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Percuataneous Vertebroplasty-New Treatment For Vertebral Fractures Using Indiginous Instrumentation

Dr. Arvind Bhave,

Bhave Hospital
Pune - 411 009.

Introduction

The vertebral compression fractures due to osteoporosis, malignancies—primary(myeloma) or secondaries in spine are common occurance in day to day practice in our clinics. Some times it is also a surprise on a routine checkup. This fractures are termed as 'Salient vertebral fractures'. The osteoporotic Vertebral compression fractures [VCF] caused by trivial fall are major spine problems as they cause bad long term pain, cause disabilities , can cause progressive deformities ,variable degree of neurodeficit including paraplegia, compromised lung and abdominal visceral function. Long term bedriddenness may also cause bed sores, DVT and embolic phenomenon , pneumonias.

Aim

To study the usefulness of the 'vertebroplasty' using indigenously developed instrumentation for vertebral compression fractures due to various etiologies.

Material

76 patients [51females and 25 males] in the age group of 60 to 90 years of age who had vertebral compression fractures were treated by 'Percutaneous Vertebroplasty' studied for 1 years postoperatively. Total operated levels were 100. Study analysed from the period of January 2003 to May 2006. Locally made vertebroplasty needle device was used for all these cases. This device has been patented recently. Longest followup being for 36 months.

Method

The procedure was done under conscious sedation with 5 to 7 cc. of 2% lignocaine local anaesthesia infilteration. The insertion of the vertebroplasty needle in the pedicle of the affected vertebra is done percutaneously using 'C' arm image intensifier control in two or more planes. Once the tip of the vertebroplasty needle reaches the affected part or the cavity by the fracture, *i.e.,* 'Target point'. Contrast agent is injected to rule out approach in the veins. The cementing material used, was standard available PMMA cement [90cases]or Calcium phosphate cement [7cases]or combination[3 cases]. Strict monitoring with fluoroscopic control was done throughout the procedure to avoid any untoward happenings, like leak in the neural canal or in veinous plexus. Small 'band-aid' dressing was used.

Patient was allowed mobilization after 4 hours and the day to day activities [ADL] started from next day. Patients were followed up 24 hours, 4 weeks, 12 weeks, 6 and 12 months postoperatively clinically and radiologically .

Results

All patients were assessed subjectively by reduction of pain scores by Visual Analogue scale [VAS-(1 being least pain and 10 being severe pain)]. Objectively they were assessed by the ability to do activities of daily life [ADL].

X-rays were done after 2-4 weeks ,8weeks for fracture healing and lateron after 6,12,15 months for late problems like adjacent fractures , progressive kyphosis etc.

All patients had dramatic improvement of VAS scores of about 8 or 9 pre-operatively to 5 or 6 by 2nd post operative day and more than 50 % by 8 weeks .Their requirement of NSAID's also reduced significantly. All fractures united.

There were no fresh fractures noted in 24 months followup period.

Conclusion

1. Our results of vertebroplasty are comparable to the series by Wong et all [2002].And most of the earlier reported studies in the literature.

2. All patients had excellent pain relief ,immediate and late.

3. No post operative complications.

4. Less hospitalization and truly 'Minimally Invasive Surgery'. Useful in Geriatric patient population who are high risk for major open surgeries and instrumentations.

Vertebroplasty Needle Assembly [Abneedle-tm]

Vertebroplasty needle device assembly ,fully indigenously, patented devise designed to suit pedicle sizes of asian vertebrae. The needle is useful for doing minimally invasive surgery of 'Vertebroplasty' for osteoporotic vertebral fractures, malignant painful vertebral conditions.

The other uses being for vertebral or bone biopsies.

This invention relates to the orthopedic field of Vertebroplasty, and in specific to the Vertebroplasty Needle Assembly; for injecting biological material or cementing material into the cancellous portion of bones for treatment and support.

The foremost object of the this device is that, to design the Vertebroplasty needle assembly in such a way that delivers the cementing materials at the precise and accurate point in the vertebral column.

Advantages of this needle assembly :

1. The design of the Vertebroplasty needle in such a way that gives better spreadability of the cementing materials so that minimum cuts or operations are required for the delivery of the cementing materials.

2. The Vertebroplasty needle, which possesses an unique locking system at the neck of the Vertebroplasty needle, which prohibits or restricts the movement of the Vertebroplasty needle while hammering it, at the time of operation.

3. The Vertebroplasty needle that possesses a unique system at the proximal end, which can accept any syringe available for the delivery of the cementing material.

4. The design the Vertebroplasty needle assembly, which possesses a unique luer locking system having a luer locking groove in it to fix the luer locking knob of the stylet that regulates and aligns the direction of the flanged tip of the needle; deep inside the body at the time of surgery.

This precision instrument (Vertebroplasty Needle Assembly) is a composite assembly of :

(a) Long needle : The long needle has a central longitudinal lumen. A lure lock at the proximal end and a flanged tip [the angle in the spectrum of 45 to 60 degrees] at the distal (opposite) end.

(b) A Stylet : The stylet, which telescopes through the long needle till the open flanged tip of the long needle. This is achieved by having a locking arrangement between the long needle and the stylet. The locking is achieved by having a small protruding knob on the stylet, which fits precisely into the lure lock groove of the long needle. The proximal end is a solid, square in shape. This facilitates the hammering of the needle with stylet in the bone, during positioning.

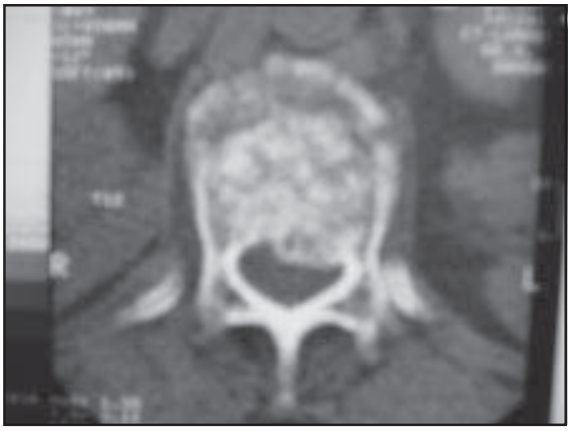
(c) The pusher : which runs through the long needle telescopically right till the end of the flanged tip of the long needle, and which actually pushes the cementing material into the bone cavity through the flanged tip end, as well as the two apertures on the long needle ensuring FULL discharge of the Cement.

Discussion

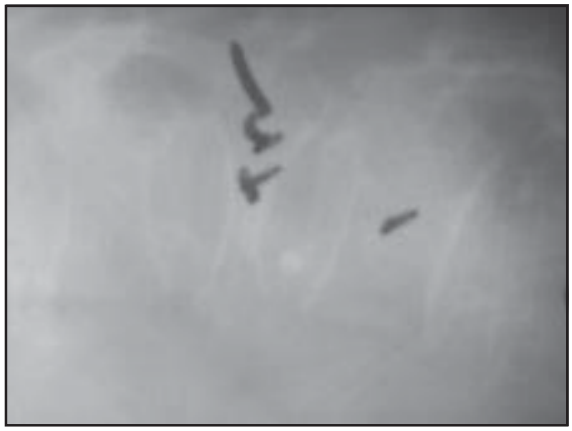
The etiology of pain after an osteoporotic or an osteolytic vertebral collapse is multi variate (biomechanical, physiological, or neurogenic). Although a number of reports describing clinical

results of vertebral augmentation reveal good pain relief, the mechanism of this relief remains unclear. The most intuitive explanation involves simple mechanical stabilization of the fracture; the cement stabilizes the vertebral bodies and offloads the facet joints. However, another explanation is that analgesia results from local chemical, vascular, or thermal effects of PMMA on nerve ending in surrounding tissue.[7].

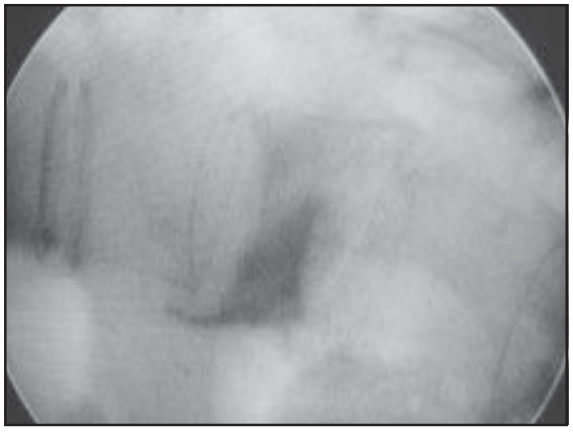
Overall, the risk of complications that carry clinical significance following PVP for osteoporotic vertebral fracture is felt to be 1% to 3%, and most potential complications can be avoided with good technique[8] .



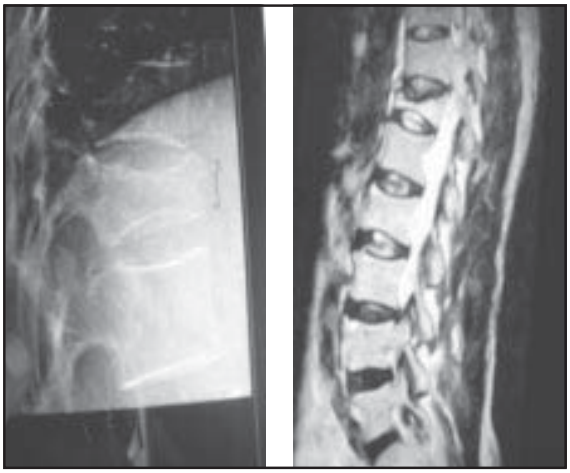
CT scan showing #



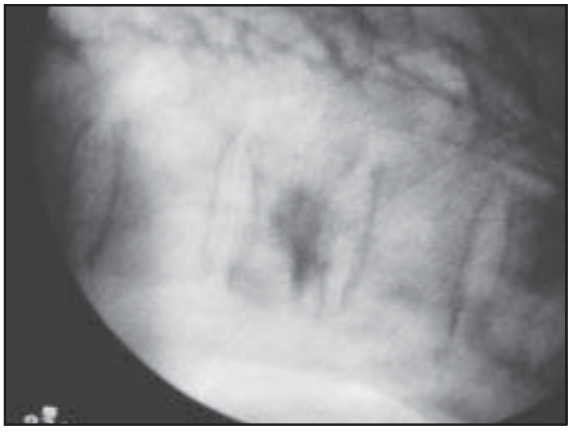
Compression # D12.



Carm view D12.



MRI showhing of compression # D-12



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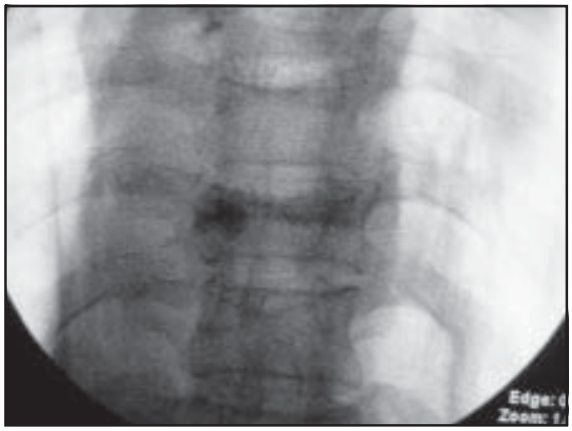
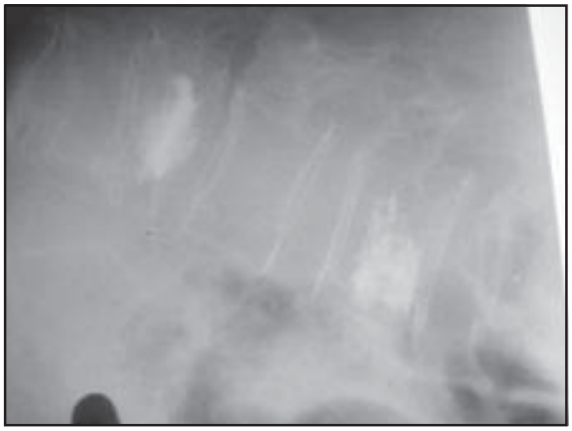
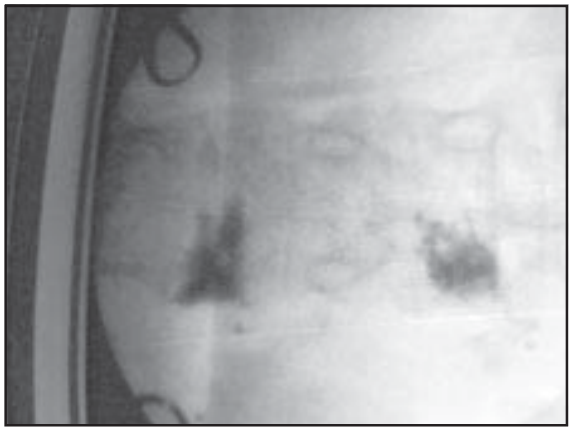


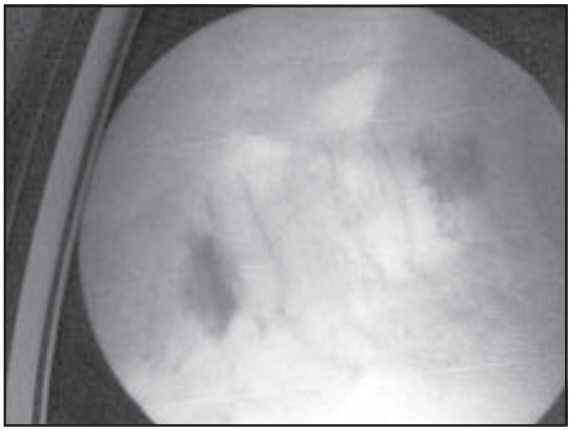
C-arm image at the end of the procedure.



6 months post operative.



Double level Vertebroplasty.



Lateral view.

References

[7] Daisuke Togawa, Mark M. Kayanja, Isador H. Lieberman: Percutaneous Vertebral Augmentation . The Internet Journal of Spine Surgery. 2005. Volume 1 Number 2.

[8] Deramond H, Depriester C, Galibert P, et al: Percutaneous vertebroplasty with polymethylmethacrylate. Technique, indications, and results. Radiol Clin North Am 36:533-546, 1998

[2] Ban JD, Ban MS, Landey TJ, Spirak JM, Percutaneous vertebroplasty for pain relief and stabilization. Spine 2000; 25:923-28.