

Prospective Study on Functional Outcome of Percutaneous Transpedicular vertebroplasty using Calcium Phosphate Bone Cement in Osteoporotic Vertebral Wedge Compression Fractures

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Abstract

Objective: To analyze functional outcome, disability index, duration and efficacy of pain relief after vertebroplasty in osteoporotic vertebral wedge compression fractures.

Methods: randomized interventional prospective study A total of 21 patients having a total of 26 collapsed vertebrae were taken up the age of the patients was in the range of 55-80 years. There were 16 females and 5 males in the study. Classification of fracture was done based on Genant's classification. Patients were followed up at 2 weeks, 1 month, 3 months and 6 months. Each time patient was assessed clinically with the Pain score – Visual analogue scale, Oswestry disability index to check functional status of patient before and after procedure and also assessed radiologically (using X-Rays/CT/MRI).

Results: mean preoperative VAS score was 7.86 which decreases to 4.76 in immediate post operative period. VAS score at subsequent follow up at 2 weeks, 1 month, 3 months and 6 months was 3.52, 2.48, 1.57 and 1.43 respectively. Statistically significant decrease in VAS score was found (p value <0.05). Mean pre operative ODI was 72.14 which decreases to 40.29 in immediate post operative period. ODI at subsequent follow up at 2 weeks, 1 month, 3 months and 6 months was 28.86, 23.57, 19.09 and 16.81 respectively suggesting gradual improvement in disability. Statistically significant difference was also found on comparing ODI at immediate post operative, 1 month and 3 months post operative period with ODI at 6 months post operatively (p value <0.05). In our study we had no complications in 17 (81%) cases, asymptomatic cement leakage into epidural space in 3 cases and 1 patient developing new onset radicular back pain 4 months after procedure. None of the cases had any major complications.

Conclusion: Percutaneous transpedicular Vertebroplasty using calcium bone cement is a minimally invasive, promising new procedure with the benefits of quick improvement in mobility, decreased pain-related doctor visits, stature improvement, and decreased use of NSAIDS post operatively in the management of osteoporotic vertebral wedge compression fracture.

Keywords: vertebroplasty, kyphoplasty, bone cement. Osteoporosis, Vertebral fracture, Biodegradable bone cement substitutes, Calcium phosphate cement, Vertebroplasty

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Introduction

Osteoporosis being the most common disorder of bone in old age group, Worldwide, an osteoporotic fracture occurs every 3 seconds; one in three women and one in five men over age 50 will sustain an osteoporotic fracture in their lifetime. Vertebral Compression Fractures (VCF) are the most common osteoporotic fracture and is one of the most common problem in old age causing incapacitating pain which produces significant morbidity, disability and mortality. Vertebral compression fracture causes chronic pain and imbalanced kyphosis leading to loss of sagittal balance due to the commonly wedge-shaped collapsing pattern of osteoporotic vertebral compression fractures. It also results in sleep loss, depression, significant limitation in daily life activities and reduced life expectancy which has a great impact on healthcare system.

Currently, there are three kinds of treatment for Vertebral compression fractures:

[A] Traditional conservative treatment

[B] Traditional surgical treatment

[C] Minimally invasive treatment

Currently, the most commonly used injectable bone cement is polymethyl methacrylate (PMMA). Because of low viscosity and good injectability, PMMA can be applied to improve vertebral rigidity. Calcium phosphate bone cement (apatite/hydroxyapatite) is a new entity with many benefits over PMMA like it being biodegradable, biocompatible, osteoconductive, little or no heat generation during polymerization, having good injectability and remodeling into healthy bone. On literature review for

OVCFs, related problems and treatment options we had found that there are very less studies in our country regarding outcome of vertebroplasty in these fractures. So, we decided to study the effect of percutaneous vertebroplasty in Indian patients.

We hypothesized That Percutaneous Transpedicular Vertebroplasty Using Calcium Bone Cement Is a Promising New procedure with the benefits of quick improvement in mobility, decreased pain-related doctor visits, stature improvement and decreased use of analgesics post operatively in the management of osteoporotic vertebral wedge compression fracture.

Materials and Methods

Study Centre: This randomized interventional prospective study was done in the Department of Orthopaedics in J. A. Group of Hospitals, Gajra Raja Medical College, Gwalior, (M. P.) from February 2020 to May 2021. Patients with osteoporotic vertebral wedge compression fractures were admitted and treated with percutaneous transpedicular vertebroplasty using calcium phosphate bone cement.

Sample Size: A total of 21 patients having a total of 26 collapsed vertebrae were taken up in the study during the above-mentioned period. The age of the patients was in the range of 55-80 years. There were 16 females and 5 males in the study. In this study intervention was started after approval from Institutional Ethics Committee.

Selection criteria was based on some inclusion and exclusion criteria:

Inclusion criteria

- Painful osteoporotic vertebral wedge compression fracture >4 weeks and < 5 months old, refractory to conservative treatment
- Regional Kyphotic Cobb angle > 15 degrees.
- Vertebral Compression Fracture with vertebral compression > 25% but < 80% (Genant's classification grade 2 and grade 3 up to 80%)

Exclusion criteria

- Refusal to consent
- Responding to conservative treatment
- Local / systemic Infection
- Coagulopathy
- Posterior cortex breach
- Cord compression
- Neurological Deficit
- Vertebra plana
- Vertebral Compression Fracture with vertebral compression > 80% (Genant's classification grade 3)
- Significant cognitive impairment
- Spinal cord narrowing due to retro pulsed fragment

Methods

Patient's vertebral wedge compression fractures were classified according to the Genant's Classification. The patients with osteoporotic compression fracture were initially treated conservatively for 1-2 weeks using analgesics and bracing. After admission a detailed history from the patient were obtained. Then patient was examined thoroughly, and attention given to examination of spine like- any local swelling, deformity, tenderness over the spine was noted. Neurological chart which included assessment of motor status, sensory status, bowel & bladder status were noted. In all patients, Pre operative Visual analog scale score for back ache,

Oswestry disability index were noted for the purpose of comparison and evaluation of post operative functional outcome.

Classification of fracture was done based on Genant's classification. Regional kyphotic Cobb angle, Anterior vertebral wedge angle, Anterior vertebral height, Posterior vertebral height and Vertebral body compression ratio(VBCR) were radiologically evaluated (using Xray's, CT scan / MRI) as it is helpful in considering the type of intervention and for further follow ups.

Surgical Procedure After preoperative assessment, cases were prepared for surgery. Percutaneous transpedicular vertebroplasty using calcium phosphate bone cement injection was done under fluoroscopic guidance. Final needle position in AP fluoroscopic view was confirmed to be in ipsilateral half of vertebral body.

Cement Preparation & Cementation: Vertebroplasty calcium phosphate bone Cement (available in 2gm pack) was prepared in separate bowl by mixing powder (polymer) and liquid (monomer) provided with the cement packet. Cement was mixed for around 1-2 minutes and then transferred to luer lock syringe of 3 ml volume,

Post Operative Protocol Patient was monitored for vital signs in post operative period. Neurological examination was done and asked for pain relief soon after procedure. VAS score and ODI were recorded. Patient was advised to gradually increase the daily activities of living over 3-7 days. Patients were followed up at 2 weeks, 1 month, 3 month and 6 months. Each time patient was assessed clinically with the Pain score – Visual analogue scale, Oswestry disability index to check functional status of patient before and after procedure and also assessed radiologically (using X-Rays/CT/MRI). Data collection tools were patient proforma, clinical examination, X-Rays, CT scan, MRI and

questionnaire table to show patients detail of examination, preoperative workup, surgical methods and post operative follow

up. Questionnaires table were used for functional outcomes.

Observation Chart

Table 1: Age and Gender Distribution.

Age Group	Male	Female	Total no. of patients	%
50-59 Year	0	5	5	23.8
60-69 Year	3	6	9	42.9
70-80 Year	2	5	7	33.3
Total	5	16	21	100
Mean ± SD	67±4.56	65.56±6.90	65.90±6.62	

Table 2: Level of Spinal Tenderness, Collapsed Vertebra and Operated Vertebra.

Level	Spinal Tenderness		Collapsed Vertebra		Operated vertebra	
	N	%	N	%	N	%
D11	3	9.4	4	14.8	4	15.38
D12	7	21.9	6	22.2	5	19.23
L1	11	34.4	8	29.6	8	30.76
L2	6	18.8	4	14.8	4	15.38
L3	3	9.4	3	11.1	3	11.53
L4	1	3.1	1	3.7	1	3.8
L5	1	3.1	1	3.7	1	3.8
Total	32	100	27	100	26	100

N= Number of vertebra

Table 3: Genants Classification

Shape	Total no. of patients	%
Wedge Fracture	15	71.4
Biconcave Fracture	6	28.6
Crush	0	0
Total	21	100

Table 4: Mean Anterior Vertebral Wedge Angle At Different Time Periods

Mean Wedge Angle	Pre-operative	Immediate Post-operative	6 months Postoperative	P Value
Mean ± SD	13.68±1.34	13.67±1.34	13.65±1.34	0.076*

Table 5: Mean Vertebral Body Compression Ratio (Vbcr) at Different Time Period

Mean Vertebral Body Compression Ratio	Pre-operative	Immediate Post-operative	6 months Postoperative	P Value
Mean ± SD	0.743±0.043	0.744±0.043	0.745±0.043	0.134*

Table 6: Mean Vas Score

VAS Score	Mean VAS Score
Pre-operative	7.86±0.65
Immediate Post-operative	4.76±0.62
2 Weeks Post-operative	3.52±0.60
1 Month Post-operative	2.48±0.60
3 Months Post-operative	1.57±0.68
6 Months Post-operative	1.43±0.59
P Value	<0.001

Table 7: Mean Oswestry Disability Index

Oswestry Disability Index	Mean Oswestry Disability Index Score
Pre-operative	72.14±3.84
Immediate Post-operative	40.29±3.16
2 Week Post-operatives	28.86±3.24
1 Month Post-operatives	23.57±2.73
3 Month Post-operative	19.09±1.86
6 Month Post-operatives	16.81±2.04
P Value	<0.001

Table 8: Complications

Type of Complications	Total no. of patients
Minor Cement leak into soft Tissue (Epidural Leak)	3
Minor Cement leak into Spinal Cord	0
Minor Cement leak into Venous Chanel intra-op	0
Adjacent level fracture	0
New onset radicular back pain	1
Major Paraplegia	0
Major Cement Embolism	0
Total	4

Results

- The mean age of cases in our study was 65.90 years with youngest case aged 55 years and eldest case aged 80 years. There were 16 (76.2%) females and 5 (23.8%) males in the study, showing female preponderance in cases having osteoporotic vertebral wedge compression fractures. The female: male ratio was **3.2:1**.
- Maximum 19 (90.5%) cases presented between 2 to 4 months after injury/illness with the mean duration of injury/illness being 3.19 months. Majority 15 (71.4%) cases had insidious onset of symptoms and only

6 (28.6%) cases gave history of trivial trauma leading to symptom onset.

- In our study 11(52.37%) cases had multiple level spinal tenderness and 10 (47.62%) cases had single level spinal tenderness on clinical examination and assessment. spinal tenderness was elicited clinically in 32 individual vertebra, out of that 56.3% were at noted at thoracolumbar junction (D12 and L1 vertebral level).
- Around 2/3rd cases had vertebral collapse at single level and remaining 1/3rd had multiple level vertebral collapse as diagnosed on radiological assessment. 27 individual vertebra

which were diagnosed radiologically to have osteoporotic collapse, 14 (51.8%) were at thoracolumbar junction (D12 and L1 vertebral level)

- In our study 16 (76.19%) cases underwent single level vertebroplasty and 5 (23.81%) cases underwent two level vertebroplasty. In 21 cases selected for study, a total of 26 individual vertebrae were operated out of which 13 (49.9%) vertebrae were at D12 and L1 vertebra (Dorso-lumbar junction).
- In our study 15 (71.4 %) cases had wedge type of compression fracture and 6 (28.6 %) cases had biconcave type of compression fracture. None of the cases had crush type of compression fracture.
- Cement injection using unipedicular approach was done in 19 (91.5%) cases and the mean amount of calcium phosphate bone cement used was 3 ml per vertebra. In most cases duration of surgery was less than 40 minutes.
- For the evaluation of local vertebral kyphosis evaluation, 21 patient's spine was radiologically assessed and Anterior vertebral wedge angle calculated. The difference in mean anterior vertebral Wedge angle at various time periods during follow up after vertebroplasty was statistically insignificant (p value > 0.05). Similarly for the evaluation of vertebral height restoration, 21 patient's spine was radiologically assessed and VBCR calculated. The difference in mean VBCR at various time periods during follow up after vertebroplasty was statistically insignificant (p value > 0.05).
- In our study mean preoperative VAS score was 7.86 which decreases to 4.76 in immediate post operative period. VAS score at subsequent follow up at 2 weeks, 1 month, 3 months and 6 months was 3.52, 2.48, 1.57 and 1.43 respectively which suggested gradual but significant difference post

operatively. Statistically significant decrease in VAS score was found on comparing immediate post operative VAS score with 1 month and 6 months post operatively (p value <0.05). On comparing VAS score at 3 months with 6 months post operatively we found no significant difference (p value >0.05).

- In our study mean pre operative ODI was 72.14 which decreases to 40.29 in immediate post operative period. ODI at subsequent follow up at 2 weeks, 1 month, 3 month and 6 month was 28.86, 23.57, 19.09 and 16.81 respectively suggesting gradual improvement in disability. Statistically significant difference was also found on comparing ODI at immediate post operative, 1 month and 3 months post operative period with ODI at 6 months post operatively (p value <0.05).
- In our study we had no complications in 17 (81%) cases, asymptomatic cement leakage into epidural space in 3 cases and 1 patient developing new onset radicular back pain 4 months after procedure. None of the cases had any major complications.

Statistical analysis: After compilation of data in Microsoft excel sheet, data was analyzed by using SPSS software version 22.0. Frequency and percentage were used to describe categorical data. For continuous data, mean and standard deviation was calculated. Repeated measure ANNOVA test was used to analyze continuous variable recorded over a period of time. p value of < 0.05 was considered to be statistically significant at 95% confidence level. Data was presented through suitable statistical graphs.

Discussion

Osteoporotic vertebral fractures occasionally lead to late-onset collapse, kyphosis, persistent back pain, and disability. Osteoporotic VCFs are a leading cause of disability and morbidity in the elderly. The consequences of

osteoporotic VCFs (pain and often progressive vertebral collapse with resultant spinal kyphosis) adversely affect quality of life, physical function, mental health, and survival. Vertebroplasty and kyphoplasty are minimally invasive procedures for treating painful fractures. Vertebroplasty entails the percutaneous injection of bone cement into the fractured vertebra in attempts to stabilize the fracture and reduce pain. Kyphoplasty addresses pain and kyphotic deformity by the percutaneous expansion of an inflatable bone tamp to effect fracture reduction before cement deposition in a fractured vertebra. Percutaneous vertebroplasty and kyphoplasty are newly developed, minimally invasive techniques for the relief of pain and for the strengthening of bone in vertebral body lesions.

Percutaneous vertebroplasty (PV) and kyphoplasty (PK) are the 2 vertebral augmentation procedures that have emerged as minimally invasive surgical options to treat painful vertebral compression fractures (VCF) during the last 2 decades. VCF may either be osteoporotic or tumor-associated. Two hundred million women are affected by osteoporosis globally. Vertebral fracture may result in acute pain around the fracture site, loss of vertebral height due to vertebral collapse, spinal instability, and kyphotic deformity. The main goal of the PV and PK procedures is to give immediate pain relief to patients and restore the vertebral height lost due to fracture. In percutaneous vertebroplasty, bone cement is injected through a minimal incision into the fractured site. Kyphoplasty involves insertion of a balloon into the fractured site, followed by inflation-deflation to create a cavity into which the filler material is injected, and the balloon is taken out prior to cement injection.

Nakano M et al describe a series of patients in whom they performed

percutaneous transpedicular vertebroplasty with calcium phosphate cement in the treatment of osteoporotic vertebral compression and burst fractures. Back pain and low-back pain were evaluated using a visual analogue scale (VAS). The deformity index of the VB was measured on a lateral radiograph as the ratio of the VB's height (sum of measurements at anterior, middle, and posterior regions) to its longitudinal diameter. Based on VAS scores, pain was decreased in all patients immediately after surgery, and pain relief was maintained at the last follow up. Complications, such as a temporary respiratory insufficiency and a small amount of CPC leakage into the spinal canal, were observed in patients who underwent Procedure B. Percutaneous transpedicular CPC-assisted vertebroplasty is a minimally invasive procedure that provides early relief of pain and prevents vertebral collapse and pseudarthrosis in patients with osteoporotic vertebral fracture. [1]

Cotten A et al also studied percutaneous vertebroplasty. Radiography and computed tomography must be performed in the days preceding vertebroplasty to assess the extent of vertebral collapse, the location and extent of the lytic process, the visibility and degree of involvement of the pedicles, the presence of cortical destruction or fracture, and the presence of epidural or foraminal stenosis caused by tumor extension or bone fragment retropulsion. Leakage of methyl methacrylate during vertebroplasty may cause compression of adjacent structures and necessitate emergency decompressive surgery; thus, the procedure should be performed only in a surgical center. Radiologists need to be aware of the various indications for vertebroplasty and of potential future developments and applications of the procedure. [2]

Heini PF et al studied: operative technique and early results in percutaneous transpedicular vertebroplasty with PMMA. From a prospectively monitored series of

70 patients with 193 augmented vertebrae for osteoporotic and metastatic lesions, they analysed a group of 17 patients suffering from back pain due to osteoporotic fractures. The reinforcement of 45 vertebral bodies in these patients led to a significant and lasting pain reduction ($P < 0.01$). The presented technique is useful, as, in one session, at least four injections can be performed when required, allowing the prophylactic reinforcement of adjacent vertebrae as well. The use of a low-viscosity polymethyl methacrylate (PMMA) in combination with a non-ionic liquid contrast dye provides a reliable and safe procedure. Extrasosseous cement leakage was seen in 20% of the interventions; however, none of them had clinical sequelae. [3]

Phillips FM et al gave a literature review of experiences with vertebroplasty and kyphoplasty for treating symptomatic, osteoporotic vertebral compression fractures. Studies of vertebroplasty and kyphoplasty have reported excellent pain relief and improved function in most patients with osteoporotic VCFs. Vertebroplasty has the advantage of being relatively quick and inexpensive. Kyphoplasty, while associated with increased cost and surgical time, offers the potential to improve spinal alignment. In addition, by creating an intravertebral cavity, kyphoplasty reduces the risk of extra vertebral bone filler extravasation. The authors concluded that vertebroplasty and kyphoplasty are currently used to treat osteoporotic VCFs with successful short-term results. [4]

Groen RJ did a reappraisal of the vertebral venous system and did anatomical and pathological considerations, so as to offer a tool to better understand and anticipate (potential) complications that are related to the application of percutaneous vertebroplasty and kyphoplasty. Thorough knowledge of the anatomic and (patho) physiologic characteristics of the vertebral

venous system is mandatory for all physicians that participate in percutaneous vertebroplasty and kyphoplasty. To reduce the risk of cement extrusion into the vertebral venous system during injection, vertebral venous pressure should be increased during surgery. This can be achieved by operating the patient in the prone position and by raising intrathoracic venous pressure with the aid of the anesthesiologist during intravertebral instrumentation and cement injection. Intensive theoretical and practical training, critical patient selection, and careful monitoring of the procedures, also taking into account patient positioning and intrathoracic and intra-abdominal pressures, will help to facilitate low morbidity outcomes in these very promising minimally invasive techniques. [5]

Li C et al evaluated the feasibility, efficacy and safety of minimally invasive pedicle screw fixation (MIPS) combined with percutaneous vertebroplasty (PVP) using calcium phosphate for the treatment of thoracolumbar burst fracture without neurologic deficits. Like our study, the preoperative and postoperative pain assessment were evaluated using Visual Analogue Scale (VAS) and American Spinal Injury Association (ASIA). The Cobb angles and central and anterior columns height were measured on the lateral radiographs before surgery and immediately, 1 month, 3 months, 6 months, 1 year and 2 years after surgery. The patients were followed up for an average of 27.54 ± 2.47 months. The mean VAS significantly decreased from 9 (range 6–10) before surgery to 2 (range 1–3) immediately after surgery and 1 (range 0–2) at 2-year follow-up. Study indicated that MIPS combined with PVP using calcium phosphate is a good choice for the treatment of thoracolumbar burst fracture without neurologic deficits. [6]

This literature review on current status of percutaneous vertebroplasty and

percutaneous kyphoplasty by Yimin Y et al presents a qualitative overview on the current status of vertebral augmentation procedures, especially PV and PK, and compares the efficacy and safety of these 2 procedures. The review consists of a brief history of the development of these 2 techniques, a discussion on the current research on the bone cement, clinical outcome of the 2 procedures, and it also sheds light on ongoing and future research to maximize the efficacy and safety of vertebral augmentation procedures. [7]

Study of outcomes at a minimum follow-up of two years was done by Nakano M et al in cases of vertebroplasty using calcium phosphate cement for osteoporotic vertebral fractures. Back pain and lower back pain were evaluated using the visual analogue scale (VAS). The VB deformity index was measured in a lateral radiograph as the ratio of the VB's height to its longitudinal diameter. All patients reported decreased pain according to the VAS immediately after vertebroplasty, and pain relief was maintained at the last follow-up in all patients without new OVs. Complete bone union was observed in all cases by six months after surgery. It was concluded that vertebroplasty using CPC gave a satisfactory outcome and no delayed complications in elderly patients with osteoporotic vertebral fractures at follow-up times of at least two years. [8]

Ishiguro S et al compared percutaneous transpedicular vertebroplasty using calcium phosphate cement (CPC) versus conservative treatment for osteoporotic vertebral fractures. The indication for vertebroplasty was a painful unstable fracture, with mobility of the vertebral body shown on flexion and extension lateral radiographs. Fractures without mobility despite deformity were treated conservatively. The mean visual analogue score for pain decreased significantly from preoperation to one day after surgery (9.3 vs. 6.2, $p=0.02$), and further decreased to 2.8 ($p=0.04$) on day 3 or 4 when

ambulation began, and to 1.5 at the one-month follow-up and 1.4 at the final follow-up (mean, 14 months). The mean duration of analgesic treatment was significantly shorter in the vertebroplasty than conservatively treated group (10.2 vs. 63.5 days). All patients in the vertebroplasty group achieved bone union, with no adjacent vertebral fractures. However, in patients having conservative treatment, there were 2 adjacent vertebral fractures and 4 pseudarthroses, and the collapse continued for several months. So it was concluded that percutaneous transpedicular vertebroplasty using CPC achieves immediate pain relief and reduces the risk of vertebral body collapse and pseudarthrosis among elderly patients with osteoporotic vertebral compression fractures. [9]

Korovessis P evaluated the efficacy of minimal invasive surgery for acute lumbar fractures by means of balloon kyphoplasty with calcium phosphate plus segmental short posterior instrumented fusion. Posterolateral radiologic fusion was achieved within 6 to 8 months after index operation. There was no instrumentation failure or loss of sagittal curve and vertebral height correction. Balloon kyphoplasty with calcium phosphate cement combined with posterior segmental short minimal invasive fixation for fresh burst and severe compression lumbar fractures provided excellent immediate reduction of post-traumatic segmental kyphosis with simultaneous reduction of spinal canal encroachment and restoration of vertebral body height in the fracture level. [10]

Choryłek P enumerated advantages and disadvantages used bone cement of PMMA in. Vertebroplasty and kyphoplasty. This paper was a review of literature where the analyses of the commonly used bone cements were carried out especially: methods of manufacturing, surgical techniques, mechanical properties, biocompatibility studies as well as

possibility of improvement some properties by using additives. Most common used bone cement on matrix Poly(methyl methacrylate) – (PMMA) and presentation cement parameters which affect potential postoperative complications. Discussion allows to prepare samples during practical work with new kind additives in composite with bone cement as matrix. Originality/value: The original in this discussion is the possibility to improve fundamental properties of the selected bone cements by using different than commonly used additives. [11]

Lieberman I et al saw that as many as 70% of patients with cancer and multiple myeloma initially present with osteolytic involvement of the spine. These vertebral fractures are associated with significant morbidity and mortality and represent a tremendous personal and societal burden. Vertebroplasty involves the injection of polymethylmethacrylate to strengthen a vertebra. This minimally invasive method, which has been adopted by practitioners during the past decade to treat symptomatic osteoporotic compression fractures is reported to provide quick pain relief in 90% of patients, with only infrequent, mostly minor, complications. In patients with osteolytic fractures, vertebroplasty is associated with an increased rate of cement leak and less predictable pain relief. Kyphoplasty is an extension of vertebroplasty that uses an inflatable bone tamp to restore the vertebral body toward its original height while creating a cavity to be filled with bone cement. Preliminary data indicate that kyphoplasty is a safe procedure associated with a lower risk of cement leak, restoration of vertebral body height, and sagittal spinal alignment. In patients with osteolytic fractures secondary to multiple myeloma, kyphoplasty yields quick pain relief, and is associated with a statistically significant improvement in generic health outcome measures. [12]

These procedures are associated with complications also. Yoshii T et al in a case report found severe kyphotic deformity resulting from collapses of cemented and adjacent vertebrae following percutaneous vertebroplasty using calcium phosphate cement. Despite its minimally invasive procedure, several complications associated with PVP have been reported, including adjacent-level vertebral fracture. Although rare, recollapse of the same vertebrae after PVP has also been reported. Here, they reported a rare case of severe kyphotic deformity resulting from collapses at the cemented and adjacent vertebrae after PVP using calcium phosphate cement (CPC). The patient required a highly invasive reconstruction procedure as a salvage surgery. [13,14]

Conclusion

Percutaneous transpedicular Vertebroplasty using calcium bone cement is a minimally invasive, promising new procedure with the benefits of quick improvement in mobility, decreased pain-related doctor visits, stature improvement, and decreased use of NSAIDs post operatively in the management of osteoporotic vertebral wedge compression fracture. It is as effective as the PMMA assisted procedure without the dreaded neurological complications which might be rarely associated with PMMA. In this study, satisfactory results were observed with this procedure in terms of excellent pain relief and improvement in disability at a very reasonable cost and with very minimal complications.

Declarations:

Funding: None

Availability of data and material:

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Code availability: Not applicable

Consent to participate: Consent taken

Ethical Consideration: There are no ethical conflicts related to this study.

Consent for publication: Consent taken

What This Study add to Existing Knowledge

Vertebroplasty-percutaneous cement augmentation of osteoporotic vertebrae is an efficient procedure for the treatment of painful vertebral fractures. It is an effective new radiologic procedure consisting of the percutaneous injection of a biomaterial, usually methyl methacrylate, into a lesion of a vertebral body. This technique allows marked or complete pain relief and bone strengthening in most cases. The principal indications for vertebroplasty are osteolytic metastasis and myeloma, painful or aggressive hemangioma, and osteoporotic vertebral collapse with debilitating pain that persists despite correct medical treatment.

Limitations of the Study

- Our follow up period was short (just 6 months). We believe more follow-up period, is required, especially for detailed assessment of pain and quality of life improvement and other complications like adjacent level fracture and further collapse of operated vertebra.
- Due to two successive years of COVID lockdown we didn't have a large patient number.
- The study would have been more analytical if we could have compared it with other modes of management.

Contribution by Different Authors

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