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單髁人工膝關節接觸特性之研究

Finite Element Analysis of UKA Contact Characteristics

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【Introduction】

Currently, the most common problem in the application of UKA is the malresection of the tibial plateau and resulting malposition of the tibial implant. This study focuses on the stress change of different tibial cut between different implant designs.

【Materials and Methods】

Three different designs of unicompartamental knee prostheses were chosen as the study samples in this investigation. They were from the Zimmer, the Depuy and the Howmedica.

The angle for posterior slope used in the study was set at 5° and 10°. In addition, the positioning angles of the femoral component in the coronal plane were simulated neutral position and various varus tilts.

The loading condition was defined as the maximal load on the tibiofemoral joint while walking with knee flexion 0°. Or, it is approximately three times of a person's body weight (BW).

【Results】

For all models, the von Mises stress exceeds the yield strength of the PE tibial components, and the value is highest at a 15° varus tilt. We also found that the maximal stress of PE components shifts laterally with the increasing varus tilt.

【Discussion】

Therefore, indications of UKA for correcting varus deformity are not fully developed and controversies still exist. Our study reveals that besides considering the patient's body weight, excess activity loading to the postoperative knee joint should be avoided and the angle after correction of varus deformity should not exceed 10°, or edge contact could easily happen.