (Patchell et al., 2005 [2]). Infrequently, patients with MM present with spinal cord compression and neurological impairment due to bony encroachment from vertebral translation and kyphosis where significant lytic bone disease has rendered the spine mechanically unstable. The standard management for these patients is surgical decompression and internal fixation.

PURPOSE: This study aimed to report a high-risk myeloma patient with a mechanically unstable spine, acute spinal cord compression, and neurologic deficit that was treated successfully using nonoperative means.

STUDY DESIGN: Case report.

METHODS: A 37-year-old male patient with MM was referred to our tertiary referral spinal unit with acute bony spinal cord compression and neurological impairment. Computer tomography revealed lytic lesions of T2 and T3 and anterolisthesis of T1 on T2 producing mechanical instability and magnetic resonance imaging confirmed extension of disease into the epidural space and cord compression. This was successfully managed with nonoperative treatment using a brace.

RESULTS: Management in a brace restored clinical and radiological stability and normal neurological function.

CONCLUSION: Certain high-risk myeloma patients with a mechanically unstable spine, acute spinal cord compression and neurologic deficit can be treated effectively in an appropriate brace when managed by a tertiary referral spinal unit.

Introduction

A 37-year-old male with undiagnosed multiple myeloma (MM) presented with a 2-month history of upper thoracic back pain. He was subsequently diagnosed with light chain MM and commenced on appropriate chemotherapy and corticosteroid treatment for disease control and radiotherapy to his spine for pain relief. Following an acute deterioration in lower limb motor and sensory function, he was referred to our tertiary referral spinal myeloma service. Neurological examination revealed sensory deficit (1 of 2) in the right T7–T11 dermatomes and motor weakness (grade 4 MRC) in both lower limbs, graded ASIA D. He had no bowel or bladder dysfunction and his Visual Analogue Score (VAS) for back pain was 7 of 10.

Computer tomography (CT) of the thoracic spine demonstrated multiple lytic lesions throughout but extensively in the T2 and T3 vertebral bodies resulting in significant loss of vertebral height and regional kyphosis (Fig. 1). There was significant anterolisthesis of T1 on T2 causing marked narrowing of the anterior to posterior canal dimension (Fig. 2). Subsequent magnetic resonance imaging (MRI)

FDA device/drug status: Not applicable.

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* Corresponding author. Spinal Deformities Unit, Royal National Orthopaedic Hospital, Brockley Hill, Stanmore, Middlesex HA7 4LP, UK. Tel.: +44 208 954 2300.

E-mail address: kgokaraju@hotmail.com (K. Gokaraju)

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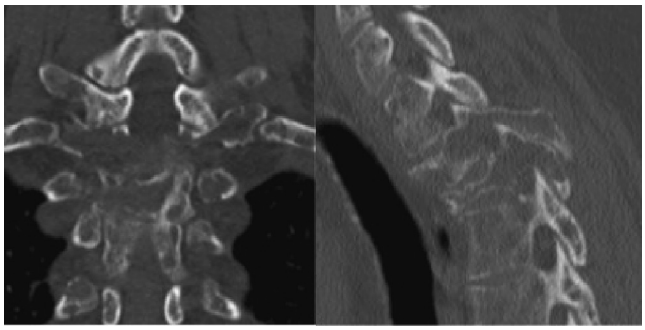

Fig. 1. Coronal and sagittal CT images through lesion demonstrating significant osteolysis and regional kyphosis.

Fig. 2. Sagittal image of CT demonstrating anterolisthesis of T1 on T2 and associated narrowing of the spinal canal (red line demonstrating disruption in posterior border of vertebral bodies).

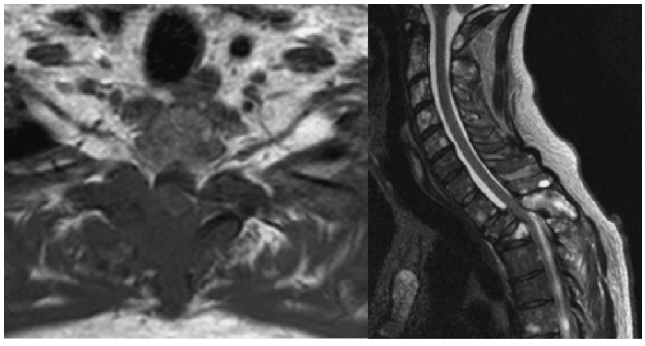

Fig. 3. MRI with axial image of lesion and sagittal cut demonstrating vertebral body collapse at T2 and T3, anterolisthesis of T1 on T2, infiltration of the posterior elements, and cord compression.

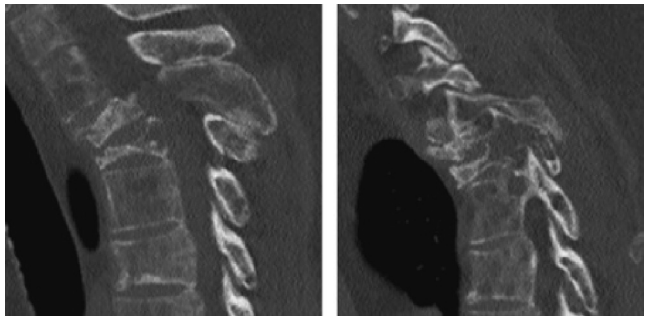

Fig. 4. Sagittal CT images demonstrating new bone formation at anterior column and elongated or expanded spinous processes.

demonstrated involvement of the posterior vertebral wall at T2 and T3 and extension of disease into the epidural space (Fig. 3). This patient had a Spinal Instability Neoplastic Score (SINS) of 18.

He was managed with a custom-made cervico-thoraco-lumbo-sacral (CTLSO) brace for a planned 3-month period and continued on chemotherapy and radiotherapy treatment. He was monitored with regular clinical and radiographic assessment.

After 10 weeks in brace, an interval CT demonstrated significant anterior and posterior extra-osseous bone formation with reconstitution of the T2 and T3 vertebral bodies and posterior elements. Bridging bone between the diseased vertebral levels conferred mechanical stability to the upper thoracic spine (Figs. 4 and 5). At the 12-week follow-up appointment, the brace treatment was discontinued. VAS for back pain was 0 of 10 with complete resolution of neurologic deficit (ASIA E). There was no obvious clinical deformity in the sagittal plane (Fig. 6) and the patient had a pain-free functional range of movement of the spine.

Discussion

Patients with MM commonly present with back pain from pathologic vertebral compression fractures. Cement augmentation is a successful technique providing good analgesia in these cases [3,4]. A small cohort of patients with MM present

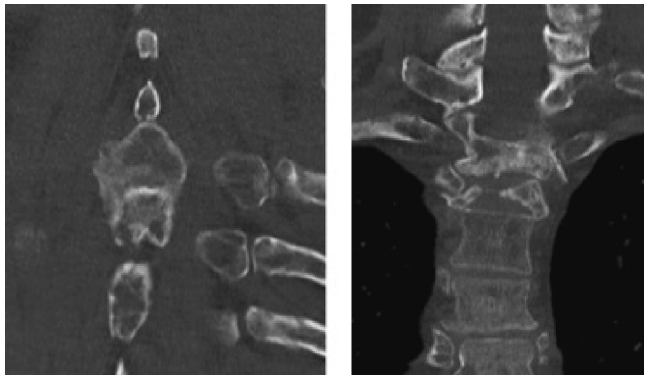

Fig. 5. Coronal CT images of thoracic spine demonstrating new bone formation between spinous processes and vertebral bodies.

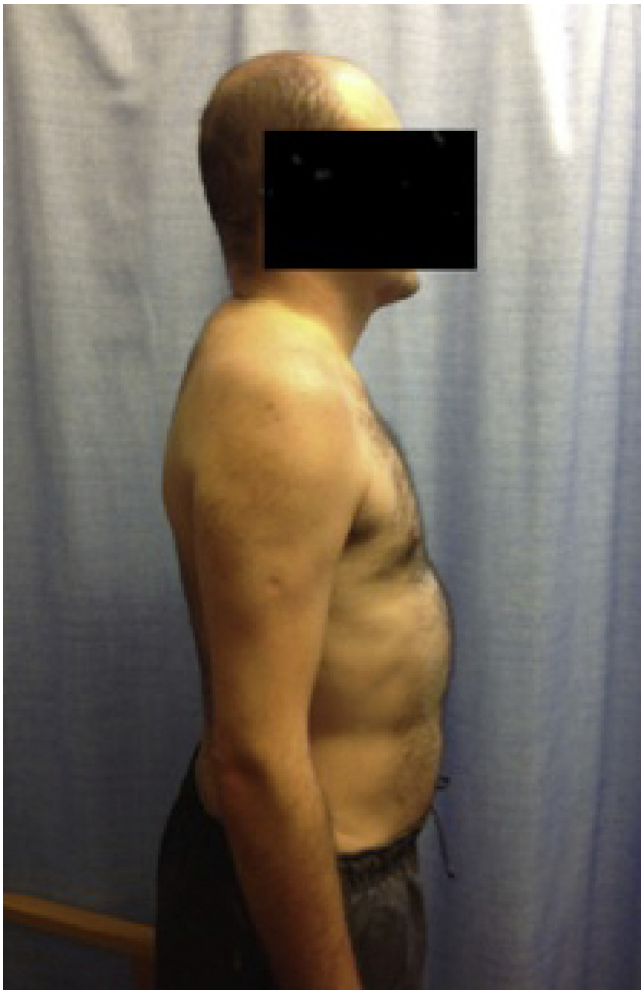

Fig. 6. Patient standing at 12-week follow-up with no obvious sagittal deformity.

with soft-tissue disease extending into the spinal canal, which may result in cord compression and neurological deficit [1]. The treatment of these soft tissue epidural MM lesions classically involves chemotherapy and radiotherapy for those with no neurologic deficit [5–7]. This treatment obviates the need for surgical decompression [8]. Surgical decompression is generally reserved for cases of acute neurologic deficit as a result of soft tissue extension into the canal compressing the cord or the cauda equina [2,9].

Patients with MM presenting with bony spinal cord compression and neurological impairment traditionally require decompression and instrumented fixation to relieve the neural compression and stabilise the spine [9]. This mode of presentation commonly occurs when the spine is unstable as a result of significant vertebral body collapse, involvement of the facet joints and pedicles and translation of the vertebral bodies. In our institution, we have adopted a more conservative approach in managing patients with MM with spinal involvement. The reasons for this are that radiotherapy and/or chemotherapy decompresses the spinal canal effectively and that there is great potential for extraosseous bony healing conferring spinal stability [4]. In addition, operative management may be accompanied by anaesthetic complications, wound sepsis, wound dehiscence, iatrogenic axial neurological deficit, and metalwork failure because of poor bone quality. Avoidance of instrumentation is particularly relevant in patients receiving chemotherapy who are pancytopenic and in those planned for stem cell transplantation, as they are at high risk for developing secondary metalwork infection [4,9].

This case report discusses a patient with significant spinal instability producing a maximum Spinal Instability Neoplastic Score (ie lytic lesion associated with a junctional level, greater than 50% vertebral body collapse, involvement of posterolateral elements bilaterally, and spinal malalignment due to translation and kyphosis) [10,11]. Hence, the patient was treated as an unstable spinal cord injury and subsequently given a CTLSO brace for relative stability and to allow unaided mobilisation. Following treatment in the brace, restoration of stability was demonstrated both clinically and radiographically. The patient had a pain-free functional range of movement and new bone formation in both the anterior and posterior columns of the spine spanning the affected vertebrae. In addition, neurological function returned to normal.

This case highlights successful non-operative management of a high-risk myeloma patient with a mechanically unstable spine, acute spinal cord compression, and neurologic deficit. Our treatment strategy was safe and effective, avoiding surgery and associated risks while subsequently producing sufficient extraosseous new bone formation to confer mechanical stability. This report suggests that there is a role for bracing as part of an overall non-operative management strategy for the treatment of mechanically and neurologically unstable vertebral fractures in MM. In our opinion, this mode of treatment should only be considered in a tertiary referral spinal unit with expertise in treating patients with MM.

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