Clinical Research in Orthopedics

Opinion Article

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Finite Element Study of Stress and Stability of Newly Designed Absorbable Screw and the Traditional Screw in the Treatment of Lauge-Hansen Type 2 Medial Malleolus Fracture

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Abstract:

Background: Poly-L-lactic acid, with good histocompatibility, was used as a new biological material in the orthopaedic field. It does not react with the surrounding tissue, no necessary for secondary surgery and more conducive to fracture healing with an elastic modulus which close to the bone. However, there are not much biomechanics researches of absorbable screws in the current literature yet.

Purpose: This study aims to use the finite element analysis technology to explore the feasibility of newly designed absorbable screw to treat the Lauge – Hansen 2 medial malleolus fracture.

Methods: CT raw data was used to establish a simple medial malleolus fracture model, which fixed by newly designed absorbable screws and traditional metal screw. Import the model into finite element analysis software and export the analysis result of stress concentration and displacement.

Results and conclusion: the total units, nodes of absorbable screws with newly designed shape, metal screws with newly designed shape and metal screws with traditional shape were 36, 240 units, 660 nodes, 36, 240 units, 660 nodes, 41 236 units, 8 121 nodes, respectively. And the maximum stress and maximal displacement under a 450 N pressure of absorbable screws with newly designed shape, metal screws with newly designed shape and metal screws with traditional shape were 46.78 MPa, 0.239 mm, 46.49 MPa, 0.223 mm, 59.08 MPa, 0.182mm. Treating the Lauge-Hansen type 2 medial malleolus fracture by the newly designed absorbable screws has an evenly distributed stress and low probability of screw breakage; this research verified the biomechanical feasibility of absorbable screw for simple medial malleolus fracture. For surgeons, selecting newly designed absorbable screws to treat the Lauge-Hansen type 2 medial malleolus fracture is an effective choice.

Biography:

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