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Stability of femoral neck osteosynthesis: Comparison of different cannulated screws configurations

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Objective: The objective of this study was to compare the biomechanical characteristics of three cannulated screws in paralleled and non-paralleled (including crossed and divergent) configuration in treating femoral neck fractures, also to identify the association between bone mineral density and biomechanical characteristics in the femoral neck fractures using three cannulated screws.

Methods: Thirty-six femurs of human cadavers were divided into three groups (each group included 12 femurs). The bone mineral density of all the specimens was tested. Femoral neck fractures were simulated in all the specimens, followed by osteosynthesis using three cannulated screws in three kinds of configurations. Load test and torsion test were used to evaluate the biomechanical characteristics. Axial load test included single progressive test, cyclic fatigue test and destructive test. Torsion test included single progressive test and destructive test. Multiple linear regression models were constructed to analyze the statistics.

Results: Only when axial load was small (200N and 400N)

in single progressive test, the results showed no significant difference between crossed group and divergent group. After the adjustment for bone mineral density, other axial load tests showed paralleled group excelled divergent group, divergent group excelled crossed group. After the adjustment for bone mineral density, other torsion tests showed paralleled group excelled crossed group, crossed group excelled divergent group. After adjustment for configuration of cannulated screws, the greater the bone mineral density, the stronger will be the axial and anti-rotation strength.

Conclusion: Both the configuration of cannulated screws and bone mineral density can affect the axial strength and anti-rotation strength. The configuration appears to be even more weighted than bone mineral density.

Speaker Biography

Xu Renjie is an Associate Chief Physician in Orthopedic Department of Suzhou Municipal Hospital. He graduated with a Medical Doctor degree from Peking University in 2009. After graduation, he has worked in Suzhou Municipal Hospital, major in Trauma of Bone and Joint.

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