Biomechanical Load to Failure in Torsion of iBalance® HTO with and without Arthrex Quickset™

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Introduction

The purpose of this study was to compare the biomechanical load to failure and mechanism of failure in torsion for the Arthrex iBalance HTO PEEK wedge implant with and without Arthrex Quickset calcium phosphate bone cement.

Methods and Materials

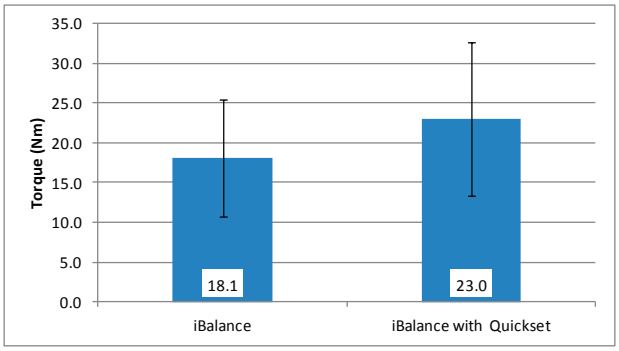
Eighteen cadaveric tibias were used for this study, nine for the iBalance alone and nine for the iBalance with Quickset. The standard iBalance technique and instrumentation was used to create 10 degree corrections for each tibia, which is on the large end of the medium size openings and one of the most commonly used sizes. The implant was placed in its standard position posteromedially between the posteromedial tibia and the tibial tubercle. The iBalance with Quickset group used 10 cc of Quickset for each tibia in order to fill the osteotomy site lateral to the iBalance implant. Pressure was applied to the posterior tibia to prevent extravasation.

The distal aspect of each tibia was fixated to the base of the MTS Machine (MTS Systems Corp, Eden Prairie, MN), while the proximal tibia was fixated to the cross-head (Figure 1). A compressive load of 70 N was applied axially while simultaneously applying an internal rotation torque. Torque to failure, along with mode of failure, was recorded for each specimen.

Results

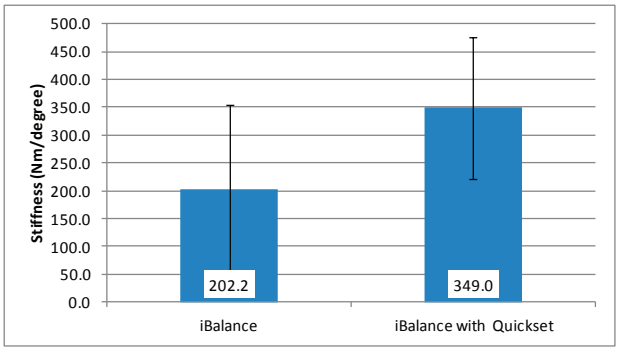
The iBalance with Quickset failure torque of 23.0 ± 9.6 Nm was significantly greater than the iBalance alone failure torque of 18.1 ± 7.3 Nm (p = 0.024) (Figure 2).

Figure 2: Failure Torque Comparison



The iBalance with Quickset stiffness of 349.0 ± 126.8 Nm/degree was significantly greater than the iBalance alone stiffness of 202.2 ± 153.4 Nm/degree (p = 0.040) (Figure 3).

Figure 3: Stiffness Comparison



Conclusion

The iBalance HTO procedure with Quickset is significantly stiffer than performing an iBalance HTO alone. The iBalance with Quickset also has a greater failure torque than the iBalance alone. The results suggest that the addition of Quickset to the iBalance HTO procedure is advantageous for greater failure torque and greater stiffness.