

Comparison of the mobile-bearing and fixed-bearing designs in high flexion total knee arthroplasty using an navigation system

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Purpose: We compared and analyzed the short term results of high flexion total knee arthroplasty (TKA) with mobile-bearing and fixed bearing designs using an electromagnetic navigation system.

Materials & Methods: We studied 32 patients who had undergone TKA with LPS-Flex Mobile[®] and 34 patients with LPS-Flex Fixed[®] using an electromagnetic navigation system between January 2010 and June 2010, and were followed up for at least 1 year. The mean follow-up period was 14.5 months and the mean age of the patients was 67.5 years in the mobile-bearing group and 68.5 years in the fixed-bearing group. The cause of injury was degenerative arthritis in all patients. The clinical results were graded according to the Knee Society Knee Score (KSKS) and Knee Society Functional Score (KSFS). Patient satisfaction and preference were assessed according to the WOMAC score. Postoperative pain was evaluated using the Visual Analog Scale (VAS). A patient's ability to kneel and sit cross-legged was assessed through interview or observation during follow-up. Physical examination and goniometric measurement have been commonly used in the assessment of range of motion (ROM) and maximal flexion angle (MFA) of knee joint. Radiographic assessment was done by measuring the mechanical axis deviation and the femoral and tibial component positions in the sagittal and coronal planes.

Results: In the mobile-bearing group, the mean KSKS and KSFS increased from 48.2 preoperatively to 94.5 at the last follow-up and from 45.3 preoperatively to 93.8 (93.8 ± 2.8) at the last follow-up, respectively. In the fixed-bearing group, the mean KSKS and KSFS increased from 49.5 preoperatively to 95.1 at the last follow-up and from 46.9 preoperatively to 94.2 at the last follow-up ($p > 0.05$). The mean WOMAC score decreased in both groups, from 81.0 preoperatively to 14.5 at the last follow-up in the mobile-bearing group and from 82.5 preoperatively to 15.2 at the last follow-up in the fixed-bearing group ($p > 0.05$). The mean VAS pain score improved from 7.8 preoperatively to 1.5 at the last follow-up in the mobile-bearing group and from 7.6 preoperatively to 1.4 at the last follow-up in the fixed-bearing group ($p > 0.05$). Thus, there were no significant differences between the two groups.

Kneeling and cross-legged sitting was possible in 22 and 28 cases, respectively, in the mobile bearing group ($n = 32$) and in 24 and 29 cases, respectively, in the fixed-bearing group ($n = 34$). Thus, significant intergroup differences were not identified in the ability to kneel and sit cross-legged through observation or interview during the follow-up ($p > 0.05$).

The mean ROM increased from 118.5° preoperatively to 130.0° at the last follow-up in the mobile-bearing group and from 118.0° preoperatively to 129.5° at the last follow-up in the fixed-bearing group. The mean MFA increased from 122.0° preoperatively to 131.1° at the last follow-up in the mobile-bearing group and from 121.8° preoperatively to 130.8° at the last follow-up in the fixed-bearing group ($p > 0.05$). Thus, there were no statistically significant intergroup differences in ROM and maximal flexion angle.

On the lower limb alignment, the mechanical axis deviation was more varus in the fixed-bearing group (0.9°) than in the mobile-bearing group (0.7°), but there was no significant difference between the groups. The coronal inclination of femoral component coronal and tibial component was 89.3° and 89.8° , respectively, in the fixed-bearing group and 89.6° and 89.3° , respectively, in the mobile-bearing

group. The sagittal inclination of femoral component and tibial component was 88.5° and 86.6° in the fixed-bearing group and 88.5° and 86.2° in the mobile-bearing group. Thus, the coronal and sagittal implant positioning was satisfactory in both groups, which showed no significant intergroup differences.

Conclusion: The clinical results of high-flexion TKA were satisfactory in both the mobile-bearing and fixed-bearing group. There were no significant intergroup differences regarding the clinical results (KSS, KSFS, and WOMAC score), radiological results (ROM and maximal flexion angle), and possibility of kneeling and sitting cross-legged. However, these results should be verified in long-term follow-up studies that address the longevity of the implants.