

ROBOTIC-ASSISTED HIP REPLACEMENT SURGERY

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DISCLOSURES

NONE



LEARNING OBJECTIVES

- Cause of joint pain
- Conservative treatment
- Traditional THA
- Robotic Arm Assisted



CAUSES OF JOINT PAIN

- One of the most common causes of joint pain is arthritis.
- The most common types of arthritis are:
 - Osteoarthritis (OA)
 - Rheumatoid Arthritis (RA)
 - Post-traumatic Arthritis
 - Avascular Necrosis



Common causes of joint pain

Osteoarthritis (OA) is sometimes called degenerative arthritis because it is a "wearing out" condition involving the breakdown of cartilage in the joints. When cartilage wears away, the bones rub against each other, causing pain and stiffness.

Arthritis is the nation's most common cause of disability. It limits the activities of **30 million Americans**.¹



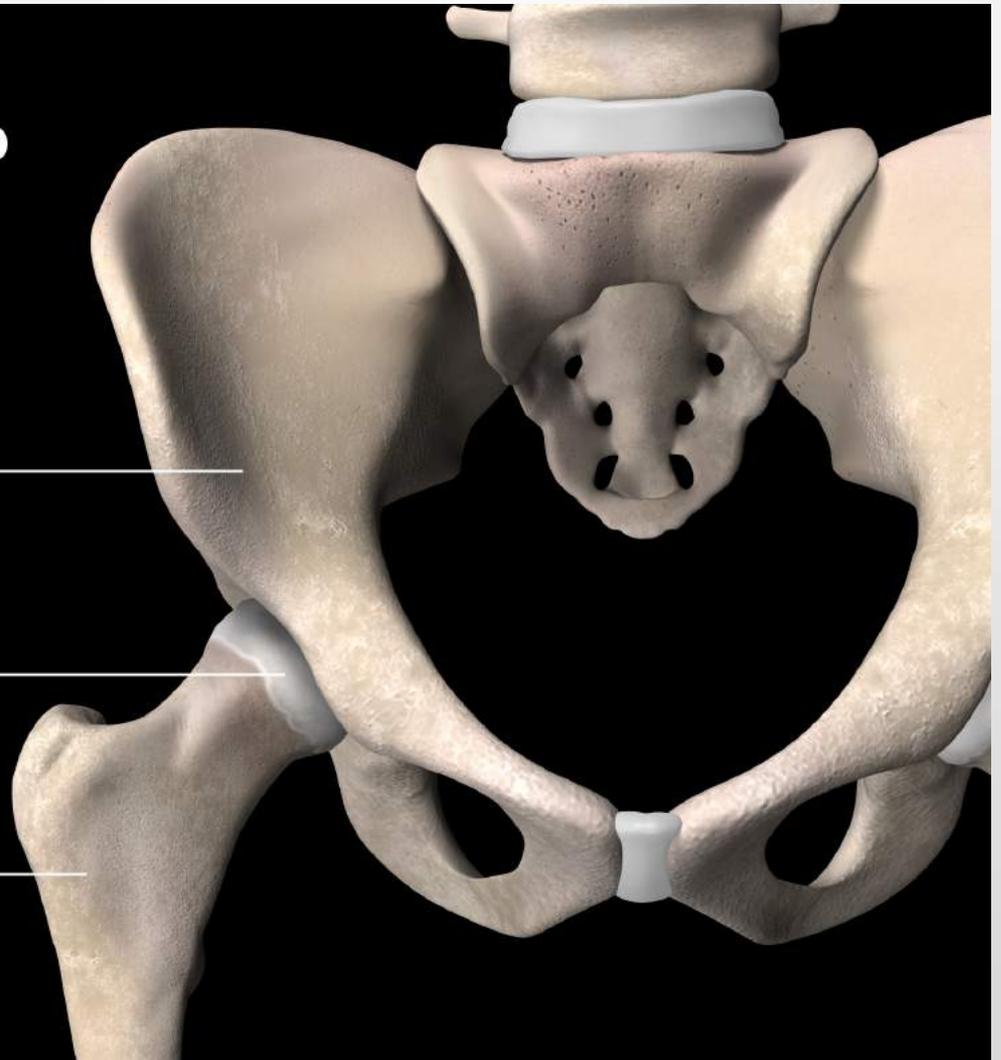
Hip Anatomy

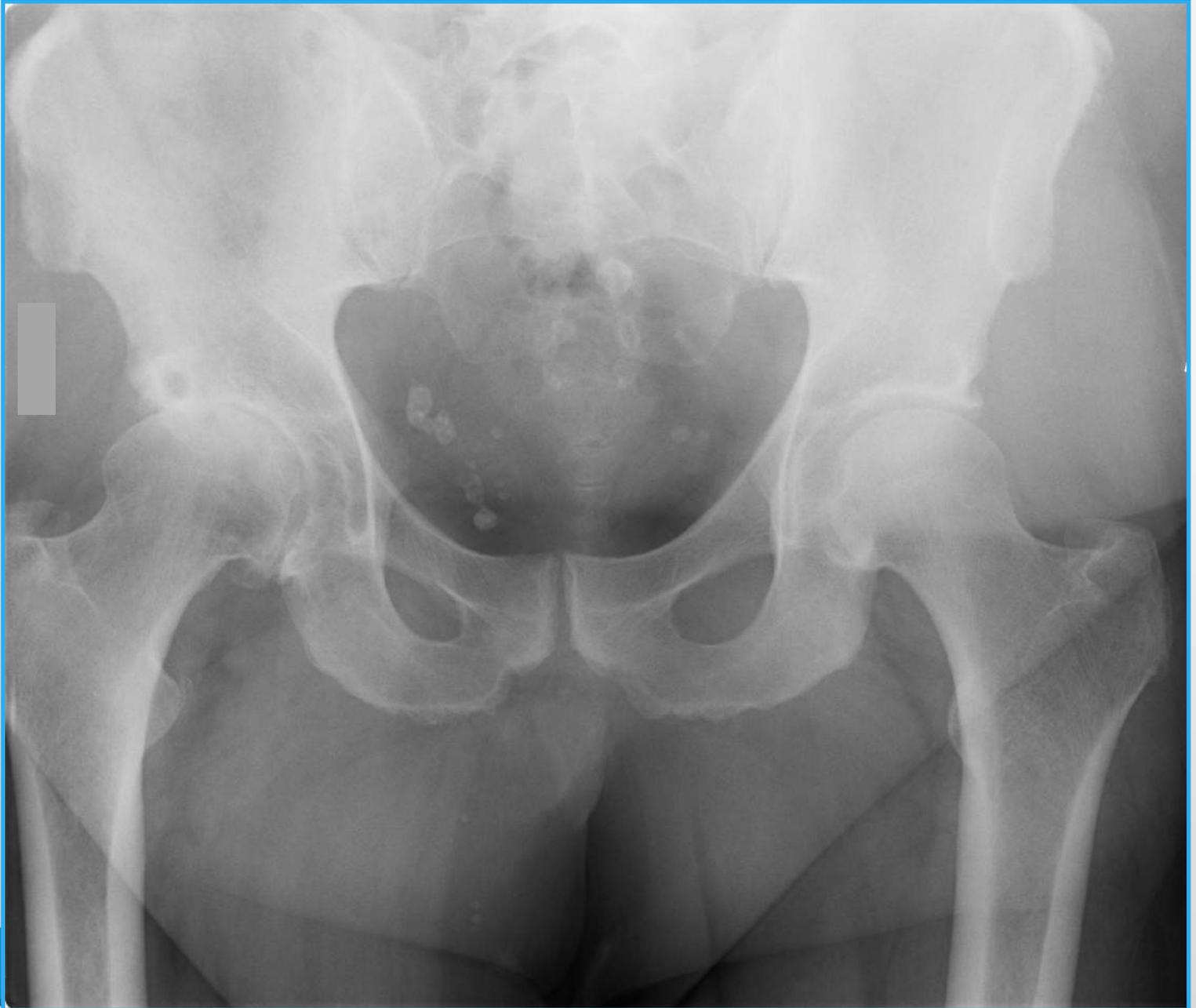
A Normal Hip

Pelvic Bone

**Healthy
Cartilage**

Femur





Non-surgical treatment options

Partnering with a doctor to discuss a treatment plan is an important part of the process.

Making one change towards a healthier lifestyle can make a big difference. Altering your **diet** or **incorporating low-impact exercises** into your daily routine help increase your range of motion and reduce the pressure of your current weight on your joints.



For every 1 pound you lose, you take off 4 pounds of pressure off the **knees**.

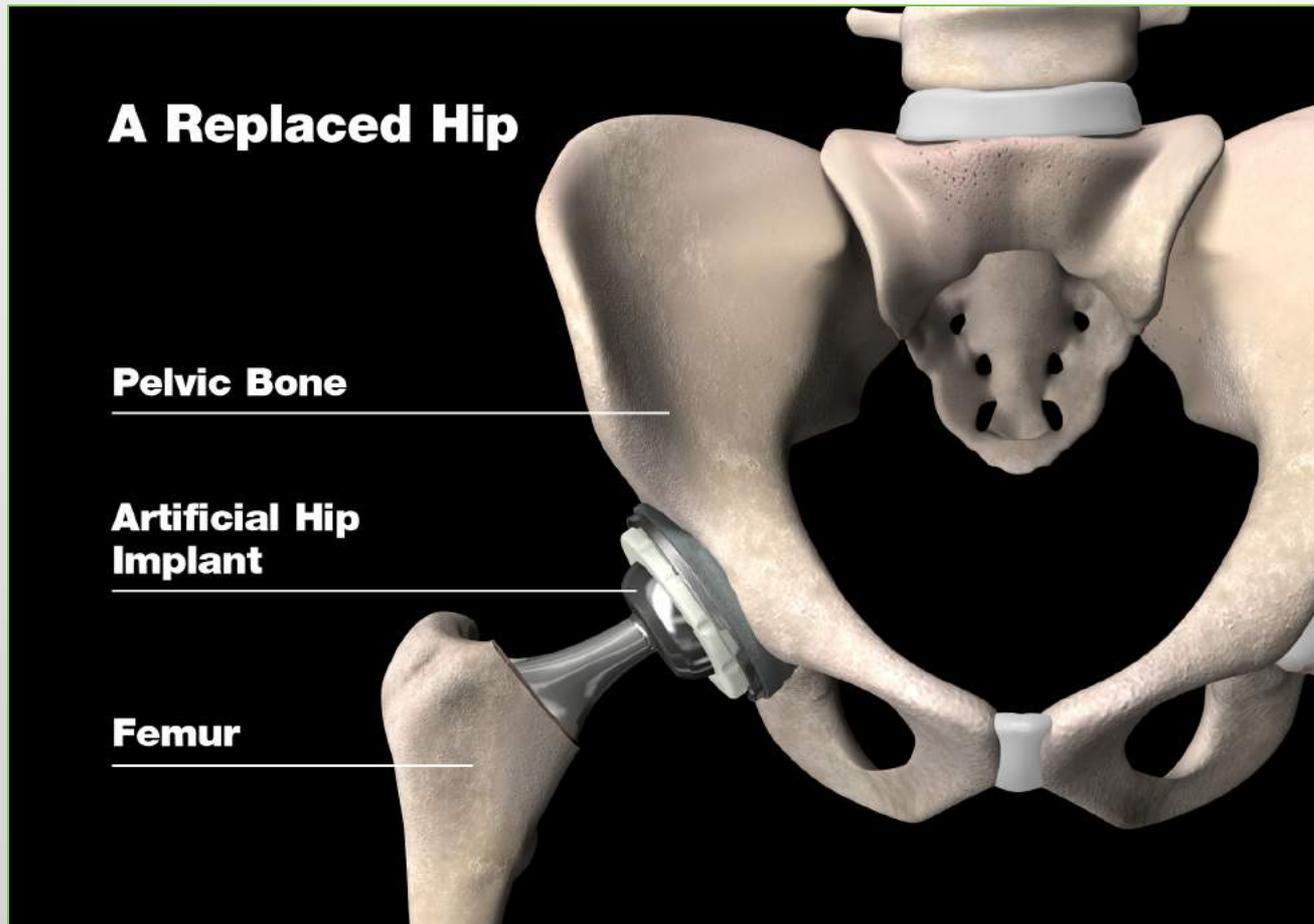


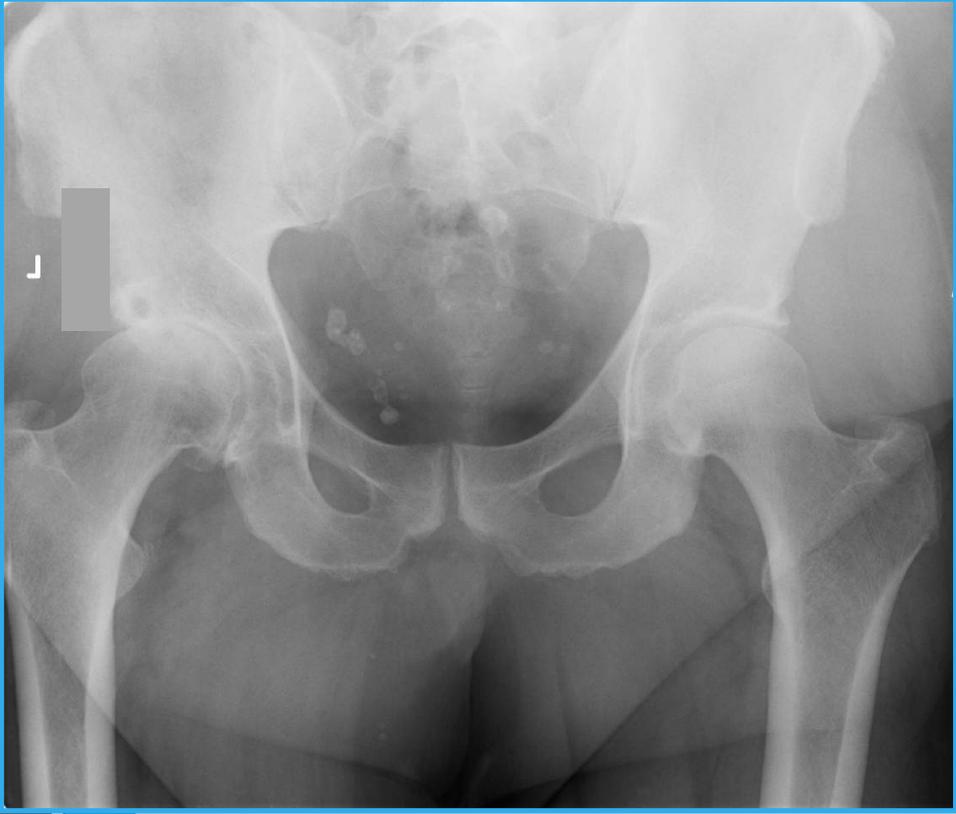
Treatment Options

- Simple Analgesics
- Medication (NSAIDS)
- Weight Loss
- Intra-articular Injections
 - Corticosteroids
 - Hyaluronic Acid
 - Platelet-Rich Plasma
 - Stem Cells
- Joint Replacement Surgery



Total Hip Replacement





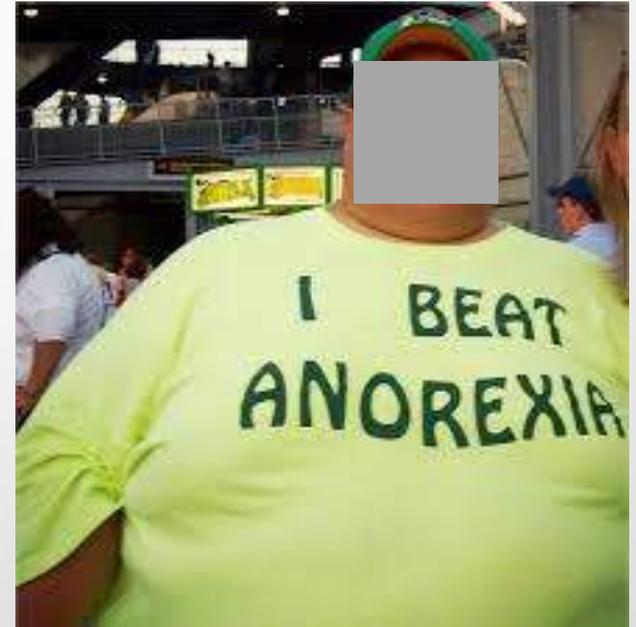
HIP REPLACEMENT INDICATIONS

- FAILURE TO IMPROVED WITH CONSERVATIVE CARE
- APPROPRIATE LOCATION OF PAIN WITH PHYSICAL EXAM AND RADIOGRAPHIC CORRELATION
- APPROPRIATE PATIENT EXPECTATIONS
 - OCCUPATION AND OR ACTIVITY LEVELS
- AGE ?



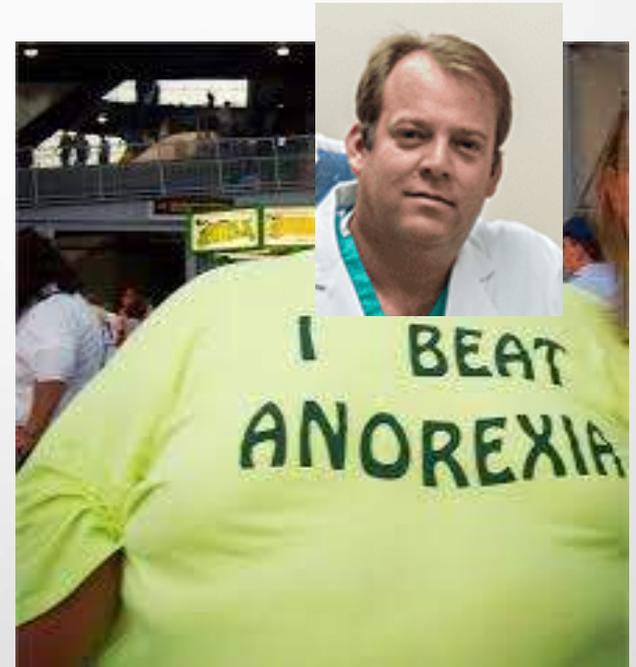
HIP REPLACEMENT CANDIDACY

- MEDICALLY CLEARED
 - SMOKING CESSATION
 - DIABETES - CONTROLLED
 - ? BMI < 35
- PRE-OPERATIVELY EDUCATED
- FAMILY SUPPORT
- LOS ₁ NIGHTS



SAME DAY HIP REPLACEMENT

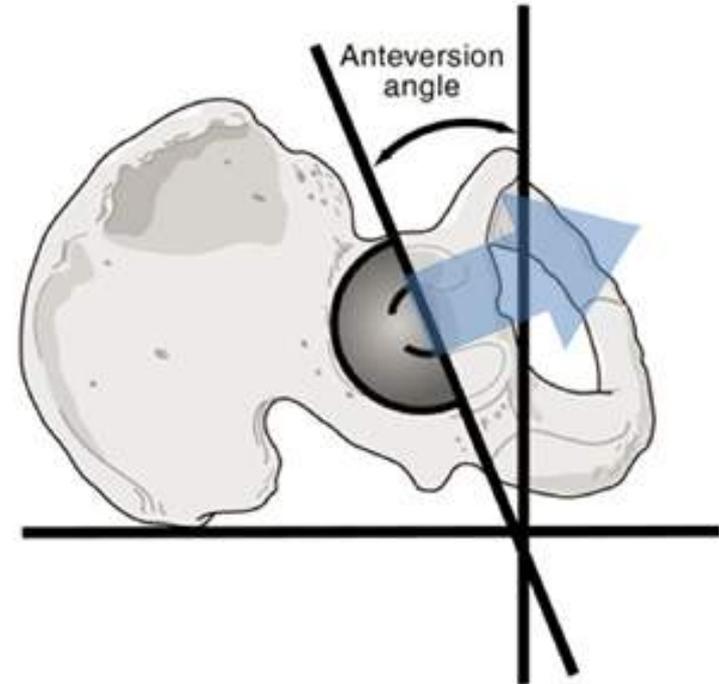
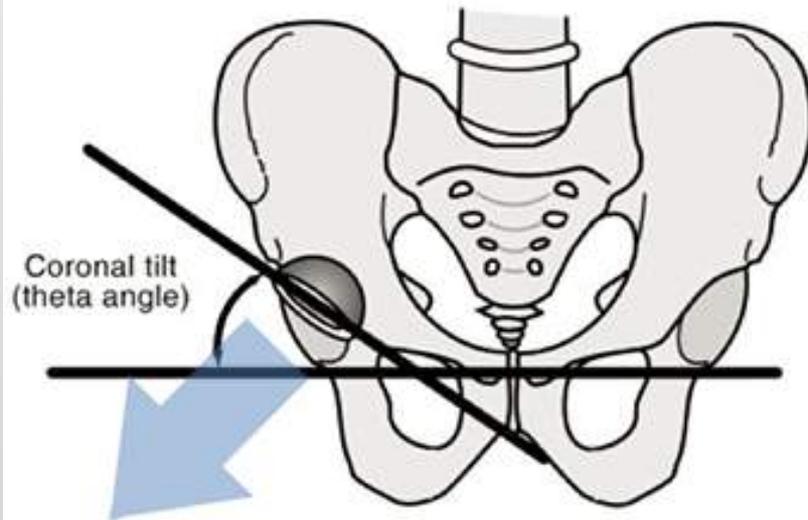
- OVERALL HEALTHY (ASA I OR II)
 - NON-SMOKER
 - NO DIABETES
 - MEDICALLY CLEARED
 - ? AGE <70
 - ? BMI < 35
- PRE-OPERATIVELY EDUCATED
- FAMILY SUPPORT
- SURGICAL CENTER OR HOSP



HIP REPLACEMENT GOALS

- FIXATION OF IMPLANTS
- STABILITY (AVOID DISLOCATION)
- THE ABOVE LEADS TO LONGEVITY OF IMPLANTS
 - PAIN CONTROL
 - IMPROVED FUNCTION
- ALIGNMENT OF IMPLANTS DETERMINES FIXATION / STABILITY

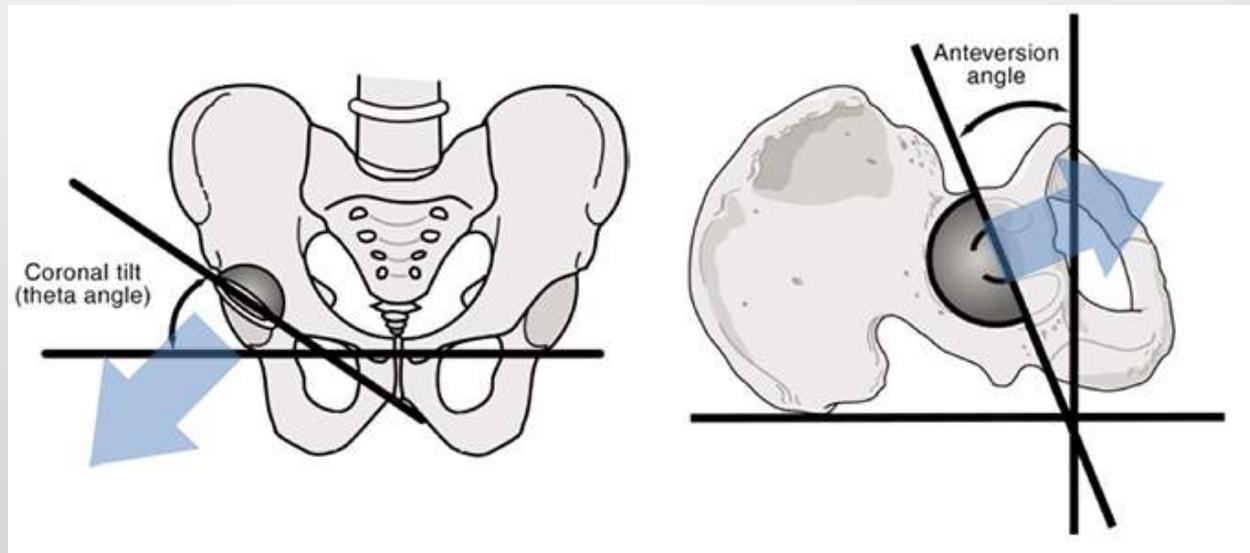
CUP ALIGNMENT

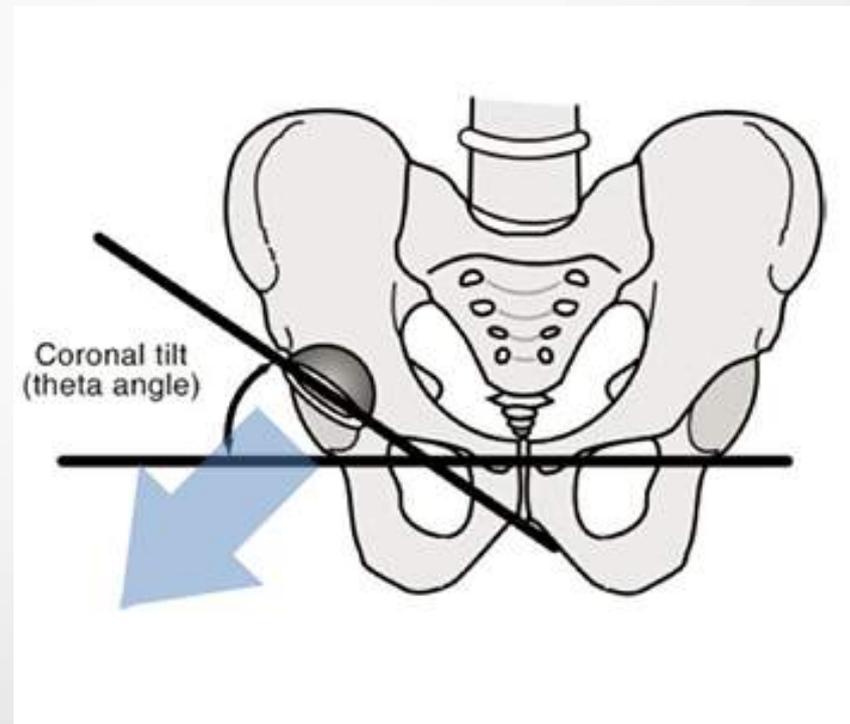
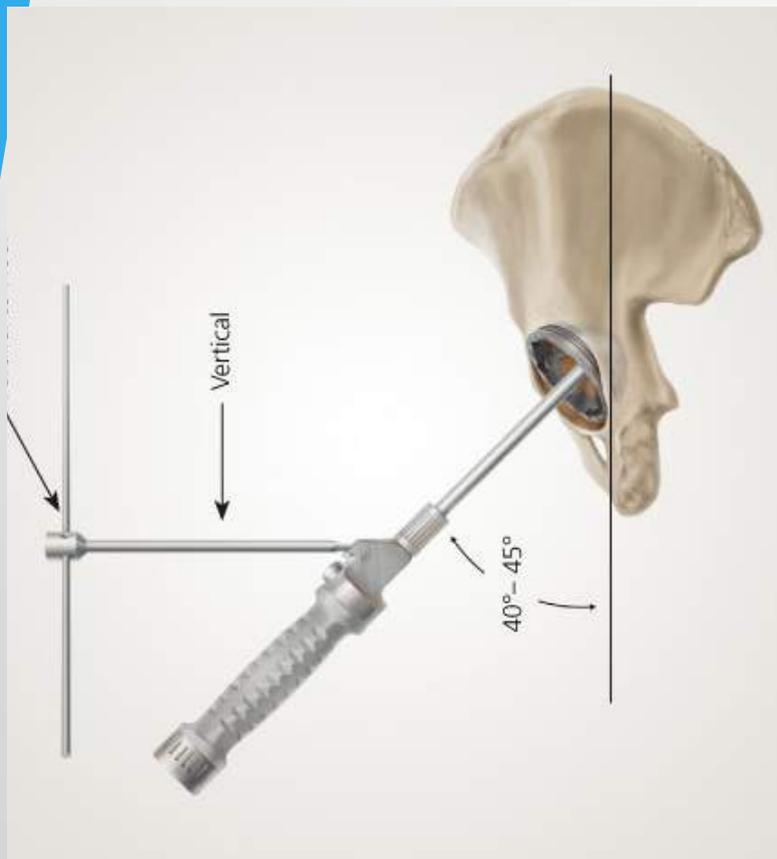


- Acceptable cup placement:

- Inclination: $30-45^{\circ}$

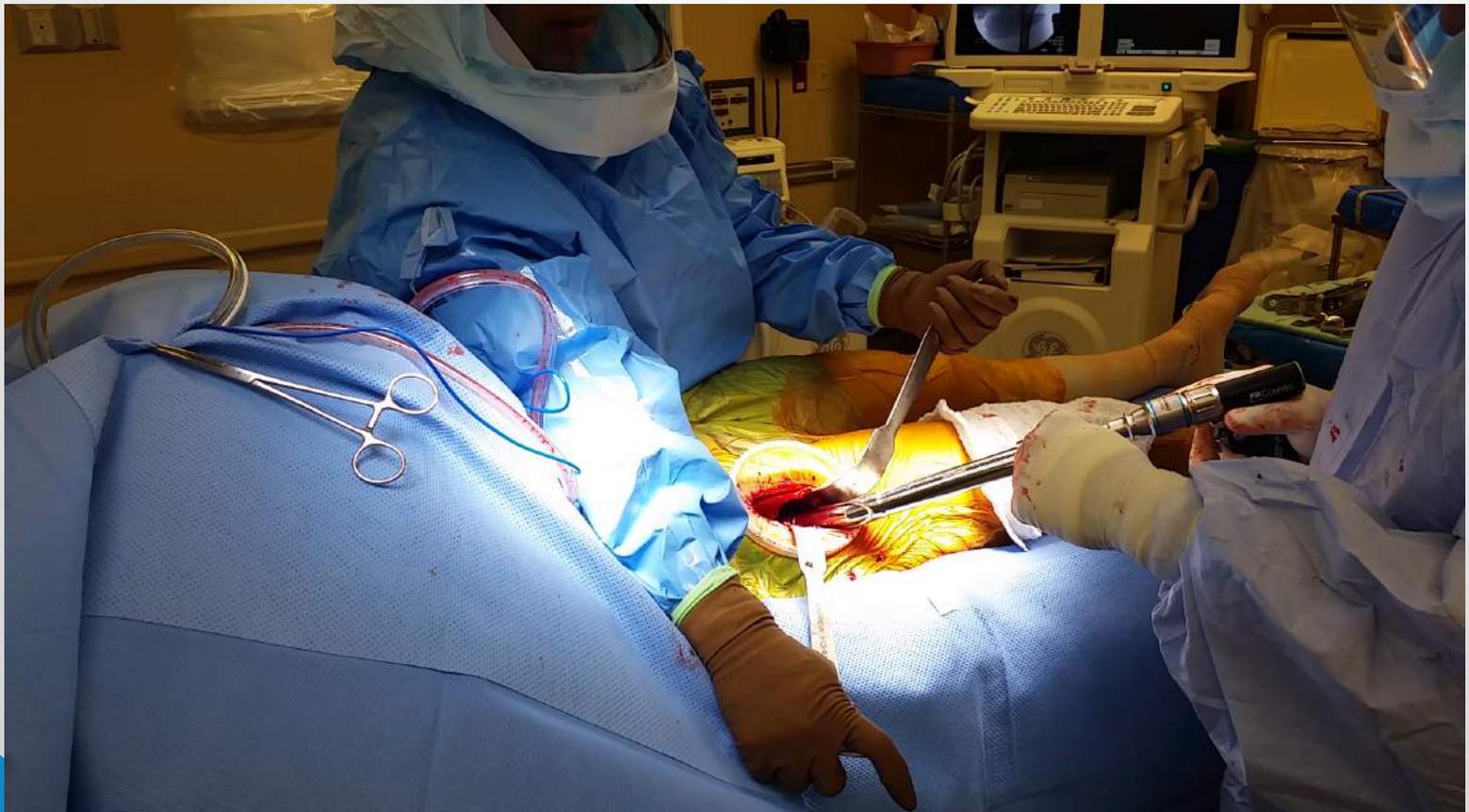
- Anteversion: $5-25^{\circ}$



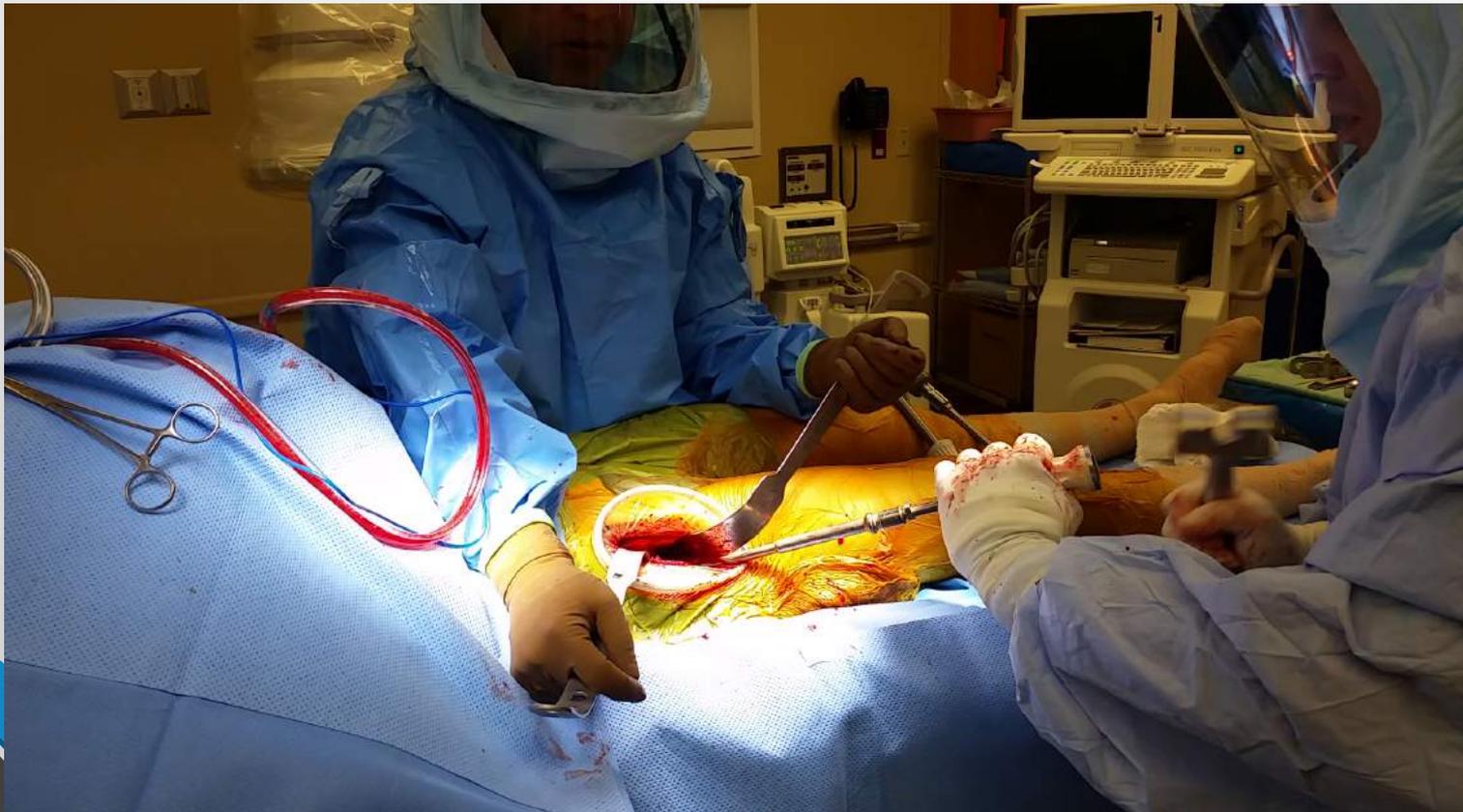
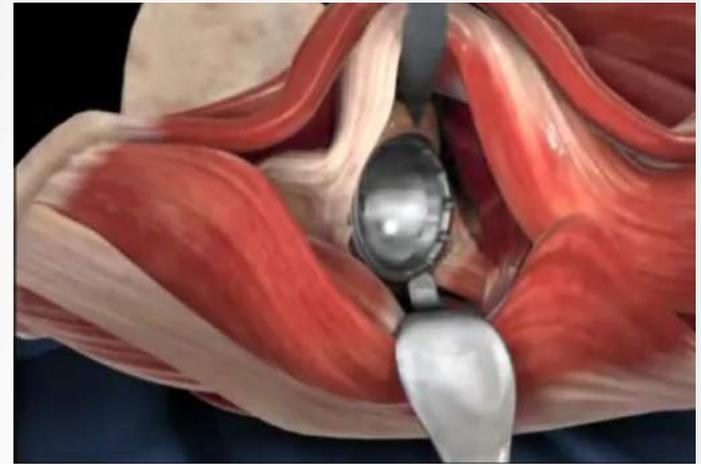


40 – 45 DEGREES

REAMING - ANTERIOR THA



CUP PLACEMENT ANTERIOR THA





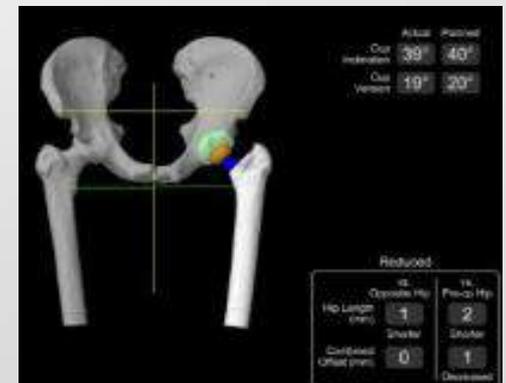
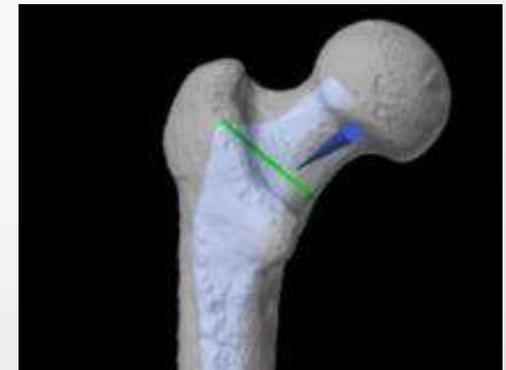
Robotic-Assisted THA

- **Robotic arm helps surgeons provide patients with a personalized surgical experience.**
- **Also called RIO (Robotic Interactive Orthopaedic Arm)**



Robotic – Assisted THA

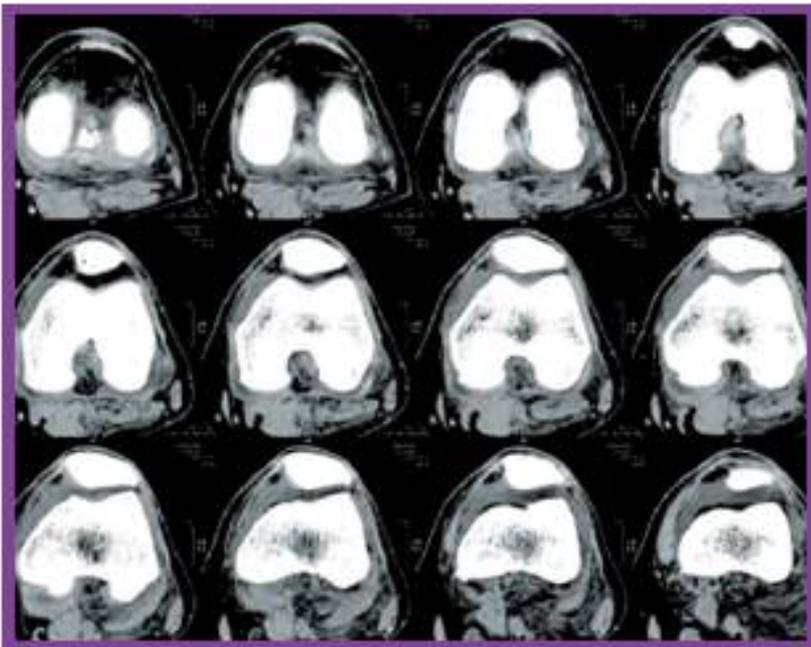
- **Enhanced planning**
- Virtual 3D model of the patients joint is generated from pre-operative CT Scan
- Patient-specific pre-operative plan enables more accurate implant positioning.⁷⁻¹¹
- **Intra-operative joint adjustment**
- Enhanced pre-operative planning allows a surgeon to assess and leg length
- **Guided single stage reaming**
- Guided single stage reaming allows for controlled translation, orientation and depth
- **Guided cup placement**
- Controlled cup orientation and auditory and visual feedback provide guidance during cup placement



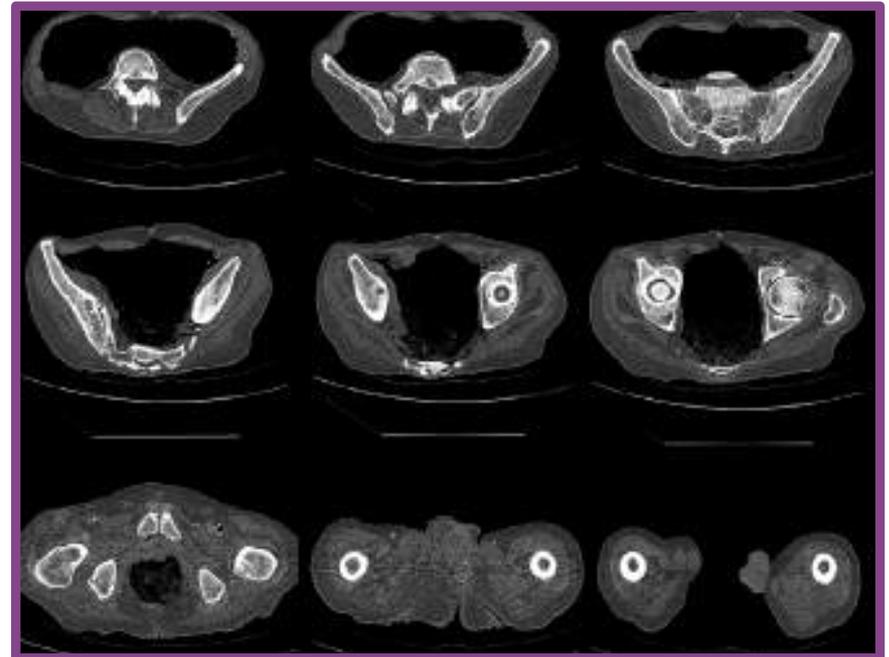
How it works

The planning begins with a CT scan before the patient enters the operating room.

Knee CT scan

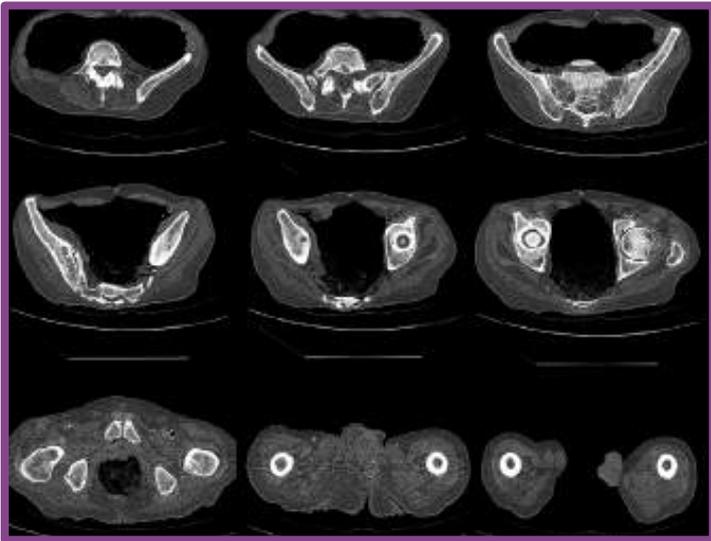


Hip CT scan



Hip 3D Virtual Model

Hip CT scan



Total hip 3D model



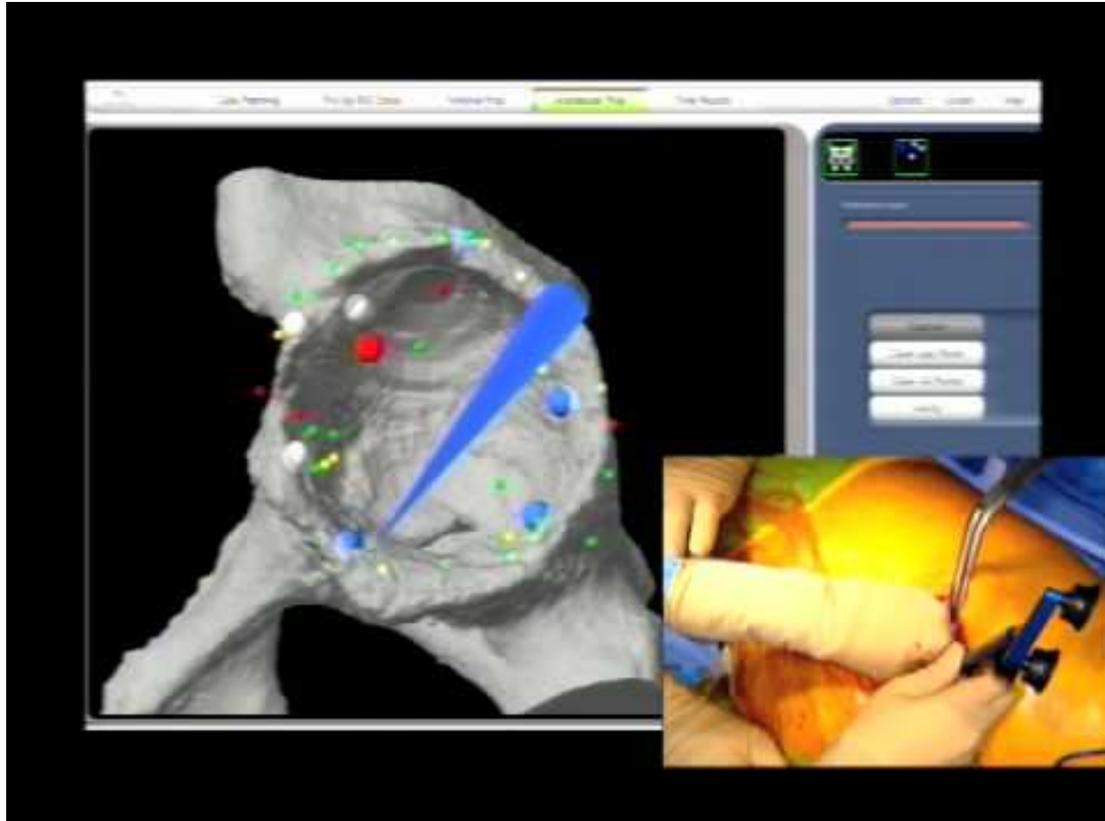
Before surgery,

The surgeon takes a CT scan of the hip or knee that is turned into a 3D virtual model. It's loaded into the System software and is used to create your personalized pre-operative plan.



Pictured above:
Total Knee and Partial Knee Systems

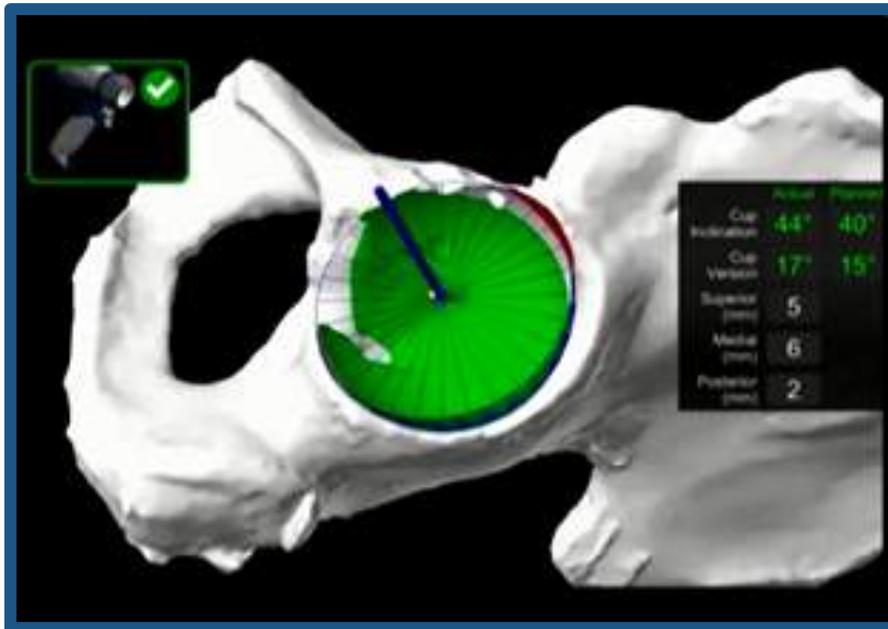
Registration of Bone Structure



Bone Preparation

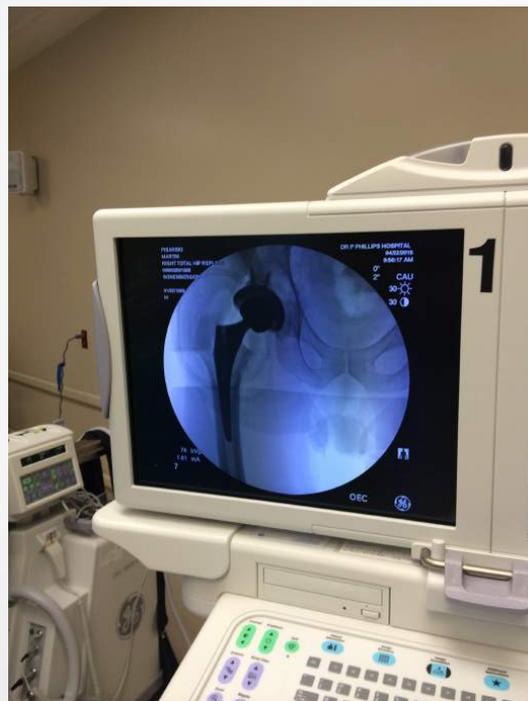
The surgeon uses RA to assist in performing your surgery based on your **personalized pre-operative plan**.

- The surgeon guides the robotic-arm within the plan's predefined area and the Robotic System helps the surgeon stay within the planned boundaries.
- The system allows your surgeon to make adjustments to your plan during surgery as needed.



Cup Placement





Summary

- Robotic-Assisted THA may improve implant positioning
- Potential disadvantages are minimal
- All 3 Robotic procedures can be “Same Day” (outpatient)
- More research is needed
 - Prospective randomized clinical trials
 - Comparisons between intra-op Fluoroscopy & Robotic-Assisted is lacking

Potential Drawbacks – Robotic THA

- Cost of CT scan
- Radiation exposure
- Increase surgical time
- Cost of Robotic
- Competition for the Robot



Summary

- “How Man & Improve Joint Replacement Outcomes”
 - Maybe...

MY PRACTICE

- COMPUTER NAVIGATED SURGERY
- 2006
- ROBOTIC CERTIFIED - 2014



