

# **MAKO Robotic Hip Replacement from the Anterior Approach**

**Fast Track Recovery**

**Nathaniel Stewart MD**

# **MAKO Robotic Hip Replacement**

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- Fast Track Recovery as an out growth of changes in surgical technique and perioperative care.**
- Advantages to the anterior approach**
- Methods to ensure accuracy in surgery compliment minimally invasive techniques**
- How the MAKO robot works**
- Our experience with the MAKO and the anterior approach**
- Fast Track Recovery and preoperative care**
- Conclusions**

# **MAKO Robotic Hip Replacement**

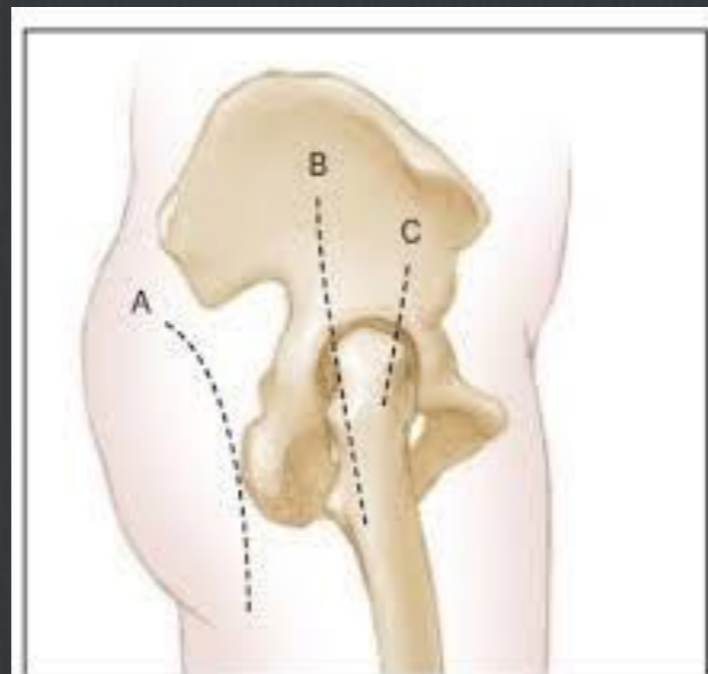
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- There are several steps in the operation to replace a hip. The approach is the first, basically getting down to the bones that form the joint.**

# MAKO Robotic Hip Replacement

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- The approach starts with a skin incision. The photo demonstrates the incision for the anterior, anterolateral, and posterior approaches



# **MAKO Robotic Hip Replacement**

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- We are going to compare the anterior approach to the posterior approach, since the posterior has been the most common for decades.**

# MAKO Robotic Hip Replacement

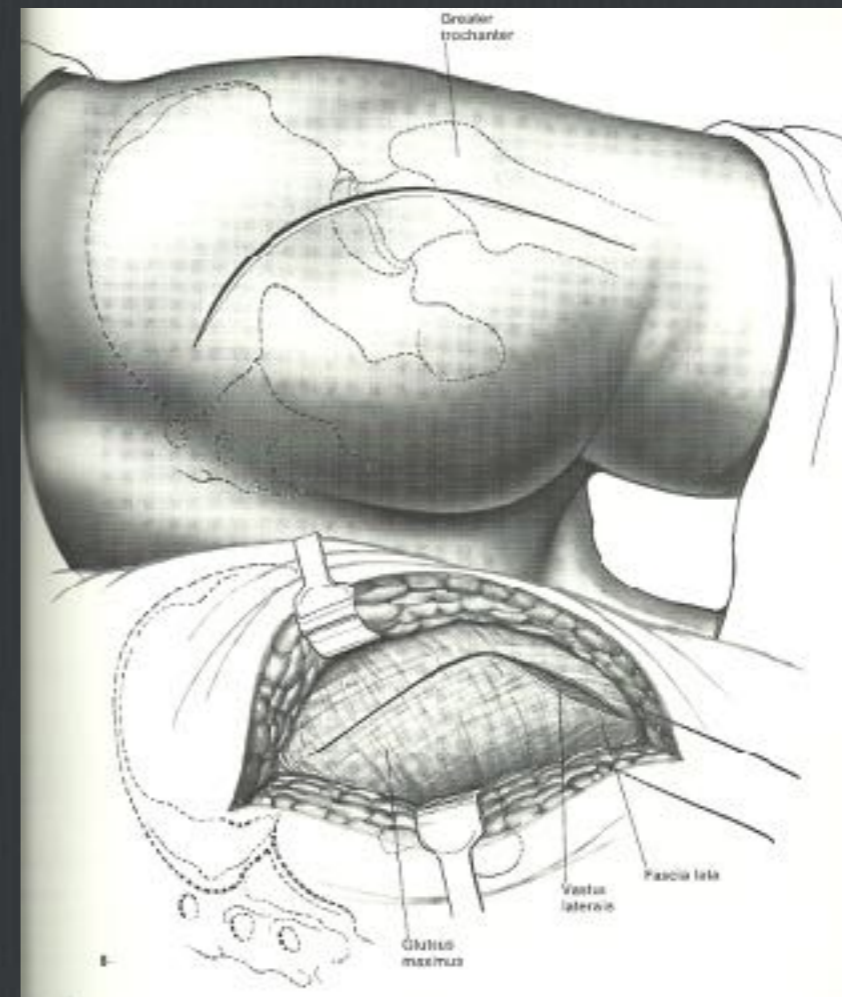
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- For the posterior approach the patient has to lay on their side.



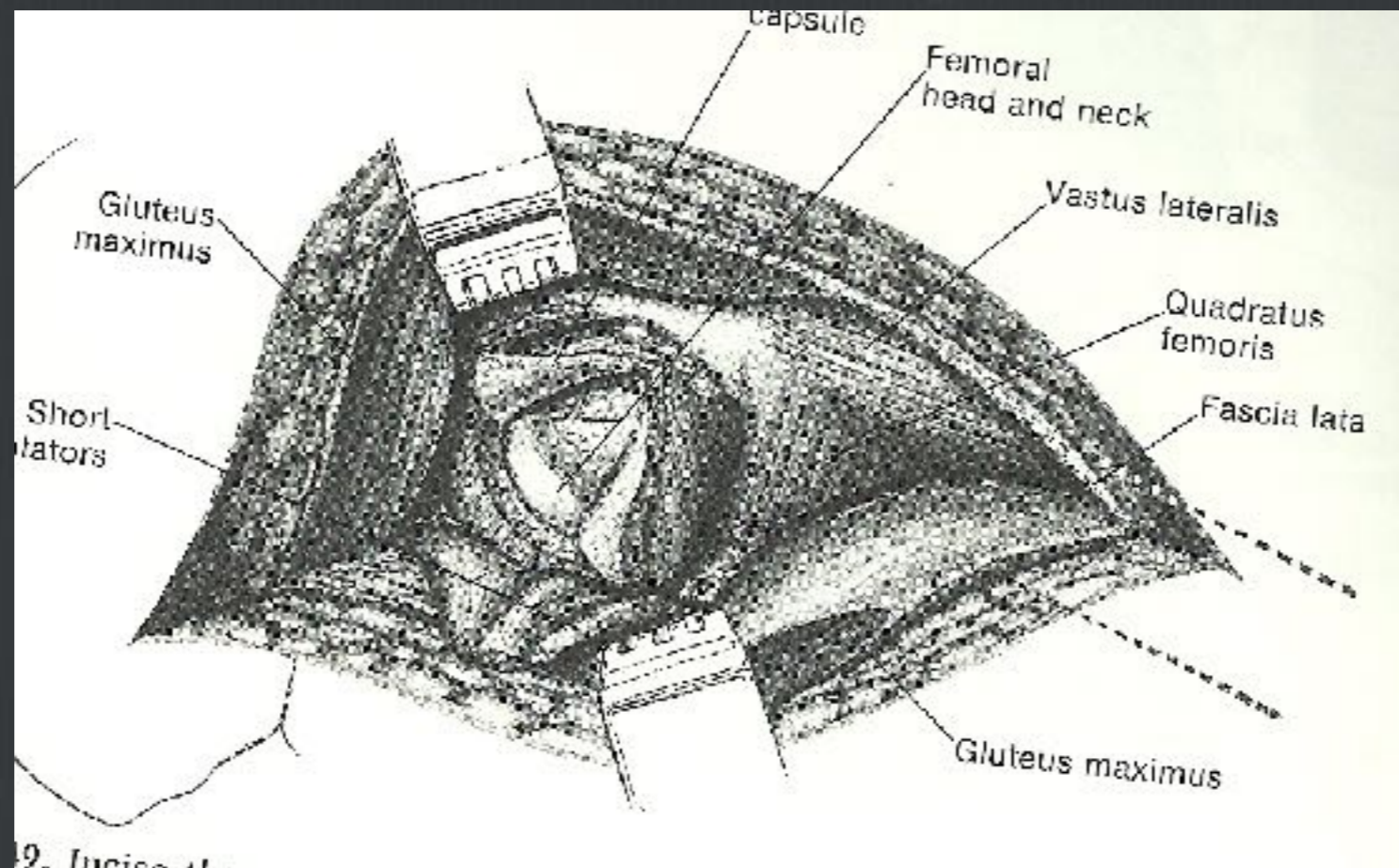
# MAKO Robotic Hip Replacement

- **Posterior Approach**
- **A large muscle must be split**



# MAKO Robotic Hip Replacement

- **Posterior Approach**
  - **Smaller muscles must be cut**





# MAKO Robotic Hip Replacement

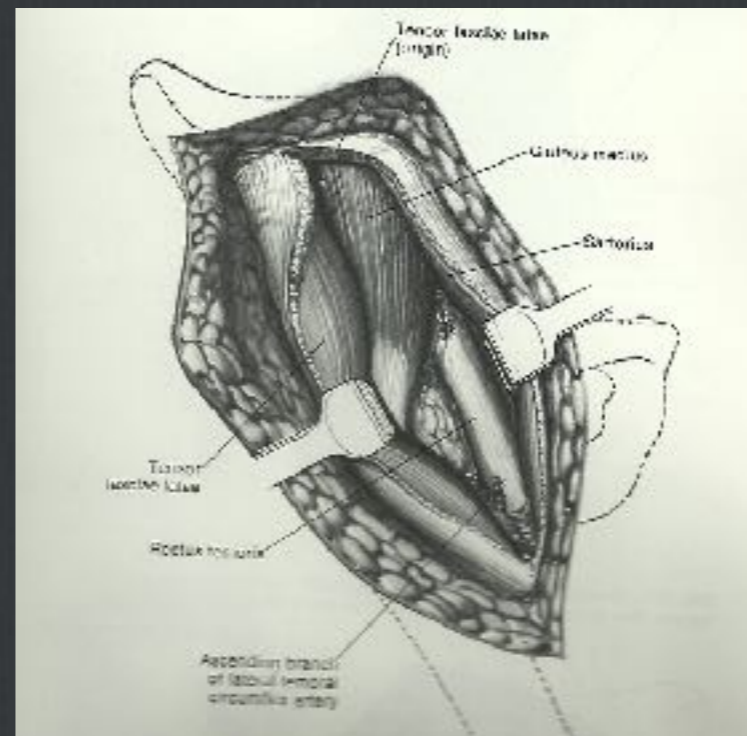
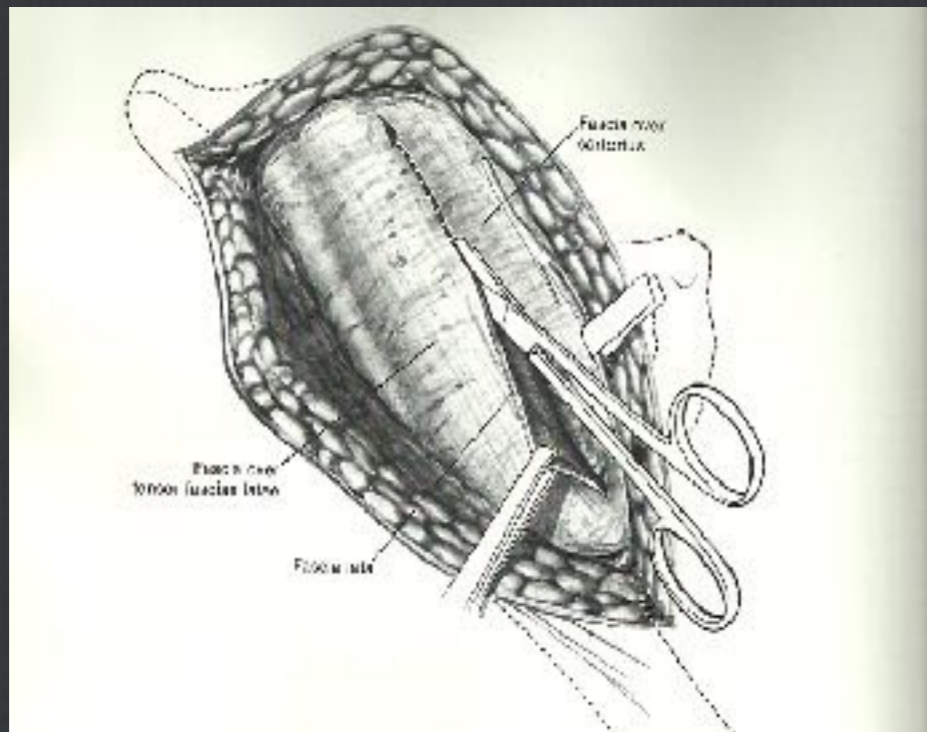
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- Anterior Approach



# MAKO Robotic Hip Replacement

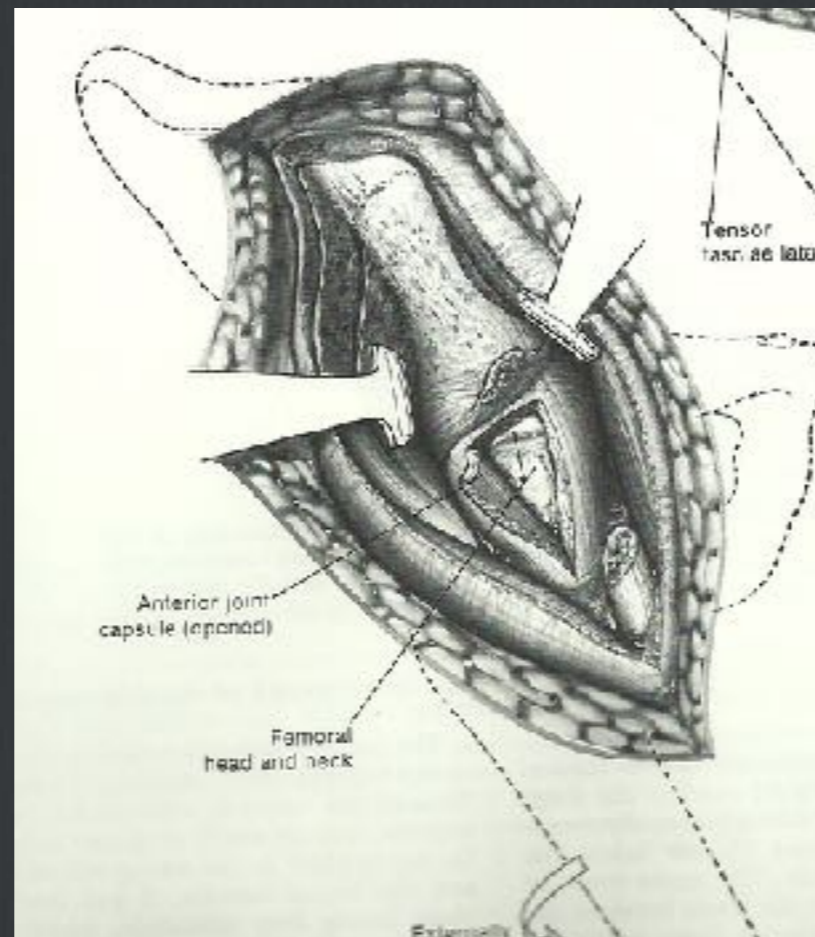
- Anterior Approach
  - No outer muscle layer to split



# MAKO Robotic Hip Replacement

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- No muscles to be cut on the lower layer



# MAKO Robotic Hip Replacement

Less muscle damage leads to faster recovery

ACUTE CARE STAY		OUT-PATIENT THERAPY			NOTES:
<p><b>Week 0</b>                      Ankle Pumps      Quad Sets                      Gluteal Sets      Heel slides                      SAQ's**            LAQ's**                      Abd/Add**                      **Assist as needed</p> <p><b>ROM PRECAUTIONS:</b>                      Hyperextension and external rotation, and those two motions combined are the two motions that would cause discomfort or stress to the repair site. Be aware of how these positions effect movement occurs and avoid pain in these motions.</p> <p>Bed mobility                      May sleep on either side with pillow in between their knees. No prone sleeping for 3 months.</p> <p>WBAT with assistive device, unless modified by MD.</p> <p>ADL's: May not be necessary. Use devices as needed for soft tissue discomfort needs.</p>		<p><b>1-2 weeks post-operative</b></p> <p>Continue post-op exercises</p> <p>Stretches: Hip adductor                      - Hip Flexor (Thomas)                      - Hip fall-out</p> <p>Hip Adductor Ball squeeze in hooklying</p> <p>Hip Abductor Isometric in hooklying</p> <p>Standing: Hip Abduction                      - Hip Extension                      - Hip Flexion</p> <p>Heel raises</p> <p>Bike</p> <p>Gait training: Crutches, or walker for 3 weeks to avoid risk of stress fracture. Pt to avoid limping. As they wean off, may start with short distance, bed to bath without device, no limping.</p> <p>Pool Therapy with occlusive dressing.</p>	<p><b>3-5 weeks post-operative</b></p> <p>Continue previous stretches</p> <p>Continue previous strengthening</p> <p>Progress to:                      Hip Abduction with resistive tubing in hook-lying</p> <p>Sub-max isotonic with 1-5 pounds</p> <p>Hip Abduction side-lying Active-Isometric-Isotonic</p> <p>Bridge-double leg</p> <p>Clamshell</p> <p>Balance-double leg to single leg</p> <p>Total Gym</p> <p>Walking activation                      - March                      - Sidestep                      - Backwards</p> <p>Pool therapy</p> <p>Gait training- 1 crutch or cane</p>	<p><b>6-10 weeks post-operative</b></p> <p>Progress ROM and strength to WNL or equal to opposite extremity</p> <p>Progress strengthening of Quad and Hip groups</p> <p>Total gym with single leg</p> <p>Leg press</p> <p>Mini-squats</p> <p>Step-ups forward and lateral</p> <p>Wall sits</p> <p>Balance</p> <p>Treadmill walking forward and backward</p> <p>Walking without a limp</p> <p>D/C cane when walking without a limp</p> <p>Address work, sport and recreational functional activity demands</p>	

Any Questions? Please contact:

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# MAKO Robotic Hip Replacement

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- Another advantage is fewer dislocations with the anterior approach



- Three possible factors
  - Less muscle damage
  - Less common position of instability
  - More accurate component positioning

# MAKO Robotic Hip Replacement

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- Positions to avoid for posterior approach patients



# MAKO Robotic Hip Replacement

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- Positions to avoid for anterior approach patients**



# **MAKO Robotic Hip Replacement**

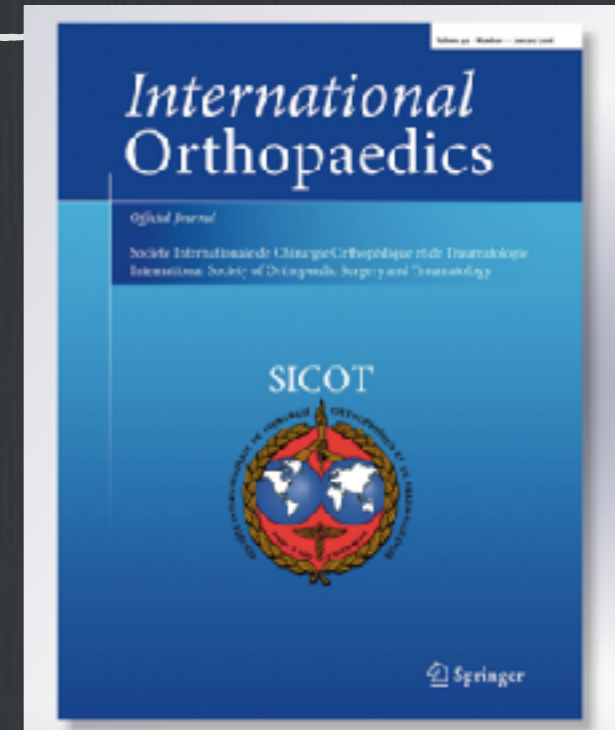
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- Switching to the direct anterior approach allowed us to assess the accuracy of component positioning using intraoperative x-ray more effectively**
- Dr. Weifeng Ji and I published an article recently in the International Orthopedics Journal comparing the accuracy of the anterior approach vs the posterior approach based on the patient's intraoperative x-rays**



# MAKO Robotic Hip Replacement

- Intra operative x-ray
  - Improves accuracy
  - Is more effective with the anterior approach
  - Published by Weifeng Ji and Nathaniel Stewart in the International Orthopedics Journal in January 2016



# **MAKO Robotic Hip Replacement**

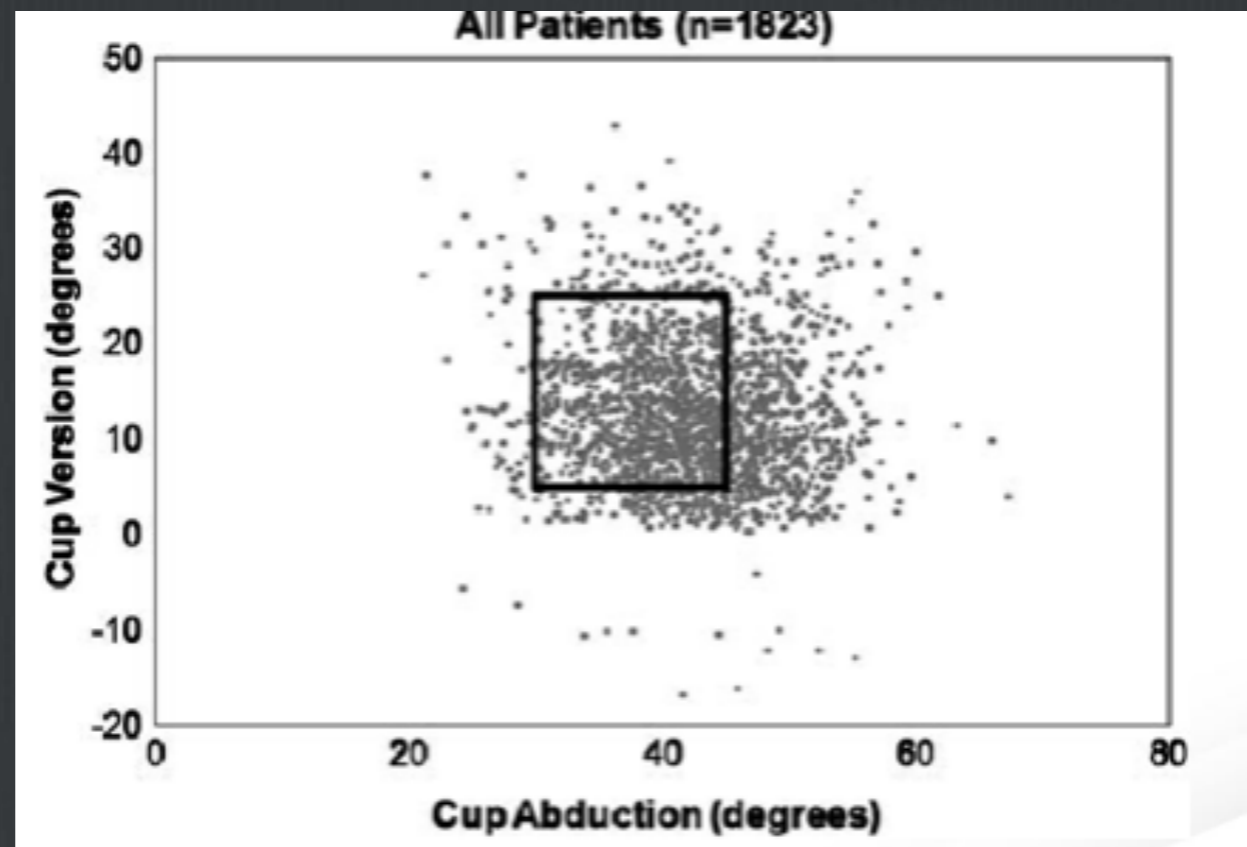
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- Component positioning is important**
  - It effects**
    - Longevity of the components**
    - Chance of dislocation**
    - Leg length**
    - Muscle power**

# MAKO Robotic Hip Replacement

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- While component positioning is important, it's not easy with traditional methods



# **MAKO Robotic Hip Replacement**

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- In general, methods to assist with component positioning**
  - Intra operative X-ray**
  - Navigation**
  - MAKO robotic assist**

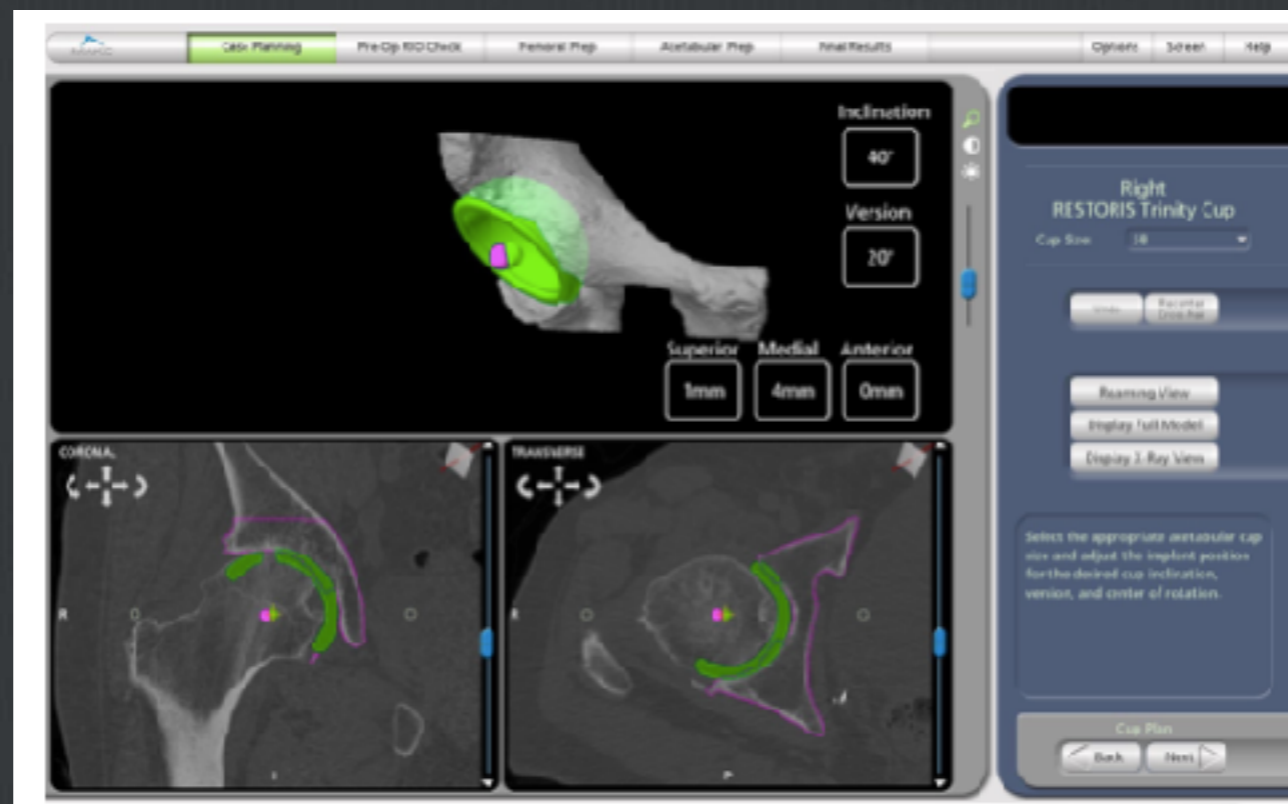
# **MAKO Robotic Hip Replacement**

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- Navigation**
  - Was similar to, though less sophisticated than, MAKO robotic assist. MAKO incorporates a sophisticated form of navigation with a mechanical (robotic) interface.**

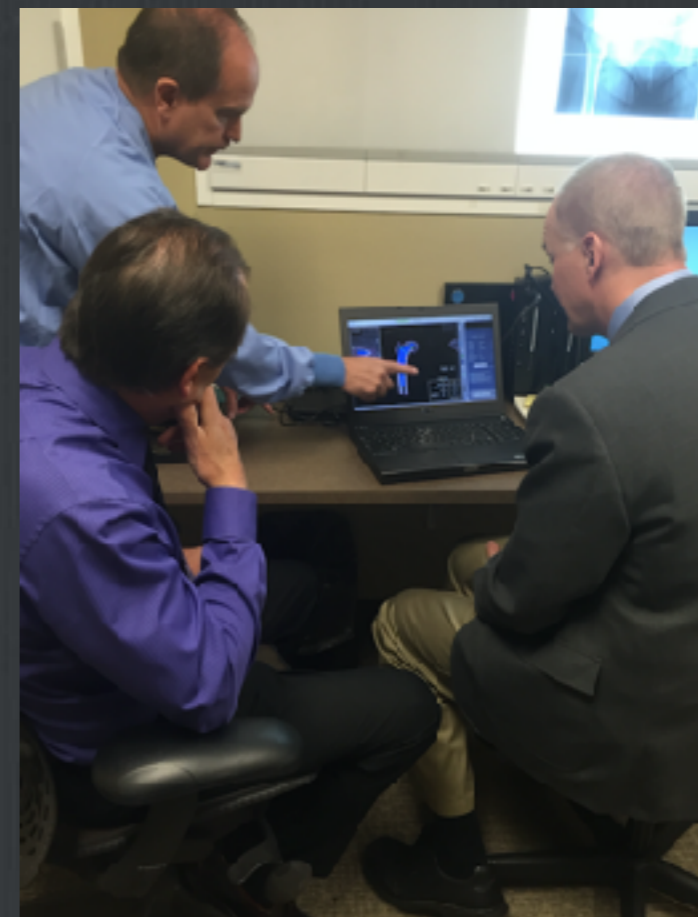
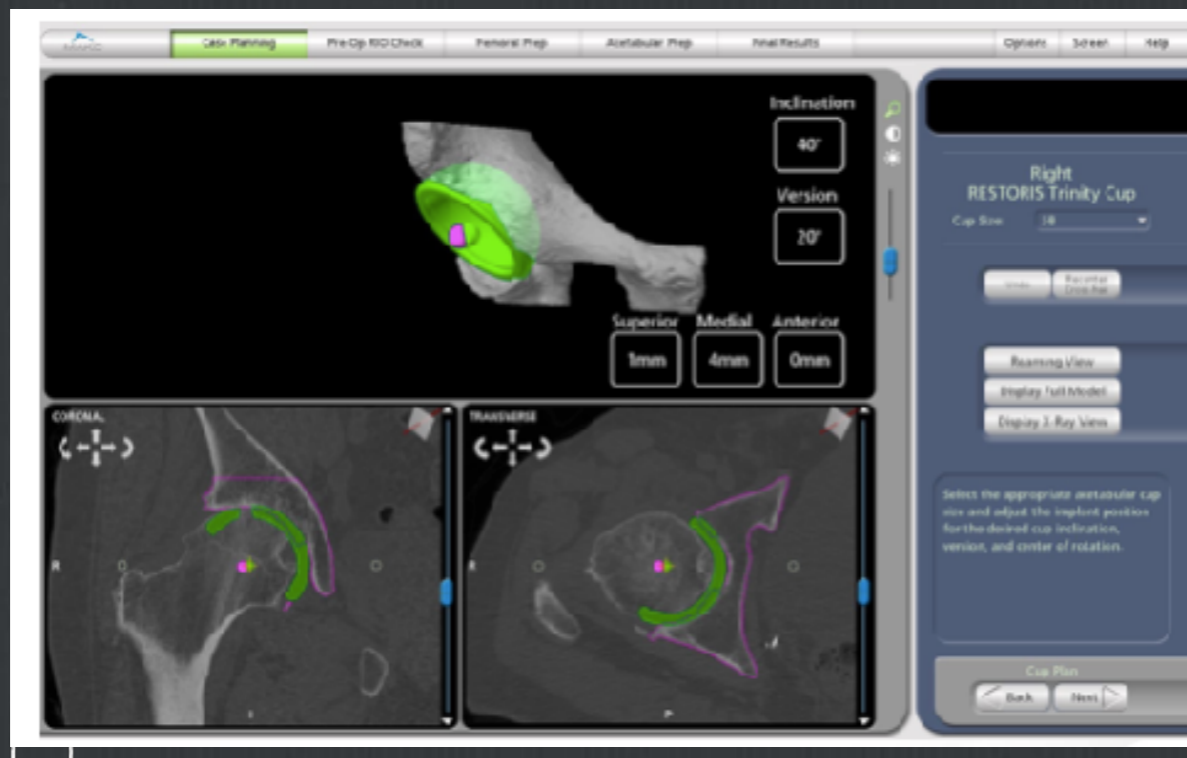
# MAKO Robotic Hip Replacement

- MAKO hip replacement starts with a CT scan of your hip to fully define your bony anatomy



# MAKO Robotic Hip Replacement

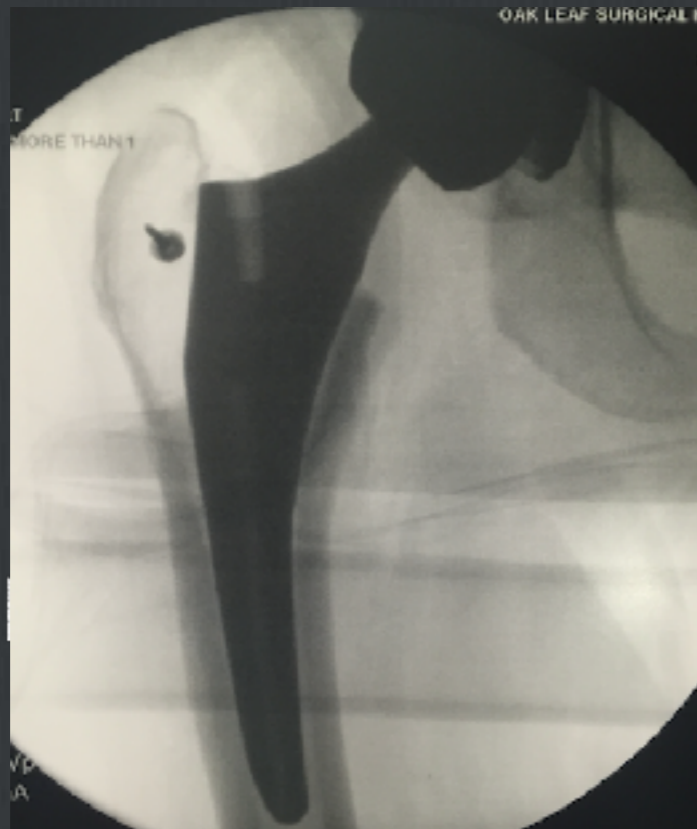
- Your surgeon then plans your surgery on a computer, which is very similar to a computer aided design (CAD) work station used in many other industries



# MAKO Robotic Hip Replacement

- During the operation the computer needs to "register" where your bony anatomy is in space

- First bony markers





# MAKO Robotic Hip Replacement

- A pointer, which communicates with the computer, completes the registration



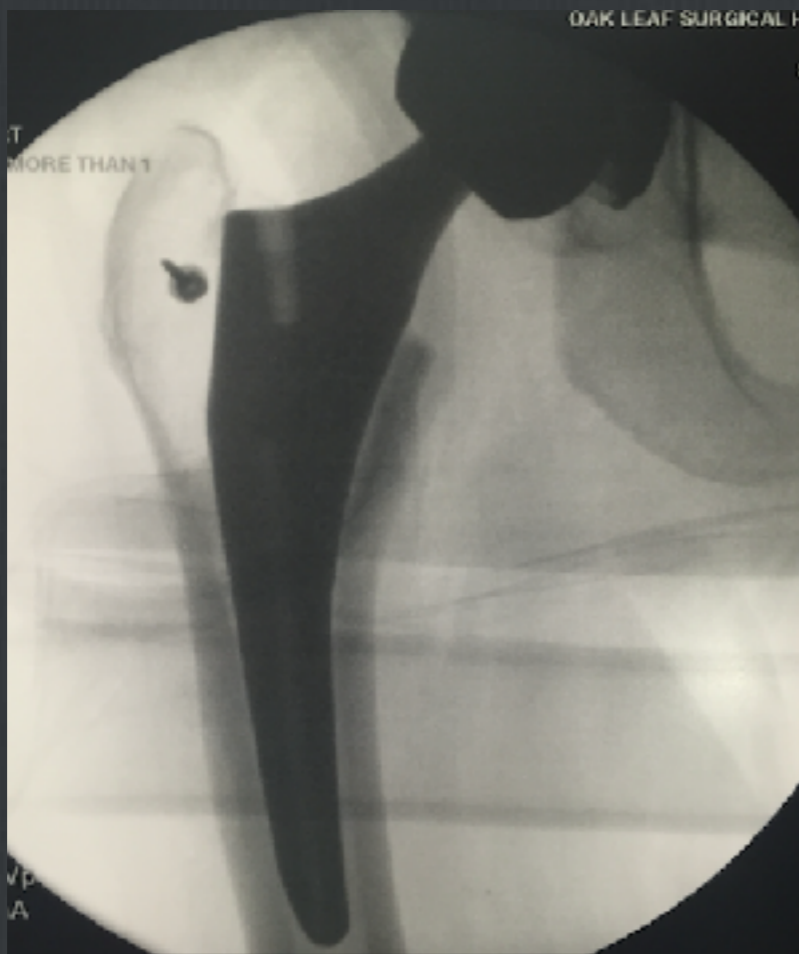
# Mako Robotic Hip Replacement

- Once the work begins on the bone, the surgeon provides the force while the robot provides guidance



# MAKO Robotic Hip Replacement

- The robot continues to provide guidance through out the procedure



# MAKO Robotic Hip Replacement

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- At this time, I continue to use intra-operative x-ray to double check the MAKO



# **MAKO Robotic Hip Replacement**

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- Our experience**
  - As of October 12th, 2016 OLSH has done 89 MAKO robotic hip replacements**
    - 7 bilateral total hip arthroplasties**
    - 74 single total hip arthroplasties**

# **MAKO Robotic Hip Replacement**

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- My personal experience as of October 12th, 2016**
  - 344 direct anterior hip replacements**
  - 68 MAKO robotic hip replacements**
  - We continue to monitor our results, noting increased accuracy of component placement and faster recovery**

# **MAKO Robotic Hip Replacement**

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- Robotics as part of rapid recovery program**
  - The idea is not to have the patient go home before they are ready, but to have them truly ready to go home sooner than they currently are.**

# MAKO Robotic Hip Replacement

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- **Injection of Exparel**





# **MAKO Robotic Hip Replacement**

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- Fast Track Recovery**
  - Multimodal Analgesia**
    - Scheduled Tylenol**
    - Scheduled small amount of narcotic**
    - Cold therapy**
    - Compression therapy**

# **MAKO Robotic Hip Replacement**

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- Fast Track Recovery**
- Aggressive treatment of nausea**
  - Fluid bolus**
  - Scopolamine patch**
  - IV anti-emetics**

# **MAKO Robotic Hip Replacement**

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- Fast Track Recovery**
- Aggressive mobilization**
  - Walking in the hall within a few hours of arrival on floor**
  - Walking every couple of hours while awake**

# **MAKO Robotic Hip Replacement**

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- Fast Track Recovery**

- Current Inpatient Experience**

- Data collected from June 30th-September 30th, 2016  
from 50 Mako THA's performed by Dr. Stewart**

- 64% discharged on POD 1**

- 26% discharged on POD 2**

- 10% discharged on POD 3**

# **MAKO Robotic Hip Replacement**

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- Outpatient Therapy and Restrictions**
  - Therapy and restrictions are primarily dictated by surgical approach**
  - Both DA and posterior approach patients benefit from rapid recovery protocols**

# MAKO Robotic Hip Replacement

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- Outpatient Therapy



# **MAKO Robotic Hip Replacement**

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## **Conclusions**

- Fast track recovery is made possible due to the direct anterior approach and multimodal pain control**
- Approach effects recovery and post op restrictions**
- MAKO Robotic Assist is a sophisticated tool to improve accuracy, which follows the tradition of OLSH leading the region in orthopedic innovation**
- The use of robotics during hip replacement allows for a fast track recovery program to be implemented in our younger, healthier patients**

# **MAKO robotic Hip Replacement**

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- Its the trust that our patients put in us that drives us to do the best that is humanly possible.**