Clinical Study to Determine the Efficacy of Percutaneous Vertebroplasty in Management of Osteoporotic Compression Fracture

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Abstract

Introduction: Back pain and spinal deformity are common presentation in majority of senile osteoporotic vertebral compression fracture. Vertebroplasty provides pain relief with correction of spinal deformity and least period of hospital stay.

Material and Method: Twenty patients underwent vertebroplasty and clinical evaluation of pain was done by recording the VAS score done preoperatively and after surgery.

Result: Percutaneous vertebroplasty with 1 year followup.VAS score 52% were excellent,14% good and 34% fair result.

Conclusion: Vertebroplasty is useful in management of vertebral compression fracture which are refractory to conservative treatment & helps in early mobilization.

Keywords: *Osteoporotic compression fracture, Visual Analog Scale (VAS), Local anaesthesia (LA).*

Introduction

Senile osteoporotic vertebral compression fracture takes place spontaneously or after minor trauma, commonly in elderly female patients.

One third to three fourth of such patients may develop chronic pain due to osteoporotic spinal deformity[1]. Analgesic, muscle relaxant, bed rest and physiotherapy are used as conservative management. Variable analgesic effect shown by calcitonin in osteoporotic vertebral compression fracture.

Percutaneous vertebroplasty was primarily introduced for management of osteolytic tumors (firstly used in hemangiomas C2 vertebra) and later for osteoporotic vertebral compressionfracture. Primary aim of percutaneous vertebroplasty is to reduce pain caused by vertebral fracture[2].

The purpose of our study is to determine the efficacy of percutaneous vertebroplasty in management of osteoporotic compression fracture and to evaluate pain relief after the procedure.

Material and Method

A study was conducted in the Department of Orthopaedics, Rohilkhand Medical College & Hospital, Bareilly, for one year from November 2018 to October 2019. Twenty patients who were diagnosed as a case of osteoporotic compression fracture were included in the study.

Patients Selection Criteria Includes: Anterior vertebral vertebral height loss at least 15%.Patients refractory to conservative treatment for > 6 weeks.

Prior to surgery clinical examination was

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performed on selected patients: Varius causes were ruled out by blood investigations. Visual Analog Scale (VAS) used to compare pain pre-op and post-op. Radiological evaluation done pre-op and post-op after procedure include radiograph of spine both antero-posterior view and lateral view with additional flexion and extension views for stability. MRI was done in selected cases as per existing recommendations[3].

Before vertebroplastylocation of patients pain correlated with physical examination under fluoroscopy. A written and informed consent taken from each patient before procedure and an ethical committee approval was taken.

Procedure: Under local anaesthesia (LA) or sedation vertebroplasty was performed. Patient was positioned prone on the operating table with bollesters under chest and pelvis to increase the anterior widening of the vertebra. Patient was painted and draped under all aseptic precautions.

Affected vertebrae marked by fluoroscopy. A small incision given over and a 11 or 13 gauge vertebroplasty needle with trocar and cannula (Jamshedi needle) introduced through the pedicle keeping in mind that the tip of needle is at center of affected vertebrae which is confirmed by C- arm. Fig 1a, Fig 1b. Tip is moved forward 1 cm approx posterior to anterior vertebral body. Similarly, the contralateral pedicle is cannulated. Bilateral cannulation forms safe cementing. Radio-opaque dye mixed with normal saline pushed by cannula till resistance in vaccum is felt. This vaccum signifies that now there is no leakage in vertebrae and by measuring the amount of radio-opaque dye mixed normal salinepushed we will get an idea of how much amount of bone cement to be used. The radio-opaque dye mixed normal saline is sucked out and bone cement is introduced into the vertebral body. All this procedure take place under guidance of c-arm. Expansion of vertebral height noted on C-arm. To avoid leakage of cement through perforated pedicle cannula are removed by rotatory manner until the cement hardens.

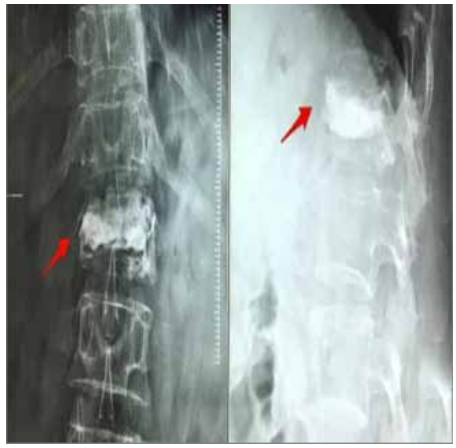
Fig (1a): Insert Jamshedi needle Fig (1b): Target pedicle under AP view

Follow-up: Patient was instructed to lie supine flat position for 1 hour after procedure. Patient was mobilized 6 hours following the procedure. Patients pain level assessed by VAS score after procedure and compared with pre-operative VAS score. Neurological status was assessed post-operatively. X-ray on next day, then at 1, 6, 12 months after percutaneous vertebroplasty. MRI scan was done after 3 month. Pre-op and post-op vertebral height assessed and compared to each other.

Results

- 14 patients operated for L1 vertebra osteoporotic compression fracture. Fig 2a & 2b
- 6 patients operated for D12 vertebra osteoporotic compression fracture. Fig 3a & 3b

A total of twenty patients were followed up for one year. Patient was able to respond to verbal commands while the procedure being carried out as local anesthesia or mild sedation given. Post-op improvement in pain assessed by VAS score. 52% patients showed excellent results, 14 % good and 34 % fair by VAS score. Post-operatively vertebral height improved from 3 to 5 mm.



Fig(2a): Osteoporotic compression fracture at L1 levelFig (2b): After vertebroplasty at L1 level

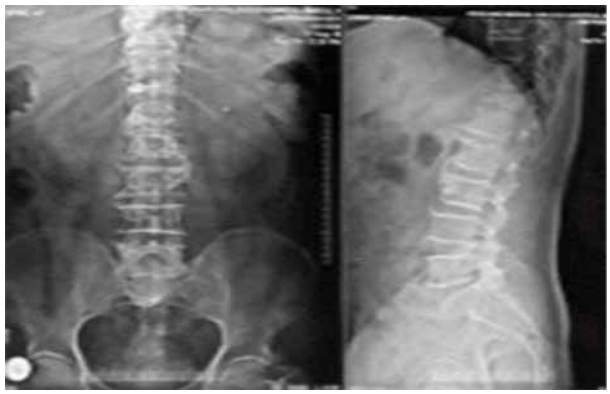


Fig (3a): Osteoporotic compression fracture at D12 level

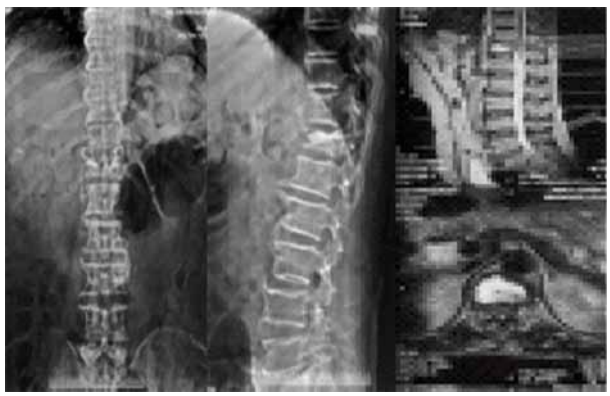


Fig (3b): After vertebroplasty at D12 level

Discussion

In osteoporosis, there is decrease in bone mass and bone strength which lead to increase risk of fracture. Chronic pain makes daily activity difficult. Hence, patients who have shown failed response to conservative treatment are treated by percutaneous vertebroplasty. Significant pain reduction was attained in 70% to 95% of patients within 24 hours [4,5] as per current literature.

In our study pain relief after percutaneous vertebroplasty was achieved 74.2% pt after 24 hour of procedureas per by VAS score (Figure 4) (Table 1). After 6 months of followup, following percutaneous vertebroplasty 93.3% of patients had pain relief in comparison to the result reported by Liliang (2005) [5]. Pain relief occurred due to structural reinforcement of fractured vertebrae.

Fig (4): Visual Analog Scale (VAS)

Table (1): Showing mean VAS score and mean vertebral height pre-op & post-op.

Time Point	Mean VAS Score
Pre operative	8.8±1.1
24 hour post operative	6.9±1.5
1 month post operative	4.5±2.3
6 month post operative	2.9±1.4
1 year post operative	2±1.1
Mean pre-op vertebral height	Mean post-op vertebral height
2.3±1	4.2±2.8

In our study, the mean pre-op VAS score was 8.8±1.1 were decreased significantly (P<0.001) to 4.5±2.3 within 1 month of percutaneous vertebroplasty, to 2.9±1.4 after 6 months (P<0.001) and to 2±1.1 after 1 year which is highly significant results are comparable[6,7].

The main determinant of achieving satisfactory pain reduction depends on age of fracture and degree of osteoporosis[8,9]. However recurrent fracture at the level of treated vertebrae is not being reported in our study.

Vertebroplasty has been simple interventional procedure with evidence based treatment in treating severe chronic disability cause by osteoporotic vertebral fracture[10].

Conclusion

Vertebroplasty is a minimally invasive surgical procedure where the vertebral height is maintained following the procedure. It is extremely useful in management of vertebral compression fracture which are refractory to conservative treatment & helps in early mobilization. Percutaneous vertebroplasty is a very cost effective procedure compare to other spinal surgeries.

Ethical Clearance: taken from institutional ethical committee of Rohilkhand medical college and hospital

Source of Funding: Self

Conflict of Interest: Nil

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