Medial laxity during total knee arthroplasty leads to inferior postoperative clinical outcomes and functions

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INTRODUCTION:

Medial release during total knee arthroplasty (TKA) is used to correct ligament imbalance in the knees with varus deformity, although medial release has risks for causing medial and anterior-posterior instability. A certain amount of lateral laxity may be necessary to have medial pivot motion as well as good range of motion to represent ligament balance in normal knees. The purpose of this study was to examine if the intraoperative gap balance and laxity affect postoperative clinical outcomes.

METHODS: A retrospective multi-center cohort study of prospectively collected data on patients undergoing TKA with a single posterior-stabilized implant was conducted. The varus-valgus gap angle and joint gap in extension and 90° of flexion were measured using a tensor device for 656 knees in 11 centers while applying a distraction force of 178 N (Figure 1). The varus angle was denoted as positive. The medial and lateral gaps were calculated based on the center gap and the varus-valgus angle. Medial and lateral joint laxity was determined by subtracting the polyethylene thickness from the joint gap. The correlations were calculated between varus-valgus gap angle and medial and lateral joint laxity and clinical outcomes at one month, one year and two years using Knee Society Score and the new Knee Society Score (2011 KSS).

RESULTS:

The average gap angle was 1.5° varus (standard deviation [SD] = 3.1°) in extension and 1.0° varus (SD = 4.3°). The average medial and lateral laxity in extension was -1.4 (SD = 2.7) mm and -0.6 (SD = 3.2) mm, respectively. The corresponding values in flexion was 2.4 (SD = 3.9) mm and 3.0 (SD = 3.9) mm, respectively. In extension, polyethylene thickness was slightly thicker than the medial and lateral gaps.

The varus gap angle in flexion was positively correlated with KSS knee score at two years (r = 0.107, p = 0.027), KSS function score at two years (r = 0.140, p = 0.004), 2011 KSS symptoms at two years (r = 0.132, p = 0.006), and 2011 KSS functional activities at two years (r = 0.105, p = 0.030) (Table 1) (Figure 2). Medial laxity in extension had negative correlation with KSS function score at one month (r = -0.110, p = 0.009) and at two years (r = -0.097, p = 0.045), 2011 KSS symptoms at two years (r = -0.130, p = 0.007), and 2011 KSS functional activities at one month (r = -0.087, p = 0.039) and at two years (r = -0.118, p = 0.015). Medial laxity in flexion had negative correlation with 2011 KSS symptoms at one year (r = -0.112, p = 0.016) (Table 2) (Figure 3). Lateral laxity in extension and flexion had little effect on KSS and 2011 KSS (Table 3).

DISCUSSION AND CONCLUSION:

Better clinical outcomes are obtained with varus gap balance than with equal medial and lateral gaps. Medial laxity in extension and flexion can lead to inferior postoperative clinical outcomes and functions. Medial release to correct ligament imbalance seems unnecessary during TKA.

Figure 1: Measurement of extension and flexion gap and gap angle.

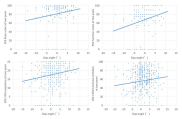

Figure 2: Correlation between gap angle and clinical outcomes

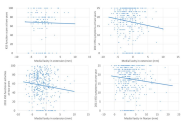

Figure 3: Correlation between medial laxity and clinical outcomes