

A comparison of intra-operative laxity and clinical outcomes in single-radius versus multi-radius femoral design for TKA

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Introduction: Knee arthroplasty prostheses with a single-radius femoral component design were introduced in an attempt to more accurately reproduce the kinematics of the natural knee. This design has been associated with improved extensor mechanism function and increased functional stability in total knee arthroplasty. One of advantages of single-radius femoral design was to offer better ligament stability based on a maintained isometry of extensor muscle during the whole range of motion. The purpose of this study was to compare intraoperative varus-valgus laxities from 0° to 90° of flexion in patients that received TKA using either a single-radius femoral design or multi-radius femoral design. We also compared the short-term results between two designs.

Materials & Methods: Fifty six TKAs with a single-radius femoral design (Scorpio NRG, SR group) and 59 TKAs with multi-radius femoral design (Zimmer NexGen, MR group) were included in this study. We measured and compared varus-valgus laxities at 0°, 30°, 60°, 90° of flexion using the navigation system and manual force between the 2 groups. And after 2 year follow-up, clinical outcomes regarding range of motion, HSS score, and WOMAC score were compared between two designs.

Results: The mean total varus-valgus laxities in both groups were significantly less at 0° of knee flexion ($3.2 \pm 1.5^\circ$ in SR group and $3.5 \pm 1.8^\circ$ in MR group) than other selected flexion angle ($p=0.011$); but the difference was not significant between 2 groups ($p=0.062$). At 30° and 60° of knee flexion, the mean total varus-valgus laxities in SR group ($6.2 \pm 3.5^\circ$ at 30° of knee flexion and $6.8 \pm 1.5^\circ$ at 60° of knee flexion) were significant less than those in MR group ($9.2 \pm 4.3^\circ$ at 30° of knee flexion and $8.3 \pm 3.8^\circ$ at 60° of knee flexion) ($p=0.027$ and $p=0.042$, respectively). In the clinical results with a minimum of 2 year follow-up, we could not find any significant differences between two designs in terms of range of motion, HSS, and WOMAC scores

Conclusion: The total knee arthroplasty with single-radius femoral designs showed significantly less intra-operative mid-flexion laxities compared with total knee arthroplasty with the multi-radius femoral designs. However, we could not find any significant differences between two designs in terms of clinical outcomes.

References

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