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SUCCESSFUL KYPHOPLASTY IN THE PRESENCE OF SEVERE RETROPULSION OF LUMBAR SPINE WITHOUT NEUROLOGICAL DEFICITS

Ruben H. Schwartz, DO¹
Ivan Urits, MD²
Samara Shipon, DO³
Omar Viswanath, MD³⁻⁵

Background: Vertebral compression fractures are common causes of back pain in the aging patient population. Osteoporosis is an extremely common disease process within the elderly population, especially females, placing these patients at an increased risk of compression fracture formation. Besides pain, the fracture pattern can increase the risk of neurological compromise as well. Retropulsed fragments of the vertebral body cause impingement on the spinal canal and can be catastrophic.

Case Report: We present the case of a 72-year-old man with 5 mm retropulsion of the lumbar spine at the L1 level without signs of neurological compromise. This extensive amount of retropulsion causing no signs of weakness is rare. He was subsequently successfully treated with kyphoplasty after failed conservative therapies.

Conclusions: A case by case basis must be utilized when considering kyphoplasty for patients with retropulsion of the spine. If a patient's pain persists after conservative therapy, then kyphoplasty can be utilized with full knowledge of the risks involved.

Key words: Retropulsion, kyphoplasty, lumbago, spinal stenosis

From: ¹Mount Sinai Medical Center, Department of Anesthesiology, Miami Beach, FL; ²Beth Israel Deaconess Medical Center, Department of Anesthesia, Critical Care, and Pain Medicine, Harvard Medical School, Boston, MA; ³Valley Anesthesiology and Pain Consultants, Phoenix, AZ; ⁴University of Arizona College of Medicine – Phoenix, Department of Anesthesiology, Phoenix, AZ; ⁵Creighton University School of Medicine, Department of Anesthesiology, Omaha, NE

Corresponding Author: Ruben H. Schwartz, DO, Mount Sinai Medical Center, Department of Anesthesiology, 4300 Alton Rd, Miami Beach, FL 33140, E-mail: rubenschwartz@yahoo.com

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BACKGROUND

Vertebral compression fractures are common entities in the aging population. Osteoporosis, seen most commonly in elderly women, predisposes patients to these fracture patterns. Often caused by ground level falls, these fractures can cause debilitating pain, decreased ambulation, loss of vertebral height, and extreme kyphosis. This often leads to rapid deconditioning. Fortunately, vertebral stabilization procedures such as vertebroplasty and kyphoplasty can stabilize the fracture, restore vertebral body height, and decrease the severe associated pain. Retropulsed fragments, oftentimes from burst fractures, can cause spinal impingement essentially narrowing the spinal canal, which, depending on severity and location, is a contraindication to performing vertebral stabilization procedures. These patients are at an increased risk of developing neurological compromise. Radicular pain stemming from the fracture site can be commonly seen in these patients. A clinical case is presented here of a retropulsed vertebral compression fracture without radicular symptomatology where kyphoplasty was successfully performed, despite the presence of a retropulsed bony fragment.

CASE PRESENTATION

A 72-year-old man well known to our clinic fell while helping his wife with amyotrophic lateral sclerosis (ALS) standup. He initially presented with severe low back pain, nonradiating and worsening with movement. On initial imaging, an L1 compression fracture was noted with bony retropulsion of 5 mm.

Our initial treatment approach was conservative with rest, opioid medications, and a back brace. He had persistent, severe, and functionally limiting pain, which affected his ability to care for himself and his wife. At his follow-up visit we discussed at length the risks and benefits of different options. Ultimately we decided on performing a kyphoplasty at the L1 level since he did not exhibit any radicular symptomatology even with the presence of bony retropulsion. One week postoperatively he noticed a significant decrease in pain and an increase in functionality. He was able to go back to helping his wife without pain. He was later evaluated a subsequent time one month postoperatively with continued improvement in symptomatology.

DISCUSSION

Vertebral compression fractures can be characterized by pain, decreased ambulation, kyphosis, and some-

times, even paralysis (1). Most commonly seen with burst fractures of the thoracolumbar spine, posterior retropulsion of the vertebral body carries a significant risk of neurologic injury (2). By impinging on the spinal canal, the retropulsed fragment significantly reduces the diameter that nerves can travel through.

In our patient, significant spinal cord impingement was noted at the L1 level on magnetic resonance imaging (MRI) due to posterior retropulsion 5 mm into the epidural space. He did have localized pain at the fracture site but was able to function with limitations. He did not exhibit any neurological weakness or radicular pain. This presentation is extremely rare with such a significantly retropulsed fragment.

The location of the impingement has been shown to correlate with potential neurological sequelae. In the upper thoracolumbar region, previous case reports have shown impingement of only 40% causing neurologic compromise. The lower lumbar spine has been shown to be more resistant to spinal impingement. There have been reports of patients with 90% impingement at the lower lumbar spine without neurologic compromise (3).

Axial imaging on computed tomography (CT) scans of the spinal canal has been demonstrated as the gold standard for diagnosing degree of spinal impingement (4). Correlating CT imaging with MRI findings can be utilized for treatment planning for patients with spinal impingement due to retropulsed fragmentation. Treatment of these fractures is patient-dependent. If the patient does not exhibit any neurological deficits then conservative therapy is typically advised with rest, pain medications, and back bracing. Retropulsed fragments have been shown to resorb with canal remodeling over time (5). Therefore, conservative therapy is usually sufficient. Open surgical repair or percutaneous pedicle screw fixation is indicated when the patient exhibits radicular symptomatology or neurological compromise. The goal of surgery is to maintain the sagittal profile of the vertebral column, thereby preventing extremes in lordosis or kyphosis (6,7).

In our patient's case, we recommended kyphoplasty as he was not having radicular pain, but still had debilitating lower back pain. The literature has shown that one of the contraindications for vertebroplasty is significant retropulsion of bone into the spinal canal (8). After weighing the risks and benefits of the procedure he elected to proceed with kyphoplasty, and to the patient's satisfaction, ended up having complete relief of symptomatology postoperatively.

CONCLUSION

Posterior retropulsion of the vertebral column is a serious complication of compression fractures that must be carefully evaluated. The treatment of these complex fracture patterns must be tailored to the patient. Although typically treated with open surgical repair, in our patient's case the stability of the fracture via kyphoplasty proved vital for decreasing pain and increasing functionality (8). The literature continues to evolve on

indications for kyphoplasty with retropulsion. Case reports have shown improvement in radicular symptoms and neurological deficits with the use of kyphoplasty for patients who are not candidates for open spinal surgery (9). Percutaneous intervention for the stability of retropulsed fragmentation is a viable option and should be heavily considered before surgery. It is critical for practitioners to treat patients on a case-by-case basis in order to make the best clinical decisions.

REFERENCES

1. Kaplan PA, Orton DF, Asleson RJ. Osteoporosis with vertebral compression fractures, retropulsed fragments and neurologic compromise. *Radiology* 1987; 165:533-535.
2. Wood KB, Li W, Lebl DS, Ploumis A. Management of thoracolumbar spine fractures. *Spine J* 2014; 14:145-164.
3. Meves R, Avanzi O. Correlation among canal compromise, neurologic deficit, and injury severity in thoracolumbar burst fractures. *Spine* 2006; 31:2137-2141. doi:10.1097/01.brs.0000231730.34754.9e.
4. Fontijne WP, de Klerk LW, Braakman R, et al. CT scan prediction of neurological deficit in thoracolumbar burst fractures. *J Bone Joint Surg Br* 1992; 74:683-685. doi:10.1302/0301-620X.74B5.1527112.
5. Dai LY. Remodeling of the spinal canal after thoracolumbar burst fractures. *Clin Orthop Relat Res* 2001; 382:119-123.
6. Wood KB, Bohn D, Mehbod A. Anterior versus posterior treatment of stable thoracolumbar burst fractures without neurologic deficit: A prospective, randomized study. *J Spinal Disord Tech* 2005; 18:S15-S23.
7. Chipman JG, Deuser WE, Beilman GJ. Early surgery for thoracolumbar spine injuries decreases complications. *J Trauma* 2004; 56:52-57.
8. Heini PF, Orler R. Kyphoplasty for treatment of osteoporotic vertebral fractures. *Eur Spine J* 2004; 13:184-192. doi:10.1007/s00586-003-0654-4.
9. Niu JJ, Shen MJ, Meng B, et al. Percutaneous kyphoplasty for the treatment of osteoporotic thoracolumbar fractures with neurological deficit: Radicular pain can mimic disc herniation. *Int J Clin Exp Med* 2014; 7:2360-2364.

