The Effect of Stabilization on Vertebral Augmentation Procedures after a First Event, Single Level Osteoporotic Vertebral Compression Fractures in the Early Old Aged Patients

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Purpose: Vertebral augmentation may reduce the patient's pain significantly after osteoporotic vertebral compression fractures (VCFs). However, in some cases, subsequent fractures after vertebral augmentation procedures often deteriorate the patient’s lifestyle seriously. Therefore, initial treatment of osteoporotic VCFs is very important for remaining lifestyle of old aged patients. The purpose of the current study was to evaluate the significance of stabilization on augmentation procedures and to evaluate the effectiveness of vertebral augmented transpedicular screw stabilization (VATSS) for patients with osteoporotic VCFs.

Materials and methods: This study retrospectively evaluated the patients with VCFs who underwent the augmentation procedures between May 2003 and August 2009. Among those patients, only following patients were included in the current study; 1) less than 75-year old age 2) first event fracture 3) single level fracture and 4) exceeded 6 months of X-ray follow-up after augmentation procedures. The current study included the 172 patients into the following 3 groups. Group A (n=95), patients who underwent a Vertebroplasty (VP) procedure; group B (n=42), patients who underwent a Kyphoplasty (KP) procedure; and group C (n=35), patients with unstable burst fractures who underwent the VATSS procedure (open, 20 cases; percutaneous, 15 cases). In group C, the surgical procedure included polymethylmetacrylate vertebral augmentation of the fracture vertebrae, one level above and below the fracture level with short segment transpedicular screw stabilization.

Treatment outcomes were measured based on the changes in vertebral height, kyphotic angle, VAS (visual analogue scale) and the rate of subsequent fractures. The subsequent fractures classified with 3 groups. 1) Hammer fractures (HFs), 2) new fractures (NFs) and 3) Kyphotic collapsed fractures (KCFs) of augmented vertebrae those were progressive collapse and kyphotic changes of augmented vertebral.

Results: In order of the group A / group B / group C, the mean Age was as follows: 66.7 / 67.9 / 61.2 years. In order of preoperatively / postoperatively / at last follow up, the vertebral height changes: group A (70.3% / 76.6% / 71.8%); group B (55.7% / 70.8% / 64.6%); group C (42.5% / 81.2% / 76.6%), the kyphotic angle change: group A (15.0° / 11.4° / 13.7°), group B (17.4° / 11.2° / 13.8°) ; and group C (23.5° / 9.8° / 11.4°). In order of preoperatively / last follow up, the VAS change was as follows: group A (8.53 / 2.69) group B (8.86 / 2.79); group C (8.73 / 1.88). In order of HFs / NFs / KCFs, the subsequent fracture occurred as follows: group A (24 cases [25.3%] / 11 cases [11.6%] / 8 case [8.4%]); group B (5 cases [10.3%] / 5 cases [10.3%] / 3 cases [7.1%]); and group C (0 cases [0.0%] / 3 cases [8.6%] / 0 cases [0.0%]).

Conclusions: Based on radiologic follow-up, in group C, the vertebral height and kyphotic angle were more improved after the augmentation procedures and the improvement was well-sustained. According to these results, we expect that the stabilization of unstable spinal segments may reduce subsequent fractures. Therefore, in which VCFs are localized at a focal level, VATSS will be a useful method for decreasing the subsequent fractures and increasing the life quality in osteoporotic VCFs.