CSRS-E Title

Evaluation of Bone Mineral Density of Vertebral Body in the Cervical Spine

<Background>

Osteoporosis is the cause of vertebral body and proximal femur fractures. The quantitative examination is performed by dual-energy X-ray absorptiometry (DEXA) and computed tomography (CT). Since osteoporosis increases the risk of postoperative adjacent segmental fracture, it is important to evaluate the bone mineral density (BMD) before surgery. It has been reported that the BMD of the cervical spine is different from that of the thoracolumbar spine, but there are few reports about BMD of the cervical and the upper thoracic spine.

< Design>

Preoperative cervical spine CT were collected from 28 subjects (Male: 18 cases/Female: 10 cases/ Average age: 69.8 years old) who suffered the cervical spine disease at our institute. 3D trabecular bone structure measurement software (TRI/3D-BON-FCS: RATOC SYSTEM ENGINEERING CO., LTD) was used for the evaluation. Measurements were performed on the cervical (C3～7) and upper thoracic (Th1～4) vertebral bodies. Evaluation items were BV/TV (%), cancellous bone volume BMD: vBMD (mg/cm3) and V*m space (mm3) which are numerical indexes of osteoporosis. We evaluated the measured value in each vertebral body and the correlation with YAM value of femoral neck measured before surgery.

< Results>

BV/TV, vBMD and V*m space of the cervical and the thoracic spine varied at each level. BV/TV and vBMD were highest at C4, and followed by C5, C3, C6 and C7. V*m space was the lowest at C4, followed by C5, C3, C6, and C7. In the thoracic spine, BV/TV and vBMD were maximum and V*m space was minimum at Th1. Th2,3 and Th4 were tended to decrease each values. There was a strong positive correlation between BV/TV, vBMD and the YAM value at C3 and positive correlation at C4,5,6,7. In addition, a negative correlation was observed for V*m space in all cervical vertebrae. In the thoracic spine, there were strong positive correlation at Th3, 4 and a positive correlation at Th1, 2.

< Discussion>

In the past studies, the cervical spine BMD were high values in C4, 5 and lower values in C3,6 compared to C4,5, and the lowest values in C7. This study showed the same tendency and the thoracic spine BMD tended to decrease toward the caudal side. Since there is a correlation between the femoral YAM value and the cervical and the upper thoracic vertebrae bone density, preoperative DEXA and cervical vBDM evaluation may predict the risk of adjacent segmental fractures in cervicothoracic fusion surgery.