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Case Report

Management of Vertebral Burst Fracture after a Fall in Patients Older than 65 Years Old, is Kyphoplasty Enough?

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Abstract

Burst vertebral fractures pose a serious problem for elderly osteoporotic patients. Patients must be ambulant as soon as possible and braces may not be enough or very cumbersome for them. It has been proposed a technique of short instrumentation plus balloon vertebroplasty (kyphoplasty). Considering the mechanical demands and the biomechanical environment in the spine at this stage of life it might be that we can skip instrumentation, transforming surgery in a wake patient surgical procedure. Then the hypothesis is that stand alone kyphoplasty is enough in this kind of patients.

A series of 21 consecutive patients older than 65 years of age sustaining a vertebral burst fracture considered for non operative management (brace) is studied. Sixteen were older than 70 years of age and 7 were older than 80 years of age. Stand alone modified kyphoplasty (less pressurized PMMA) was carried out and patients were followed for at least 2 years, up to 11 years in some.

Farcy index and regional Cobb were measured on admission (lying down), immediate postoperative standing (4 hours), 3 months follow-uup , one year follow-up and then yearly radiographies. Besides, vertebral height at both anterior and posterior walls and vertical height at the point of maximum collapse were measured. Differences up to 2 mm or 2° were considered not relevant (measurement error).

Radiological results: Farcy improved with intervention in 9, remained in 9 and deteriorated in 3; during follow-up (comparison 3 months to one year) no-one improved, fourteen remained the same and 7 had a bigger kyphosis. As for the Cobb data (vertebra above to vertebra below), with intervention 9 improved, nine remained unchanged and 3 deteriorated; during follow-up 2 improved, eight remained and 11 deteriorated.

Clinical outcome: all patients were satisfied with the treatment, no deaths, no reinterventions, no local pain at the site of fracture, two adjacent fractures (lower vertebra) treated successfully and uneventfully with a Taylor brace, there was a 25% incidence of self resolving low back pain (one patient received one round of facet blocks).

Conclusion: Stand alone kyphoplasty is clinically successful in patient older than 65 years of age, despite fair radiological results, especially in patients older than 80 years of age.

INTRODUCTION

Elderly osteoporotic patients usually present with vertebral compression fractures, some of them subclinical, but in case they fall, a burst fracture may happen, and this is a different scenario: a more mechanically stable treatment is necessary, and early independent ambulation is mandatory in this age group. Bed rest is to be avoided. Braces are cumbersome and uncomfortable; even more they may hinder respiratory movements, so precluding its use. Surgical stabilization needs general anesthesia with intubation and may be too aggressive.

There is a good experience with augmentation procedures for osteoporotic fractures. A procedure has been proposed with a kyphoplasty (or balloon vertebroplasty, as it is described by the authors) after an instrumentation to the vertebrae above and below [1], the rationale being to reduce the fracture with the instrumentation and, after that, then the superior endplate in order to stop disc material migration into the fractured vertebral body and therefore fracture collapse [2]; but this technique requires general anesthesia and the role of this instrumentation might be at least questionable [3,4].

The role of the posterior longitudinal complex is well known in thoracolumbar burst fractures, and also the disc degenerative process with loss of height so rendering the lever arm for flexion stresses shorter. Having said that, the hypothesis is that stand alone kyphoplasty without further posterior instrumented fusion might be enough for stabilization of the fractured vertebra.

MATERIAL & METHODS

From January 2005 to December 2009 a series of 21 patients older than 65 years of age who sustained a burst vertebral fracture without neurologic deficit, due to a fall, were treated by modified stand alone kyphoplasty with PMMA, by the same surgeon, under local anesthesia and conscious sedation. Sixteen

were older than 70 years of age and 7 were older than 80 years of age. Our series was composed of 12 females and 9 males.

All patients were followed for a minimum of 2 years, and a maximum of maximum of 5 years. During the first 2 years there were no losses to follow up. Modification consisted in aiming at postural reduction with the ordosis created by lying prone on 2 pillows, one for the chest, one for both iliac bones; ballon inflation just to create a cavity, or just a slight further correction of vertebral plates when deemed necessary; then the final cement pressurization was avoided in order to prevent excessive cement invasion through the bone trabeculae around the cavity. Special care was taken to leave space for the bone to grow for fracture healing: the PMMA is just a stop for further collapse.

Patient was free to ambulate after 2-3 hours of the procedure, no braces were used and they were released home at the first (patients operated the previous morning) or second (patients operated in the evening) postoperative day. Surgical staples (one per portal) were taken out at 15 days (clinical revision by a nurse), then patients were controlled at 1 month, 3 months, one year and yearly afterwards in the outpatient clinic. The variables chosen were: demographical (age, gender), radiological (kyphosis and vertebral height), and clinical (complications /reinterventions).

Kyphosis was measured in two ways: a) local, one vertebra (Farcy) and b) regional (vertebra above to vertebra below the fractured one, after Cobb method). Radiographies were taken on admission (lying down) and then on standing postoperative (3-4 hours after the procedure), and afterwards at 3 months, 1 year and then each year. Vertebral height: a) anterior wall, b) between upper and lower endplates at the point of maximum vertical collapse and c) posterior wall. Same radiological protocol. Each image was compared to the previous one to check for changes in height or kyphosis: 2 mm or 2º difference were deemed "not relevant".

RESULTS

There were 21 fractures in 21 patients. Anatomical vertebral levels were: L1 (8), T12 (6), L3 (2) and T8, T89, T11, L2 and L5 (1 each).

Clinical outcome

All patients were satisfied with the treatment, no patient lost to follow up at least for 2 years. There were 2 lower adjacent vertebra fracture treated with Taylor-like brace uneventfully. Apart from these, there was no pain in the area of fracture but 25 % referred low back pain that required minor analgesia (acetaminophen) for some weeks, only one patient required facet blocks (one session) in the lower lumbosacral spine. There were no deaths and no other reinterventions.

Radiological results

Local kyphosis (Farcy) from preoperative to postoperative images: 9 improved by 7º on average, in 9 there was no change and in 3 collapses was even worse by 6º on average. Afterwards, from 3 months to one year images: 14 no change, and in 7 kyphosis increased by 6º on average, especially among patients older than 80 years of age. Regional kyphosis (Cobb) from preoperative to postoperative images: 9 improved (6º on average), in 9 there was no change, 3 worse by 6º on average. Afterwards, from 3 months to one year images: 2 increased ordosis by 8º, in there was 8 no change, and in the other 11 kyphosis increased by 8º on average.

DISCUSSION

The concept is that cement stabilizes enough until the bone heals in the fractured vertebra, we aim at a live bone vertebra with an internal support during callus formation, not a composite of bone plus cement, thus a modification in the surgical technique is needed in order to leave space for such fracture callus to grow, this means not pressurization on cement to bring about its interspersion through the bone trabeculae around. Based on load sharing classification [5] and the fact that probably vertebral body comminution is the key factor for collapse [6], kyphoplasty may be a way to treat these patients in a mechanically sufficient and clinically sound way. Even more, need kyphoplasty in this clinical setting (elderly patients) be aimed at an anatomical reconstruction of the vertebra?

Mechanical stabilization is important because progressive local posttraumatic kyphosis may develop during years, causing canal compromise and pain, which, in some cases, may even need a vertebral osteotomy, which is by far more aggressive than any treatment for the fresh primary fracture. There is no golden rule to know which fractures will collapse during healing, nevertheless our group published a protocol based on immediate standing lateral radiography with a brace, if there is some collapse or apin, further intervention was decided [7].

After completion of this series, some years later, I had a patient with a burst vertebral fracture treated with stand alone kyphoplasty who died of a subarachnoid hemorrhage in the postoperative weeks, not immediately after the procedure, whether or not related to it. Apart from this, no other major event has happened with patients treated I with this protocol. Also, during these years after this study, have had to perform 2 posterior substraction osteotomies due to late posttraumatic deformities in this subset of patients, both had been managed successfully with a brace. No patient in this series needed any further treatment to my knowledge since then.

There have been several reports on the short instrumentation plus balloon vertebroplasty technique with calcium phosphate cements or PMMA [8-11], but our proposal was to avoid instrumentation to manage a technique without general anesthesia and with a short operative time. Even the designers of the technique were questioned about whether such instrumentation was needed [3] and the answer was not an absolute need for it [4]. This study shows that instrumentation can be avoided, at least in a considerable number of patients.

CONCLUSION

Besides the fair radiological results, the clinical outcome seems to justify the possibility of "less-aggressive" kyphoplasty as a tool in the management of patients older then 65 years of age and a traumatic vertebral burst fracture without neurological compromise.

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