



“Vertebroplasty” A New Modality of Treatment for Vertebral Compression Fracture”

Dr. Pratik Patel

Orthopedic Surgeons, Department of Orthopedics, SMIMER, Surat.

Dr. Sejal patel

Obstetrics and gynecology student, department of obstetrics and gynecology, SMIMER, Surat

ABSTRACT

Background: percutaneous vertebroplasty is a safe and effective, minimal invasive treatment in patients with painful osteoporotic vertebral compression fractures. Although the technique of procedure is optimized during the last 20 years, the clinical outcome of percutaneous vertebroplasty has been evaluated only in retrospective studies and in few prospective studies.

objective:- To study the efficacy of vertebroplasty as a new modality of treatment for vertebral compression fracture. To study the management of vertebral compression fracture with vertebroplasty in comparison with conservative management. **Materials and methods:** Every alternate case of fracture vertebra was treated by conservative method or vertebroplasty. Cases of vertebral fractures were selected from orthopaedic OPD and casualty within age group of 30 to 70 years of age. The period of collection of data was 2 yrs.

Results: At 1 month of follow up, 90.5% of patients in case study group showed improvement in daily activities. However in control group, only 35% patients showed improvement.

Conclusion: Percutaneous vertebroplasty is the effective new modality of treatment for patients with vertebral compression fracture. Conservative management has less significant role in management of these patients and also in prevention of complications associated with vertebral compression fracture.

KEYWORDS

percutaneous vertebroplasty, vertebral compression fracture

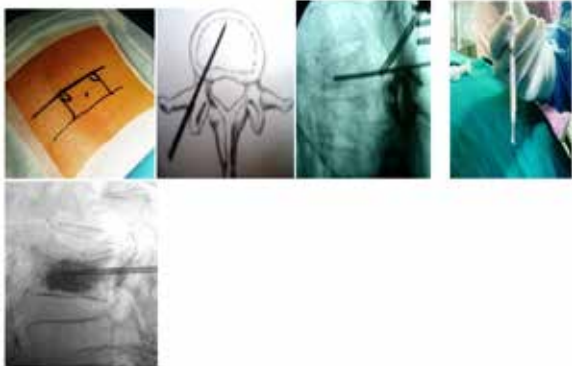
INTRODUCTION:- Osteoporosis is the leading cause of vertebral fractures. In osteoporosis there is progressive bone loss creating structural weakness and skeletal fragility. Osteoporotic fracture most commonly involves hip, wrist and spine¹. Approximately 700000 vertebral fractures occur in United States annually. After menopause, women become especially susceptible to bone loss and development of fracture. Life time risk of symptomatic vertebral fracture is 16% for females and 5% for males². 18% of women over 50 years and 27% over 65 years will suffer from one or more symptomatic vertebral fractures². Majority of osteoporotic vertebral compression fractures arise at thoracolumbar region, commonly spontaneous or due to minor trauma. 20% of vertebral compression fractures heal within 6 to 8 weeks and subsequent pain relief is observed³. The pain of osteoporotic compression fracture must be distinguished from other types of back pain. Pain of vertebral compression fractures give rise to focal, sharp, deep pain at the level of fracture and/or adjacent regions, only during movement and without radiating component⁴. The pain of vertebral compression is best measured by visual analogue scale which defines it in mild, moderate and severe or in numerical value.⁵ A vertebral body fracture differs from other bone fracture as it consists of numerous micro fractures that stimulate pain nerve of periosteum during movement. Through the instillation of cement inside vertebral body, the micro fractures are fixed which results in loss of movement of parts of (micro) fracture and pain relief^{6,7}. The heat generated by cement also causes damage to free nerve endings and reduces pain⁸. Traditional treatment of vertebral compression fracture had included strict bed rest, analgesics, muscle relaxants, external back bracing and physiotherapy⁹. Percutaneous vertebroplasty means augmentation of vertebral body through skin. The main goal of percutaneous vertebroplasty is partial or complete relief from pain as it reinforces the fracture bone and prevents further vertebral collapse.

This study was aimed to study the efficacy of vertebroplasty for treatment of vertebral compression fracture and to com-

pare it with conservative management in terms of pain relief, improvement in daily activities and complications.

Methods:- Every alternate case of fracture vertebra was treated by conservative method or vertebroplasty. Cases of vertebral fractures were selected from orthopaedic OPD and casualty within age group of 30 to 70 years of age. Detailed clinical examination was done. Patient signed consent forms after being explained the method and risk of procedure. The period of collection of data was 2yr. patient were selected according to Inclusion criteria like Vertebral compression fracture with no neurological deficit due to: Osteoporosis, Traumatic, Painful metastasis and multiple myeloma with or without adjacent radiation or surgical therapy, Painful vertebral haemangiomas. Procedure was done in the operation theatre under local anesthesia with monitoring of patient's vital. Patient was placed on a radiolucent table in prone position. visualization of involved vertebra was done with help of C-Arm in AP and lateral views. Marking of spinous process and pedicles bilaterally was done. L.A i.e. 2% lignocaine was given from Para spinal area around each pedicle. With help of no. 15 surgical blade, stab incision was made over the pedicle. A.B needle with stylet in situ was inserted in Para spinal area at 10'o clock position on the left pedicle and 2'o clock position on right pedicle of vertebra. This position of needle was checked under C-Arm. Needle was inserted through the pedicle into the vertebral body under C-Arm guidance in A.P and lateral view. The depth of needle was about 20-30% short of anterior vertebral border. The stylet was removed; with the help of 2cc syringe, bone marrow aspiration could be done and sent for laboratory analysis. About 2cc of iohexol 300mg (contrast agent) was injected through A.B needle and any leakage through any border of vertebra was noted under C-Arm in A.P and lateral view. If any evidence of leakage was present, then the procedure was abandoned. We used CMW 3 cement for all our procedures. We slowly started injecting the cement into involved vertebral body through A.B. needle under C-Arm guidance in A.P and lateral view and again noting any cement leakage. About 3cc

cement was injected into vertebral body, keeping watch over patient's vital parameters. Patient was shifted to the post operative room and ice packs were applied at operated site and neurological examination was done. Patients were shifted to ward after 2-3 hours of monitoring and then the evaluation of patient as per the performa was done.



patient was followed immediately, at 1,3,6 months and assessed on x-ray and visual analogue scale.

Results:-

The present study consists of total 40 cases of age group 30 to 70 years. Every alternate case was treated with either percutaneous vertebroplasty or by conservative method. In this study, the mean age group of osteoporosis vertebral compression fracture was 55 to 67 years of age and female preponderance was clearly seen. The L1 compression fracture was most common among both case and control groups (43%) followed by L3 compression fracture (30%). Total 10 dorsal vertebral compression fractures were seen in both groups (25%). The most common cause of vertebral compression fracture was non traumatic (osteoporotic) (85%). In VAS study, the difference in mean VAS on admission and at 6 months follow up were 5.4 in patients treated with percutaneous vertebroplasty whereas this difference was 3.8 in the patients who were managed conservatively and 90.5% of patients treated with percutaneous vertebroplasty showed improvement in daily activities at 1 month of follow up. There were no immediate and late complications like neurovascular complications, infection, vertebral collapse or associated paravertebral fracture were found in patients treated with percutaneous vertebroplasty at 6 months of follow up. However, 25% of patients in control group had collapse vertebrae at 3 months and 30% of patients had collapse vertebrae at 6 months. 5% of patients in control group had kyphosis at 6 months of follow up.

Discussion:-

In this study, out of total 40 cases, 20 cases were managed by vertebroplasty and mobilization was started immediately as soon as patient appreciated pain relief. Other 20 cases were managed conservatively by giving bed rest for 2 months and spinal braces. The following data was observed.

Age wise distribution: Age group statistics in this study shows that about 60% of cases in case study group were of age between 51 to 70 years. Similarly, 50% of the patients of control group were of 51 to 70 years of age. Hence it is comparable. The mean age in case study group was 55.2 ± 10.38 years and in control group was 67.1 ± 14.32 years (P value < 0.001) In a study done by Barr et al, out of 38 patients, the range of age group was 33 to 88 years with a mean of 69.4 years¹⁰. In another study done in year 2002 by Peh et al, out of total 37 patients, the range of age was 44 to 91 years with a mean age of 73.6 years¹¹.

Sex wise distribution:

Out of the 20 case study group, 13 patients were females and 7 were males. In the control group, 13 patients were females and 7 patients were males. . Hence it is comparable. In a

study done by Voormolen et al, out of total 18 patients, with 33 osteoporotic vertebral compression fractures, 14 patients were females and 4 patients were males¹².

Distribution of vertebral compression fractures:

In the present study, in case study group, there were 21 lumbar vertebral compression fracture and L1 compression was most common (45%), followed by L3 vertebral compression fracture (40%). However in control group, there were 14 lumbar vertebral compression fracture and L1 vertebral compression fracture was 30% followed by L3 which was 25%. In the case study group, there were 3 dorsal vertebral fractures and in control group, there were 7 dorsal vertebral compression fractures. In a study by Voormolen et al, out of 18 patients with 33 vertebral compression fractures, 10 were thoracic fracture and 23 were lumbar vertebral fracture¹³.

Cause wise distribution:

In the present study, in case study group, the cause of 80% of vertebral compression fracture was found to be non traumatic (osteoporotic) and 15% cases were due to traumatic causes. In 5 % of cases, cause was multiple myeloma. In the control group, in 90% of patients, the cause of vertebral compression fractures was non traumatic (osteoporotic) and in 10% of patients cause was traumatic. (P value > 0.005). According to Schlaich et al, about half of vertebral compression fractures arise spontaneously whereas 36% of vertebral compression fractures arise after a minor traumatic event. Through the progression of spine kyphosis and accompanying forces on lung, stomach, bladder and pelvis, the vertebral compression fracture can cause symptoms in these regions¹⁴.

Difference in VAS:

In the present study, the mean VAS in the case study group was 6.15 ± 0.74 on admission, which after doing vertebroplasty, reduced to 3.70 ± 0.73 (P value <0.001). The mean VAS after 1 month of vertebroplasty was 2.1 ± 1.12 . The mean VAS showed a steady decline over 6 months of follow up which was 0.75 ± 0.91 after 6 months. In control group, the mean VAS was 6.85 ± 0.67 on admission, which on starting the conservative treatment, reduced to 6.70 ± 0.86 which reduced to 4.4 ± 1.60 and showed a slow decline over 6 months of follow up which was 3.05 ± 1.54 after 6 months. According to a study by Hendriske et al, the effect of pain relief varied between 60 to 100% with in 24 hours after percutaneous vertebroplasty and the long term effect (upto 4 years) show a rise in this percentage. (78 to 100%)¹⁵. In a study done by Cortet et al, the pre percutaneous vertebroplasty mean VAS was 7.2 which reduced significantly to 2.9 after the percutaneous vertebroplasty¹⁶. In another study by Grados et al, in 25 patients, 34 vertebroplasty were done. The mean VAS pre percutaneous vertebroplasty was 8.0 which after treatment reduced to 3.4⁵.

Improvement in daily activities:

In our study, at 1 month of follow up, 90.5% of patients in case study group showed improvement in daily activities. However in control group, only 35% patients showed improvement. According to Cyteval et al, about 90% of patients treated with percutaneous vertebroplasty return to normal daily activities with in 24 hours. The outcome of vertebroplasty treatment remains constant for 15 to 18 months¹⁷.

Complications:

In our study, there was no distal neurovascular complication or infection during and after percutaneous vertebroplasty. At 6 months follow up, of all case study patients, no complication like collapse, kyphosis and associated paravertebral fracture was found. However in control group, 25% of patients had collapse of vertebrae at 3 months and 30% of patients had collapse of vertebrae at 6 months. 5% of patients in control group had kyphosis. The risk of second osteoporotic vertebral compression fracture within first year is 20%¹⁸. According to Mathis et al, complications occur in 1 to 35 of percutaneous vertebroplasty and are mainly caused by inappropriate patient selection, wrong needle placement, cement leakage, bleeding

and infection¹⁹. In addition, according to Watts et al, complications tend to occur more easily in hypervascular lesions, when cement consistency is too liquid and in cases of dorsal vertebral wall fracture²⁰.

Conclusion:-

Percutaneous vertebroplasty is the effective new modality of treatment for patients with vertebral compression fracture. Conservative management has less significant role in management of these patients and also in prevention of complications associated with vertebral compression fracture.

Percutaneous vertebroplasty has following advantages over conservative management: The difference in pre operative mean VAS and at 6 months follow up is significant, The improvement in daily activities is seen early and in larger percentage of patients, There are less chances of collapse, kyphosis and associated paravertebral fracture, The outcome of percutaneous vertebroplasty treatment remains constant for 6 months.

REFERENCES

1. Campbell's operative orthopaedics; V2:1646-1648. | 2. Melton LJ, Epidemiology of spinal osteoporosis. Spine 1997; 22:2-11. | 3. Black DM, Arden NK, Paleroma L, Pearson J, Cummings SR. Prevalent vertebral deformities predict hip fractures and new vertebral deformities. Journal of bone mineral reserve 1999; 14:821-828. | 4. Voormolen MHJ, Verhaar HJJ, Lohle LEH. Percutaneous vertebroplasty in treatment of painful osteoporotic vertebral compression fracture: an overview. Ned Tijdschr Calcium Bostofwisseling 2004; 2:59-64. | 5. Huskisson EC. Measurement of pain. Lancet 1974; 2:1127-1131. | 6. Belkoff SM, Mathis JM, Erb EM, Fenton DC. Biomechanical evaluation of new bone cement for use in vertebroplasty. Spine 2000; 25:1061-1064. | 7. Blakoff SM, Maroney M, Fenton DC, Mathis JM. An in vitro biomechanical use of bone cement in percutaneous vertebroplasty. Bone 1999; 25:23-26. | 8. Jefferis CD, Lee AJC, Ling RSM. Thermal aspects of self curing PMMA. Journal of bone joint surgery 1975; 57:511-518. | 9. Tamayo O, Palumbo A, Vidales P, Bolfeta M. vertebral fractures associated with osteoporosis: patient management. American journal of medicine 1997; 103:44-50. | 10. Barr JD, Barr MS, Lemley TJ. Percutaneous vertebroplasty for pain relief and spinal stabilization. Spine 2000; 25:923-928. | 11. Peh WCG, Gilula LA, Peck DD. Percutaneous vertebroplasty for severe osteoporotic vertebral compression fracture. Radiology 2002; 223:121-126. | 12. Voormolen MHJ, Lohle PNM, Lampmann LEH. Prospective longitudinal clinical follow up after percutaneous vertebroplasty in patients with painful osteoporotic vertebral compression fracture. Journal of vascular interventional radiology 2002; 13:883-886. | 13. Deramond H, Depriester C, Galibert P. percutaneous vertebroplasty with PMMA: technique, indications and results. Radiology clinical of North America 1998; 36:533-546. | 14. Schlaich C, Minne HW, Bruckner T. reduced pulmonary function in patients with spinal osteoporotic fracture. Osteoporosis intervention 1998; 8:261-267. | 15. Hendriske CA, Kalminj S, Verhaar HJJ. Percutaneous vertebroplasty in treatment of osteoporotic vertebral compression fracture: review of literature. Ned Tijdschr Geneeskde 2003; 147:1553-1559. | 16. Cortet B, Cotton A, Boutry N. percutaneous vertebroplasty in management of osteoporotic vertebral compression fracture. Journal of rheumatology 1999; 26:2222-2228. | 17. Cyteval C, Sarreber MP, Rowx JO. Acute osteoporotic vertebral collapse: open study on percutaneous injection of acrylic surgical cement. American journal of rheumatology 1999; 173(6):1685-1690. | 18. Lindsay R, Silvermann SC, Cooper C. Risk of new vertebral fracture in the year following the fracture. Journal of American medical association 2001; 285:320-323. | 19. Mathis JM, Wong W. Percutaneous vertebroplasty: technical consideration. Journal of vascular interventional radiology 2003; 14(8):953-960. | 20. Watts NB, Harris ST, Genant HK. Treatment of painful osteoporotic vertebral fracture with percutaneous vertebroplasty. Osteoporosis intervention 2000; 12:429-437. |