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Intra-op Fluoro in THA: No More, No Less

UCSF/ Hoag Arthroplasty for the Modern Surgeon Course 2025

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Sept 27, 2025

Disclosures

- CORIN- Consultant

- Smith & Nephew- Advisory Board

Outline

Benefits of ‘Technology’ in THA

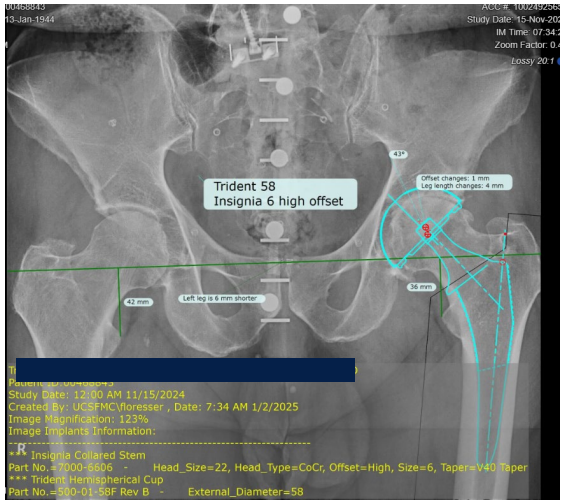
- Restore anatomy
- Optimize component size/position
- Mitigate complications

Costs of Implementation

UCSF Health

My Practice

- Digital templating
- DA, off table approach
- Intra-op Fluoro
- Collared triple taper stem



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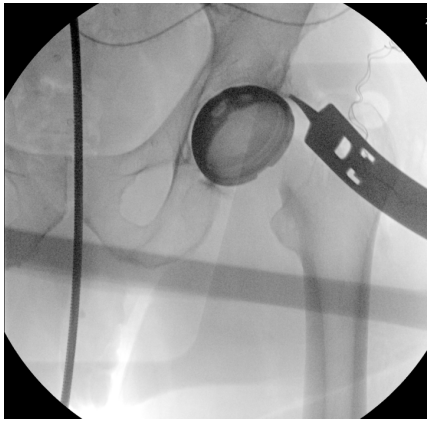

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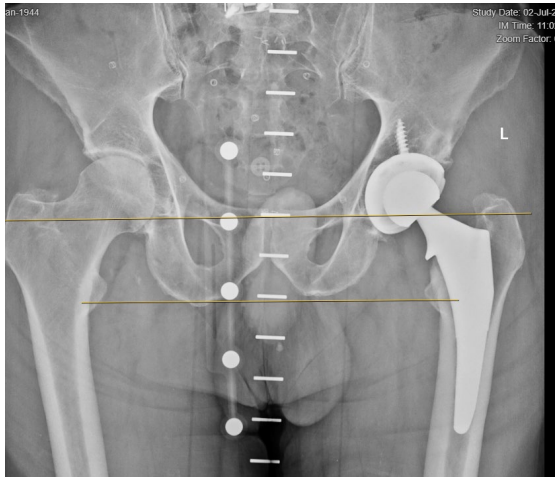
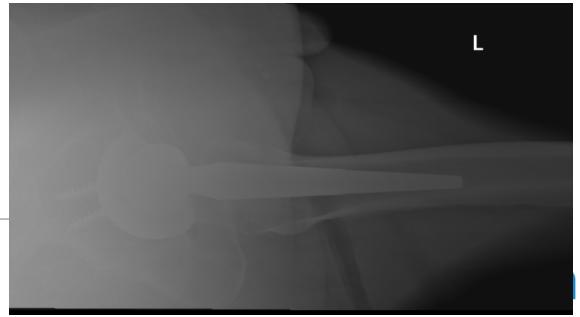




Optimizing Restoration of Anatomy

Primary Hip

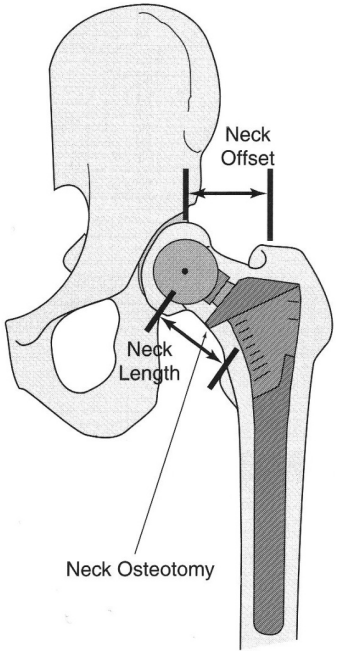
A Comparison of Component Positioning Between Fluoroscopy-Assisted and Robotic-Assisted Total Hip Arthroplasty

Nathaniel J. Stewart, MD [a,*], James L. Stewart, BS [a], Abra Brisbin, PhD [b]

[a] Chippewa Valley Orthopedics and Sports Medicine, Altoona, Wisconsin
[b] Department of Mathematics, University of Wisconsin Eau Claire, Eau Claire, Wisconsin

The Journal of Arthroplasty 37 (2022) 1602–1605

- Recreating Leg Length & Offset
  - NO difference in LLD, femoral and global offset



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Optimizing Component Size/ Position

Primary Hip

A Comparison of Component Positioning Between Fluoroscopy-Assisted and Robotic-Assisted Total Hip Arthroplasty

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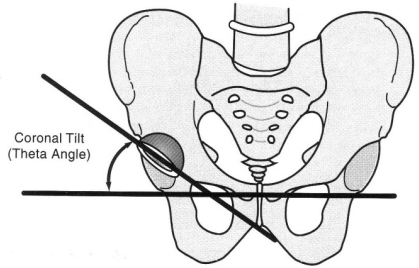
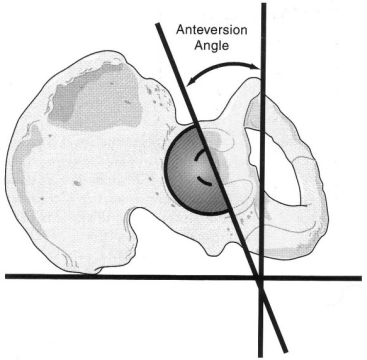
Acetabulum

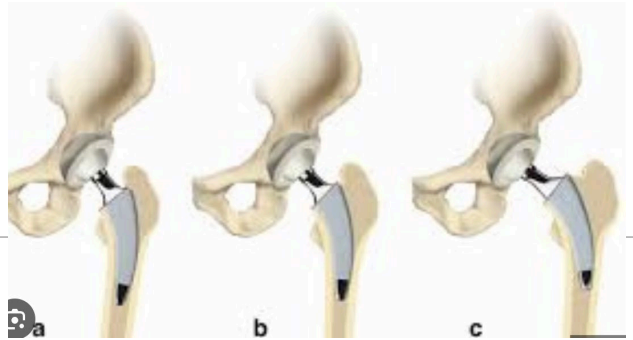
- Inclination error - 3.8° robotic vs 4.6° fluoro ($p<0.01$)
- Anteversion- NO difference
- ”Safe Zones”- NO difference





Femur

- NO data



Minimizing Complications

Dislocation

Robotic & DA w/ fluoro both 0.4%

Multivariate analysis of DA specifically - fluoro significant (OR 0.1); DM, robotics and navigation NOT sig

2023 AAHKS Proceedings

Fewer Dislocations After Total Hip Arthroplasty With Robotic Assistance or Fluoroscopic Guidance

Check for updates

Catherine Di Gangi*, Alana Prinos, Weston Buehring, MHS, Patrick A. Meere, MD, Morteza Meftah, MD, Matthew S. Hepinstall, MD

Department of Orthopaedic Surgery, NYU Langone Health, New York, New York

AAHKS AMERICAN ASSOCIATION OF HIP AND KNEE SURGEONS

The Journal of Arthroplasty 39 (2024) S359–S366

Periprosthetic Fracture

Intra-op: 0.4% in both groups

Within 1yr: 0% to 0.4%, NO sig diff

Comparative Study > Hip Int. 2025 Mar;35(2):116-123. doi: 10.1177/11207000241305977. Epub 2024 Dec 17.

Robotic-assistance and computer-navigation have similar rates of intraoperative fracture and return to the operating room within 1 year to fluoroscopy-only direct anterior total hip arthroplasty

Ilya Bendich [1], Yu-Fen Chiu [2], Nana Sarpong [2], Alejandro Gonzalez Della Valle [2], Edwin Su [2], Alexander McLawhorn [2]

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Special Clinical Scenarios

Complex Anatomy

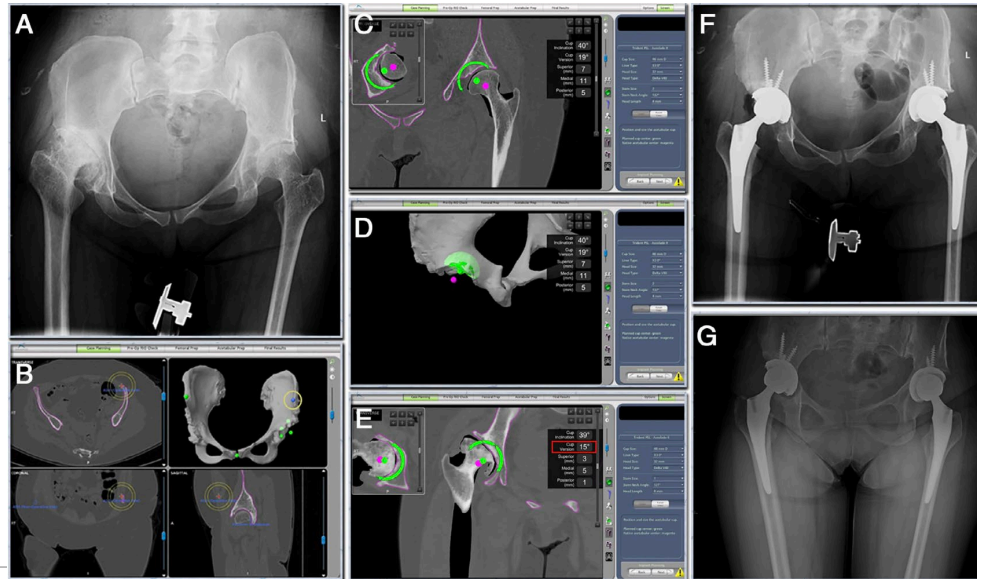
Robot only as good as its program

Hip- Spine Syndrome

Obese Patient

Use of Robotic-Arm Assisted Technique in Complex Primary Total Hip Arthroplasty

Wei Chai, MD[1†], Ren-wen Guo, MD[1†], Ken Lee Puah, MBBS, MRCS (Edin), MMed (Ortho), FRCS (Ortho), FAMS[2], Seth Jerabek, MD[3], Ji-ying Chen, MD[1], Pei-fu Tang, PhD[1]



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Special Clinical Scenarios

Complex Anatomy

2020 AAHKS Annual Meeting Symposium

Managing Hip-Spine Concepts in the Direct Anterior Approach With Use of Fluoroscopy

Jeffrey J. Frandsen, MD, Timothy L. Kahn, MD, Lucas A. Anderson, MD, Christopher E. Pelt, MD, Christopher L. Peters, MD, Jeremy M. Gililland, MD *

Department of Orthopaedic Surgery, University of Utah, Salt Lake City, UT

The Journal of Arthroplasty 36 (2021) S104–S110

Hip- Spine Syndrome

Recognize distortion/ parallax

Recreate standing FPP

Adjust targets based on spinopelvic motion

Obese Patient

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Special Clinical Scenarios

Complex Anatomy

Hip- Spine Syndrome

Obese Patient

Fluoroscopy-based robotic assistance for total hip arthroplasty improves acetabular cup placement accuracy for obese patients compared to the manual, fluoroscopic- assisted technique

Christian B Ong [1], Graham B J Buchan [1], Christian J Hecht Ii [1], Daniel O Kendoff [2], Yasuhiro Homma [3 4], Atul F Kamath [1]

> Bull Hosp Jt Dis (2013). 2020 Sep;78(3):187-194.

The Effect of Obesity on Fluoroscopy-Assisted Direct Anterior Approach Total Hip Arthroplasty

Roy Davidovitch, Aldo Riesgo, Nicholas Bolz, Hamadi Murphy, Afshin Anoushiravani, Nimrod Snir

NO sig diff, other than anteversion (21 vs 18°) in morbidly obese pts

mTHA had higher inclination angles in obese pts (44 vs 41°), less likely in 'safe zone' (48 vs 67%)

Health

Co

Hip

Ob

pts

al,

isted Direct

iravani, Nimrod Snir

Health

OR Efficiency

Learning Curve

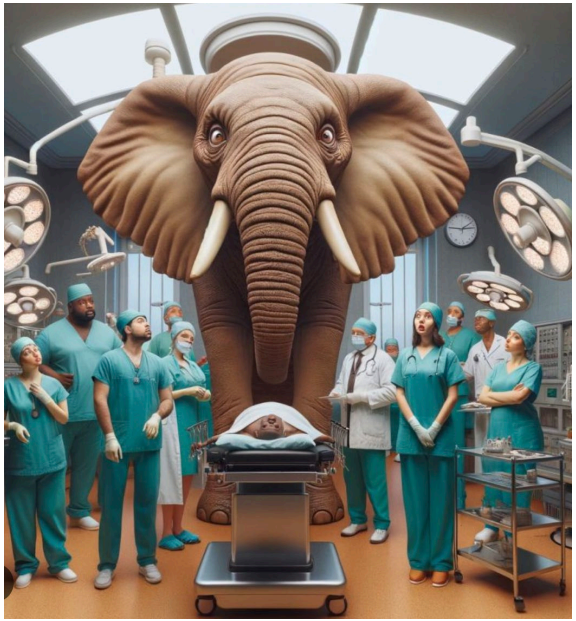
Additional Trays

Robotic Footprint

Registration Process

Technical ‘glitches’

Turnover Running 2 Rooms



Radiation Exposure

- Surgeon vs Patient
- Average fluoro shots/case
  - 21 (9-31)
- Mean fluoro time
  - 21 s (16-26s)
- Mean radiation dose/case
  - Surgeon- 7.7 x 10^{-5} mGy
  - Patient- 1.8 x10^{-3} mGy

Direct Anterior Hip Replacement Does Not Pose Undue Radiation Exposure Risk to the Patient or Surgeon

David Clinton McNabb, MD, Jason M. Jennings, MD, DPT, Daniel L. Levy, BS, Todd M. Miner, MD, Charlie C. Yang, MD, and Raymond H. Kim, MD

Investigation performed at Colorado Joint Replacement, Denver, Colorado

Radiation exposure in fluoroscopy-guided anterior total hip arthroplasty: a systematic review

Nayeem Baksh[1] · Lulu Wei[1] · Elver S. Ho[1] · Jack J. Zhou[1] · Nicholas D. Stekas[1] · Ahmed M. Eldib[1] · Qais Naziri[1]

Radiation Exposure During Fluoro-Assisted Direct Anterior Total Hip Arthroplasty

Christopher L. Pomeroy, MD, J. Bohannon Mason, MD, Thomas K. Fehring, MD, John L. Masonis, MD, Brian M. Curtin, MD *

OrthoCarolina Hip and Knee Center, Charlotte, North Carolina

The Journal of Arthroplasty 31 (2016) 1742–1745

Conclusions: Each surgeon would need to perform >300,000 DAA THAs to exceed the 800-mGy cataract threshold dose. The decision to wear protective glasses should be at the surgeon's discretion; however,

Health Care Cost

Robotic System Acquisition

Service/ Maintenance

Disposables

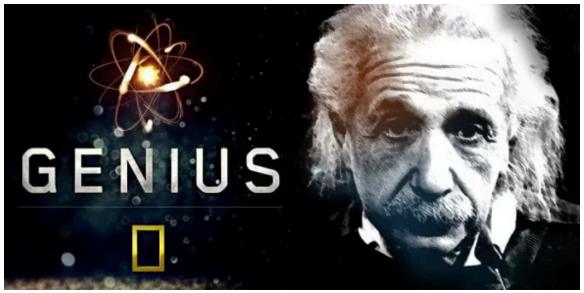
Additional Trays/ SPD

Preoperative Imaging

Summary

- DA THA w/ fluoroscopy achieves equivalent radiographic and clinical outcomes
- Useful in challenging patient populations
- Improved efficiency, reduced radiation exposure, and more economic

Radiation Exposure



Original Research

Robotic Assistance is Associated With No Intraoperative Fluoroscopy or Radiation Exposure During Direct Anterior Total Hip Arthroplasty

Sean Sequeira, MD[a], Alan Brett, PhD[b], Joseph Nessler, MD[c], Benjamin Frye, MD[d], Michael A. Mont, MD[e, *]

Arthroplasty Today 32 (2025) 101617

[a] *Medstar Union Memorial Hospital, Baltimore, MD, USA*
[b] *Stryker Orthopaedics, Mahwah, NJ, USA*
[c] *St. Cloud Orthopedics, Sartell, MN, USA*
[d] *West Virginia University, Morgantown, WV, USA*
[e] *The Rubin Institute for Advance Orthopedics, Sinai Hospital of Baltimore, Baltimore, MD, USA*

The average estimated effective radiation dose from fluoroscopy was 2.4 times that of a preoperative hip CT scan, but both were lower than the maximum acceptable annual occupational radiation