Burst Compression Fracture in Ankylosing Spondylitis: A Challenging Case of Vertebroplasty

Snehil Gupta, Gautam Das, Amiya Mishra, Abhishek Gupta

ABSTRACT

Ankylosing spondylitis (AS) is a chronic inflammatory joint disease. Osteoporosis and fractures of the vertebral body and its dorsal arch are now well-recognized features because of the altered biomechanics of the ankylosed spine. “Seat belt” or “burst compression” fractures through the disk, juxta-end plate, and posterior segments have been observed very often in the thoracolumbar spine. These are associated with increasing pain with or without neurologic deficit, and may require intervention. Vertebroplasty has proven benefits in the treatment of stable spinal fractures and this technique allows complete or marked pain relief and bone strengthening in most cases. Decision to perform vertebroplasty should be made by a multidisciplinary team. In this case report, we have tried to emphasize on the fragility of the spine that can result from minor injury as well as the management of thoracic vertebral fracture complicating AS.

Keywords: Ankylosing spondylitis, Burst compression fracture, Vertebroplasty.


INTRODUCTION

Ankylosing spondylitis or Marie–Strumpell disease is an inflammatory disorder of unknown etiology that primarily affects the axial skeleton. The human leukocyte antigen HLA-B27 gene is present in approximately 90% of patients, compared with a prevalence of 1 to 3/1,000 in the general population. Radiologically, the earliest manifestation of AS is sacroiliitis, followed by spine involvement. In the spine, the disease manifests as ossification of the spinal ligaments, joints, and disks along with the formation of syndesmophytes leading to a bamboo spine. All these events result in restricted spine movement and progressive deformity. The most serious complication of the disease is spine fracture that can occur more commonly with minor trauma because of the rigidity and osteoporotic involvement of the spine, but spontaneous fractures are considered to be rare.

Three recognized patterns of fractures are simple vertebral compression fractures, transversely oriented shear fractures, and stress fractures associated with pseudoarthrosis. Biomechanically, most of these fractures resemble the “seat belt type,” probably because of shifting of the axis of flexion and extension in the ankylosed spine away from its normal location, i.e., in the center of the nucleus pulposus, but in some cases simple vertebral burst fractures have also been reported. Thoracolumbar fractures are reported less frequently than cervical injuries in patients with AS. Although there is usually no neurologic deficit, the lesions can cause persistent pain incorrectly attributed to the spondylitis. These lesions usually heal spontaneously but some may require interventions. The surgical operation for burst fractures without neurological deficit remains controversial. Percutaneous vertebroplasty can be very beneficial for patients with stable spinal fractures, but some authors have asserted that vertebroplasty is contraindicated in patients with burst fracture. However, we have performed the procedure, considering the intense pain, i.e., not responding to conservative treatment on the one hand and the risks of surgery or prolonged immobilization on the contrary.

CASE REPORT

A 67-year-old man with established AS since 52 years presented with predominant upper back pain for past 4 months following a minor trauma with history of fall on the ground. Patient complained of bilateral diffuse paramedian pain [numerical rating scale (NRS) 8/10] in lower dorsal area radiating anteriorly in the upper part of abdomen, which aggravated on sitting, standing, and walking and got relieved on lying down. Pain was so severe that patient had a tendency to stoop forward,
because of which center of gravity was shifted anteriorly and patient had to take the help of a stick to walk properly. With medication and transcutaneous electrical nerve stimulation, pain was not significantly relieved. On examination, lumbar lordosis was lost and spine movements were grossly restricted. No median or paramedian tenderness could be elicited; however, mild tenderness was present in infrascapular region bilaterally. While performing axial deep percussion over middle and lower dorsal spine, it resulted in severe pain. Other neurological examinations were normal. A differential diagnosis of fracture of dorsal spine or myofascial pain was made. Initially, X-ray of dorsolumbar spine in anteroposterior (AP)/lateral view (Fig. 1) showed typical bamboo spine with ossifications of anterior and posterior longitudinal ligaments. Due to extensive calcification, no fracture was identified in X-ray.

Blood investigations were normal. Thereafter, computerized tomography (CT) scan of dorsolumbar spine (Fig. 2) was done, which revealed burst fracture of D-9 vertebral body including the anterior and middle column along with costovertebral junction. However, dorsal spine curve and alignment appeared normal. Later, magnetic resonance imaging (MRI; Fig. 2) revealed the presence of marrow edema at D9 level. Hence, vertebroplasty was planned. Marrow edema was also evident on D8 level but it was a sequel of inflammation secondary to vertebral fracture. Procedure was performed in well-equipped operation theater under local anesthetic infiltration. Suitable IV antibiotic was given to the patient preoperatively. The patient was positioned prone with the spine extended by chest and pelvic bolster. Under all aseptic precautions, a 13-gauge vertebroplasty needle was advanced toward the center of the D9 vertebral body using a transpedicular approach under fluoroscopic guidance. After proper placement of needle, bone cement [polymethylmethacrylate (PMMA)] was prepared taking adequate precautions, and when the mixture of cement attained toothpaste-like consistency, 5 mL of it was injected into vertebral body under continuous, multidirectional fluoroscopy. As soon as cement was seen in the posterior part of vertebral body in lateral view, the injection was stopped.

At the end of procedure, cement leakage was seen through the upper endplate fracture site into the disk space. This might be due to the cement filling the fracture line that was oblique crossing the anterior and middle compartments (Fig. 3). Ideally, the vertebral body should be completely filled with cement, but pain relief has been reported even when the anterior two-thirds of the vertebral body contains cement.\textsuperscript{13} The patient was not moved from the prone position until the cement had cured. Patient was advised for postoperative CT scan to exclude intracanal leakage and was kept under observation for 4 hours. Postoperative CT scan revealed normal findings (Fig. 4).
Patient was discharged on the second day of the procedure as all neurological examinations were normal, with NRS score being dropped to 2 from 8/10. On follow-up after 2 weeks, NRS score was 0 and patient was able to walk without using a stick.

**DISCUSSION**

Erosive, sclerotic, and osteoporotic changes in the vertebral bodies secondary to inflammation are considered to be the cause of spinal fractures even with the slightest trauma in AS patients. Fracture of the ankylosed lumbar spine was first reported by Abdi in 1903. Since then, cervical spine fracture have been well documented in the literature, but existence of similar fractures in the thoracic and lumbar spine has not been emphasized as clearly, probably because of confusion with inflammatory changes as well as the neurological deficit. In the ankylosed spine where compensatory disk and facet joint movement in response to load is prevented, it seems likely that bony deformation and therefore, stress fracture would tend to occur most frequently at the thoracolumbar and lumbosacral junction. The thoracolumbar spine represents a unique system, from a skeletal as well as neurological standpoint. The rigid rib-bearing thoracic spine articulates with the more mobile lumbar spine at the thoracolumbar junction (T9-L2), i.e., the site of most fractures. A complete examination includes a careful neurologic examination of both motor and sensory systems. The CT scan best describes bony details, while MRI is most efficient at describing soft tissues and neurological structures including marrow edema. According to the most recent classification system of “Thoracolumbar Injury Classification (TLIC) and Severity Score”, different fracture types include compression fractures, burst fractures both stable and unstable, flexion-distraction injuries, and fracture dislocations. Their treatment, both operative and nonoperative, depends on the degree of bony compromise, neurological involvement, and integrity of the posterior ligamentous complex. In our case, the involvement of posterior compartment was questionable in CT scan but no neurological involvement was seen. So, as per TLIC scoring, this case had a total score of ≤4, which corresponds to the conservative or nonsurgical management recommendations including vertebroplasty and kyphoplasty.

Recently, minimally invasive procedures to address the pain and deformity associated with osteoporotic vertebral compression fractures have been developed. The principal indications for vertebroplasty are osteolytic vertebral metastasis and myeloma, vertebral hemangioma, and painful osteoporotic vertebral collapse. The decision to perform this technique should be made by a multidisciplinary team as the choice between vertebroplasty, surgery, medical treatment, or a combination of these methods depends on multiple factors. Vertebroplasty, involving the percutaneous fluoroscopically guided injection of PMMA directly into fractured vertebral body, has been used to stabilize osteoporotic vertebral compression fractures. Substantial pain relief in a majority of patients treated with vertebroplasty has been reported. The mechanism of pain relief after vertebroplasty is not clear. One possible explanation is a mechanical immobilization of the fracture and support to the cortex by the bone cement. Another theory suggests that the heat produced during PMMA polymerization causes deafferentiation of the fractured vertebra. Research on the outcome for vertebroplasty has suggested that most patients experience partial or complete pain relief within 72 hours of the procedure. Overall, 60 to 100% of patients noted reduced pain after vertebroplasty, with pain reduction maintained for months to 10 years. In addition to decreased pain, improved functional levels and reduced analgesic medication requirements have been also reported.

**CONCLUSION**

Diagnosing fractures of the vertebral body in AS patients remains a challenge in clinical practice. New back pain in patients with AS or other diseases with paraspinal ossification should be assumed to be caused by fracture until disapproved. In highly selective patients, percutaneous vertebroplasty is a promising therapeutic procedure for pain control in spinal burst fractures and thus the complications that may occur as a result of major surgical procedures should be prevented. However, this procedure still has potential risks and should be employed with extreme precaution to prevent extravasation of PMMA into the spinal canal. We would like to offer it as a relatively safe and effective method of management in thoracolumbar burst fractures.
REFERENCES