Comparison of in vivo kinematics during deep knee bending between fixed bearing and mobile bearing posterior stabilized total knee arthroplasty

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Introduction:
Recently mobile-bearing total knee arthroplasty (TKA) has become more popular. However, the advantages of mobile bearing (MB) PS TKA still remain unclear especially from a kinematic point of view. The objective of this study was to investigate the difference and advantage in kinematics of mobile bearing PS TKA compared with fixed bearing (FB) PS TKA

Materials and Methods:
Femorotibial nearest positions for 19 subjects (20 knees), 10 knees implanted with NexGen Legacy flex (Zimmer, Warsaw, IN) with mobile bearing PS TKA, and 10 knees implanted with NexGen Legacy flex (Zimmer, Warsaw, IN) with fixed bearing PS TKA were analyzed using the sagittal plane fluoroscopic images. All the knees were implanted by a single surgeon. All the subjects performed weight bearing deep knee bending motion (Figure1). We evaluated range of motion, axial rotation of the femoral component, AP translation of medial and lateral sides.

Results:
The average range of motion between femoral component and tibial component was 119°±18° in MB and 122°±10° in FB. The axial rotation of the femoral component was 11.8°±6.2° in MB and 11.8°±4.9° in FB (Figure2). There was no significant difference both in range of motion and axial rotation between MB and FB. The AP translation of MB and FB showed same patterns. They were rollback in early flexion, the lateral pivot pattern (the medial condyle moved forward significantly compared with the lesser amount of AP translation for the lateral condyle ) at mid flexion, and bicondylar rollback at deep flexion. The rollback in early flexion was 3.4mm in MB and 1.8mm in FB at medial side, 4.2mm in MB and 4.8mm in FB at lateral side. There was no significant difference. The lateral pivot pattern, which moved anteriorly, was 7.8mm in MB and 7.0mm in FB at medial side, 3.0mm in MB and 2.4mm in FB at lateral side. There was no significant difference. The bicondylar rollback at deep flexion was 6.4mm in MB and 7.7mm in FB at medial side, 6.9mm in MB and 4.8mm in FB at lateral side. In four subjects, more than 12° axial rotation was observed in knees implanted with FB TKA which allows only 12° axial rotation (Figure3).

Discussion:
The results in this study demonstrate that there was no significant difference in kinematics of weight bearing deep knee bending motion between MB and FB. The advantage of MB is allowance of axial rotation which restricted until 12° in FB NexGen Legacy flex PS TKA.

REFERENCES: