

Gap Tension Affects the Rotation of Femoral Component in Total Knee Arthroplasty

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Summary:

The use of excessive tension of 30 lb with tensor device resulted in externally-rotated femoral component and frequent outliers.

Abstract:

Introduction:

In total knee arthroplasty (TKA), the femoral component rotation is very important factor in the flexion stability and biomechanics of the knee joint. However, it is still unclear how much tension is appropriate when performing TKA. In this retrospective matched pair study, we analyzed the femoral component rotation in postoperative CT scan of 150 TKAs using gap technique of three different amount of gap tension.

Methods:

One hundred and fifty primary knee osteoarthritis patients who underwent total knee arthroplasty and followed up for more than 2 years were included in this study. The patients were divided into the three groups according to the method of gap tensioning. The Group 1 was the patients who had undergone TKAs by conventional gap technique using their own gravity of lower leg. In the Group 2, a gap tensioning device which was set at 20 lb was used. In the Group 3, the tensioning device set at 30 lb was used. Each group composed of 50 TKAs and was matched each other by age, sex, body mass index (BMI), range of motion, severity of deformity, clinical and functional Knee Society score, Hospital for Special Surgery score and WOMAC score. The femoral component rotation was measured on the basis of clinical transepicondylar axis (TEA) on the postoperative CT scan and the outliers were evaluated whose femoral component rotation diverging from the epicondylar axis more than 3 degrees.

Results:

The mean femoral component rotation was $-0.82^\circ \pm 2.44^\circ$ in Group 1, $-0.40^\circ \pm 2.22^\circ$ in Group 2 and $1.37^\circ \pm 2.70^\circ$ in Group 3. The rotation in Group 3 was different from those in Group 1 and 2 ($p=0.001$, $p=0.001$), although there was no statistical difference between Group 1 and 2 ($p>0.05$). The outliers were more frequent in Group 3 (18% in Group 1, 18% in Group 2 and 36% in Group 3, $\chi^2=0.043$).

Discussion and Conclusion:

The femoral component rotated externally as the tension increased in TKA when the soft tissue gap tensioning technique was used in bone cutting, suggesting abnormal widening of lateral flexion gap was expected when the excess tension was applied. The use of tensor device set at 30lb resulted in externally-rotated femoral component and frequent outliers. It may be appropriate to use the gravity of the lower leg or the tensor device set at 20lb to obtain optimal femoral component rotation.