Spondylolysis is a fracture of the pars interarticularis and has a high risk of developing spondylolisthesis. There was a wide variation of angle in pars defects in clinical CT scan. In clinical situation, the different angle of pars fracture maybe have their favors and has a high risk of developing spondylolisthesis. We studied the variation in angle of pars fracture maybe have their favor treatment methods. We studied the variation in orientation of spondylolytic in different loading conditions and stress variation.

Materials and Methods

An experimentally validated three-dimensional non-linear finite element model of the intact L1–S1 segment was used. Spondylolysis was simulated by creating bilateral pars defects with 1.0 mm gap at L5. The angle of pars defect was defined as a line parallel to the posterior cortex of the vertebral body at the lysis level defined the coronal plane, and a second line was drawn tangential to the defect. There are six known angles of pars defect often measured in clinical observation (-15, 0, 15, 30, 45 and 60 degree).

Purpose of this study was to analyze the disc stresses at cranial and caudal adjacent level of lumbar spondylolysis in different angles change. of lumbar respectively were imposed on the superior surface of the L1 body. Von Mises stresses in the annulus fibrosus and nucleus pulposus at L4/5 and L5/S disc levels were analyzed.

Methods

Spondylolysis increases disc stresses at the affected levels under different angles and it may lead to disc degeneration in measured values. However, the increase in stresses is higher at the affected levels under more horizontal angle of pars defect, when compared to the more vertical angles. (P< 0.05)

Discussion

CT is the accurate diagnosis of spondylolysis in modern treatment options. The variation in the angles of defects in the pars may also affect surgical management. However, less consider about the angles of pars defect in biomechanics and the option for treatment.

Our results may be beneficial from a biomechanical perspective and provide treatment options under different angles of pars defect as well. While pars fracture was happened, many kinds of method were used for treatment, as Buck’s screw, hook system, pedicle and wire system, etc. However, every method had it’s limitation for clinical treatment. Different angles of the broken pars was seen in CT, but no more thought from this finding. Our results showed more instability when more horizontal level was appeared in pars fracture. Surgery treatment will be needed to elevate including the findings for more stabile fixation.

References

1. Orientation of lumbar pars defects: IMPLICATIONS FOR ADILOGICAL DETECTION AND SURGICAL MANAGEMENT (1998 JBJS)