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Fluoroscopy-based Robotic-assisted Total Hip Arthroplasty Produces Greater Improvements in Patient Reported Outcomes at One Year Compared to Manual, Fluoroscopic-assisted Technique



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Cup placement in Total Hip Arthroplasty impacts Patient Reported Outcomes (PROMs)

Introduction

- Accurate cup positioning is a crucial element in producing favorable post-operative patient reported outcome measures (PROMs) following total hip arthroplasty (THA)
- Use of a novel, fluoroscopy-based robotic assisted system for THA (RA-THA) has been associated with more accurate cup placement compared to manual, fluoroscopy-assisted technique (mTHA)
- Purpose of the study:** To compare the one-year PROMs of patients who underwent fluoroscopy-based RA-THA through a direct anterior approach (DAA), to those who underwent this same procedure using a mTHA technique

Methods

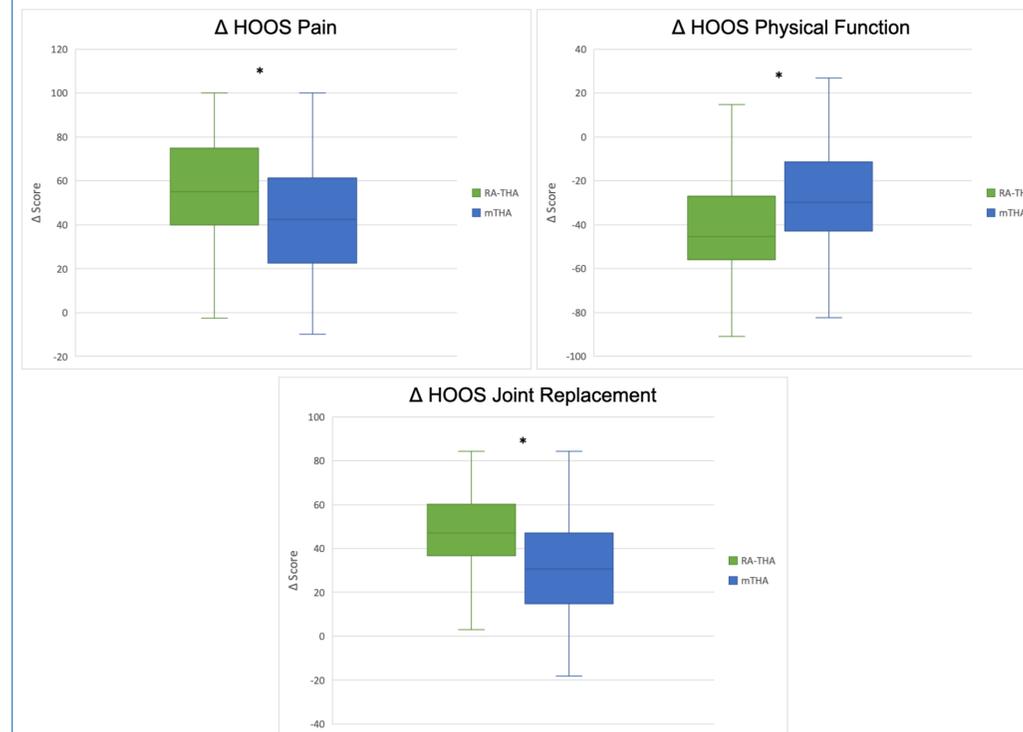
- All procedures were performed by a single surgeon at the same institution, via DAA
- Control: 91 consecutive mTHA; Study: 85 consecutive RA-THA
- Cohorts were similar in their distributions of age, sex, race, body mass index (BMI), pre-operative diagnosis, procedure laterality, and pre-operative American Society of Anesthesiologists (ASA) risk classification
- Inclusion criteria: 1) Age ≥ 18 ; 2) Primary THA; 3) Primary dx osteoarthritis, rheumatoid arthritis or avascular necrosis
- Outcome variables: 1) One-year PROMs (Veterans RAND-12 (VR-12) Physical/Mental, Hip Disability and Osteoarthritis Outcome (HOOS) Pain/Physical Function/Joint Replacement, University of California Los Angeles (UCLA) Activity scores); 2) Differences between pre- and post-operative PROMs (Δ)

The use of fluoroscopy-based robotics improves post-operative PROMs

Results

- Cohorts experienced similar post-operative PROMs
- RA-THA patients experienced greater Δ PROMs for all HOOS sub-scores compared to mTHA patients: Pain (+54.7 vs. +42.1; $p=0.009$), Physical Function (-41.6 vs. -28.7; $p=0.007$), and Joint Replacement (+46.6 vs. +33.0; $p=0.002$)
- Differences exceeded minimum clinically important difference (MCID)

Figure 1: mTHA and RA-THA Δ HOOS sub-score comparisons



Note: * = $p < 0.05$

Functional improvements exceeded minimum clinically important difference (MCID)

Discussion

- The use of a novel, fluoroscopy-based RA-THA system for primary DAA THA resulted in significant improvements in post-operative HOOS scores compared to mTHA**
- Up to 27% of THA patients report having unfulfilled expectations regarding their surgery, with dissatisfaction often being driven by post-operative complications and poor functional outcomes
- Improper acetabular cup positioning has been associated with post-operative complication: 1) Dislocation; 2) Accelerated component wear; 3) Revision surgery
- The use of fluoroscopy-based robotics may improve intra-operative cup placement, and thus promote more favorable post-operative PROMs relative to mTHA

Conclusions

- Use of a novel, fluoroscopy-based RA-THA system resulted in greater improvements in HOOS scores relative to manual technique at one-year post-operative
- Adoption of the robotic-assisted DAA THA may be associated with improved functional outcomes relative to mTHA
- Additional long-term prospective research amongst an expanded cohort that is still needed to validate these findings



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