

## Original Research Article

# Unilateral percutaneous vertebroplasty for symptomatic osteoporotic vertebral compression fractures -evaluation of radiological and clinical outcomes

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### ABSTRACT

**Background:** Vertebral fractures are the most common type of osteoporotic fractures. These are developing into a significant health problem worldwide as about 30% of the patients above 50 years suffer from a fracture secondary to osteoporosis. Osteoporotic vertebral fractures may be treated with rest and analgesics. Some fractures may also require surgery. Percutaneous procedure like vertebroplasty and kyphoplasty done under local anaesthesia can reduce the pain and restore height of vertebral body without need for an open surgery. The aim of the study was to assess the clinical and radiological outcomes following unilateral percutaneous vertebroplasty under local anaesthesia.

**Methods:** 21 patients who underwent unilateral vertebroplasty for symptomatic osteoporotic compression fracture between 2012 and 2015 were included in the study. Unilateral vertebroplasty using an 11-gauge trocar through transpedicular technique was performed under c-arm guidance. Patient was mobilized as soon as tolerated. Oswestry disability index and visual analogue scale were assessed pre-operatively, in the immediate post-op and at 1-year follow up.

**Results:** There were 15 females and 6 males. The mean age was  $70.04 \pm 6.07$  years. The pre-op ODI score was  $76.8 \pm 7.6$ . The pre-op VAS score was  $7.66 \pm 0.71$ . The average time period from fracture to vertebroplasty is  $4.19 \pm 3.19$  days. The immediate post-operative VAS score was  $5.76 \pm 0.8$  and the ODI score was  $62.85 \pm 7.17$ . The VAS at final follow up was  $1.23 \pm 1.19$ . ODI at final follow up was  $9.04 \pm 3.19$ . There was a showed a significant improvement when preoperative, immediate post-operative ODI and VAS scores and final follow up ( $p < 0.001$ ).

**Conclusions:** In our study unilateral percutaneous vertebroplasty has provided pain relief, early mobilization of the patient with less complication without the requirement of general anaesthesia.

**Keywords:** Verterbroplasty, Vertebral fractures, Osteoporosis, PVP

### INTRODUCTION

Osteoporotic vertebral fracture is developing into a significant health problem worldwide. Fractures secondary to osteoporosis occurs in approximately 30% to 50 % of the people aged above 50 years.<sup>1</sup> Vertebral fractures are the most common type of osteoporotic fractures, while most fractures treated conservatively by

rest, analgesics and brace do well symptomatically some fractures cause persistent pain and worsening kyphotic deformity causing impaired quality of life.<sup>2</sup> In a prospective study of vertebral compression fractures in elderly women increased mortality is also noticed due to pulmonary complications.<sup>3</sup> Osteoporotic vertebral fractures causing significant pain and reduced quality of life should be treated aggressively to improve the quality

of life. Open procedures like posterior stabilization can give good pain relief and also restore vertebral height but associated with increased risk for surgery as the patients are elderly with associated co morbid diseases. Percutaneous procedure like vertebroplasty and kyphoplasty can reduce the pain and restore height of vertebral body. These procedures done under local anaesthesia are best suited for elderly with comorbid diseases. This study was conducted to evaluate the clinical and radiological outcomes following unilateral percutaneous vertebroplasty for symptomatic osteoporotic vertebral compression fractures.

## METHODS

21 Patients who underwent unilateral vertebroplasty for symptomatic osteoporotic compression fracture between 2012 and 2015 at Saveetha Medical College Hospital were taken up for the study. Inclusion criteria are osteoporotic vertebral compression fracture single level without break in posterior cortex in CT scan, intractable pain related to compression fracture and without neurological compromise. Exclusion criteria are compression fracture of more than 6 months duration, pathological fracture following benign, primary or secondary malignant lesion of vertebrae, neurological compromise or unstable fractures.

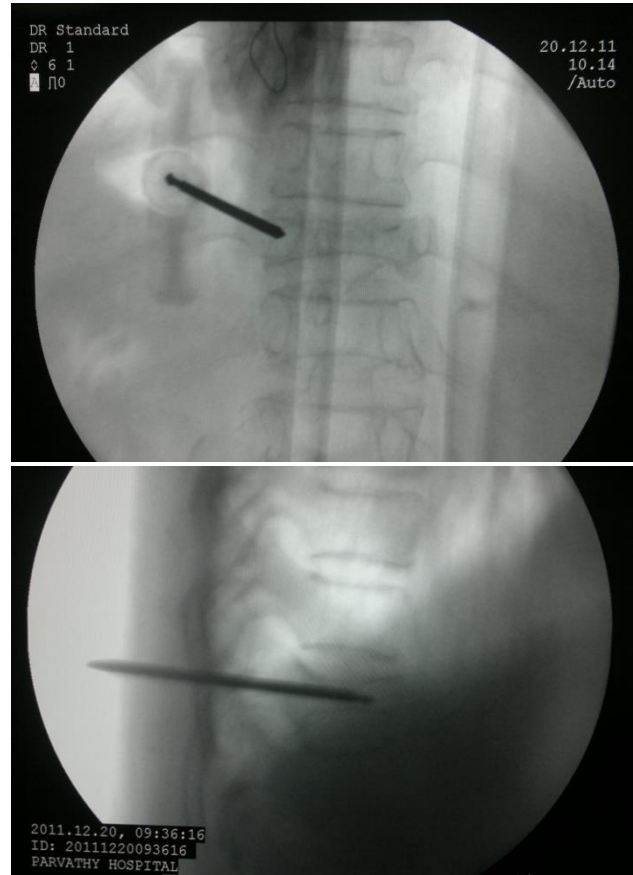


**Figure 1 (A and B): Pre op x ray.**

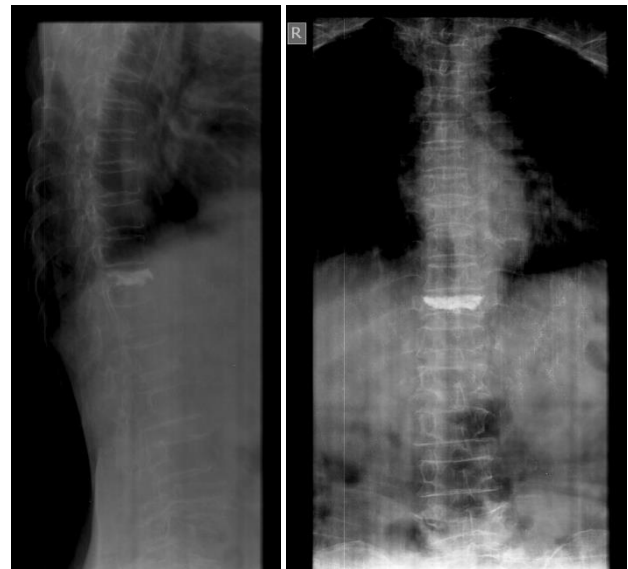
### Operative procedure

The procedure is done under local anesthesia, with the anesthetist monitoring the patient throughout the procedure. Patient positioned prone on bolsters, which helps in partial restoration of anterior vertebral height. 11-gauge trocar with cannula advanced to anterior third and middle third junction trans-pedicular under fluoroscopic guidance. Throughout the procedure anteroposterior and lateral views are taken confirming there is no breach of the medial wall of pedicle. The procedure is abandoned if there is any suspicion of breach in the medial wall of pedicle and is done through the other pedicle. Three 2 cc syringes are loaded with the properly mixed cement. Syringes are fitted to the cannula and started injecting once the cement is sticky. Care is taken to inject cement with gentle force and under

continuous monitoring under c-arm guidance, making sure the cement is well within the vertebral body.



**Figure 2 (A and B): Intra-operative C-arm pictures.**



**Figure 3 (A and B): Post-op x-rays.**

The patients are mobilized immediately, made to sit, stand and walk gradually according to patient comfort. Oswestry disability questionnaire and visual analogue scale are used to assess the patient in the immediate post

op and one year after procedure.<sup>4,5</sup> All patients are followed up to one year. Microsoft Excel is used for statistical calculations.

## RESULTS

There were 21 patients in our study, 15 female and 6 male. The mean age was 70.04±6.07 years.

**Table 1: Demographic profile of patients.**

	Number	Mean age	Min	Max	SD
<b>Male</b>	6	68.16	63	75	3.76
<b>Female</b>	15	70.8	61	84	6.63

Regarding co-morbidities diabetes mellitus was found in 7 patients, hypertension was found in 7 patients. 5 patients were obese. Ischaemic heart disease was found in 2 patients. 1 patient had depression. The average time period following fracture to do percutaneous vertebroplasty in our study is 4.19±3.19 days.

### ODI scores

The pre-operative, immediate post-op and final follow up ODI scores were calculated and tabulated.

**Table 2: ODI scores.**

	Mean	Std Dev	Min	Max
<b>Preoperative</b>	76.80	7.61	62	90
<b>Immediate post OP</b>	62.85	7.17	48	77
<b>Final follow up</b>	9.04	3.19	5	15

The pre-operative, immediate post-op and final follow up VAS scores were calculated and tabulated.

**Table 3: VAS scores.**

	Mean	Std Dev	Min	Max
<b>Preoperative</b>	7.66	0.71	7	9
<b>Immediate post OP</b>	5.76	0.81	4	7
<b>Final follow up</b>	1.23	1.19	0	5

There was cement leakage found in one patient but no further complications were observed. No complications were observed in any of the patients. There was showed a significant improvement during preoperative, immediate post-operative ODI and VAS scores and final follow up (p<0.001).

## DISCUSSION

Vertebral compression fractures due to osteoporosis are commonly encountered in elderly age group<sup>1</sup>. Mainstay of treatment of osteoporotic vertebral compression fractures is bracing, bed rest, and medical management of osteoporosis. Not all patients do well after conservative line of management because of prolonged bed rest,

worsening of deformity and persistent pain<sup>6</sup>. Conservative approach using newer modalities of treatment does not always achieve painless full functional life. Minimally invasive procedures like percutaneous vertebroplasty provide immediate pain relief, early mobilization and achieve painless full functional life.<sup>6</sup> These advantages has made percutaneous vertebroplasty more widely used.<sup>7</sup> Our study evaluates the procedure unilateral percutaneous vertebroplasty for treating vertebral compression fractures in terms of achieving pain relief, early mobilization and possible complication.

Studies, which commented on short-term benefits of percutaneous vertebroplasty, had followed the patient for minimum of one year.<sup>8-10</sup> Follow up period in our study is also minimum of one year and we have sufficient follow up like these studies to comment on short term benefits and complications of percutaneous vertebroplasty.

Different studies have done percutaneous vertebroplasty at different periods following vertebral compression fracture. Muijs et al, in his study, the procedure percutaneous vertebroplasty was done after 6 weeks following fracture.<sup>11</sup> Mpotsaris et al did the procedure percutaneous vertebroplasty within 6-12 weeks following fracture.<sup>10</sup> The average time period following fracture to do percutaneous vertebroplasty in our study is 4.19±3.19 days

The volume of cement that can be injected in the fracture vertebrae shown in multiple studies varied from 1.5-5.3 ml.<sup>10-12</sup> In our study the volume of the cement we are able to inject in the fractured vertebrae varied from 1.5 ml to 2.5 ml.

The pain relief achieved in our series of patient is immediate which is noticeable while turning the patient from prone to supine position and this is comparable with the study done by Klazen CA et al.<sup>12</sup> VAS scores and ODI scores observed in our patients show improvement in pain scores and functional ability in ODI scores and they are all well maintained till 1 year follow-up This results are also comparable to various studies.<sup>3,10,11</sup>

The most common complication associated with percutaneous vertebroplasty reported by all studies is asymptomatic radiological cement leakage. Incidence of cement leakage ranges from 6% to 15% is reported in various studies, Martin et al reported a very high incidence of 82%.<sup>10-13</sup> Severe complications like pulmonary cement embolus and spinal cord injury are rarely reported.<sup>10-12</sup> In our study we had 2 asymptomatic cement leakage, one anteriorly and another into superior disc space.

### Limitations of the study

It has small sample size, short duration follow-up and not comparing with other modalities of treatment, Adjacent vertebral fracture reported widely did not occur in our

study and we are not able to comment as our study is short duration and only long term follow-up is needed to comment on that.

## CONCLUSION

In our study unilateral percutaneous vertebroplasty has provided pain relief, early mobilization of the patient with less complication without the requirement of general anaesthesia. Probably because of unilateral approach and limited cement injection there is less incidence of cement leakage to other studies, but may require large sample size to substantiate it.

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