



FUNCTIONAL OUTCOME OF VERTEBROPLASTY IN OSTEOPOROTIC VERTEBRAL FRACTURES – A PROSPECTIVE STUDY

Orthopaedics

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ABSTRACT

Aim: The aim of this study is to evaluate the efficacy of vertebroplasty for treatment of painful osteoporotic vertebral fractures on clinical grounds. **Materials & Methods:** 20 patients with osteoporotic compression fractures treated by vertebroplasty were enrolled in this study. In all patients, Pre operative Visual analog score for back ache, Oswestry disability score were noted for the purpose of comparison of post operative functional outcome. **Observation & Results:** In our study, average follow up was done for 12 months with maximum follow up was for 16 months and minimum follow up was for 3 months. Statistics comparing preop VAS score versus VAS score, pre op ODS vs post op ODS at immediate, one month, three months, six months and twelve months were done from which we interpreted that p value <0.005 in all postoperative period, so it was a significant comparison. Statistically, there was significant pain relief and functional outcome in immediate post operative period which was maintained at the end of 12 months also. **Conclusion:** We conclude that the Vertebroplasty are promising innovations with the benefit of quick improvement in mobility, markedly decreases pain-related doctor visits, stature in the management of osteoporotic compression fracture.

KEYWORDS

Vertebroplasty, Osteoporosis, Compression, Pain, Denis, Oswestry.

INTRODUCTION

Vertebral compression fracture, the most usual type of old age problem, results in the onset of unbearable pain which is a leading issue of significant morbidity, disability and finally death^[1]. Osteoporosis, as one of the most common diseases of bones in older people, is affecting millions of people throughout the globe.

In recent time frame, the profound establishment of minimalistic invasive treatment options has led to the reduced level of morbidity and early mobilization. The thoracic spine is the most commonly affected region .Without any sort of discrepancy, the risk of osteoporotic fractures increases with the increasing age^[2]. Most commonly, women are at a higher level of risk in this case. Vertebral fractures are usually associated with the erosion or collapse of the vertebral body.

Despite the availability of modern medical therapy for treating osteoporotic fractures, they are still a common problem. The traditional treatment methods for these fractures included bed rest, muscle relaxants, and physical therapy. Calcitonin is known to have a variable analgesic effect on osteoporotic fractures^[3]. Another method of treatment could be Vertebroplasty. It is a kind of vertebral augmentation procedure which is minimally invasive and offers symptomatic rapid relieve in pain for a long time^[4].

MATERIALS AND METHODOLOGY.

Study Design:

This prospective study was conducted in Chettinad Hospital and Research Institute, Kelambakkam in the 'Department of Orthopaedic Surgery', from August 2019 to March 2021. During the time period mentioned, 20 patients having osteoporotic compression fractures were enrolled in the study. In our study, 20 Patients with osteoporotic vertebral wedge compression fracture were counselled and admitted and the intervention of vertebroplasty. Average follow up was done for 12 months with maximum follow up was for 16 months and minimum follow up was for 3 months.

Inclusion Criteria

- Patients who have painful osteoporotic compression fractures
- Fractures with intact posterior cortex of the vertebral body

Exclusion Criteria

- Patients who have received conservative treatment and have adequate pain relief
- Patients who are having any systemic infection or any local infection near the spine.

- Patients with vertebral fracture in which there is a breach in the posterior cortex of the vertebral body.
- Patients with vertebral fractures having associated compression in the spinal cord
- Patients with associated sensory or motor deficit.

Technical Discription:

During the time period mentioned, 20 patients having osteoporotic compression fractures were enrolled in the study. Patient's age ranged from 55 to 75 years old. In this investigation, there were 7 males and 13 females. Two of the patients had comorbid injuries that were addressed and had no effect on the functional outcome. The Denis Classification was used to classify the patient's vertebral wedge compression fractures, which were treated conservatively for four weeks by giving analgesics & a TLSO brace. Patients were given conservative management at first, but eventually developed unbearable low back discomfort, with or without radiating pain, and were unable to perform everyday activities due to neurological deficits. Outpatient admissions were used for these individuals.

After admission, a complete history of the patient was acquired, which included name of the patient, age of the patient, date of the alleged injury suffered by the patient, the manner in which the injury had occurred, the previous therapy which the patient received, and the patient's current symptoms. Any history of other illnesses was noted and treated to cancel out alternative causes of fractures that may have occurred due to compression and related co-morbidities. The patient was then extensively checked, with special attention paid to the spine for any local oedema, deformity, or pain. There was a neurological chart that contained an evaluation of motor neurology and sensory neurology, and the bowel & bladder habits of the patients and any alterations in the same. Frankel's grading was done after thorough neurological examination of the patient. This neurological examination was done in order to check the post-operative neurological condition of the patient. The patients were then evaluated according to the pre-operative Vas score for the back pain, Oswestry disability score which were then compared with the same scoring system done after the post-operative period.

In all of the patients, a radiological examination was performed. X-ray of spine AP view and lateral image of the spine were done, with a dynamic lateral X-ray—which involves the flexion lateral view and the extension lateral view were done if any instability was noted in the AP and Lateral view.

Computed tomography with 3D reconstruction was used to evaluate

the fracture pattern, including the fracture level, fracture type, posterior cortex intactness, amount of fracture collapse in percentage, superior and inferior endplates – either are involved in the fracture pattern, percentage of spinal canal compromise, presence of cord compression due to impingement due to any fracture fragment, any pedicle fracture. To avoid postoperative problems, all of these characteristics were assessed as part of the preoperative evaluation.

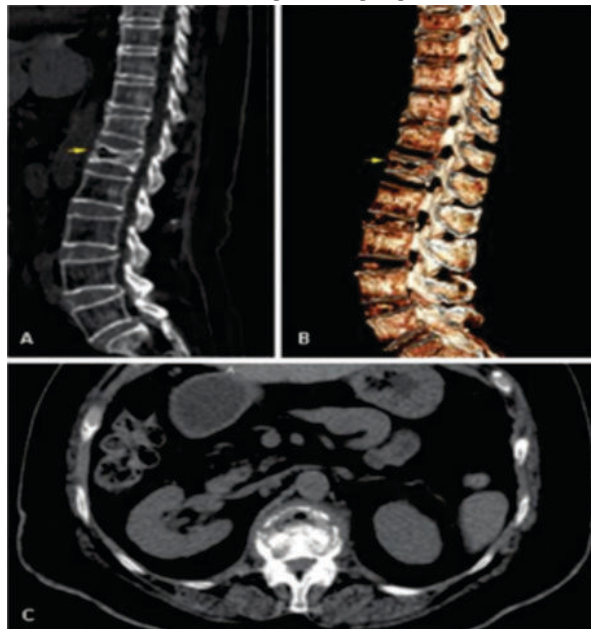


Fig 1– Sagittal, axial and 3D reconstruction of thoraco-lumbar spine showing compression fracture in L1 vertebra

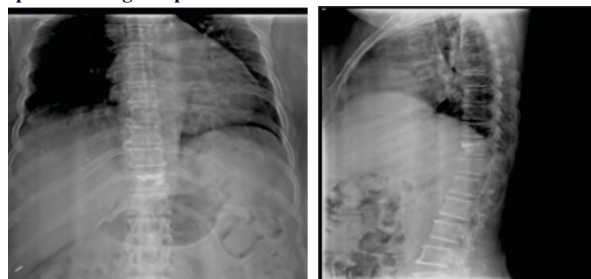


Figure 2: shows AP and lateral view of spine of immediate post op x-ray treated with vertebroplasty.

RESULTS:

Functional Outcome Of Pain Relief

The benefits of vertebroplasty includes pain relief that is quick, consistent and successful, as measured by VAS score.

VAS	N	Mean	Std Deviation	P-VALUE (Pre vs Post)
Pre op Vas	20	6.3	1.11	0.0005 (Highly Significant)
Post op Vas	20	2.75	5.75	
Post op Vas 1month	20	2.15	0.1275	0.000455 (Highly Significant)
Post op vas 3 months	20	1.55	0.3475	0.004053 (Highly Significant)
Post op vas 6 months	20	1.4	0.24	0.000694 (Highly Significant)
Post Op vas 1year	20	1.25	0.000445952	0.000584 (Highly Significant)

The data of Pre-op VAS score and Post-op VAS score were compared at month, three months, and six months, and it was concluded that the p value was less than 0.001 in all postoperative periods, indicating that the comparison was significant. Statistically, we experienced great pain alleviation in the immediate post-operative period, which lasted for another six months.

Functional Outcome Assessed By Oswestry Disability Index (odi)

ODI	N	Mean	Std Deviation	P-VALUE (Pre vs Post)
Pre-Op ODI	20	14.9	4.39	8.34641E-05
Post op ODI	20	12.75	2.59415	(Highly Significant)
Post ODI 1 Month	20	13.05	3.332145	0.008237531
Post ODI 3months	20	9.9	1.49	0.002315 (Significant)
Post ODI 6 Months	20	8.8	1.26	0.00059888 (Significant)
Post ODI 1 year	20	6.7	0.31	0.0000834641 (Highly Significant)

This data was compared for Pre-op ODI score with Post-op ODI score at one month, three months, and six months, with a p value of less than 0.001 in all postoperative periods, indicating that it was a significant comparison. We experienced significant pain reduction in the immediate post-operative time as well as at the end of the 6-month post-operative period, according to statistics.

DISCUSSION:

Our study shows that the use of vertebroplasty for osteoporotic vertebral fractures can improve the quality of life. Vertebroplasty is a minimally- invasive treatment procedure that augments the space between the vertebral end plates[5,6]

This study emphasis on the marked reduction of lower back pain. It is clinically and statistically crucial in reducing the amount of analgesic intake and hence, the quality of life was drastically improved as compared to before. Our study shows very few instances of cement extrusion as differentiated to previous studies.

Bingefors K in their study of gender perspective in osteoporotic vertebral fractures reported that overall prevalence of osteoporotic vertebral fractures in 10-20% with a higher prevalence in women than in men. We found similar age demographic in our study^[7].

Cooper et al stated that osteoporotic vertebral fractures clustered around T12 and L1^[8], our study was also consistent with this finding showing 40% fractures occurring at L1 level.

All the patients who were selected for the study had already received conservative treatment for at least 3 weeks. All our procedures were done in patients with fractures more than 1 month old. Yu S.W., PC Lee et al^[9] reported that vertebroplasty performed in acute phase (<4 weeks) for several indications including osteoporotic fractures may lead to a higher risk of complications, such as cement leakage. Most of the literatures support the view that it should be done after 3-6 weeks of conservative therapy.

Cement leakage was found in only 5 cases, and all the cases showed an average cement injection of 3.5ml which showed no correlation between the amount of cement injected and the leakage of cement. Cement leak can thus be avoided by following proper steps and having good surgical expertise.

A significant reduction in back pain was observed after 12 months following Vertebroplasty. The reduction was measured using VAS score. It revealed that the pain relief helped in reducing the need for analgesics.

In another study, Vertebroplasty was performed but only approximately 50% results were obtained and the patient still had pain. There are 18 Prospective and 3 nonrandomized studies performed which compare Conservative vs vertebroplasty vs percutaneous balloon kyphoplasty. 2752 vertebral bodies in 1573 patients were reported to be having a success rate of 90% on an average.

On the basis of all these studies we can clearly observe no correlation between the pain relief and the volume or the amount to the PMMA cement that is injected; bi- pedicular vs unipedicular vertebroplasty; correction in the vertebral body height (degree of kyphosis); between viscosity that is the fluidity of the injected PMMA cement and the reduction in the pain. Literature that suggests the volume or the amount of PMMA cement that is injected varies from 2-11 ml.

The higher volume of cement insertion is carried out to overcome the complication of leaking of cement into the veins and epidural space.

Therefore, it is highly recommended to avoid the injection of more than 5 ml per Vertebral body^[10].

CONCLUSION:

Vertebroplasty is a procedure that can reduce back pain and improve quality of life. We found in our study that the functional outcome in respect to reduction of pain and improvement in activities of daily living increases over time. When done meticulously, the procedure does not have significant complications. The most common complication of cement leak can also be avoided by proper patient selection and correct surgical technique. Vertebroplasty thus yields great results in patients who have been refractory to conservative management. Hence vertebroplasty should be considered as a next step to conservative management in patients with painful osteoporotic vertebral fractures.

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