

Marut Wongcumchang 2010: A Biomechanical Study of the Antegrade and Retrograde Nailing for the Femoral Shaft Comminuted Fractures Fixation. Master of Engineering (Industrial Production Technology), Major Field: Industrial Production Technology, Interdisciplinary Graduate Program. Thesis Advisor: Assistant Professor Supasit Rodkwan, Ph.D. 117 pages.

Intramedullary (IM) fixation with reaming is an excellent operative procedure that has revolutionized the treatment of fractures of the femoral shaft. However, there are still controversial issues related to the treatment of antegrade nailing and retrograde nailing. The purpose of this research aimed to evaluate the biomechanical performance of both fixators using the finite element method (FEM) to investigate the stress and strain distributions in the healed femur after fixation. This study presents an advanced method of use CT images combined with 3D reverse engineering CAD and FEM techniques to analyze and evaluate stress distributions in the nail and femur comparing between two parameters, which are (1) three different locations of comminuted fractures with the fracture gap of 1 cm. in the mid-third region, (2) three different material properties of bone involved in the fracture healing process. Under single-legged stance loading condition while walking activity, the results showed that the higher stress concentration at the nail–screw interfaces for all cases especially in earlier healing process were produce the maximum stress occurred on it. In case of the proximal fragment, the retrograde nailing produced the stress higher than antegrade nailing but in case of distal fragment was opposite result. Although the analysis showed that the biomechanical stability of fractures for cases of retrograde nailing gave better results than antegrade nailing. Nevertheless the result of stress occurred on retrograde nail in case study of the middle fragment was higher than antegrade nail. Therefore the antegrade technique was preferred than retrograde technique in case of the proximal and middle fragment but retrograde technique was preferred for the distal fragment.

---

Student's signature

---

Thesis Advisor's signature