The Difference of Fracture Pattern in Thoracolumbar Burst Fractures Between Young- Age and Old-Age Patients

O-01

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Introduction：Traumatic thoracolumbar fractures had been generally discussed in the past years. The issues about this topic usually directed to the injury severity of the vertebral body bony structures, posterolateral complexes, or neurological status affecting the treatment algorithm. However, few attentions focus on the integrity of endplate-disc complex (EDC) and the differences between young and old-age patients. Our objective was to assess the incidence and difference of the injury of endplate-disc complex (EDC) in thoracolumbar burst fractures between young-age and old-age patients.
Materials and Methods：From January 2008 to December 2011, 50 young-age patients (Age < 50 y/o) and 50 old-age patients (Age > 50 y/o) with thoracolumbar burst fractures underwent surgical interventions in our institute were included in this study. Retrospectively, we reviewed the MR images or CT images to assess the injury severity of EDC at the fractured vertebra and the difference between young-age and old-age patients.
Results and Discussion：Detailed analysis of the images showed a higher incidence of endplate and intervertebral disk injury in young generation group comparing with old generation group. Superior endplate-disc complex(EDC) injury was more common than inferior endplate-disc complex(EDC) injury in the same group.
Conclusion：Severe EDC injury was more commonly seen in young-age patients with thoracolumbar burst fractures. While the injury of EDC was only mild in old-age patients with thoracolumbar burst fracture. These difference in injury of EDC between young and old-age patient may result in different surgical policy in these two patient groups.

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O-02

An Investigation for Collagen Crosslinking Reagent Genipin Improves the Structural Properties of the Lumbar Endplate

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Introduction：The endplate damage could commonly occur when loading rises to a high magnitude, because of it has relatively low mechanical strength to the disc. Collagen crosslinks provide mechanical strength in the load-supporting tissues. Genipin crosslinking augmentation has previously demonstrated beneficial effects in enhancing mechanical stiffness of annulus. However, the influences of genipin exogenous crosslinking on the structural properties of the endplate are still unknown. The objective of this study was to test the hypothesis that genipin could augment the stiffness and failure load of the endplate.
Materials and Methods：64 superior and inferior lumbar endplates were obtained and randomly divided into control and crosslinked group. The specimens of control group were soaked in PBS and the ones of crosslinked group were treated by 0.33% genipin solution. The indentation tests were conducted on an MTS 858 material testing system (Eden Prairie, MN). An indenter was pressed into the central site of the endplates to a depth of 3 mm at a rate of 0.2 mm/sec and 2 mm/sec for the low and high loading rate tests, respectively. The load-displacement data were recorded and the curve was used to analyze the stiffness and failure load of the endplate. The statistical independent t-test was used to analyze the significant mean difference of the two parameters between the endplate levels, testing groups, and loading rates. PASW statistics 18 software (SPSS Inc., IL) was used to perform all the statistical analyses, and the significant difference was set at $P < 0.05$.
Results：Both stiffness and failure load between superior and inferior endplates have no significant difference in the two testing group, either at the low or high loading rate. The two mechanical parameters of the crosslinked group were significantly higher than the ones of the control group. For the each group, the stiffness and failure load were significantly enhanced with high loading rate as compared to low loading rate.
Discussion：The central site of the endplate contacts with the nucleus that sustaining the most of intradiscal pressure. It implies that the central site of the endplate may be damaged under loading. The present study found that genipin crosslinking could improve the stiffness and failure load of the endplates. The extracellular matrix modification of the endplate by genipin may contribute to the changes of structural properties. The effect of loading rate on the structural properties of the endplate is more sensitive to the crosslinked specimens. It again shows that the endplates may become stiffer following genipin exogenous crosslinking treatment.