

Comparison of results of total knee arthroplasty performed using the navigation system and the conventional technique

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Accurate alignment and soft tissue balance are essential for successful total knee arthroplasty (TKA). Malalignment and soft tissue imbalance produce unequal loads on the medial and lateral tibial plateaus, and thus, substantially increase component wear. Moreover, in order to obtain well-balanced knees, good varus and valgus alignment and equal flexion and extension gaps must be achieved. Recently, computer assisted navigation systems have been developed to help surgeons improve TKA alignment accuracy, and these systems have been demonstrated to reduce some alignment errors. However, despite improved alignment accuracies, soft tissue balancing remains a challenge. To the best of our knowledge, no reports are available on knee stability after TKA performing using a navigation system. We compared the laxity, radiological and clinical outcomes of TKA (total knee arthroplasty) that performed using the navigation system and using the conventional technique at least 5-year follow up.

Total of 92 TKAs were included for this study, 47 TKAs were performed by the navigation group and 45 TKAs were performed by the conventional surgery. At the final follow up, to evaluate knee joint laxity, varus-valgus laxities were measured on the stress radiographs taken with varus or valgus loads at 90° of flexion. The radiological measurements with regard to the mechanical axis, the inclination of the femoral and tibial components, femoral posterior condylar off-set difference and radiolucency were compared between two groups. The clinical evaluations were performed using range of motion, Western Ontario and McMaster Arthritis index (WOMAC) scores and Knee Society (KS) score.

At a final follow up, the mean of valgus laxities were 3.9° in the navigation group and 4.0° in the conventional group, and the corresponding mean of varus laxities were 4.0° and 4.3° ($p=0.19$, $p=0.22$). Although there was no significant difference in the total laxity (7.8° in the navigation group and 8.1° in the conventional group, $p=0.35$). However, more than 10° of total laxity was significantly reduced in the navigation group (1 knee in the navigation group and 6 knees in the conventional group). The mean of mechanical axis was not statistically different between two groups. In the inclination of the femoral and tibial components, posterior femoral offset difference, radiolucent line, there were no statistical differences between two groups. But, the outlier numbers at mechanical axis, the mean of coronal inclination of the femoral and tibial component and the mean of sagittal inclination of the femoral component in the two groups was significantly different. At the last follow up, the differences in ROM, WOMAC score and KS scores were not observed between the two groups. But, stiffness of WOMAC score were significantly better in the navigation than in the conventional group ($p<0.001$).

In conclusion, the navigation system can provide good stability, improved alignment accuracy of the lower extremity and better result in stiffness of knee compared with conventional technique.

References

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