

UNIVERSITI TEKNOLOGI MARA

**EFFECTS OF RETROVERSION AND
ANTEVERSION ALIGNMENT IN
CEMENTED HIP ARTHROPLASTY**

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ABSTRACT

Arthritis is a joint disease or known as a joint failure that normally occurs due to wear at the cartilage where the part that protecting the bone end. Total Hip Arthroplasty (THA) is a procedure where damage bone (femoral head and acetabulum) will replace with a hip prosthesis. Cemented Hip Arthroplasty is one of the alternative choice of a treatment. There are some risk might be happen during the surgery such as mal-alignment. There are two types of mal alignment commonly occur which are retroversion and anteversion. Analyst using mechanical software is one of the method to detect effects of retroversion and anteversion alignment. 3D model of femoral bone was developed from computed topography (CT) Data Scan of 54 years old male with body weight 800 N. Femur ($E = 17 \text{ GPa}$, $\nu = 0.3$) was generated using MIMIC software and exported into 3-matic Research software to obtain 3D model. The bone cement used in this study is assumed to be polymethylmethacrylate (PMMA) ($E = 2 \text{ GPa}$, $\nu = 0.3$) were reconstructed in Total Hip Arthroplasty. Meanwhile, the Exeter Stem ($E = 200 \text{ GPa}$, $\nu = 0.28$) act as stem prosthesis was used to investigate the effect of anteversion and retroversion in Hip Arthroplasty. The Maximum Von Mises Stress during stair climbing for femur, stem prosthesis and cement mantle are 114.58MPa, 1157.5 MPa and 12.83 MPa respectively meanwhile the highest displacement of two different loading condition cement mantle for walking and stair climbing is 9.5 μm and 12.83 μm . Anteversion and retroversion gave higher stress that can lead to debonding and cement fracture.

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