



Case Series

A case series: Transforaminal anterior vertebral augment with interference screw with short segment posterior fixation for thoracolumbar junctional fractures

Anil Dhule¹, Shubham Madhukarrao Lakde^{1*}, Raj Nawkhare¹,
Sayed S. M Haque¹

¹Government Medical College and Hospital, Aurangabad, Maharashtra, India



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ABSTRACT

Percutaneous vertebroplasty has become widely accepted as a safe and effective minimally invasive procedure for the treatment of painful vertebral body compression fractures refractory to medical therapy. In this article, we provide an procedure with vertebral body interference screw placement via a percutaneous approach with posterior instrumentation for wedge compression fractures at junction level, as a anterior column support, it's approach, risk and complications of the procedure.

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1. Objective

In this article we will be discussing about the approach to the procedure, its indications and contraindications, expected outcomes and complications.

2. Introduction

Vertebral body wedge compression fractures occurs most commonly in osteoporosis. Other causes include malignancies, trauma, hemangioma and osteonecrosis of the vertebral body.¹

It frequently result in moderate to severe back pain, interfering in there day to day activities. Many patients may experience significant morbidity and decreased quality of life secondary to severe pain, prolonged immobilization, kyphosis, pulmonary deterioration, depression, and loss of independence.²⁻⁴ Patients with vertebral body wedge compression fractures are at the life-time risk of chronic back pain and kyphotic deformity.

Worldwide, 1.4 million people are affected by VF annually; the lifetime risk for Vertebral wedge fracture is 16% in women and 5% in men.^{5,6}

Vertebroplasty was described by Galibert and colleagues in 1987,⁷ has been widely used as a treatment for symptomatic wedge compression fractures who are refractory to medical therapy. Vertebroplasty is a image-guided percutaneous procedure involving the injection of bone cement into a fractured vertebral body to improve pain and gain stability to the fracture.⁸

In this case series, we will be using interference screw as an anterior strut graft to support the anterior column in wedge compression fractures via a percutaneous approach under image guidance with short segment posterior instrumentation for thoracolumbar junction at wedge compression fractures.

3. Case Series

3.1. Case 1

A 37yrs old female patient with history of self-fall from stairs, complaining of low back pain, with inability to sit,

* Corresponding author.

E-mail address: shubhamlakde@gmail.com (S. M. Lakde).

difficulty in walking and doing day to day activities. Pain was severe in nature, and got relieved to some extent by rest and lying down.

On clinical examination, there was local tenderness, to palpation and percussion, but no neurological deficit nor any signs of radiculopathy.

Plain radiographs and noncontrast lumbar computed tomography (CT) demonstrated a wedge compression fracture of D12 vertebra. Magerl type A1.3, with loss of vertebral body height and without spinal canal or neuroforaminal compromise (Figure 1).⁹ Noncontrast lumbar magnetic resonance imaging (MRI) demonstrated integrity of the posterior spinal elements.junctional level of thoracolumbar vertebrae.

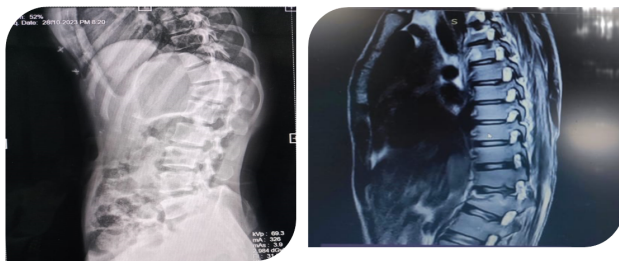


Figure 1: Pre op x-rays and MRI

3.2. Procedure

Patient lying in prone position under general anaesthesia, fractured vertebrae body was identified and marked under the image intensifier.

Transforaminal approach was used to reach the superior body of the D12 vertebrae and long guide wire was inserted. After confirming the position of the guide wire under image intensifier, dilators were introduced to clear the soft tissue. 6mm Cannulated drill was passed over the guide wire. Interference screw of 7 mm titanium was introduced over the guide wire through the sheath, into the vertebral body under c arm such as it would in the anterior part of the vertebral body in lateral view and in the midline in anteroposterior view.(Figure 2)

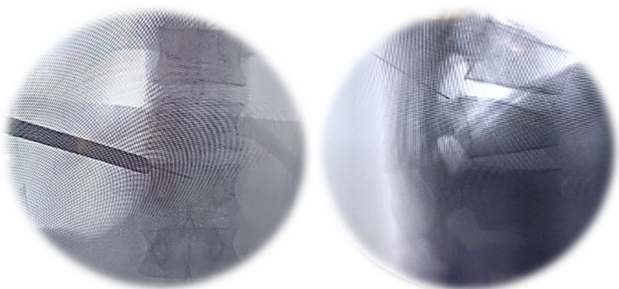


Figure 2: Entry point in anteroposterior and lateral view

Sequential images were taken so as to visually the increase in the height of the collapsed anterior column. (Figure 3) Junctional level fracture. (Figure 4)

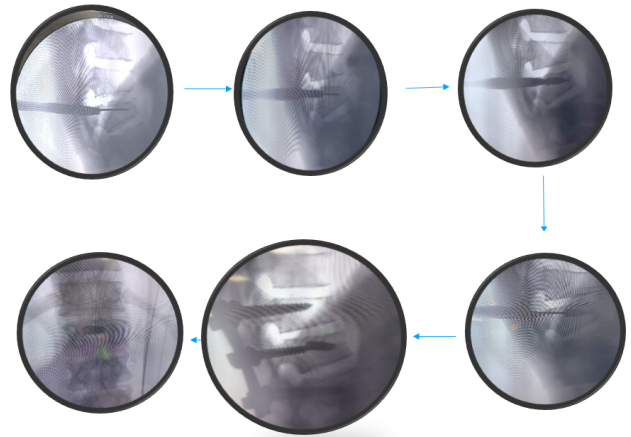


Figure 3: Sequential C arm shoots



Figure 4: Final C arm image

Postoperatively patient was made to sit the next day with the help of the TLSO brace and there was significant decrease in the level of pain. Patient was mobilised with the help of walker after fifth post operative day with TLSO brace, and was discharged on day seventh. X-RAYS were taken at the first week follow up visit and there was significant decrease in the pain. (Figure 5)

4. Case 2

A 30 yrs old male patient with history of self fall from height complaining of inability to walk difficulty in standing and sitting. On physical examination patient was paraplegic with bowel and bladder involvement. There was localised tenderness over back on palpation and no palpable step or list was felt.noncontrast lumbar computed tomography (CT) demonstrated a wedge compression fracture of

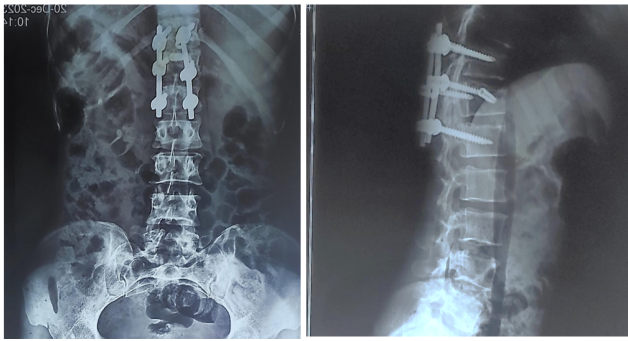


Figure 5: Follow up x rays

D12 vertebra. Magerl type A1.3, with loss of vertebral body height and without spinal canal or neuroforaminal compromise. (Figure 6)

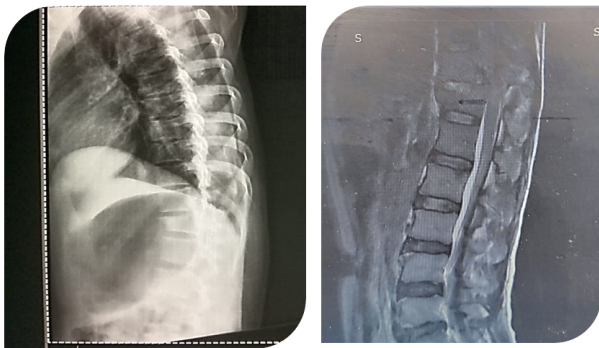


Figure 6: Pre op x rays

Due to lack of economic restraints, patient was planned for decompression and unilateral short segment posterior fixation with anterior vertebral body augmentation with interference screw.(Figure 7)

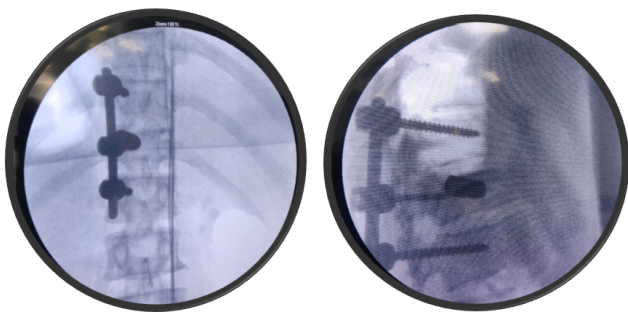


Figure 7: Final C arm shoot

Post operatively patient had significant decrease in the level of pain and was able to sit with support. Post operatively patient was advised to continue brace and was started on physiotherapy protocol for paraparesis.

Patient wound was healthy and thus was discharged on post operative day 10 and was advised about log rolling sitting with support to continue bracing and physiotherapy.

5. Case 3

A 40 yrs old male with known case of mental retardation on antipsychotic medications was admitted from casualty with a history of self fall from height, was a case of polytrauma with chest injury, right side subtrochanter fracture with crush injury to calcaneum, left side tibia plateau fracture with pilon fracture and calcaneum fracture. Patient complained of back pain and was diagnosed with L1 superior endplate impaction fracture Magerl type A1.1.⁹Figure 8 with no associated neurodeficit.



Figure 8: Pre op MRI image

After all, the pre anaesthetic workup and with due risk, patient was planned for short segment posterior fixation and vertebral augmentation.

Intraoperatively due to breach of inferior wall of L2 pedicle on right side, pedicular screw was not inserted.

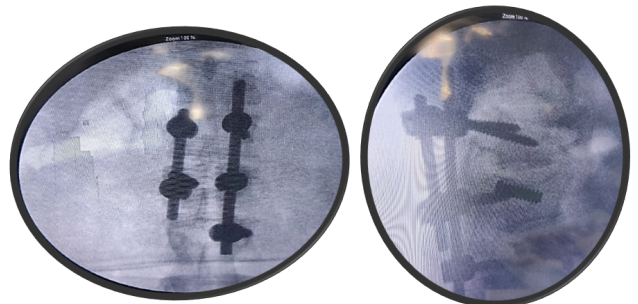


Figure 9: Final C arm shoot

Postoperatively patient had decrease in the level of back pain and was able to sit with support.

Patient suffered lower respiratory tract infection post-operatively and succumbed to death on day 8 due to Septicemia.

6. Discussion

Studies have given the importance of anterior column support for wedge unstable fractures.¹⁰ For which an anterior retroperitoneal approach is best employed, when spinal canal decompression is desired, it requires an expert surgeon training and may be associated with significant increase in the risk of morbidity and mortality.¹¹

Posterior approaches have been thus taken place with newer techniques, to achieve both the lumbar corpectomy and the posterior fixation.¹² Studies have shown that short-segment posterior fixation in a case of unstable junctional fractured vertebrae appears to be insufficient in the absence of anterior support,¹³ and hence extension of the posterior instrumentation to two segments above and one below the fracture was advised and proved successful, at the cost of decreased mobility.¹⁴ Thus to decrease the number of instrumentation segments, some studies advised the placement of a screw in the fractured vertebral body¹⁵ in addition to anterior vertebral column augmentation with vertebroplasty¹⁶ or interference screw as we did in our study of case series.

In our case series, The presentation and indications for treatment were radically different from the ones in the cited articles. Our patients had a wedge fractures at thoracolumbar junctional level resulting in excruciating pain immediately after the accident and even minor attempts to mobility. Therefore, they could not be mobilized in any way, and 'conservative treatment' would have implied keeping them bedridden for at least several months until the fracture had started to heal. This option was considered unacceptable by both the patients and the physicians. The patients thus where opted for operative procedure and underwent successful mobilization to at least sitting at the side of bed after the procedure.

This approach thus offers the advantages of minimal operative morbidity and preservation of lumbar mobility, by subsequent short-segment pedicle screw fixation and/or fusion and anterior vertebral augmentation.

Other advantages are that the side effects associated with vertebroplasty and kyphoplasty predominantly extravasation of cement posteriorly in to canal and allergic reaction to cement can be avoided. This procedure, thus can be employed in posterior breach of vertebral body as well with minimal risk of screw migration.

Other demonstrated complications of vertebroplasty like cement embolization in to the pulmonary vasculature¹⁷ vertebral osteonecrosis following cementing^{18–20} associated adjacent segment fractures and collapse following vertebroplasty,^{21–26} can be reduced.

7. Conclusion

In this study we provided with the technique of anterior column support with the help of interference screw via a percutaneous approach, which helped us to reduce the number of levels posterior segment fixations and also reduced the risk of complications associated with vertebroplasty.

As the screws used where of titanium, patient had no limitation of future radiological investigations and was the procedure was cost effective.

The procedure provided with the good results of decreased post of pain level in patients and helped them in early mobilization and thus reducing the risk of morbidity and mortality.

8. Consent Form

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

9. Source of Funding

None.

10. Conflict of Interest

None.


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Author biography

Anil Dhule, Associate Professor  <https://orcid.org/0009-0006-1708-0168>

Shubham Madhukarrao Lakde, Senior Resident  <https://orcid.org/0009-0004-9849-3209>

Raj Nawkhare, Junior Resident  <https://orcid.org/0009-0000-8741-3120>

Sayed S. M Haque, Assistant Professor  <https://orcid.org/0009-0004-2859-4143>

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