

## A Prospective Comparison of Adapted Measured Resection Versus Gap-Balancing In Determining Femoral Component Rotation In TKA

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### Summary:

Both gap-balancing and adapted measured resection techniques proved equally reliable and accurate in determining femoral component rotation in TKA with a tendency towards more external rotation in the gap-balancing group

### Abstract:

#### Introduction:

Obtaining a balanced flexion gap with a correct femoral component rotation is one of the prerequisites for successful outcome after total knee arthroplasty (TKA). In this study, we describe a new technique for determining femoral component rotation, termed it 'adapted' measured resection and compared with a tensor device in terms of reliability and accuracy for femoral component rotation in TKA. To our knowledge, this is the first study to compare these techniques in a prospective controlled trial.

#### Materials and Methods:

We prospectively studied 96 consecutive primary TKA cases at our department. In 48 patients, a tensor device was used to determine rotation of the femoral component. In the second group of 48 patients, an 'adapted' measured resection technique taking into account the native rotational geometry of the femur was used. With classic measured resection, surgeons adapt the femoral component rotation to the surface derived reference frame located intra-operatively. At our institution however, the rotation is adapted according to the native rotational geometry of the distal femur using the pre-operative CT-scan. Using the instrumentation system without adaptation results in a 3° external rotation of the femoral cutting block relative to the PCL. When x° internal rotation of PCL relative to the surgical transepicondylar axis (sTEA) of the native femur is measured on pre-operative CT-scan, we externally rotate our cutting block by an additional (x-3)° using shims (so x° rotation in total).

Pre- and postoperative CT-scans of the knee were performed. Pre- and postoperative rotational geometry of the distal femur was determined. All measurement were performed twice by three independent observers. For all 96 cases, the need for per-operative soft tissue releases was noted.

#### Results:

Both groups systematically reproduced a similar external rotation of the femoral component. The mean postoperative external rotation of the femoral component relative to the sTEA was 1.7° (SD 2.1) in the measured resection group and 2.4° (SD 2.5) in the gap balancing group. The difference in mean femoral component rotation between the 2 groups equaled 0.71°. Statistical analysis showed us that this difference was not significant (p=0.134). Also the variability (SD 2.1 vs. SD 2.5) and the number of outliers between the two groups was not statistically different (p=0.23). The postoperative posterior condylar line was on average 2.9° externally rotated compared to the pre-operative situation in the measured resection group and 3.2° in the gap-balancing group. For none of the ligamentous releases, there was statistical evidence that the percentage of releases differed between the two groups.

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### Summary:

We described a new technique to determine rotation of the femoral component and termed it 'adapted' measured resection. Both gap-balancing and 'adapted' measured resection techniques proved equally reliable and accurate in determining femoral component rotation in TKA. There was a tendency towards more external rotation in the gap-balancing group. However, this difference was small ( $0.71^{\circ}$ ) and not statistically significant. The number of outliers for the 'adapted' measured resection technique was much lower than reported in literature with 'classic' measured resection.