Assessment of joint gap for mid-flexion (45°) and hyper-flexion (120°) during navigation-assisted total knee arthroplasty

YANG JH[1], JEONG HI[2], OH KJ[3], YOON JR[3]

[1]*Department of Orthopedic Surgery, Seoul Veterans Hospital, Seoul, Korea*
[2]*Korea Orthopedic Clinic, Seoul, Korea*
[3]*Department of Orthopaedic Surgery, Konkuk University Medical Center, Konkuk University School of Medicine, Seoul, Korea*

jaekorea@hotmail.com

Purpose: The aim of gap balancing during total knee arthroplasty (TKA) is to achieve rectangular flexion and extension gaps. However, assessment of gap in midflexion (45˚) and deep flexion (120˚) is obscure. The hypothesis of this study was that if the mediolateral gap is assessed in different knee flexion angles (0˚, 45˚, 90˚, 120˚), gap difference would be categorized into several groups. Consequently, midflexion lax group and non-lax group would show clinical difference.

Methods: Fifty knees operated by TKA using a navigation-assisted gap balancing technique were evaluated with a minimum of 2-year follow-up period. Intraoperatively, final mediolateral gap in each flexion angle (0˚, 45˚, 90˚, 120˚) was measured after tibia/femoral bone resections with femoral prosthesis in situ. Any gap difference of more than 3 mm was considered significant. Clinical outcomes were assessed at 3, 6, 12 and 24 months postoperatively using the Knee Society Score (KSS) and Western Ontario MacMaster (WOMAC) score. Correlation between the incidence of midflexion/hyperflexion laxity and demographic data and the preoperative mechanical alignment was analyzed. The Analysis of variance (ANOVA) and Pearson correlation analysis test was performed. Significance was considered in $p<0.05$.

Results: All 50 cases were managed to have rectangular gap at 0˚ and 90˚. The last follow-up mechanical axis was within 3˚ in all cases. Patients were divided into 4 groups. Group 1: no gap difference, Group 2: Lax in midflexion, Group 3: Lax in hyperflexion and Group 4: Lax in both midflexion and hyperflexion. Number of patients in each group was: Group 1; n=32 (64%) Group 2; n=10 (20%), Group 3; n=4 (8%) and Group 4; n=4 (8%). All of the joint gaps with significant difference (>3mm) were in trapezoidal shape with a wider lateral side. However, there were no clinical differences between groups ($p>0.05$). Correlation between the incidence of midflexion/hyperflexion laxity and demographic data or preoperative mechanical alignment was not found.

Conclusion: This study demonstrated significant proportion (20%) of TKA cases had laxity in midflexion (45˚) angle even when rectangular extension (0˚) -flexion (90˚) gap was achieved. However, clinical significance was not found for this group in this short term follow-up study. Any correlations between this group and the preoperative demographic data or the deformity were not found.

Purpose: The aim of gap balancing during total knee arthroplasty (TKA) is to achieve rectangular flexion and extension gaps. However, assessment of gap in midflexion (45˚) and deep flexion (120˚) is obscure. The hypothesis of this study was that if the mediolateral gap is assessed in different knee flexion angles (0˚, 45˚, 90˚, 120˚), gap difference would be categorized into several groups. Consequently, midflexion lax group and non-lax group would show clinical difference.

Methods: Fifty knees operated by TKA using a navigation-assisted gap balancing technique were evaluated with a minimum of 2-year follow-up period. Intraoperatively, final mediolateral gap in each flexion angle (0˚, 45˚, 90˚, 120˚) was measured after tibia/femoral bone resections with femoral prosthesis in situ. Any gap difference of more than 3 mm was considered significant. Clinical outcomes were assessed at 3, 6, 12 and 24 months postoperatively using the Knee Society Score (KSS)

and Western Ontario MacMaster (WOMAC) score. Correlation between the incidence of midflexion/hyperflexion laxity and demographic data and the preoperative mechanical alignment was analyzed. The Analysis of variance (ANOVA) and Pearson correlation analysis test was performed. Significance was considered in $p<0.05$.

Results: All 50 cases were managed to have rectangular gap at 0˚ and 90˚. The last follow-up mechanical axis was within 3˚ in all cases. Patients were divided into 4 groups. Group 1: no gap difference, Group 2: Lax in midflexion, Group 3: Lax in hyperflexion and Group 4: Lax in both midflexion and hyperflexion. Number of patients in each group was: Group 1; n=32 (64%) Group 2; n=10 (20%), Group 3; n=4 (8%) and Group 4; n=4 (8%). All of the joint gaps with significant difference (>3mm) were in trapezoidal shape with a wider lateral side. However, there were no clinical differences between groups ($p>0.05$). Correlation between the incidence of midflexion/hyperflexion laxity and demographic data or preoperative mechanical alignment was not found.

Conclusion: This study demonstrated significant proportion (20%) of TKA cases had laxity in midflexion (45˚) angle even when rectangular extension (0˚) -flexion (90˚) gap was achieved. However, clinical significance was not found for this group in this short term follow-up study. Any correlations between this group and the preoperative demographic data or the deformity were not found.