Evidence in focus

World Arthroplasty Congress. 19-21 April 2018; Rome, Italy.

JOURNEY™ II BCS is designed to facilitate near-normal kinematics, positively impacting on patients’ satisfaction

Key results

- JOURNEY II BCS is designed to approximate normal-like knee kinematics
- Different implant designs are associated with different kinematic patterns
- Normal-like kinematic patterns result in better patient-reported outcomes

Data presented from the World Arthroplasty Congress 2018:

How close to normal motion does JOURNEY II BCS get?

Designed to achieve normal-like kinematics through full range of motion

Typically, TKA results in less femoral rollback and axial rotation than in the normal knee, which may contribute to patient dissatisfaction.

“wide range of motion with an associated pronounced femoral rollback upon flexion”

New results from a multi-centre study of 20 patients show that the design of JOURNEY II BCS facilitates activity dependent knee kinematics with pronounced femoral rollback upon flexion. A more posterior position and later post-cam engagement were associated with closed chain chair raising activities than open chain flexion-extension activities. In addition, paradoxical anterior sliding was not shown during any activities with JOURNEY II BCS.

Similar results were seen in a study of 40 patients with JOURNEY II BCS who were compared with 10 normal, asymptomatic knees during weight bearing motion. Patients receiving JOURNEY II BCS implants experienced normal-like kinematic patterns during early and late flexion, demonstrating adequate ACL and PCL replication (Figure).

![Figure. Medial and lateral anterior-posterior positions exhibited in JOURNEY II BCS and normal knee subjects during a deep knee bend (mm) [+Anterior, -Posterior]](image)

**Designed to achieve maximal flexion**

Achieving sufficient range of knee flexion after TKA is essential to perform activities of daily living. Building on results from a previous randomised controlled trial comparing 62 patients with JOURNEY I BCS to 62 conventional posterior-stabilised knees, Kosse et al. studied a further 62 patients with JOURNEY II BCS to examine the maximal flexion and clinical impact of the new implant. The BCS II design maintains pre-operative maximal knee flexion, with a median maximal flexion of 130°, which is 6° more than conventional posterior-stabilised TKAs (p=0.04).

These results indicate that JOURNEY II BCS has increased maximal flexion which better replicates normal knee motion.

“pre-operative maximal flexion is maintained after TKA with the BCS-II”

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- Normal-like kinematic patterns result in better patient-reported outcomes
Evidence in focus (continued)

Does implant design impact on kinematic patterns?

A comparative study of three TKAs – JOURNEY II BCS, Unity™ (Corin, UK) and Persona™ (Zimmer Biomet, US) – investigated the effects of implant design and activity on tibiofemoral kinematics. The Unity TKA was associated with significantly more posterior tibiofemoral position, whilst JOURNEY II BCS showed significant external femoral rotation upon flexion. All three TKAs demonstrated limited paradoxical anterior sliding early flexion, which was most pronounced by the Persona TKA. Flexion angle at engagement of the post-cam mechanism was relatively early for Unity (50-60° flexion) and later for both JOURNEY II (50-80°) and Persona (70-90°). There was a difference between open and closed chain activities, with open chain activities associated with lower engagement angles. Although all three TKA implants demonstrate ACL and PCL function by the cam-post mechanism, it is apparent that differences in individual designs have effects on the kinematics and post-cam engagement during activity.

“individual [TKA] design significantly affects the tibiofemoral kinematics and timing of post-cam engagement”

Can implant design impact patient satisfaction?

Van Onsem et al. have demonstrated for the first time a relationship between kinematic patterns of TKA and patient satisfaction. Kinematic patterns for three activities of daily living were analysed for JOURNEY II BCS and two posterior-stabilised TKAs. The results showed that poor patient-reported outcomes were associated with a pronounced paradoxical anterior motion on the medial side, less stable medial compartment in mid-flexion and less posterior translation in deep flexion on the lateral side.

“By evaluating and improving the factors that result in this aberrant kinematical pattern, one could increase the level of patient satisfaction after total knee arthroplasty”

Understanding TKA knee kinematics and their relationship to patient satisfaction is important for the design of implants that aim to restore normal knee function. JOURNEY II BCS has limited paradoxical anterior sliding, as well as post-cam engagement after 50° flexion which corresponds to posterior translation allowing for native knee roll back.

Conclusion

It is apparent that post-TKA knee kinematics greatly impact patient outcomes. The goal of TKA should be returning patients close to normal, which includes returning normal kinematic patterns during patient activity. Although different implant designs may replicate ACL-PCL function, it is important to understand that each individual design is associated with different kinematic patterns. The kinematic patterns observed in this study are however based on limited data; additional studies with larger sample sizes and longer follow-up periods are required to determine if these initial observations are consistent over time. Current evidence suggests that JOURNEY II BCS may be able to restore normal-like knee motion more than other posterior-stabilised implants.

References