

CASE REPORT

A New Technique That Percutaneous Endoscopic Decompression and Vertebroplasty in a Patient With Osteoporotic Vertebral Fracture

A Case Report

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Study Design. Technique note.

Objective. To evaluate the feasibility of endoscopy in various spinal pathologies.

Summary of Background Data. Osteoporotic vertebral fractures are a common pathology in the elderly. These fractures are often accompanied by serious complications such as neurological deficits due to the compression of the spinal cord or nerve roots.

Methods. A 78-year-old female patient presented to our hospital with a severe pain in her left leg and back. Lumbar magnetic resonance imaging and computed tomography scan revealed an osteoporotic L3 burst fracture compressing the left L3 nerve root. A minimally invasive translaminar endoscopic approach was used to remove the fractured fragment and cement was injected into the L3 vertebra. The patient was mobilized the same evening and was relieved of her pain.

Conclusion. Minimally invasive endoscopy is a safe and effective alternative to conventional major decompression with or without posterior stabilization, particularly in elderly patients with serious comorbidities.

Key words: endoscopic decompression, osteoporosis, vertebroplasty.

Level of Evidence: 4
Spine 2020;45:E967-E971

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Acknowledgment date: April 15, 2019. First revision date: June 9, 2019. Second revision date: October 29, 2019. Third revision date: December 29, 2019. Acceptance date: February 3, 2020.

The manuscript submitted does not contain information about medical device(s)/drug(s).

No funds were received in support of this work.

No relevant financial activities outside the submitted work.

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DOI: 10.1097/BRS.0000000000003470

Spine

www.spinejournal.com E967

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Osteoporotic vertebral fractures are a serious health problem in elderly patients, leading to decreased quality of life and socioeconomic losses.¹ Management of these fractures depends on the type of fracture and whether the fracture is stable or not, the patients' general condition, and the presence of comorbidities. Although these fractures can be commonly treated with simple measures such as bed rest and the use of collars, vertebroplasty, kyphoplasty, or major surgical interventions such as pedicle fixation, stabilization, and corpectomy may be required in some cases.² Furthermore, the presence of neurological symptoms may necessitate surgical decompression.

CASE REPORT

A 78-year-old female patient presented to our clinic with severe pain in her left leg and back. On examination, she had left knee extension muscle strength 3/5. Lumbar magnetic resonance imaging and computed tomography scan revealed an L3 burst fracture compressing the L3 nerve root. The lamina, spinous process, and interspinous and supraspinous ligaments were intact (Figures 1 and 2). According to the Thoraco-Lumbar Injury Classification and Severity Score (TLICS),³ the patient had a score of 4 due to the presence of an L3 burst fracture (score, 2) and nerve root irritation (score, 2). She had ASA score: III. As the patient had severe comorbidities including osteoporosis, Parkinson disease, hypertension, and diabetes mellitus, a minimally invasive endoscopic decompressive surgery with cement injection was performed after family consultation.

The surgery was planned in three stages.

Stage 1

The surgical procedure was performed under general anesthesia. The patient was positioned in a neutral prone position on a radiolucent operating table. A 0.7-cm skin incision was made 1 cm lateral to the midline. The endoscopic guide was inserted over the left L3 lamina in front of the L3 pedicle. A hole was made on the lamina with an endoscopic shaver (Figure 3). The lamina defect was widened using an

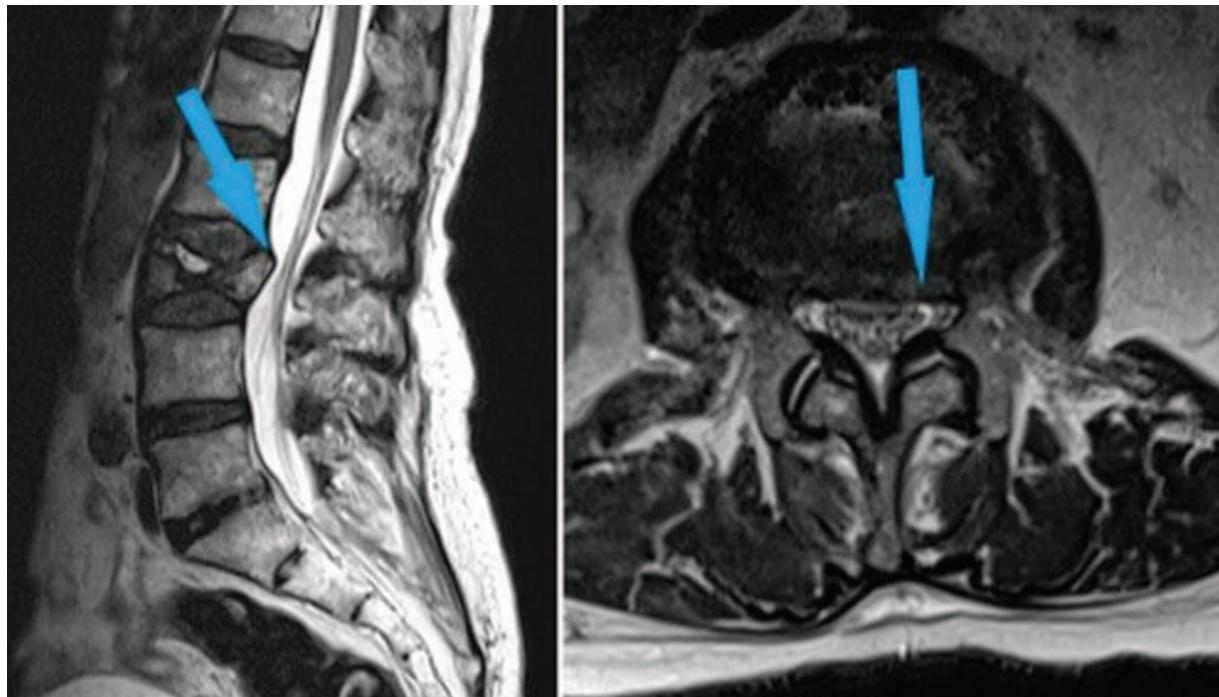


Figure 1. Preoperative MRI (sagittal T2-axial T2) (blue arrows).

endoscopic shaver and kerrison rongeurs. Subsequently, the endoscope was advanced into the spinal canal and the compression of the L3 nerve root was visualized (Figure 4). The nerve was retracted and the compression was relieved by placing the nerve behind the working cannula.

Stage 2

The bone fragment under the nerve root was drilled and decompressed with the endoscopic shaver. Under fluoroscopic guidance, the decompression was widened up to the inferior pedicle.

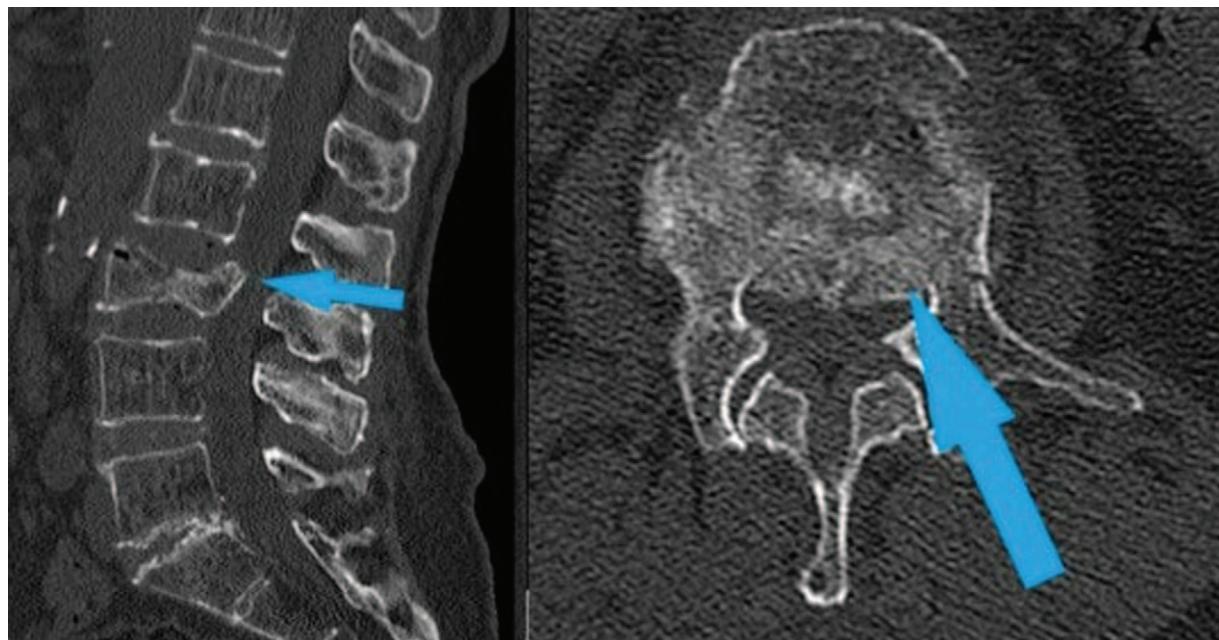


Figure 2. Preoperative CT (sagittal-axial) (blue arrows).



Figure 3. Per-operative endoscopic image: Blue arrowhead: L3 nerve root, Blue arrow: Lamina.

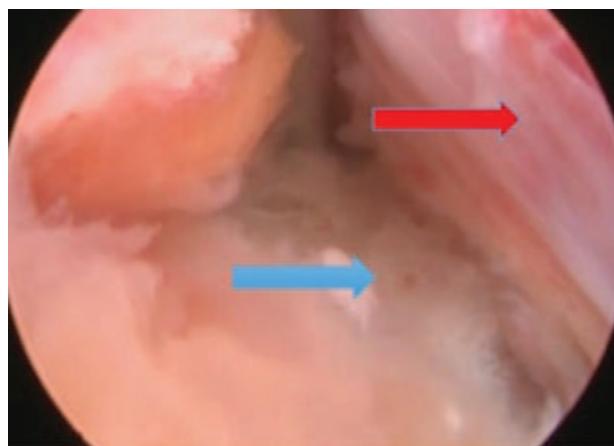


Figure 4. Per-operative endoscopic image: Blue arrow: bone fragment in the spinal canal, Red arrow: nerve root.

Stage 3

The irrigation of the endoscope was closed and vertebroplasty was applied through the right pedicle (Figure 5A, B). The application of cement to the corpus was visualized by the endoscope to avoid a contact between the cement and the nerve root. A minivac drain was inserted and the skin incision was closed with a single suture. Duration of surgery: 55 minutes.

The patient was mobilized with the aid of a lumbosacral corset the same evening. On postoperative day 1, there was 8 cc of blood in her minivac drain. The drain was removed and the patient was discharged from the hospital the following day. A postoperative control computed tomography scan visualized the full decompression of the nerve root (Figure 6). The patient's sagittal posture and vertebral corpus height were recorded using a postoperative scoliosis

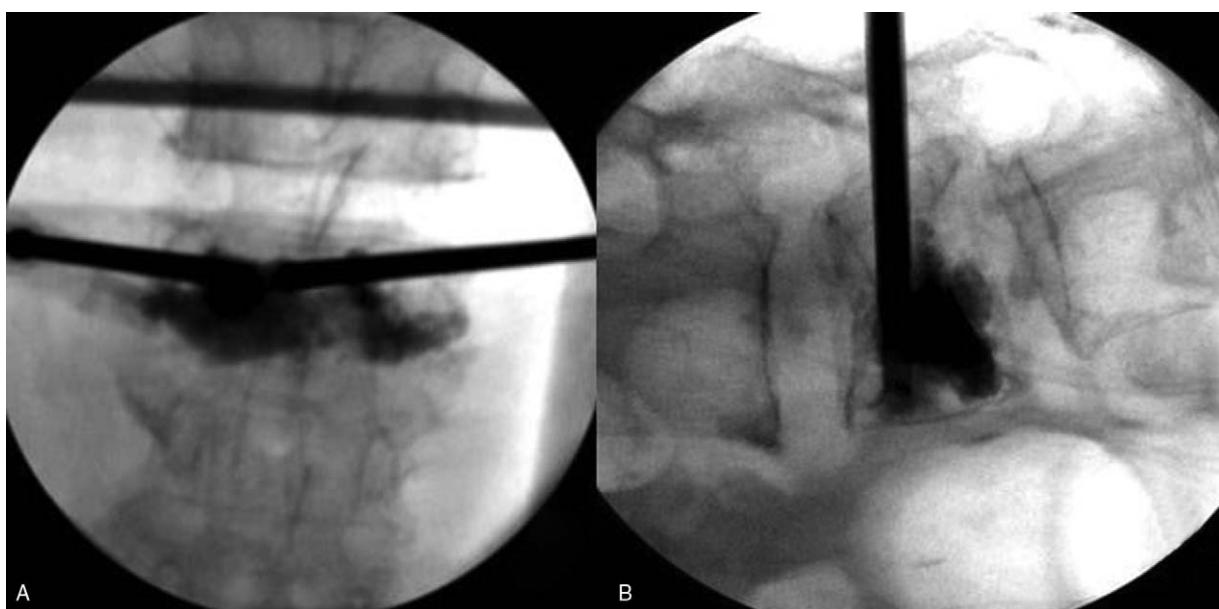


Figure 5. (A, B) Vertebroplasty was applied through the right pedicle. **A**, AP fluoroscopy view; **B**, lateral fluoroscopy view.

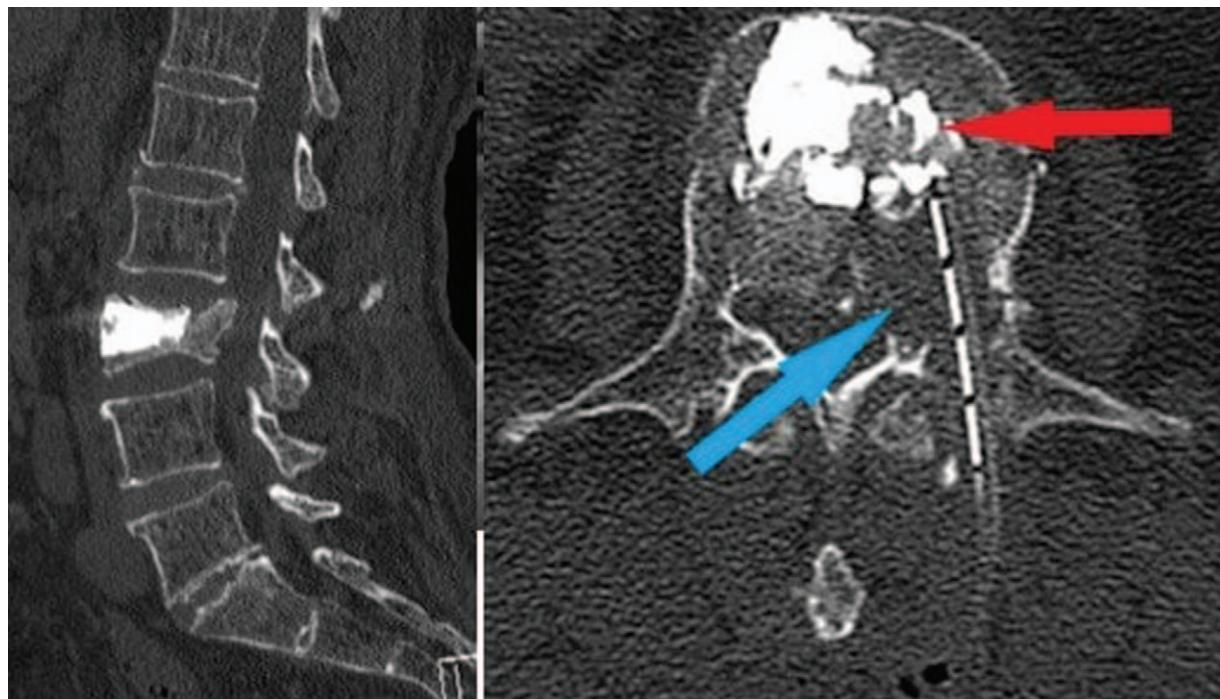


Figure 6. Postoperative CT blue arrow: Decompression zone, Red arrow: applied in cement.

X-ray image (Figure 7). Although the patient had a preoperative visual analog scale score of 9, she had complete pain relief after the surgery.



Figure 7. Postoperative scoliosis X-ray.

DISCUSSION

Treatment of osteoporotic burst fractures remains controversial.⁴ Some authors recommend the use of conservative therapy in patients with burst fractures without neurological deficits considering that the spinal canal may widen gradually over a period of 2 years.^{5,6} However, most authors suggest decompression, anterior, posterior, or 360° fixation, and fusion surgery in patients with unstable fractures or neurological deficits.^{2–7} In particular, the surgical devices used in these procedures may lead to long-term complications such as screw failure, breakage, adjacent-segment disease, proximal-junctional kyphosis, and infections. On the other hand, traditional open surgeries may additionally lead to prolonged operative times, intense blood loss, blood transfusions, longer hospital stays, and delayed return to socioeconomic life.⁸ Nevertheless, there is no consensus in the literature as to whether vertebroplasty should be performed in patients with burst fractures without neurological impairments.⁹ Microscopic technique using tubular retractor is equally effective; but endoscope could have the additional advantage of better visualization and less soft tissue disruption.¹⁰ In our patient, we decompressed the nerve root with a minimally invasive approach and strengthened the vertebra corpus with cement. We consider that, in line with the advances in endoscopic and surgical techniques in the realm of spinal surgery, minimally invasive endoscopic procedures may eventually be preferred over previously established major open surgeries.

CONCLUSION

Minimally invasive endoscopic decompression with cement injection is a novel technique which can be a safe and

effective alternative to surgery. In particular, its fewer risks compared with major surgery, smaller incision, shorter hospital stay, and faster return to daily life activities make it an attractive alternative.

➤ Key Points

- Osteoporotic vertebral fractures are a serious health problem in elderly patients, leading to decreased quality of life and socioeconomic losses
- Osteoporotic vertebral fractures can commonly be treated with major surgery, such as like pedicle fixation, stabilization, or corpectomy, may be needed required in some cases
- Minimally invasive endoscopic decompression may be a novel, safe, and effective alternative to surgery

References

1. Muraki S, Akune T, Oka H, et al. Health-related quality of life with vertebral fracture, lumbar spondylosis and knee osteoarthritis in Japanese men: the ROAD study. *Arch Osteoporos* 2010;5:91–9.
2. Jindal N, Sankhala SS, Bachhal V. The role of fusion in the management of burst fractures of the thoracolumbar spine treated by short segment pedicle screw fixation: a prospective randomised trial. *J Bone Joint Surg Br* 2012;94:1101–6.
3. Vaccaro AR, Lehman RA Jr, Hurlbert RJ, et al. A new classification of thoracolumbar injuries: the importance of injury morphology, the integrity of the posterior ligamentous complex, and neurologic status. *Spine (Phila Pa 1976)* 2005;30:2325–33.
4. Sheng X, Ren S. Surgical techniques for osteoporotic vertebral collapse with delayed neurological deficits: a systematic review. *Int J Surg* 2016;33:42–8.
5. Rajasekaran S. Thoracolumbar burst fractures without neurological deficit: the role for conservative treatment. *Eur Spine J* 2010;19:S40–7.
6. Wilcox RK, Boerger TO, Allen DJ, et al. A dynamic study of thoracolumbar burst fractures. *J Bone Joint Surg* 2003;85-A:2184–9.
7. Uchida K, Kobayashi S, Matsuzaki M, et al. Anterior versus posterior surgery for osteoporotic vertebral collapse with neurological deficit in the thoracolumbar spine. *Eur Spine J* 2006;15:1759–67.
8. Lin CL, Chou PH, Fang JJ, et al. Short-segment decompression and fixation for thoracolumbar osteoporotic fractures with neurological deficits. *J Int Med Res* 2018;46:3104–13.
9. Li CH, Chang MC, Liu CL, et al. Osteoporotic burst fracture with spinal canal compromise treated with percutaneous vertebroplasty. *Clin Neurol Neurosurg* 2010;112:678–81.
10. Parihar VS, Yadav N, Yadav YR, et al. Endoscopic management of spinal intradural extramedullary tumors. *J Neurol Surg A Cent Eur Neurosurg* 2017;78:219–2262017.