

Haptically guided robotic technology in total hip arthroplasty: A cadaveric investigation

Danyal H Nawabi¹, Michael A Conditt², Amar S Ranawat¹, Nicholas J Dunbar³, Jennifer Jones², Scott Banks³ and Douglas E Padgett¹

1. Adult Reconstruction and Joint Replacement Division, Hospital for Special Surgery, New York, USA 2. Department of Clinical Research, MAKO, Surgical Corp., Fort Lauderdale, FL, USA 3. Department of Mechanical & Aerospace Engineering, University of Florida, Gainesville, FL, USA

Publication

Journal of Engineering in Medicine. December 2012;227(3):302-309

This study sought to validate a haptically-guided robotic arm system in performing THA with the aim of comparing the accuracy of robotic-assisted acetabular cup placement to manual placement. The surgeon implanted 12 acetabular components in 6 cadaveric pelvises comparing robotic-assistance on one side with manual implantation on the other. The authors measured planned and actual center of rotation (COR), cup position, leg-length equalization and offset for each THA using computed tomography and the robotic platform.

The root-mean-square (RMS) error for the robotic-assisted system was within 3° for cup placement and within 1mm for leg-length equalization and offset when compared to computed tomography. The robotic-assisted system was significantly more accurate than manual implantation in reproducing the COR and cup orientation, as determined by a preoperative plan. The RMS error for manual implantation compared to robotic-assistance was 5 times higher for cup inclination and 3.4 times higher for cup anteversion (p<0.01).

Robotic-assistance is more accurate to plan than manual implantation in achieving optimal cup orientation. It has the ability to reduce human error from THA and should be considered in light of THA revisions due to component malposition

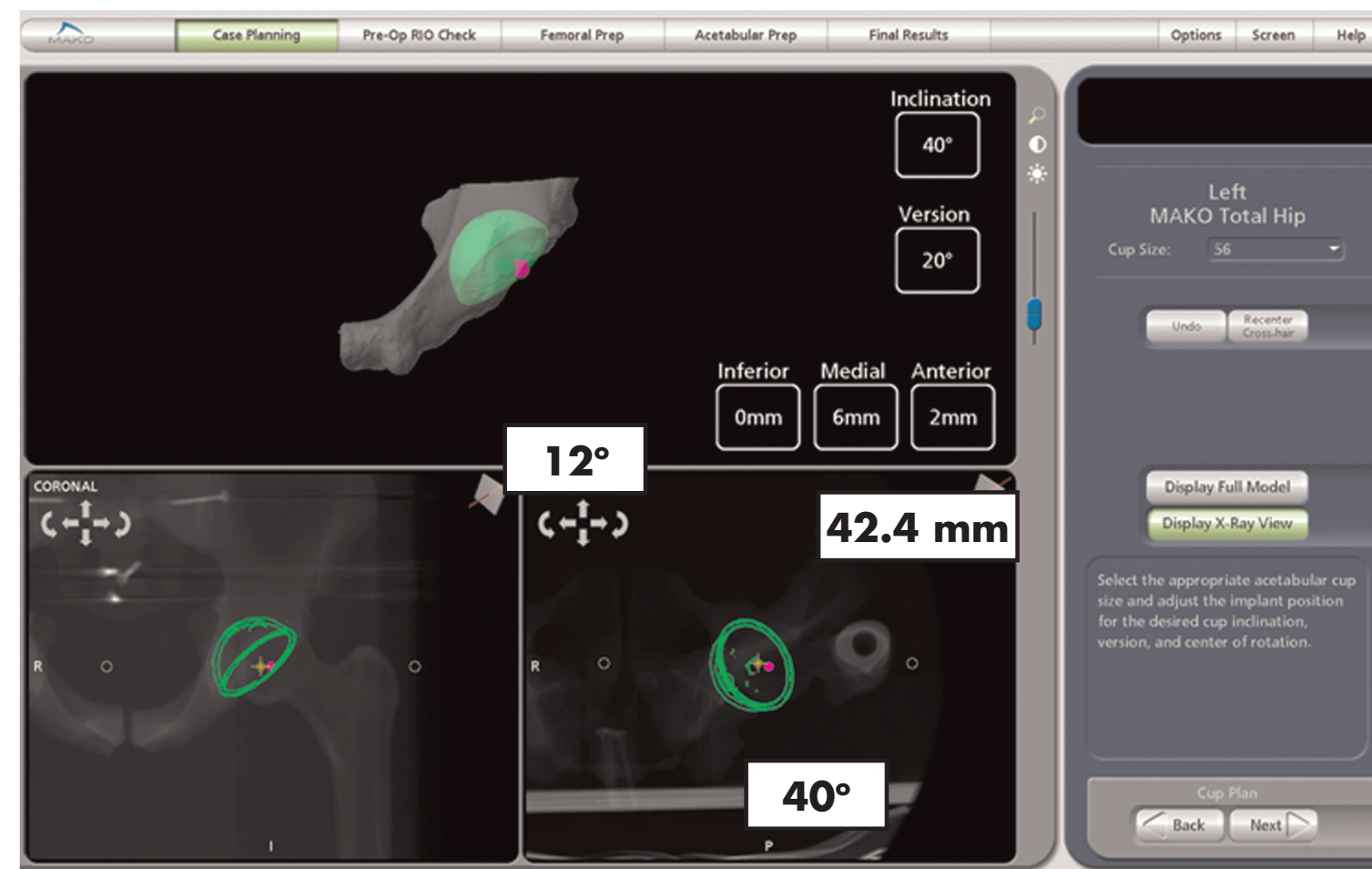


Fig. 1
Preoperative case planning on a computer screen showing positions of planned cup COR (green dot) and native hip COR (magenta dot). The CT angle (12).



Fig. 2
Computer screen showing the completion of reaming with all COR numbers reading zero and the bone color changing from green to white. Source: MAKO Surgical Corp.

Reference:
Nawabi DH; Conditt MA; Ranawat AS; Dunbar NJ; Jones J; Banks S; Padgett DE. Haptically guided robotic technology in total hip arthroplasty – A cadaveric investigation. Journal of Engineering in Medicine. December 2012;227(3):302-309.
A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. Stryker does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery.
The information presented is intended to demonstrate the breadth of Stryker's product offerings. A surgeon must always refer to the package insert, product label and/or instructions for use before using any of Stryker's products. The products depicted are CE marked according to the Medical Device Directive 93/42/EEC.
Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your sales representative if you have questions about the availability of products in your area.
Stryker Corporation or its divisions or other corporate affiliated entities own, use or have applied for the following trademarks or service marks: Stryker. All other trademarks are trademarks of their respective owners or holders.
This poster is not sponsored by or affiliated with the AAHKS.
MKOHTA-POS-8_18961 © 2018 Stryker