



Research Article

THE COMPARISON OF STRAIN DISTRIBUTION ON THAI NORMAL, VARUS AND TOTAL KNEE ARTHROPLASTY INSERTED FEMORAL BONE[†]

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ABSTRACT:

Knee is the largest joint in the human body and it has been heavily used, caused to the osteoarthritis. When the knee is more degenerate, it cause pain in every movement. The treatment has several methods such as Knee Arthroscopic Surgery, High Tibial Osteotomy and Total Knee Arthroplasty. This research aims to evaluate the strain distribution on the Thai femoral bone with the normal leg, bow-leg and inserted total knee prosthesis under the daily activities, as walking and stair-climbing by finite element analysis. The results were compared the maximum equivalent of total strain on the medial and lateral side in three cases. The results showed that the ratio of strain distribution between medial and lateral side on Thai femur with normal bone, varus bone and bone inserted TKA under walking condition are 67.27%, 84.00% and 73.12% respectively; and 60.96%, 82.74% and 70.64% respectively under stair-climbing condition. After the surgery, the ratio of strain distribution on the varus femoral bone decreased and approached that of normal femoral bone.

Keywords: Total Knee Arthroplasty; Equivalent of Total Strain; Finite Element Analysis; Varus Femoral Bone

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1. INTRODUCTION

Knee is the largest joint in the human body. When the knee is more degenerate, it cause pain in every movement. Total Knee Arthroplasty (TKA) is a surgical procedure to treat the patients with end-stage osteoarthritis in that cannot be treated by the other. The surgeon will expose cartilage that deterioration and inserted total knee prosthesis, which made from metal and polyethylene group have been designed especially to treat osteoarthritis for replacement, then seize with the extra cement with the leg axis alignment to be made after the surgery, the patient can move the knee, walking down the weight naturally and without pain.

The maximum equivalent of total strain distribution on the bone was the main cause of bone fracture [1]. The varus knee and total knee prosthesis inserted femoral bone changed strain distribution on the bone, which lead the bone fracture. This research aims to evaluate the strain distribution on the Thai femoral bone with 3 cases: the normal leg, bow-legged and inserted total knee prosthesis under the daily activities, as walking and stair-climbing by finite element analysis.

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