EFFECTS OF PROSTHESIS STEM LENGTH ON STRESS DISTRIBUTION IN CEMENTLESS HIP ARTHROPLASTY

EMMI FARISA BIN JAAFAR

(2005606991)

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Faculty of Mechanical Engineering

Universiti Teknologi Mara (UiTM)

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ABSTRACT

Total Hip Replacement (THR) represents a modern surgical technique that allow for replacement of the natural hip joint by an artificial one. In this study, finite element analysis (FEA) of the THR is performed. The effects of prosthesis stem lengths on the resulting stress are obtained. Three different lengths of prosthesis stem namely short, medium and long are analyzed. The result of each stem are discussed and compared. The prosthesis stem design is based on established model of Charnley prosthesis while the femur model is gathered from net. Both design were modeled and modified using CATIA software while MSC PATRAN, NASTRAN software is used for analysis. The stem is defined as bio compatibility material that is Ti-6Al-4V while the femur is based on cortical bone properties. The loads apply to the THR model are based on physiological load of level walking conditions of human with average weight of 80Kg. Two major loads are considered in the model that are joint contact force and abductor muscle force and fixed at the bottom end. The results are discussed with respect to Von Misses stress of the analysis. Cementless THR with medium stem represent the best stress distribution as compare to intact femur. It is suggested to have experimental result for appropriate findings.

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