



**ORIGINAL RESEARCH PAPER**

**Orthopaedics**

**COMPARISON OF HIGH VISCOSITY CEMENT VERTEBROPLASTY (HVCV) AND BALLOON KYPHOPLASTY FOR THE TREATMENT OF OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURE**

**KEY WORDS:**

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**INTRODUCTION**

The prevalence of osteoporosis increases with the increasing age of the population. Osteoporosis can lead to osteoporotic vertebral compression fractures (OVCF), and it is the major health problem of older people worldwide. Due to VCFs, the patients suffer severe chronic pain, kyphosis, compromised mobility, pulmonary function reduction, as well as high mortality. As open surgery also has great risk for these older VCF patients with multiple medical comorbidities, conservative treatment is considered for the VCF patients with bed rest, analgesics, and bracing. However, conservative management with long periods of inactivity in elderly patients can lead to pneumonia, decubitus ulcers, venous thromboembolism, new VCFs, and even death. High VCF-related morbidity and treatment costs for VCF demand finding the alternative treatments that would be less invasive than open surgery and more effective than conservative management. Two minimally invasive spine augmentation techniques were found to fulfill this demand, percutaneous vertebroplasty (PVP) and percutaneous balloon kyphoplasty (PKP). Both procedures rely on polymethyl methacrylate (PMMA) cement injection into the fractured vertebra for mechanical stabilization of the VCF. Both PVP and PKP can increase bone strength as well as alleviate the pain caused by VCFs. Vertebroplasty is the percutaneous injection into the vertebral body with bone cement. PKP was introduced to manage the kyphotic deformity and restore the vertebral height. PKP involves the percutaneous placement of an inflatable balloon device (bone tamp) into a vertebral body.

**AIM**

Comparison Of High Viscosity Cement Vertebroplasty (HVCV) and Balloon Kyphoplasty for the treatment of Osteoporotic Vertebral Compression Fracture.

**OBJECTIVE**

To assess the safety and efficacy of PKP compared to PVP in the treatment of single level osteoporotic vertebral compression fractures (OVCF).

**MATERIALS AND METHODS**

**STUDY TYPE:** Comparative Prospective Cohort Study

**PLACE:** Department Of Orthopaedic MGM Medical College & Hospital, Aurangabad

**STUDY SIZE:** 30 patients

**DURATION:** NOV 2015 – NOV 2018

**INCLUSION CRITERIA :**

1. Recent lumber or thoracic vertebral compression fractures (proven by radiographs and MRI)
2. Unsatisfactory pain relief (visual analog scale [VAS] ≥ 5) after at least 4-week conventional therapy,

3. A confirmed diagnosis of osteoporosis or osteopenia (proven by DEXA).
4. Single level vertebral Fractures
5. Osteoporotic Fractures.
6. Patient Ready to give consent.

**EXCLUSION CRITERIA :**

Burst fractures, infection, radicular syndrome, primary bone tumors, and spinal metastases, Without Neurodeficit.

**DATA COLLECTION :**

1. Pain scores will be recorded using **VAS** before the procedure, and at one day, 3 months, one year after the procedure.
2. The **Oswestry Disability Index (ODI)** was compiled to measure patients' functional disability before the procedure and at 3 months and one year after the procedure.
3. Assessment of cement leakage will be based on radiographs, supplemented by postoperative CT scans.
4. The location of leakage was classified as the following : 1) disc space, 2) epidural space, 3) paravertebral areas, and 4) peripheral veins.

Changes of the anterior vertebral body height preoperatively, postoperatively, and at one year will be calculated on lateral radiographs.

**RESULTS**

**Demographics:**

Total 50 patients underwent VAPs compressed vertebral bodies. The summary of patients' demographics is shown in Table 1. The recruitment and participation process is shown in Chart 1. Levels treated included T10 to L3. There were no statistically significant differences between the 2 groups in terms of age, gender, VAS, ODI scores, and compression rate before surgery (P > 0.05). Both groups experienced significant pain relief and life quality improvement. In the HVCV group, the mean VAS decreased from 8.31 ± 0.47 preoperatively to 2.53 ± 0.11 on the first day postoperatively (P < 0.05), and even further to 1.27 ± 0.06 at 3 months and 1.22 ± 0.01 at one year (P < 0.05), and the respective VAS score for the BKP group was 8.05 ± 0.05 preoperatively to 2.38 ± 0.07 on the first day postoperatively (P < 0.05), and even further to 1.17 ± 0.04 at 3 months and 1.04 ± 0.02 at one year (P < 0.05). The mean ODI score of 71.25 ± 0.11% before the procedure dropped to 19.69 ± 0.08% at 3 months and 17.05 ± 0.05% at one year (P < 0.05) after the procedure in the HVCV group, and from 71.40 ± 0.11% preoperatively to 19.21 ± 0.07% postoperatively at 3 months and 16.29 ± 0.09% at one year (P < 0.05) in the BKP group. The VAS change significantly after 3 months postoperatively. There were statistically significant differences between the 2 groups in terms of VAS. The ODI didn't change significantly 3 Months postoperatively.

**VISUAL ANALOGUE SCALE (VAS)**

**Table 2. VAS scores in two groups**

	Preoperative	Postoperative	3 Months Postoperative	12 months Postoperative
HVCV	8.31 +- 0.47	2.53 +- 0.11	1.27 +- 0.06	1.22 +- 0.01
BKP	8.05 +- 0.05	2.38 +- 0.07	1.17 +- 0.04	1.04 +- 0.02

**OSWESTRY DISABILITY INDEX (ODI)**

**Table 3. ODI in two groups**

	Preoperative	3 Months Postoperative	12 Months Postoperative
HVCV	71.25 +- 0.11	19.69 +- 0.08	17.05 +- 0.05
BKP	71.4 +- 0.11	19.21 +- 0.07	16.29 +- 0.09

Cement leakage in two groups

**Table 4. Cement Leakages in two groups**

Group	Total Leakages	Disc space leakage	Epidural space leakage	Paravertebral space leakage	Peripheral veins leakage
BKP	3	1	1	1	0
HVCV	8	2	4	2	0

**Radiological Assessment:**

The mean injected cement volume was 3.24 ± 0.77 mL (range, 1.5 – 5 mL) in the HVCV group, which was significantly different from the mean injected cement volume of 3.94 ± 1.29 mL (range, 1.7 – 6.8 mL) in the BKP group (P < 0.04). Leakage rates and the location are presented in Table 3. The cement leakage rate was 12% in the HVCV group, which was lower than the 32% in the BKP group (P < 0.05). The cement leakage was equal into the disc space. The mean preoperative compression rate was 29.98 ± 18.12% in the HVCV group and 28.67 ± 19.31% in the BKP group (P = 0.94). The mean vertebral height restoration rate was 28.09 ± 7.3% in the HVCV group and 37.04 ± 10.33% in the BKP group. The differences were statistically significant between 2 groups (P < 0.0001). At one year follow-up, there was no significant loss of height to be noted for each group (P > 0.05).

The final results were evaluated and compared after making observations for age, sex, VAS scores, ODI score, rate of cement Leakages, rate of vertebral height restoration time interval between injury and admission, duration of hospital stay. In our study majority of patients had excellent or good results in both the study groups

**CONCLUSION**

Osteoporotic vertebral fractures were found predominantly in 7<sup>th</sup> decade of age. In our study osteoporotic vertebral fracture pre balance had a slight female predominance. Only Single Level Vertebral Fractures were considered for study after confirming diagnosis of Osteoporosis on DEXA scan. Duration of the surgery with lesser surgical soft tissue trauma. There was no significant difference in the duration of hospital stay in the two study groups

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