

Does the reducing femoral component in PS-TKA using computer-assisted surgery have no impact on the extension gap? : A cadaveric study

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Introduction:

Success of total knee arthroplasty (TKA) should be performed to proper mechanical alignment and knee stability in flexion and extension. Unfortunately, the distal femur might mismatch either anteroposterior-mediolateral or flexion-extension gap that lead to reduce size of femoral components by surgeon. This technique could be increased flexion gap but had no impact on extension gap. The authors hypothesized that bone loss in posterior femoral condyle may increase in extension gap due to posterior capsule and soft tissue loosen.

The purpose of this study was to evaluate the effect of reducing femoral component to extension gap in posterior-stabilizer total knee arthroplasty (PS-TKA) using computer assisted surgery (CAS) in Thai cadaveric knees.

Methodology:

This study performed TKA in fifteen normal knees of fresh Thai cadavers, mean age 56.4 ± 9.3 years (47 to 69 years). The standard tibia first gap balancing technique PS-TKA (PS e-motion[®], B. Braun, Aesculap, Germany) was performed by a single surgeon (PS) in all cadavers using MIS - Midvatus approach. After proximal tibia and distal femoral bone were cut completely, the trial femoral component was inserted. Then, the patella was everted and



เสนอโดยนายพรวิชญ์ ศรีภิรมย์ นายแพทย์ชำนาญการพิเศษ โรงพยาบาลราชวิถี
ในการประชุม 12th Annual Meeting of the International Society
ซึ่งจัดขึ้นระหว่างวันที่ ๑๓ - ๑๖ มิถุนายน ๒๕๕๕ ณ สาธารณรัฐเกาหลี

measured the gap in 180° extension (medial extension gap (EM), lateral extension gap (EL)) and 90° flexion knee position (medial flexion gap (FM), lateral flexion gap (FL)) using CT-free navigation system (OrthoPilot 4.2; B. Braun Aesculap, Germany) and double-piston tension device (Knee Balancer, DePuy, Warsaw, IN, USA) to maintain constant pressure. Subsequently, the authors performed to downsize femoral bone cut - one size, and inserted new trial femoral component. Finally, the 180° extension and 90° flexion gap were recorded again. All data were calculated the average of difference and compared relation before and after downsize femoral component in each gap.

Result:

The mean of increasing of 180° extension gap on the medial and lateral sides after downsizing of femoral components were 1.3 ± 0.9 mm (0.0 - 3.0 mm) and 1.1 ± 1.2 mm (-1.0 - 3.0 mm) respectively. For the mean of increasing of 90° flexion gap on the medial and lateral sides after downsizing of femoral component were 1.0 ± 1.2 mm (0.0 - 4.0 mm) and 1.3 ± 1.3 (-1.0 - 3.0 mm) respectively.

For the relation before and after downsizing, both medial and lateral sides of flexion gap were significantly increased after downsizing of femoral component ($p \leq 0.05$). Simultaneously, the medial extension gap and lateral extension gap were significantly increased after downsizing of femoral component ($p \leq 0.05$).

Conclusion:

When the femoral components were reduced, these results presented increase laxity of both flexion and extension gaps due to cutting posterior bone and effect of soft tissue tension. Surgeons should be aware of this effect to downsize on intraoperative that lead to medial extension laxity. Thus, this effect also impact on postoperative instability of TKA.

