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Osteoporotic Verterbal Compression Fractures

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1. Introduction

As the number of old people has been growing, health care of these has been one of major socioeconomic concerns, especially in the developed countries.

Musculoskeletal diseases according to aging process are as much important as medical illness. Based on a report[1], newly diagnosed people with osteoporosis are estimated to affect 200 million women in the world. Because women has lower peak bone mass than men and lose bone mass rapidly right after menopause as they become older. So, osteoporosis imposes a greater burden on women.

The incidence of all osteoporotic vertebral compression fractures increases with age.[2] Shortly after menopause, the incidence of wrist fracture begins to increase and continues to do so until of age of 65, when it plateaus. Vertebral fracture, the most common fracture, occurs earlier after menopause than hip fracture, and continues to rise with age.

Approximately 1.5 million osteoporotic fractures occur in the United States annually, comprised of 250,000 wrist fractures, 250,000 hip fractures, 700,000 vertebral fractures, and 300,000 fractures at other sites. Thus, most common osteoporotic fractures are vertebral fractures. [3-7]

Conventional treatments with bed rest, oral or parenteral analgesics, early ambulation with a brace after relieving symptoms is sufficient to treat osteoporotic vertebral compression factures.

But some patients complain of severe pain that does not respond to these treatments and even show progressive collapse of vertebral bodies and kyphotic deformity with or without neurologic deficits.

Most patients with osteoporotic vertebral compression fractures (OVCFs) well respond to conservative treatments including bed rest, analgesics and immobilization with brace.

But, some of patients complain of uncontrolled persistent chronic pain and progressive collapse of vertebral body, post-traumatic kyphosis with or without neurologic deficits. It is well known that osteoporotic fracture is also associated with significant morbidity and mortality in postmenopausal women.[8-12] There was an approximate 2-fold increase in risk of death following any clinical fracture, primarily due to a 9-fold increase in mortality

following vertebral fractures.[13] In contrast, there was no increase in risk of mortality associated with forearm fracture or fractures at sites other than the spine, wrist, or hip.

These data suggest that clinical fractures, particularly vertebral fractures, are associated with an increased risk of mortality in postmenopausal women. Interestingly, the increased mortality following vertebral fracture is comparable to that caused by hip fractures and associated with severe back pain followed by progressive kyphotic deformity and pulmonary dysfunction and its sequelae.

It should be noted that the mechanism behind increased mortality associated with vertebral fractures remains unclear, but may be related more to underlying health status, and co-morbidities rather than the actual fracture itself.[14] Clinical vertebral fractures may be diagnosed more often in women with generally poorer health, a bias that may also contribute to the relationship between vertebral fracture and mortality.

Even though more aggressive treatment may be needed in these complicated cases followed by osteoporotic vertebral compression fractures with majority of patients are not ideal candidates for surgical treatments especially under general anesthesia.

Vertebroplasty was first introduced by Galibert et al in 1987 for the treatment of vertebral body tumor.[15] And then it was adopted as a successful treatment of osteoporotic vertebral compression fractures with advantages of rapid pain relief and long-lasting effect over conventional treatments for several decades. But it has limitation in view of restoration of reduced body heights and leakage of Polymethylmethacrlylate during the procedue.

With the aid of newly designed minimally invasive technique, balloon kyphoplsty the collapsed vertebral body has been reduced satisfactorily by an inflatable bone tamp and then polymethylmethacrylate was safely put into cavity made by bone tamp with less pressure than vertebroplasty. Early results of kyphoplasty for the treatment of osteoporotic vertebral compression fractures has provided restoration of collapsed vertebral body height and reduction of kyphosis, sasitified pain relief and sufficient recovery of daily activity.[16-19]

For those reasons, balloon kyphoplasty has been substituted for vertebroplasty. Thesedays the indication of balloon kyphoplasty has been expanded to include pathological fractures, chronic vertebral fractures and even revision cases. [20-22]

Since the early report described by Garfin et al, bilateral approach using two balloons are usually used to provide en masse reduction for the more efficienct reduction of kyphosis. To the author's knowledge, many surgeons preferred to use bilateral technique. There has been just one study reporting on the clinical result using unilateral kyphoplasty by Boszczyk et al[23] using transcostovertebral approach in mid and high thoracic area. But as well known, osteoporotic verterbral compression fractures usually occurs most commonly in the thoracolumbar junction especially in 12th thoracic and 1st lumbar vertebra. [20,24]

I already reported that the results of comparative study of balloon kyphoplasty with unilateral versus bilateral and unilateral approach in thoracolumbar junction.[25]

Unlike bilateral approach, bone tamp needs to be advanced more to the midline on the anteroposterior view for the purpose of more central placement of balloon in thoracoulumbar junction. (Fig 1,2) According to the result, pain relief was not statistically different but postoperative reduction of fracture and loss of reduction was better in bilateral

approach. Although pain score for the two techniques provided same effect, bilateral approach of balloon kyphoplasty can achieve reduction of kyphotic deformity due to an osteoporotic vertebral compression fractures to gain good sagittal alignment. (Fig 3-A,B) fractures occurred in mid and high thoracic spine and cases not requiring so much reduction for restoration of kyphosis.[24,25]

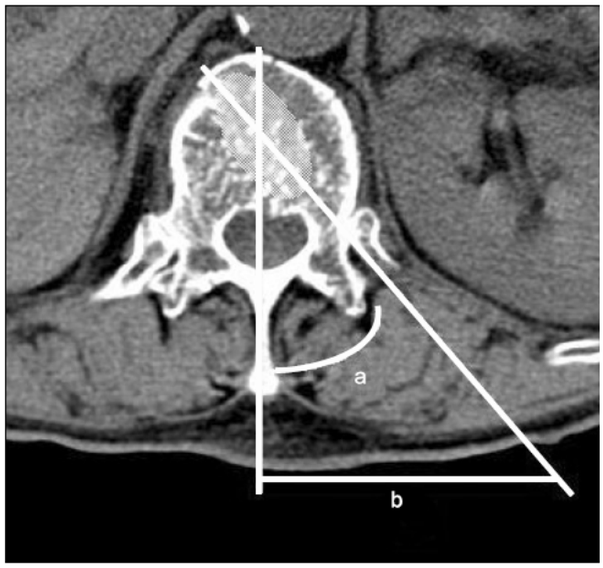


Fig. 1. Balloon kyphoplasty using unilateral Approach. The angle (a) formed by the two lines connecting the most ventral portion of the vertebral body and the spinous process and the line is placing balloon in the middle of the vertebral body, distance (b) between the two points where these two lines contacted the body surface.

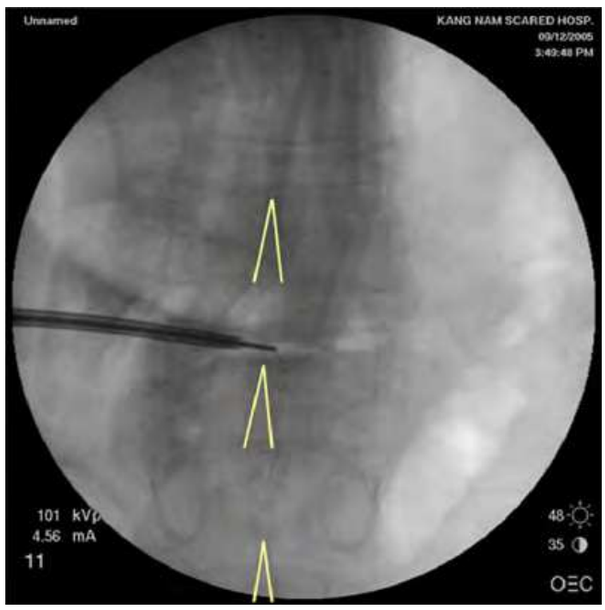
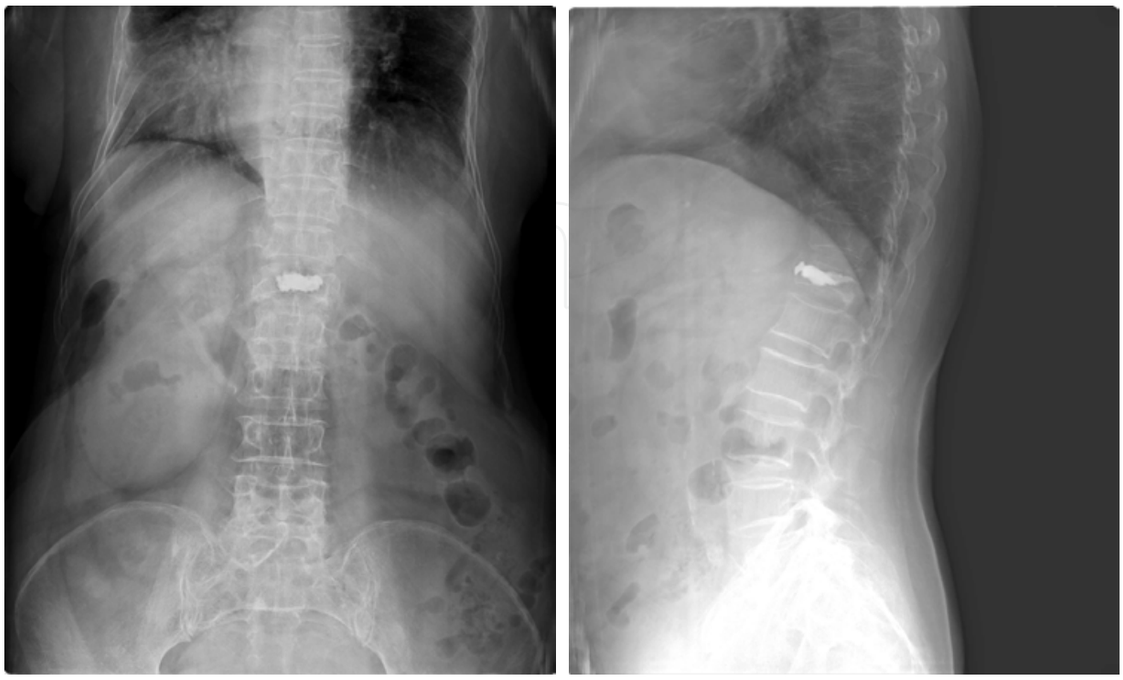


Fig. 2. Bone tamp is advanced to the midline on the anteroposterior view under the C-arm image intensifier.



(A) Anteroposterior view (B) Lateral view



(C) Axial image of computed tomography

Fig. 3. Balloon Kyphoplasty using Unilateral approach

There is no doubt that prevention of osteoporotic vertebral compression fractures is more important than surgical treatment. But in fractures not responding to prevention and conservative treatments, timely surgical intervention can afford to provide good reduction of fracture and correction of kyphosis and recovery of activity of daily living.

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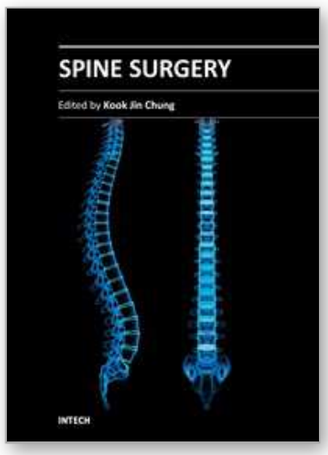
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Spine Surgery
Edited by Dr. Kook Jin Chung

ISBN 978-953-51-0469-8
Hard cover, 148 pages
Publisher InTech
Published online 28, March, 2012
Published in print edition March, 2012

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How to reference
In order to correctly reference this scholarly work, feel free to copy and paste the following:

Kook Jin Chung (2012). Osteoporotic Verterbal Compression Fractures, Spine Surgery, Dr. Kook Jin Chung (Ed.), ISBN: 978-953-51-0469-8, InTech, Available from: http://www.intechopen.com/books/spine-surgery/osteoporotic-verterbal-compression-fractures

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