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A Sudden Change in Vertebroplasty Candidacy in an Elderly Man with Lumbar Compression Fractures: A Cautionary Case Report

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Background: Osteoporosis is the leading cause of vertebral fractures, often requiring multimodal and interventional pain management, in elderly adults. Selection of vertebroplasty candidates, timing, and evaluation for risk factors is crucial for optimal results.

Case Report: A 73-year-old man with acute on chronic lower back pain with radicular symptoms, was found to have osteoporotic lumbar vertebral compression fractures with anterior and posterior column involvement. Initially an optimal vertebroplasty candidate, after re-evaluation with a computed tomography scan, showed significant displacement. Given the patient's radicular pain, he was successfully treated with transforaminal epidural steroid injections.

Conclusion: The selection of vertebroplasty candidates is a delicate process to prevent complications. This case opens the discussion for the need to further study the profiling and monitoring of patients for potential changes in candidacy, a current gray area.

Key words: Back pain, case report, compression fracture, osteoporosis, vertebroplasty

BACKGROUND

Osteoporosis is a common medical condition characterized by decreasing bone mass and deterioration of the bony architecture. This weakening of bony structures leaves the body vulnerable to fragility fractures. Osteoporosic vertebral fractures are the most common of these fragility fractures and there are approximately 700,000 new cases in the United States each year (1). Treatment measures include, but are not limited to medication management, bracing, vertebroplasty, and surgical intervention. We present the case of an evolving osteoporotic vertebral compression fracture in an elderly man (2). Although vertebroplasty was, ultimately not the treatment of choice for our patient, this case is unique because a review of his diagnostic evaluation shows a significant and concerning change in his candidacy for vertebroplasty over the short course of 6 months. This case brings forth potential areas of further study regarding predictors of poor candidacy.

CASE

A 73-year-old man with a past medical history of opioid dependence (on buprenorphine) who initially presented to his primary care physician's office with acute on chronic low back pain after lifting a couch with radiating pain down the left lower extremity along with tenderness to palpation along the lumbar paraspinals.

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He was initially advised by his primary care physician to obtain an x-ray of the lumbar spine and was prescribed a 2-week course of meloxicam. The x-ray showed diffuse osteopenia with mild to moderate compression wedge deformities of L4 and L5 vertebral bodies of undetermined age (Fig. 1). The patient was then referred to the spine center for further evaluation

At his first visit to our pain clinic, the acute on chronic low back pain persisted and the radicular pain down the left leg was worsening. A vertebroplasty versus a neurosurgery evaluation was considered. A magnetic resonance image (MRI) of the lumbar spine without contrast was ordered (Fig. 2), which showed an acute L3 vertebral compression fracture involving both the anterior and posterior cortex, as well as high-grade neuroforaminal stenosis at L3-4 on the left side. Of note, the MRI was completed approximately 3 months after the initial x-ray.

During follow-up with neurosurgery, the patient's low back pain had started to resolve, and the main pain symptom was his radicular left leg pain, specifically radiating pain to the anterolateral thigh. Consequently, the option of a multilevel lumbar decompression with instrumented fusion was offered, which the patient opted against. Additionally, a computed tomography (CT) scan of the lumbar spine and a DEXA scan were ordered to assess bone density and other areas of weakening or fracture. The DEXA scan demonstrated evidence of osteoporosis. The CT scan of the lumbar spine without contrast showed a displaced vertical fracture through the L3 vertebral body along with anterior and inferior displacement of the anterior fracture fragment (Fig. 3). This displacement was significantly increased from the MRI that was obtained just one month prior. The option of surgery was discussed again, but the patient again decided against it. He was referred again to our pain clinic for symptom management.

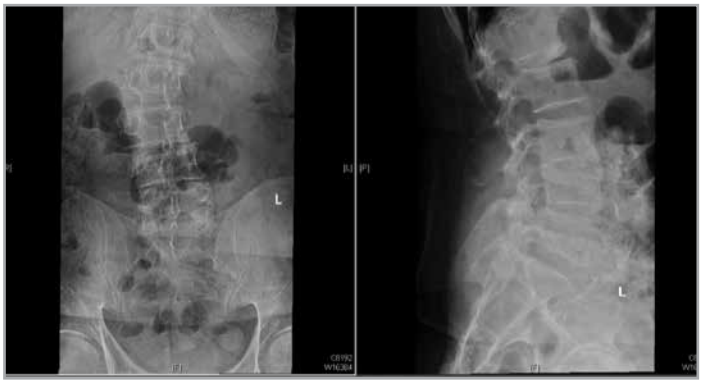

Fig. 1. Represents the patient's initial radiograph of the lumbar spine (AP and lateral views) from which mild to moderate compression wedge deformities of L4 and L5 vertebral bodies were diagnosed.

After his follow-up appointment at the pain clinic, the patient was scheduled for a left L4-L5 transforaminal epidural steroid injection (TFESI) given worsening radicular pain, from which he had 3-4 weeks of relief. He subsequently obtained a left L3-L4 TFESI, which also provided 4 weeks of relief. He reported satisfaction with this outcome and is now managing with therapy.

DISCUSSION

Given that they impact up to 1.5 million Americans annually, vertebral compression fractures are not only the most common complication of osteoporosis, but also a significant cause of decreased quality of life, disability, and morbidity (3). About two-thirds of patients are asymptomatic, but those who are symptomatic most commonly present with midline back pain. Physical examination, although commonly normal, can be significant for midline tenderness and a kyphotic posture that cannot be corrected (4).

Regarding diagnosis, the fracture is initially confirmed with radiographic evaluation of the spine with flexion, with the most common location being near the thoracolumbar junction (T8-L4) (5). When further trying to distinguish etiology and a plan of treatment, MRI is the next best modality as it helps distinguish between benign and pathologic (malignant) fractures, determine the age of fracture, and identify suspected retropulsion as well as spinal cord or nerve root involvement (4). CT imaging has similar advantages, but is not commonly used due to the high radiation burden that accompanies these scans. CT imaging may also be done in preparation for surgical or minimally invasive procedures as it can provide a better look at the degree of deformity and the quality of the surrounding bone through more information about the cortical and cancellous bone (6). Overall, radiographs and MRI are commonly done for diagnostic accuracy and prognostic value while a CT scan is more often done as a part of pre-procedure planning.

Considerations when choosing a treatment modality include pain relief, restoration of function, and the prevention of recurrent fractures. The main approaches include conversative management (medications, bracing, physical therapy, and injections), minimally invasive (vertebroplasty and kyphoplasty), and operative

management (i.e., posterior fixation, decompression surgery for neurological deficits (2).

Given the minimally invasive aspect of the procedure and faster pain relief than more conservative measures, vertebroplasty is growing in popularity. An important part of deciding a treatment approach is pain and the degree of vertebral collapse. According to a 2018 article by Hirsch et al (7) on the management of vertebral fragility fractures, a pain score of greater than 4 on the numeric rating scale or vertebral body collapse of more than 40% is an indicator that vertebroplasty is a possible intervention. It should also be noted that vertebroplasty is most effective in compression fractures less than 6 months old. Although an increasingly popular intervention, it does not come without risks. Such risks include cement leakage, adjacent vertebral or rib fracture, bleeding, and infection. Although more significant complications of cement leakage are rare, they can be potentially devastating as they include pulmonary embolism, cerebral embolism, nerve root involvement, spinal cord involvement (paralysis), as well as intra-discal and epidural leakage (8). Given these risks and complications, the decision to perform a vertebroplasty must be made while being mindful of absolute and relative contraindications to the procedure.

Our case is unique in that on initial evaluation with MRI, the patient's presentation was more radicular in nature and more consistent with spinal stenosis. Furthermore, there was no significant retropulsion at the time. If the patient's pain had been mostly axial, a kyphoplasty would have been an appropriate consideration for treatment. Initially, his case did not raise any red flags regarding medical or radiological contraindications for the procedure. The significant change on repeat imaging just one month after the MRI, a major anterior and inferior displacement of the anterior fracture fragment, occurred quickly and without new trauma to the region. This completely changed the patient's potential candidacy for vertebroplasty, as he went from a good candidate to a poor candidate over one month. Given, conducting a vertebroplasty on a potentially poor candidate can lead to significant complications, the ability to identify predictors of factors that may change a viable candidate to a poor candidate is vital. Our case brings attention to this area of clinical management that is currently poorly studied.

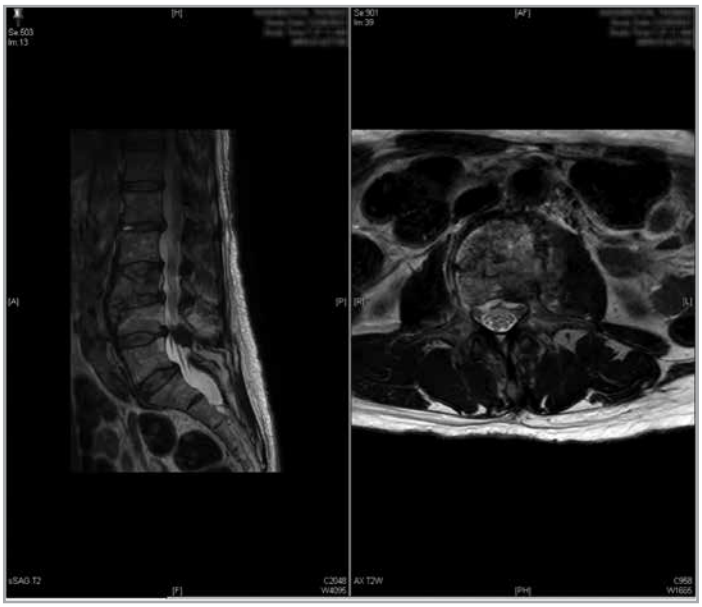

Fig. 2. Represents follow up imaging with MRI (T2-weighted sagittal and axial views) without contrast completed 3 months after initial x-ray that showed a stable L3 vertebral compression fracture involving both the anterior and posterior cortex as well as high-grade neuroforaminal stenosis at L3-L4 on the left side.

Fig. 3. Represents CT imaging of the lumbar spine without contrast (sagittal and axial views) done one month after the MRI imaging which demonstrated a displaced vertical fracture through the L3 vertebral body along with anterior and inferior displacement of the anterior fracture fragment.

CONCLUSION

Safely profiling a compression fracture for vertebroplasty candidacy and subsequently assessing if a patient's candidacy may change requires a high degree of clinical suspicion. Performing a vertebroplasty on

a poor candidate can be potentially devastating. Our case highlights how quickly imaging findings and subsequently candidacy can change. A key area of future study includes investigating predictors not yet identified regarding the likelihood of changes in vertebroplasty candidacy. Additionally, studying if an imaging series prior to a vertebroplasty should be done and for how long this type of surveillance should last are other potential areas of research. With an increasing number of compression fractures and consequently vertebroplasties being performed every year, better understanding of what can cause an osteoporotic compression fracture to become unstable is essential.

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