

INTRODUCTION

- Intra-operative fluoroscopy improves the accuracy of component position during THA
- Software is available to quantitatively assess fluoroscopic images to determine cup position and leg-length discrepancy (LLD)
- Recently, an artificial intelligence (AI) application has been introduced for fluoroscopy-assisted computer navigation, which obviates the need for human inputs
- However, to date there is no study which compares the accuracy of this AI software versus the human-controlled software



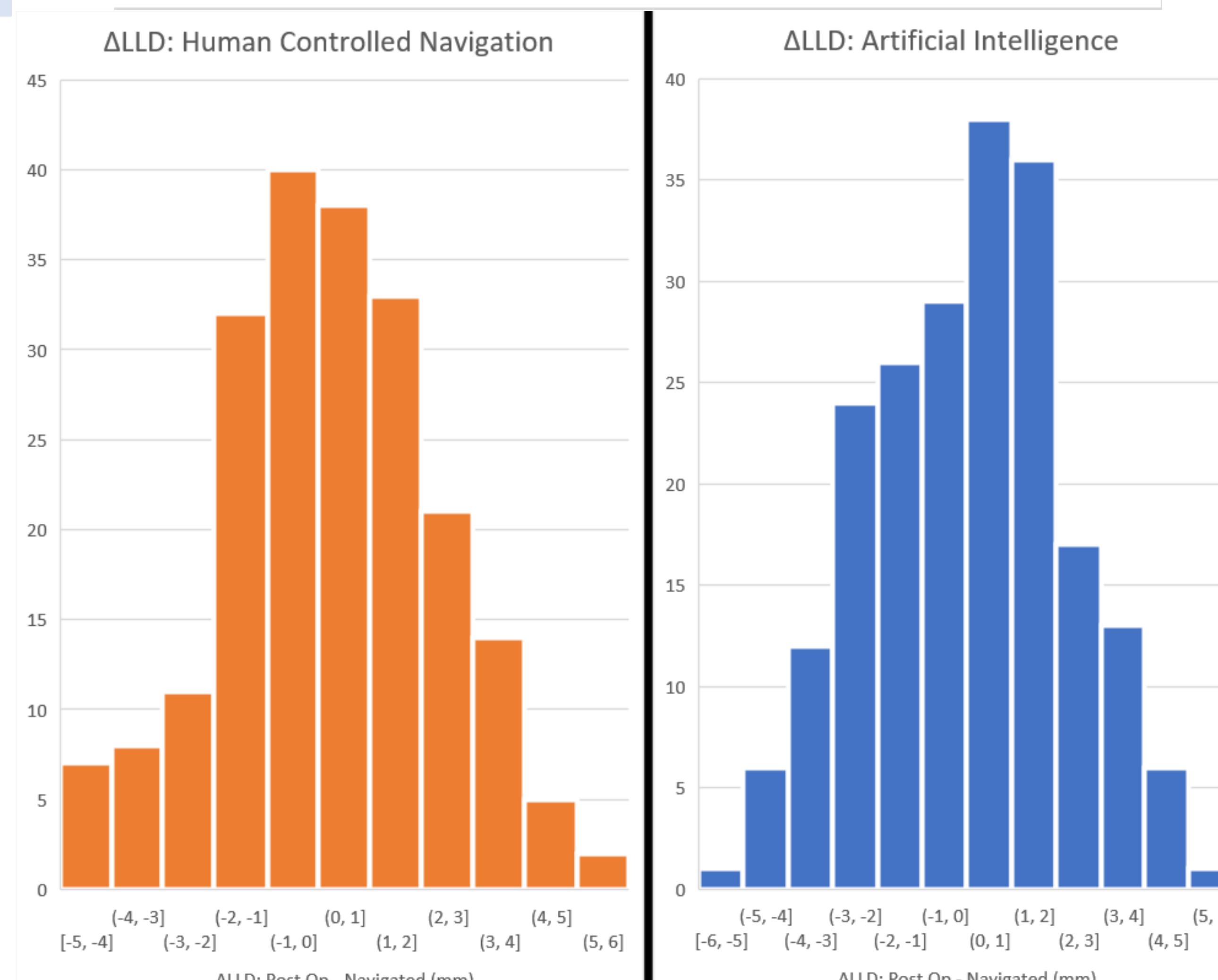
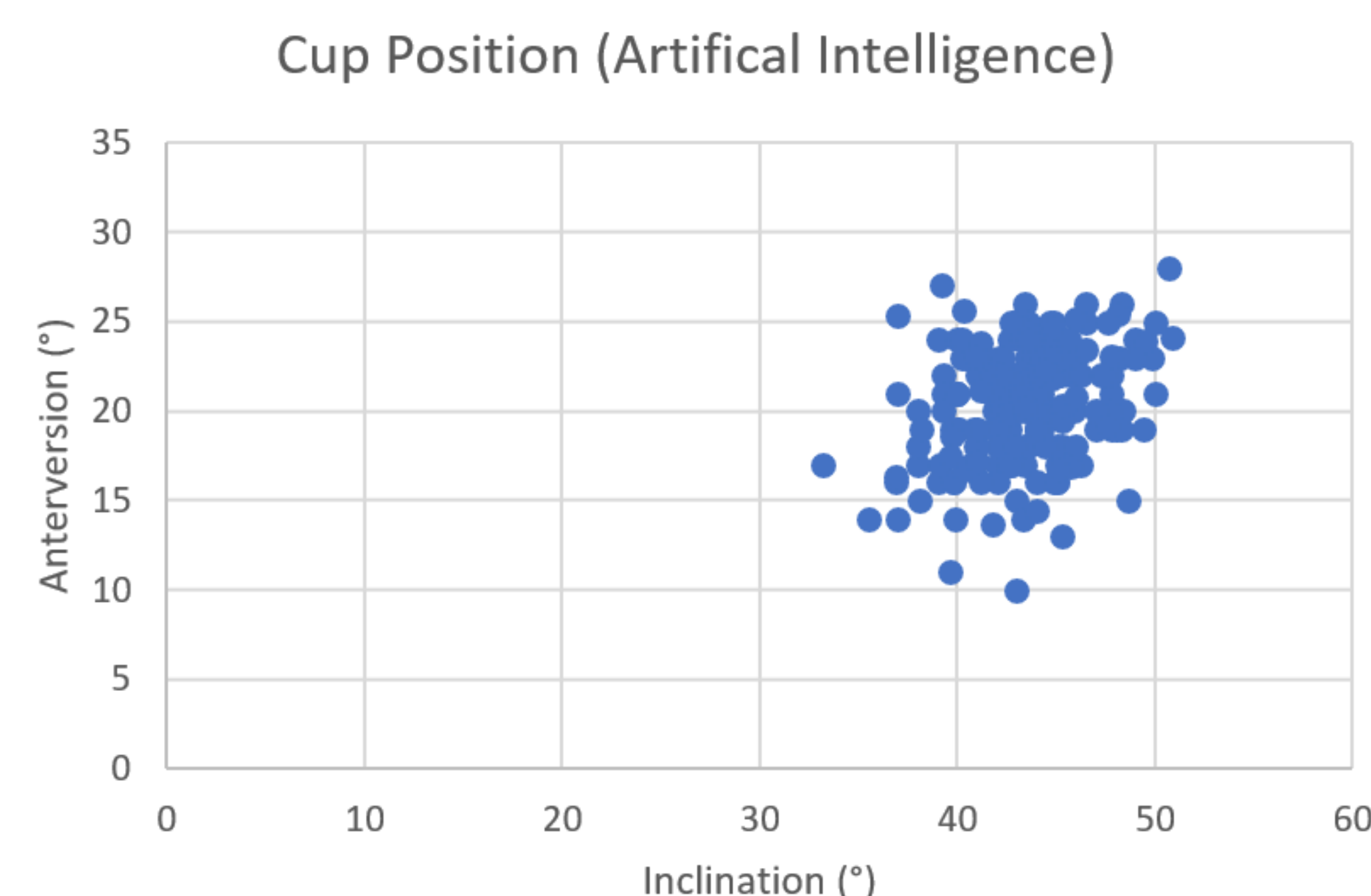
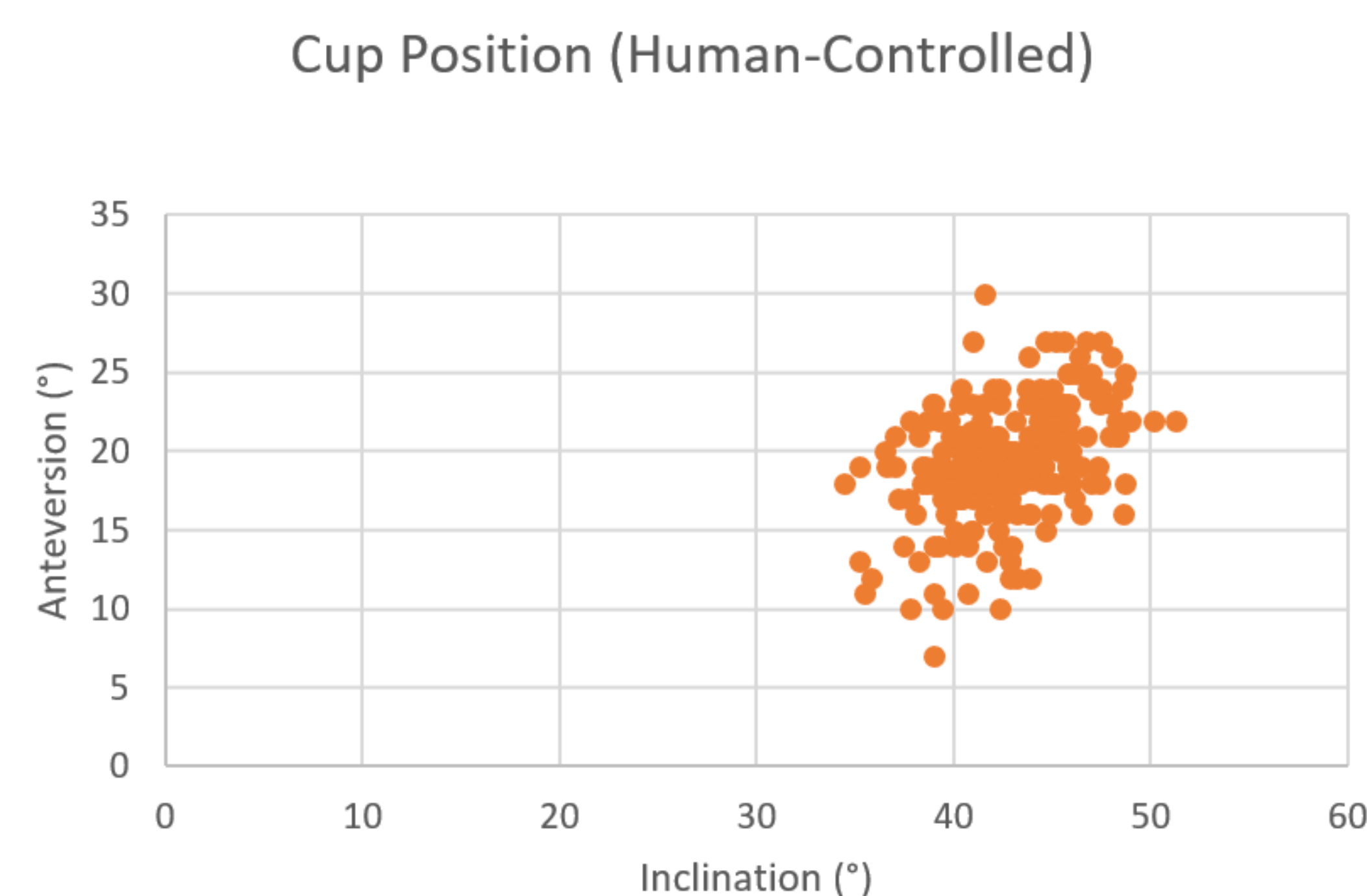
SPECIFIC AIMS

- The purpose of this study is to compare the accuracy of AI versus human-controlled fluoro-assisted navigation software for determining the following:
 - Cup Position
 - Inclination
 - Anteversion
 - Leg-Length Discrepancy
 - Δ LLD (difference between intra-op navigated versus post-operative LLD)

METHODS

- This is a retrospective review of prospectively collected data for 420 consecutive hips undergoing unilateral direct anterior THA by a fellowship-trained hip specialist at an orthopaedic teaching hospital.
- 211 hips were navigated using human-controlled fluoroscopic-assisted computer software, and 209 hips were navigated using an AI version of this same platform (OrthoGrid Systems, Inc).
- At the two-week post-operative visit, we obtained standing AP radiographs and assessed cup anteversion, cup inclination, and LLD.

RESULTS



RESULTS (continued)

- Post-operative cup inclination averaged 43 degrees (range 35-51) when navigated with human-controlled software, compared to 43 degrees (range 33-51) when navigated with AI software
- Post-operative cup anteversion averaged 19 degrees (range 7-30) when navigated with human-controlled software, compared to 21 degrees (range 10-28) when navigated with AI software
- Using human-controlled software, 94% (199/211) of cups were implanted within the Lewinnek “safe zone”, whereas using AI software 95% (198/209) of cups were implanted within the Lewinnek “safe zone” ($p = 1.0$)
- Using human-controlled software, 69% (146/211) of hips had a post-operative LLD that was within 2mm of the intra-op navigated LLD (i.e. Δ LLD \leq 2mm). Using AI software, 66% (137/209) of hips had a post-operative LLD that was within 2mm of the intra-op navigated LLD (i.e. Δ LLD \leq 2mm), ($p = 0.47$)
- Using human-controlled software, 99% (209/211) of hips had a post-operative LLD that was within 5mm of the intra-op navigated LLD (i.e. Δ LLD \leq 5mm). Using AI software, 98% (205/209) of hips had a post-operative LLD that was within 5mm of the intra-op navigated LLD (i.e. Δ LLD \leq 5mm), ($p = 0.45$)

CONCLUSIONS

- Artificial Intelligence software has comparable accuracy to human-controlled software for calculating cup position and LLD during fluoro-assisted direct anterior THA

REFERENCES

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- O'Leary R et al. Digital Fluoroscopic Navigation for Limb Length Restoration During Anterior Total Hip Arthroplasty. Arthroplast Today. 2022 Oct 11;18:11-15.