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VERTEBROPLASTY - A TREATMENT MODALITY IN OSTEOPOROTIC VETERBRAL FRACTURES

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Abstract
Aim: *This study aims to explore how effective vertebroplasty is in treating painful osteoporotic vertebral fractures from a clinical perspective.*

Materials & Methods: *We included 20 patients who had osteoporotic compression fractures and underwent vertebroplasty. Before the procedure, we assessed their pain using the Visual Analog Scale (VAS) and evaluated their disability with the Oswestry Disability Score (ODS). These measurements helped us compare their functional outcomes after surgery. The average follow-up period was 12 months, with some patients followed for as long as 16 months and others for a minimum of 3 months.*

Observations & Results :*We analyzed the changes in VAS and ODS scores before and after the procedure at several time points: immediately after surgery, and at one month, three months, six months, and twelve months postoperatively. The results showed a significant reduction in pain, with p-values below 0.005 at all follow-up intervals. This indicates that patients experienced meaningful pain relief and improved function right after the procedure, and these benefits were maintained throughout the 12 months.*

Conclusion: Vertebroplasty *appears to be a promising treatment for osteoporotic compression fractures. It not only helps patients regain mobility quickly but also significantly reduces the number of visits to the doctor for pain management. This technique represents a valuable option for effectively managing these types of fractures.*

Keywords*: vertebroplasty, osteoporotic vertebral fractures, visual analouge scale*

INTRODUCTION

Vertebral compression fractures are a serious issue for many older adults, often causing intense pain and leading to significant challenges in daily life. Osteoporosis, a common condition that weakens bones, affects millions of people around the world. The thoracic spine is typically where these fractures occur, and the risk increases with age, especially for women.Even with new treatment options available, vertebral fractures remain a frequent problem. Traditional methods usually involve bed rest, muscle relaxants, and physical therapy, but these can only do so much. Calcitonin might help with pain, but its effectiveness varies from person to person.

One encouraging option is vertebroplasty, a minimally invasive procedure that stabilizes the fractured vertebrae. Many patients find that it provides quick and lasting relief from pain, allowing them to regain mobility and improve their quality of life. This treatment not only alleviates discomfort but also helps individuals get back to the activities they enjoy.

MATERIAL AND METHODS

Study Design:

This prospective study was carried out at Chettinad Hospital and Research Institute in Kelambakkam, specifically in the Department of Orthopaedic Surgery, from August 2019 to March 2021. During this time, we welcomed 20 patients who were dealing with osteoporotic compression fractures. Each patient received thorough counseling and was admitted for vertebroplasty. We followed up with them for an average of 12 months, with some patients being followed for as long as 16 months and others for a minimum of 3 months.

Inclusion Criteria

1. Patients dealing with painful osteoporotic compression fractures.
2. Fractures where the back part of the vertebral body is still intact**.**

Exclusion Criteria

1. Patients who have tried conservative treatment and found enough relief from their pain.
2. Patients who have any kind of infection near the spine, whether systemic or local.
3. Patients with vertebral fractures that have a break in the back part of the vertebral body.
4. Patients whose vertebral fractures are putting pressure on the spinal cord.
5. Patients showing any signs of sensory or motor issues.

TECHNICAL DESCRIPTION:

During the study, we enrolled 20 patients with osteoporotic compression fractures, all aged between 55 and 75 years. This group included 7 men and 13 women. Two patients had additional injuries, but these did not affect their overall recovery. We classified their vertebral wedge compression fractures using the Denis Classification system. Initially, we managed their conditions conservatively for four weeks, providing pain relief with analgesics and fitting them with a TLSO brace. Unfortunately, many of them developed severe low back pain, sometimes with radiating discomfort, which made it difficult for them to carry out everyday activities due to neurological deficits. As a result, we treated these patients on an outpatient basis.When they were admitted, we collected comprehensive histories that included their names, ages, the date and circumstances of their injuries, previous treatments, and their current symptoms. We also noted any other health issues to rule out alternative causes for their fractures.A thorough physical exam was conducted, focusing on the spine to check for swelling, deformities, or pain. We assessed their motor and sensory functions, as well as their bowel and bladder habits, carefully noting any changes. After a detailed neurological examination, we used Frankel's grading system to evaluate their condition post-surgery.Additionally, we measured pre-operative pain levels using the VAS score and assessed their disability with the Oswestry Disability Index, comparing these to their post-operative results. Every patient underwent radiological examinations, including AP and lateral X-rays of the spine. If we detected any instability in these images, we also performed dynamic lateral X-rays in both flexion and extension.We used computed tomography with 3D reconstruction to get a detailed look at the fracture patterns. This involved checking the fracture level and type, assessing whether the back part of the vertebra was intact, and measuring how much the fracture had collapsed. We also examined whether the top and bottom endplates were affected, looked at the extent of any spinal canal narrowing, and checked for any compression of the spinal cord caused by fragments of the fracture. Additionally, we assessed for any fractures in the pedicle. By gathering all this information during the preoperative evaluation, we aimed to reduce the risk of complications after surgery.

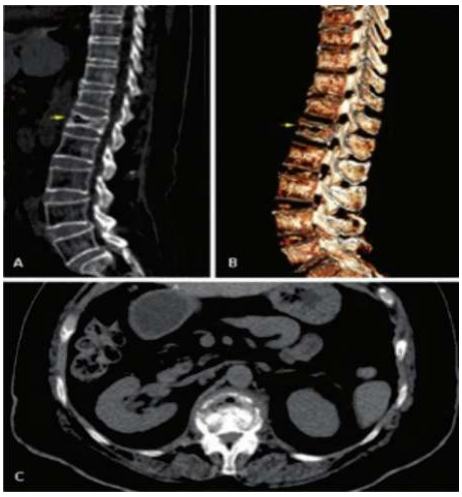

Figure 1

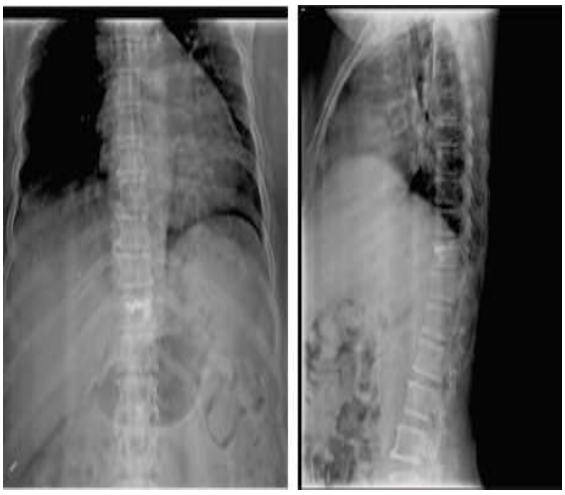

Figure-2

CT- thoraco-lumbar spine showing compression immediate post-op xray fracture in L1 vertebra

RESULTS:

Functional Outcome of Pain using VAS (Visual analouge score)

VISUAL ANALOGUE SCORE	N	Mean	Standard Deviation	P-VALUE (Pre-op vs Post-op)
Pre-op VAS	20	6.2	1.13	0.0005
Post op Vas	20	2.74	5.71	
Post operatively -1month	20	2.14	0.1273	0.000455
Post-operatively 3 months	20	1.54	0.3474	0.004053 (
Post operatively 6 months	20	1.3	0.25	0.000694
Post operatively- 1year	20	1.22	0.00044595	0.000584

We looked at the pre-operative and post-operative VAS scores one month, three months, and six months after surgery. The findings showed a p-value of less than 0.001 at all post-operative check-ins, which means the difference was significant. This indicates that patients experienced significant pain relief right after surgery, and that relief lasted for up to 6 months.

Outcome Assessed By (ODI) Oswestry Disability Index

Oswestry disability score	N	Mean	Std Deviation	P-VALUE (Pre vs Post)
Pre-Operatively ODI	20	14.8	4.38	8.34641E-05
Post-operatively ODI	20	12.74	2.59414	
Post-operativelyI 1Month	20	13.04	3.332147	0.008237532
Post-operatively ODI 3months	20	9.8	1.48	0.002313
Post operatively 6 Months	20	8.7	1.24	0.00059877
Post operatively ODI 1 year	20	6.6	0.33	0.0000834638

We compared the pre-operative ODI scores with the post-operative scores at 1 month, 3 months, and 6 months after surgery. The results showed a p-value of less than 0.001 at all points, indicating a significant difference. This means that we saw a meaningful reduction in pain right after the surgery and it continued to improve over the six months following the procedure.

DISCUSSION

Our study shows that vertebroplasty can significantly improve the quality of life for patients with osteoporotic vertebral fractures. This minimally invasive procedure helps create space between the vertebral end plates.We found a marked reduction in lower back pain, which is both clinically and statistically significant. This improvement meant that patients needed less pain medication, leading to a much better quality of life compared to before the procedure. Notably, we observed very few cases of cement extrusion, which sets our results apart from earlier studies.

Bingefors K noted that osteoporotic vertebral fractures occur in about 10% to 20% of cases, with women being more affected than men. We found similar trends in our study.Additionally, Cooper et al. reported that these fractures tend to cluster around the T12 and L1 vertebrae. Our findings supported this, showing that 40% of fractures were at the L1 level.All the patients included in the study had already received conservative treatment for at least three weeks before participating. We found cement leakage in only 5 cases, with an average injection of 3.5 ml of cement. Notably, there was no connection between the amount of cement injected and the occurrence of leakage, suggesting that following proper procedures and having skilled surgical expertise can help prevent these issues.After 12 months following vertebroplasty, we observed a significant reduction in back pain, as measured by the VAS score. This pain relief also led to a decreased need for analgesics.In another study, vertebroplasty was only partially successful, providing relief for about 50% of patients, who still reported pain. A total of 18 prospective and 3 non-randomized studies have compared conservative treatment, vertebroplasty, and percutaneous balloon kyphoplasty, showing an overall success rate of about 90% across 2,752 vertebral bodies in 1,573 patients.From this body of research, it’s clear that there’s no consistent relationship between pain relief and the volume of PMMA cement injected, whether through bi-pedicular or unipedicular vertebroplasty, the degree of correction in vertebral height, or the viscosity of the cement. The literature indicates that the volume of PMMA cement used can vary quite a bit, ranging from 2 to 11 ml.To minimize the risk of cement leaking into the veins and epidural space, some practitioners might consider using a larger volume of cement. However, it's strongly recommended to limit the injection to no more than 5 ml per vertebral body to help avoid any potential complications.

CONCULSION

Vertebroplasty is a procedure that can greatly ease back pain and improve quality of life. In our study, we found that the benefits—like relief from pain and a better ability to handle daily tasks—tend to improve over time. When done carefully, this procedure has very few complications. The most common issue, cement leakage, can be reduced by choosing the right patients and using skilled surgical techniques. Overall, vertebroplasty can deliver great results for those who haven’t found relief through conservative treatments. Because of this, it’s a strong option to consider for anyone dealing with painful osteoporotic vertebral fractures.

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