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Nailing stability during tibia fracture early healing process: A biomechanical study

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Intramedullary nailing is one of the oldest types of surgical fracture treatment and is now considered a standard procedure for the surgical management in most tibia diaphysis fractures treatment. Although bone has a unique capability to repair following trauma, it is well accepted that the mechanical conditions at the fracture site influence the healing outcome. The inter fragmentary motions are greatly determined by the stability of the bone-implant assembly and also the nature and magnitude of the loads applied to the limb. This study consists in a biomechanical evaluation of the stability of a tibia-intra medullary nail construction model and the amount of inter fragmentary movements, as closely as possible to the physiological loading conditions for partial-weight bearing which may occurs during a patient's early recovery stage. To avoid inconsistency of cadaveric bone samples, a synthetic bone model was used in the independent load cases experiments to determine the three-dimensional stability of the assembly. This study allowed a better understanding about intra medullary nail fixation devices configuration, the amount of inter fragmentary motion that occurs during patients early healing phase, and will help develop future strategies to improve intra medullary nail implants for a more favorable mechanical healing environment to occur.

Biography

Natacha Rosa received her Master's degree in Bioengineering with specialization in Biomedical Engineering at the University of Porto in 2011. Her Master thesis was in the nanotechnology field, where she studied the "Development of Nanoparticles loaded with Bioactive Compounds for Application as Nutraceuticals". Due to her high interest in the bone regeneration field, she decided to dedicate her PhD to study bone healing through the use of mechanical actuators. Since 2013, she is a Mechanical Engineering PhD student at the Faculty of Engineering of the University of Porto (Portugal).

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