

Total Joint Replacement Community Seminar

Journey to Joint Replacement

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Journey to Joint Replacement

- Clinical presentation
- Epidemiology/Pathophysiology
- Conditions
- First steps
- Options/Considerations
- What to expect/How to decide
- Surgery
- Recovery
- Life after joint replacement

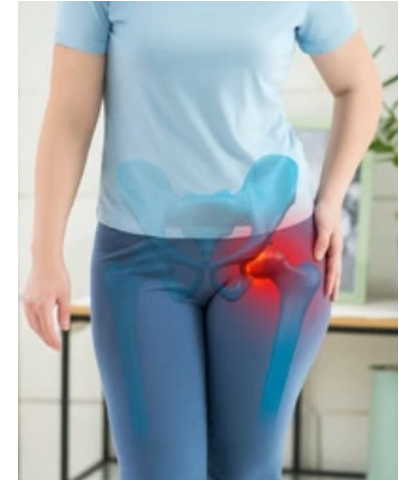


Presentation and initial treatment

Clinical Presentation

- Hip

- Pain, usually in the front rather than the side
- Stiffness/Loss of motion
- Sensation of clicking/catching
- Difficulty with various activities



- Knee

- Pain, usually along the joint line or under the knee-cap
- Stiffness, especially in the morning or after prolonged sitting
- Sensation of clicking/popping/grinding
- Swelling of the knee
- Difficulty with various activities



Clinical Presentation

- Symptoms are progressive with occasional flare-ups
- Higher impact activities will often be affected first
- Over the counter medications and activity modifications may help initially

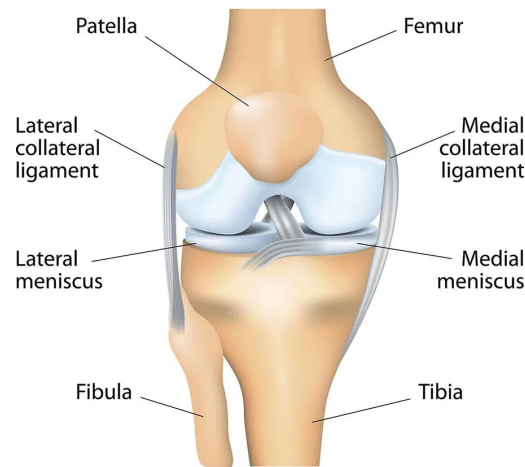
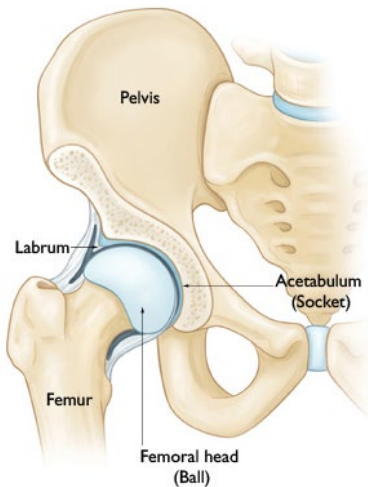


Epidemiology

- One in four U.S. adults (54.4 million people) report a diagnosis of arthritis
- Prevalence of arthritis is projected to increase to 78.4 million U.S. adults by 2040
- Among people with arthritis, about 44% report arthritis-attributable activity limitations
- Arthritis is the leading cause of disability in the U.S.
- More common in women, elderly, obese, and inactive individuals
- Over \$300 billion attributed to arthritis each year equaling 1 percent of U.S. GDP

Basic anatomy and pathophysiology

- Arthritis is the loss of articular cartilage
- Cartilage covers joint surfaces and allows them move with minimal friction and generally without pain
- Arthritis is generally a slow process (months to years)
- Articular cartilage doesn't regenerate
- Other structures can cause pain (muscles, tendons, ligaments, etc.)



Conditions causing arthritis

- Hip
 - Osteoarthritis (wear and tear)
 - Inflammatory arthritis (rheumatoid)
 - Traumatic arthritis
 - Labral injuries
 - Hip dysplasia
 - Avascular necrosis
- Knee
 - Osteoarthritis (wear and tear)
 - Inflammatory arthritis (rheumatoid)
 - Traumatic arthritis
 - ACL and meniscal injuries

First steps

- Document symptoms (location, frequency, etc.) and activities associated with symptoms
- Attempt activity modifications and over-the-counter anti-inflammatory medications
- Discuss symptoms with primary care provider
- Obtain x-rays for severe or persistent symptoms



Next steps

- Discuss with primary care physician
 - Most can begin conservative measures
- If conservative measures are not effective, consider referral to:
 - Physical therapy
 - Primary care sports medicine
 - PMR physician
 - Orthopedic surgeon
- In general, you do not need to see a surgeon until you are ready to discuss surgery

Conservative treatments

- Activity modifications/Lifestyle changes
- Acetaminophen (e.g., Tylenol)
- NSAIDs (e.g., ibuprofen, naproxen, Celebrex)
- Narcotics (e.g., tramadol, hydrocodone, oxycodone)
- Physical Therapy/Home exercises
- Ice or heat therapy
- Topical creams or gels
- Brace (e.g., sleeve, hinged, or unloader)
- Assistive device (e.g., cane, walker, crutches, wheelchair)
- Weight loss
- Cortisone (e.g., steroid) injections
- Euflexxa/Synvisc (e.g., lubricant) injections

Hip and knee replacement surgery

When are you “indicated” for surgery?

- Must meet four criteria
 - Have radiographic evidence of end-stage arthritis
 - Have significant limitations affecting function/quality of life
 - Maximized conservative treatments without relief
 - Be healthy enough for surgery
- Surgery is the only way to “change” the bearing surface of the joint
- You never “need” a hip or knee replacement
- “You’ll know when you are ready”
- There may be some benefit to “suffering” a bit before surgery

Selecting a surgeon

- Ask for a referral to fellowship-trained joint surgeon
- Beware if...
 - You are told that you have “the worse hip/knee they have ever seen”
 - Your surgeon doesn’t perform an exam, or doesn’t show or explain your x-rays to you
- Ask friends/family members who have had a hip or knee replacement about their experiences

UIHC Hip and Knee Reconstruction Providers



Jacob M. Elkins, MD,
PhD

- Orthopedics and Rehabilitation



4.73 out of 5 (1,262 ratings)



Nicolas Noiseux, MD,
MS, FRCSC

- Orthopedics and Rehabilitation



4.62 out of 5 (2,004 ratings)



Dallas A. Vanorny, MD,
PhD

- Orthopedics and Rehabilitation



4.78 out of 5 (311 ratings)

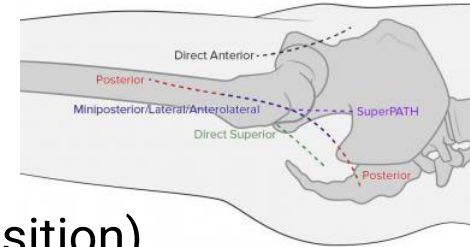
MD: University of Iowa
PhD: University of Iowa
Residency: University of Iowa
Fellowship: Colorado Joint Replacement

MD: McGill
Residency: McGill
Fellowship: Mayo

MD: University of Illinois
PhD: Northwestern University
Residency: Baylor College of Medicine
Fellowship: University of Pittsburgh

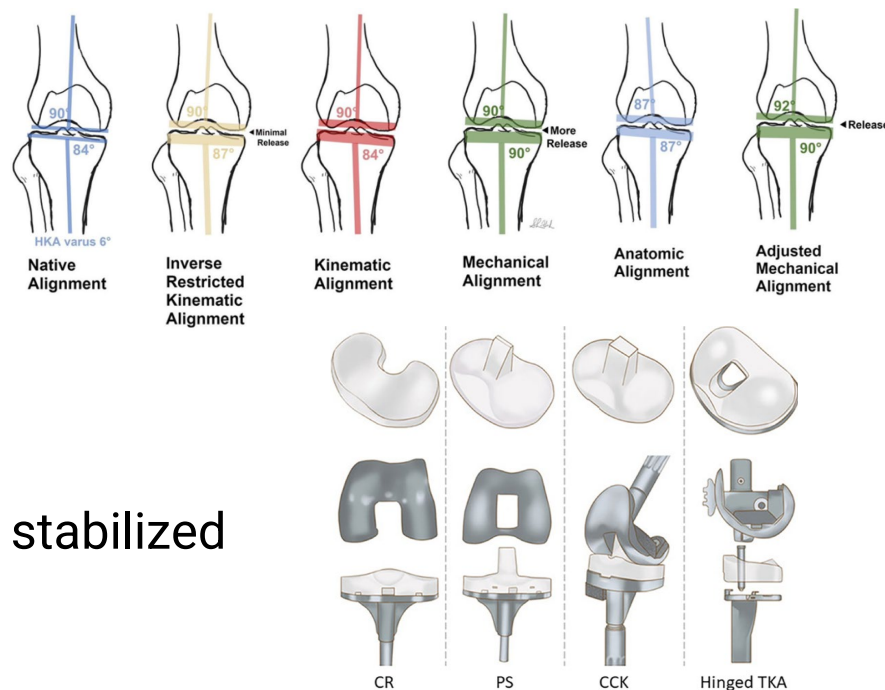
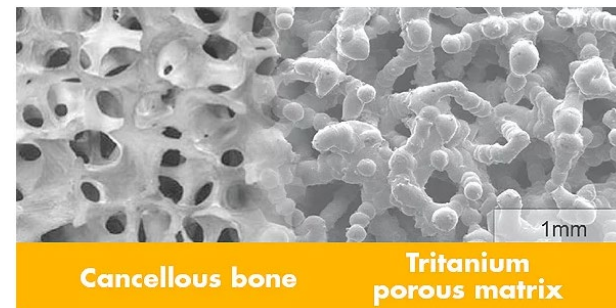
Hip replacement – Surgical Considerations

- Approach
 - Direct anterior (on-table vs off-table)
 - Anterior based muscle sparing (supine vs lateral position)
 - Lateral
 - Posterior/Posterolateral
- Stem types
 - Press-fit vs cemented
 - Triple taper vs wedge vs ream/broach
- Articulation
 - Standard
 - Dual-mobility
 - Constrained
- Bearing type
 - Ceramic, metal, polyethylene



Knee replacement – Surgical Considerations

- Total knee replacement
 - Press-fit vs cemented
- Partial knee replacement
- Patella resurfacing
- Alignment philosophies
 - Mechanical alignment
 - Gap Balancing
 - Measured resection
 - Kinematic alignment
 - Function alignment (robotics)
- Implant types
 - Cruciate retaining and posterior stabilized



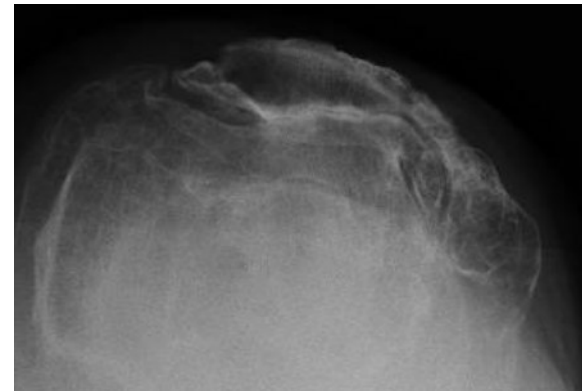
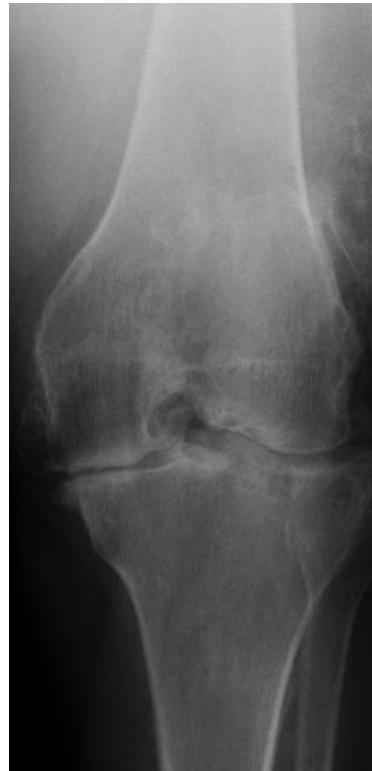
Other Considerations

- General vs Spinal anesthesia (and regional blocks)
 - Spinal anesthesia is associated with fewer complications
 - No breathing tube; less narcotics during the procedure
 - Regional blocks can decrease the need for narcotics
- Same day discharge vs outpatient surgery
 - Patients who are able to discharge home on the day of surgery typically have better outcomes than those that stay overnight or longer
- Glue, sutures, staples for wound closure
- Hospital's outcomes/reputation, specialized care

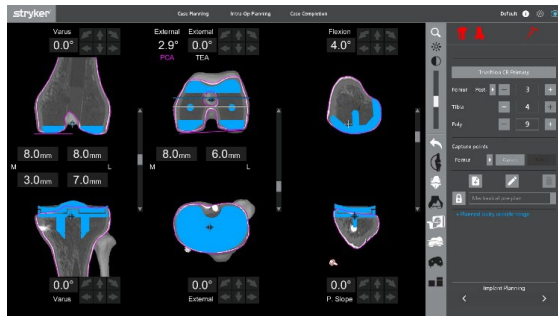
Robotic total knee replacement

Case #1

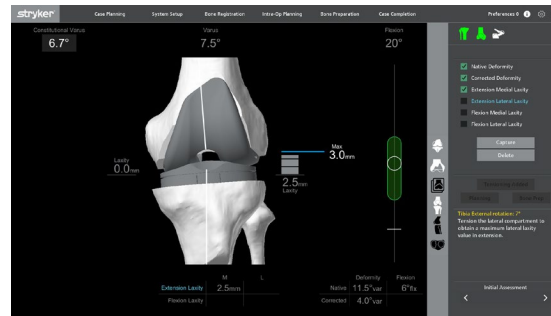
- 55-year-old female with left knee pain
- Fairly active, but significantly limited by pain
- Attempted conservative treatments, no longer helping



Robotic total knee workflow



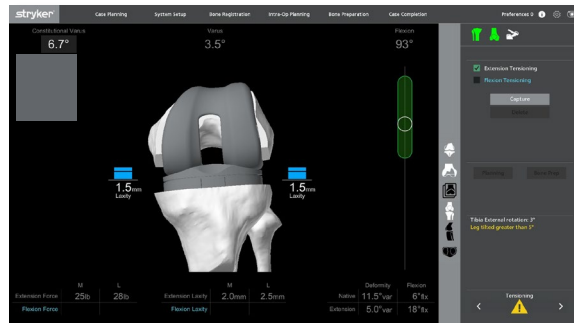
3D CT-based preoperative plan



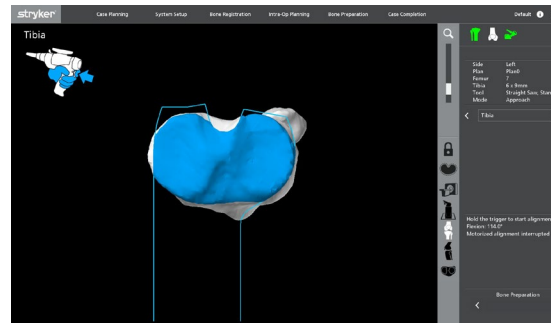
Bone registration



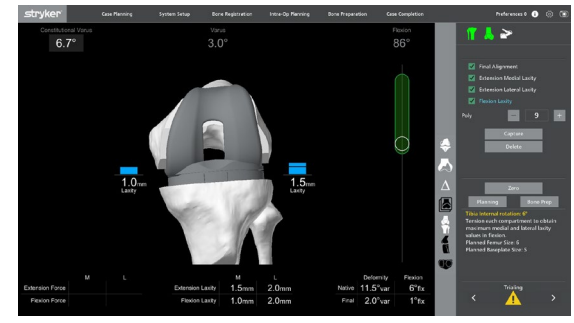
Tensioning



Assessment and planning



Bone cuts made with haptic technology



Trialing

Functional alignment planning

- Functional alignment planning enables the surgeon to prioritize the attributes of the knee that have the most impact on function, before and after assessing the soft tissue laxities.

Trochlea congruity

Medial concentricity

Tibial slope

Tibia sizing

Lateral column

Tibial varus

stryker Case Planning System Setup Bone Registration Intra-Op Planning Bone Preparation Case Completion

Varus 0.0° External 2.2° External 0.0° Flexion 5.0°

8.0mm 7.5mm 8.0mm 6.0mm 3.5mm 7.0mm

0.0° 0.0° 3.0°

Varus External P. Slope

stryker Mako Case Information

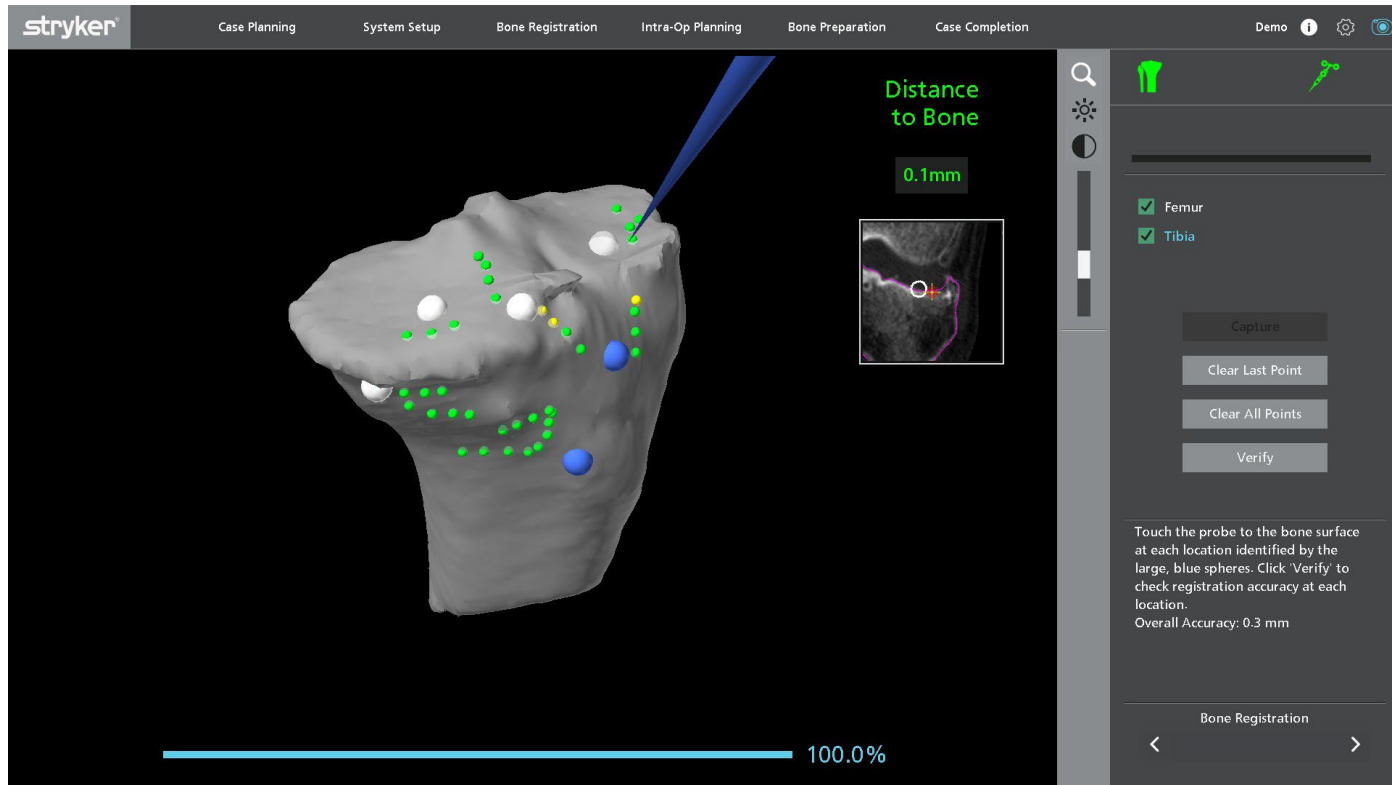
Component Planning			Anatomical Information		
Sawblade Standard			As-scanned alignment		
Femoral rotations			Joint Line		
Coronal	0.0° varus		Coronal	9.0° valgus	
Transverse	0.0° external		Transverse	0.5° external	
Sagittal	7.5° flexion		Sagittal	1.0° flexion	
Femoral resections			Anatomic Axes (femur)		
Medial	Lateral		AA to MA coronal	4.5° valgus	
Distal	7.0 mm	7.0 mm	AA to MA sagittal	0.4° extension	
Posterior	7.0 mm	3.5 mm	PCA to TEA	3.2° external	
Tibial relations			Posterior slope		
Coronal	0.0° varus		Medial	1.1° a slope	
Transverse	0.0° external		Lateral	1.1° a slope	
Sagittal	0.0° p slope				
Tibial resections					
Medial	Lateral				
Proximal	0.0 mm	6.5 mm			
Planned alignment			Joint Line		
Planned laxity	Medial	Lateral	L DFA	80.0°	
Flexion	-	-	MPTA	82.8°	
			aHKA	7.2° varus	
			JLD	1.2.9°	
			Femur JLA	0.0° varus	
			Tibia JLA	7.2° varus	
			MEC to bone	29.8 mm	
			MEC to implant	31.3 mm	

Views values related to planned implant component and measurements related to anatomy

Close

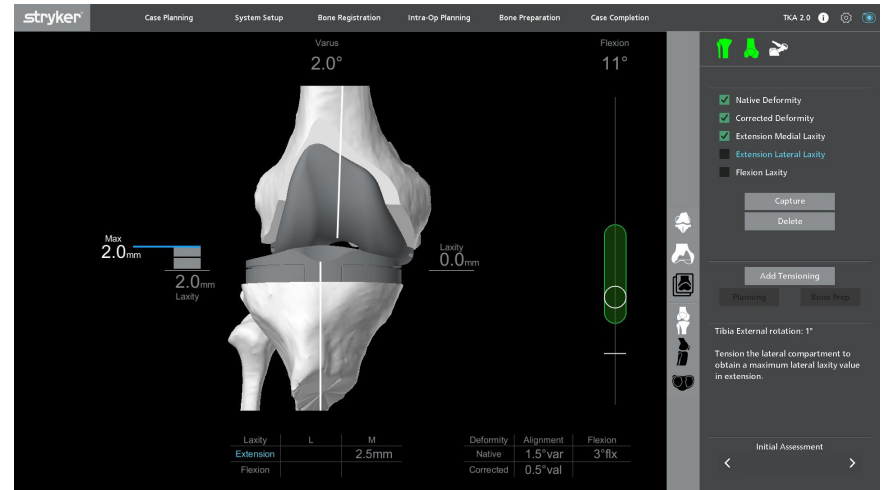
Bone registration

- The surgeon completes bone registration on the femur and tibia by collecting points on the surface of the patient's bones. This step confirms that the CT-based model is aligned to the patient's anatomy within 0.5mm.



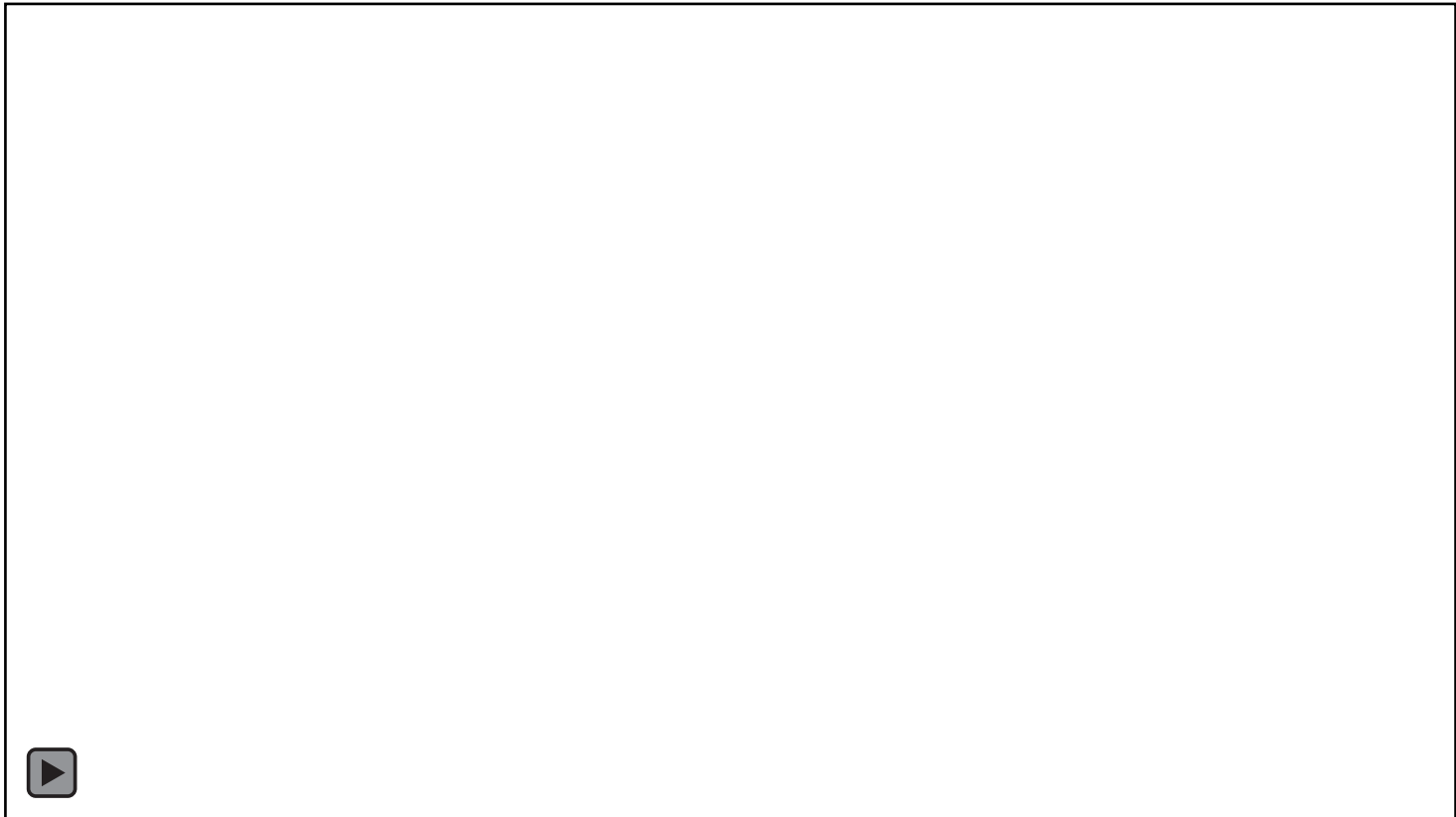
Initial assessment

- The surgeon can capture the native deformity and the corrected deformity to assess the limb and then capture the extension and flexion laxity data.



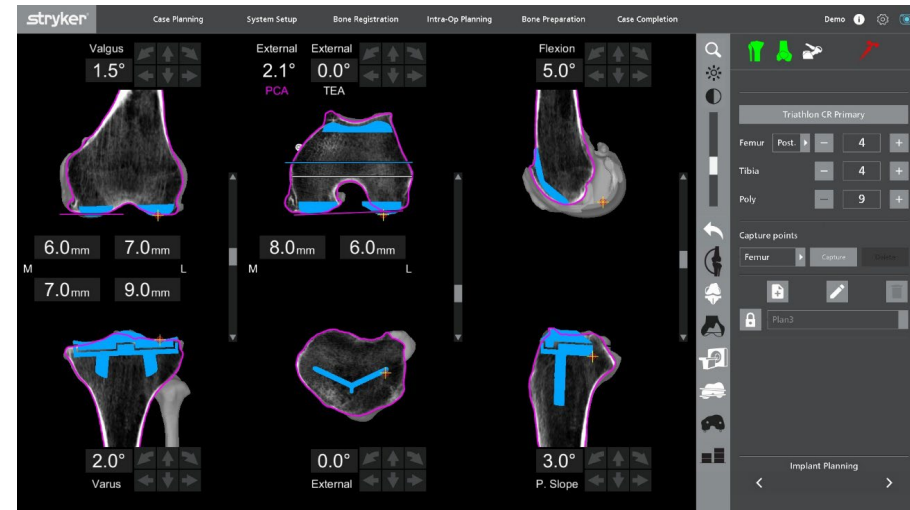
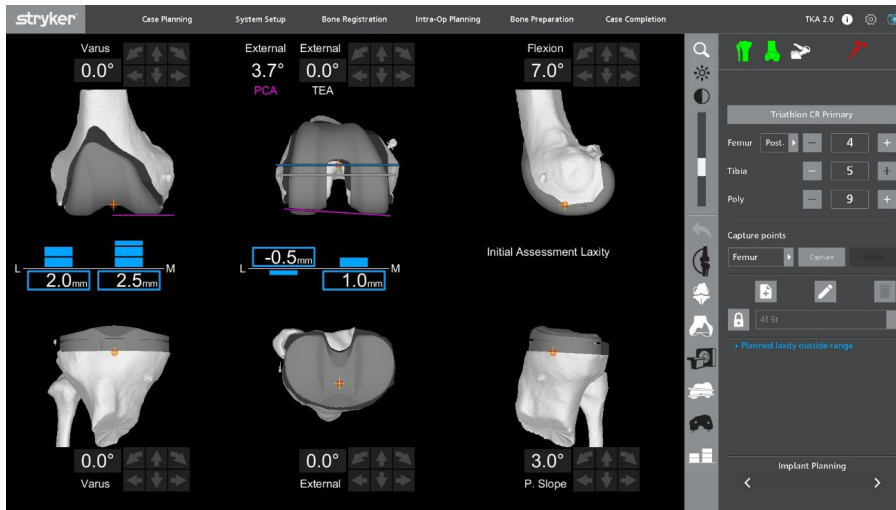
Tensioning

- The surgeon tensions the knee on the medial and lateral sides in both extension and flexion to determine the tension of the medial and lateral stabilizing structures



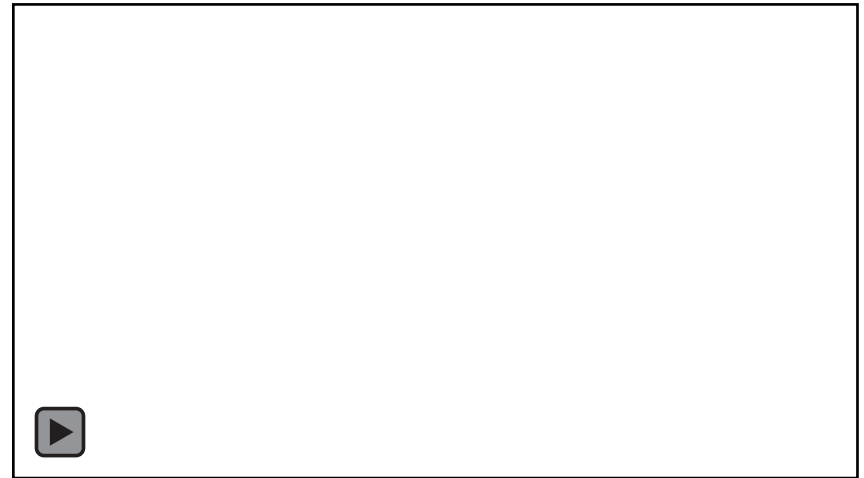
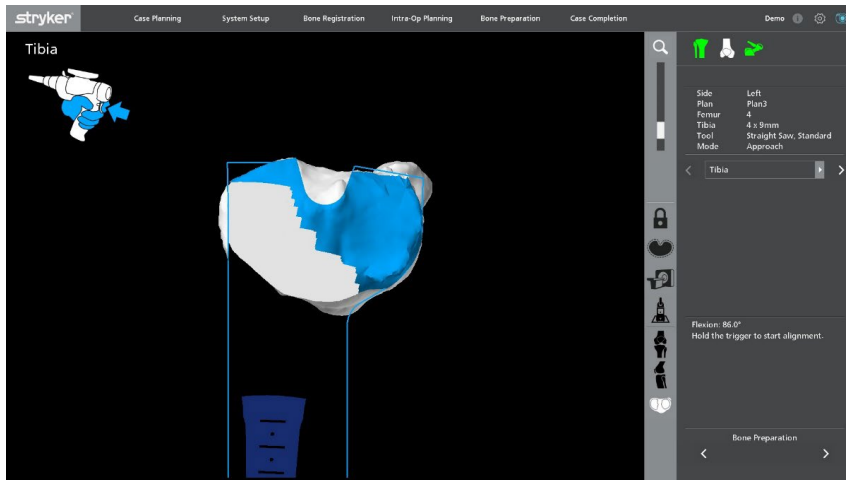
Intraoperative planning

- The laxity information is transferred to the implant planning page to allow the surgeon to balance the knee.
- The balancing page provides all the necessary information on one page, including the ability to balance the knee in CT view.
- The surgeon can balance the knee in conjunction with the functional planning guidelines to help achieve functional knee positioning.

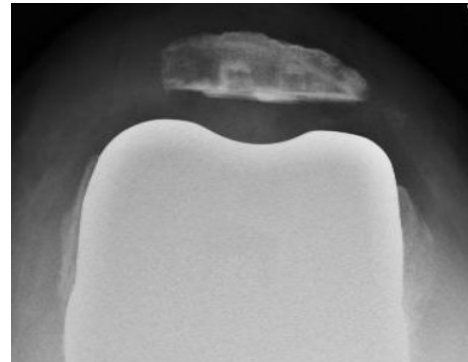
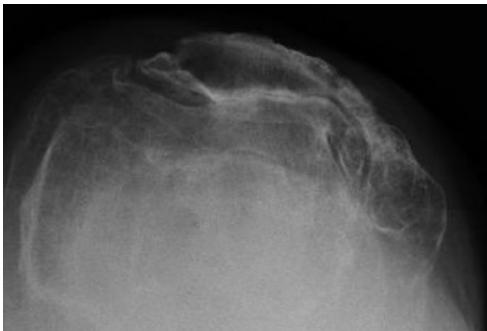


Bone cuts and trialing

- Haptic boundaries constrain the saw within a virtual boundary that is established by the surgeon's patient-specific plan
- Is no longer limited by cutting blocks and manual techniques
- Allows the surgeon to accurately execute the final plan while protecting soft tissues when compared to manual cutting blocks



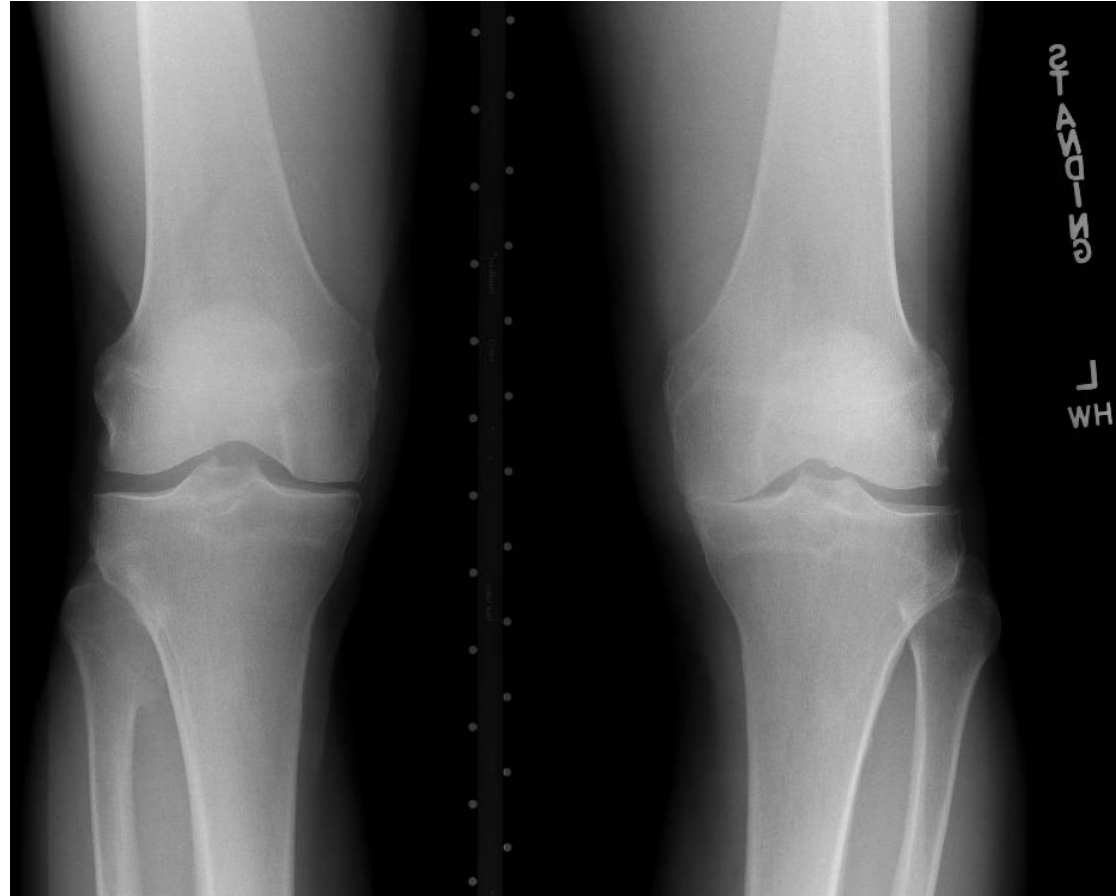
Outcome



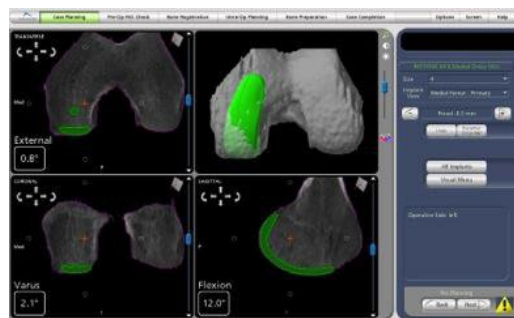
Robotic partial knee replacement

Case #2

- 66-year-old male with left knee pain
- Very active, significantly limited by pain
- Attempted conservative treatments, no longer helping



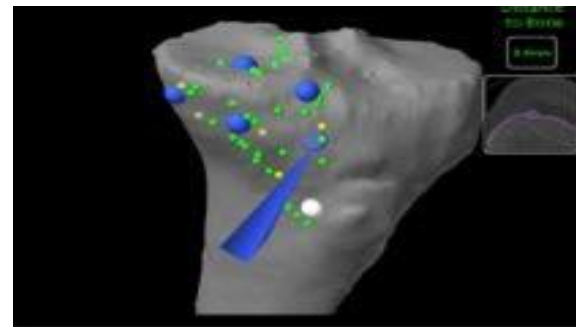
Robotic partial knee workflow



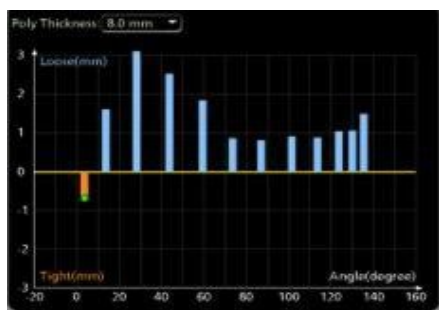
Preoperative planning



Array placement



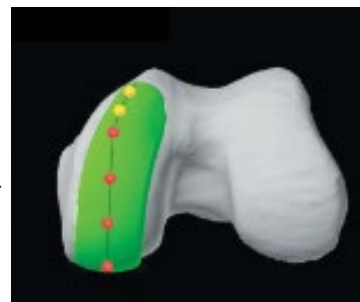
Bone registration



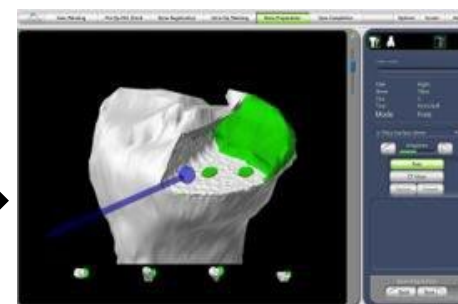
Gap balancing



Cartilage mapping



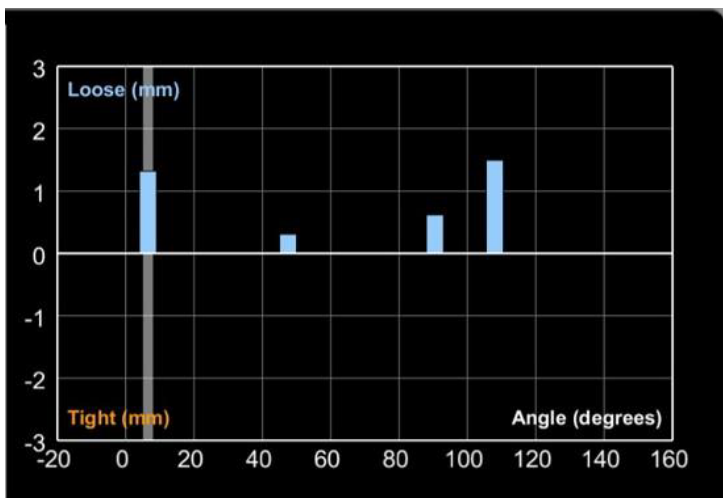
Implant tracking



Bone resection

Intraoperative planning

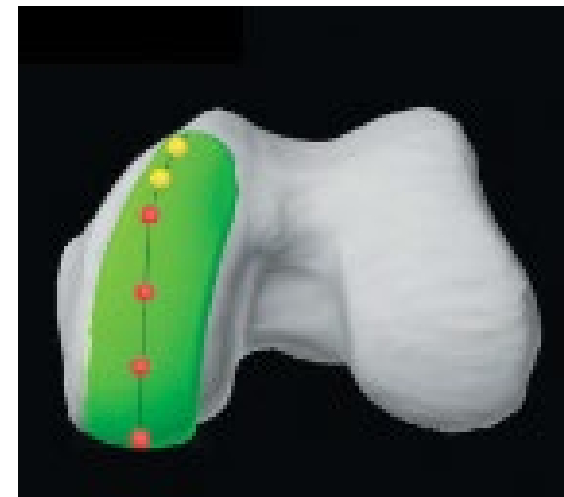
- After registration and assessing the patient's ligament tension, gap analysis, limb alignment and cartilage transition zones, surgeon-controlled intraoperative adjustments can be made to the preoperative plan.



Gap balancing



Cartilage mapping



Implant tracking

Bone cuts made using burr and/or saw

- The Mako Partial Knee application creates a haptic boundary which assists the surgeon in executing both the tibial and femoral bone resections to plan.



Burr-only workflow

Burr used for all cuts



Planar workflow

Saw used for posterior femur and tibial plateau

Burr used for remainder of cuts and tibial wall

Outcomes



Total hip replacement through a direct anterior approach

Case #3

- 78-year-old female with right hip pain
- Active, significantly limited by pain
- Attempted conservative treatments, no longer helping



Outcome



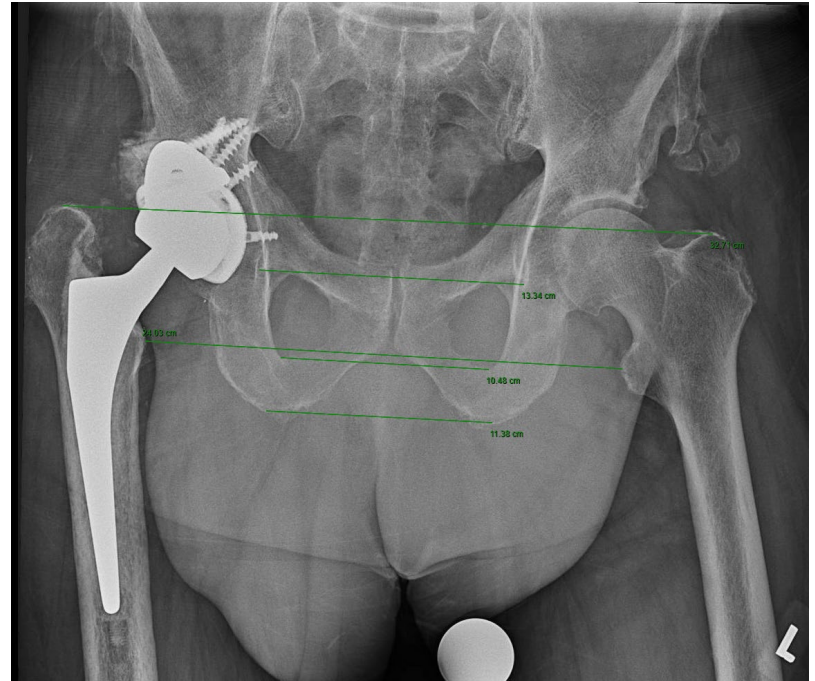
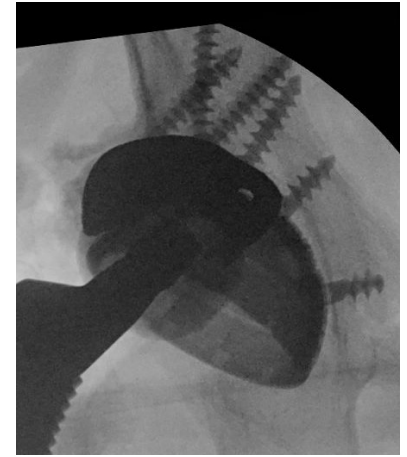
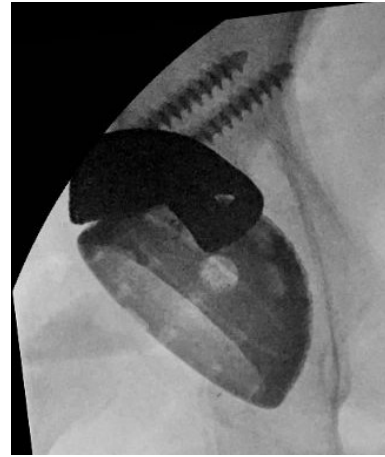
**Complex total hip
replacement through a
direct anterior approach**

Case #4

- 76-year-old male with right hip pain
- Also has 5 cm leg length discrepancy
- Active, significantly limited by pain
- Attempted conservative treatments, no longer helping



Outcome



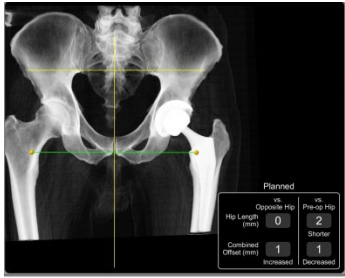
**Robotic total hip
replacement through a direct
anterior approach**

Case #5

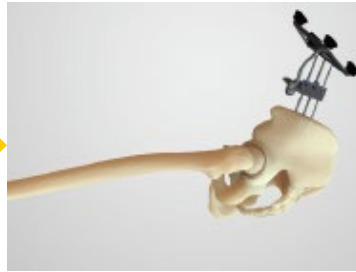
- 45-year-old male with chronic left hip pain
- History of lymphoma and chronic steroid use resulting in avascular necrosis
- Very active, but significantly limited by pain
- Attempted conservative treatments, no longer providing pain relief



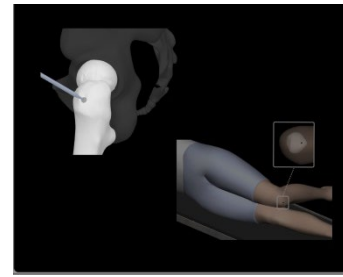
Robotic THA workflow



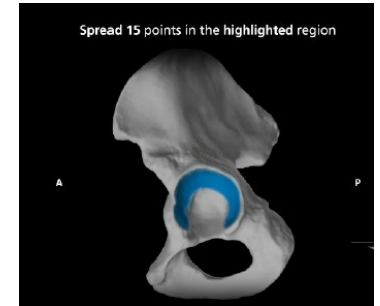
Planning



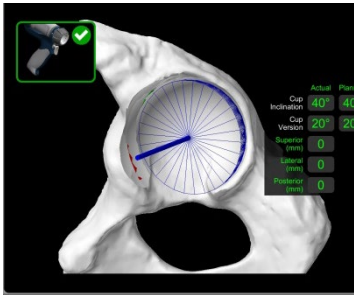
Pelvic array



Landmark placement



Verify checkpoints / acetabular registration



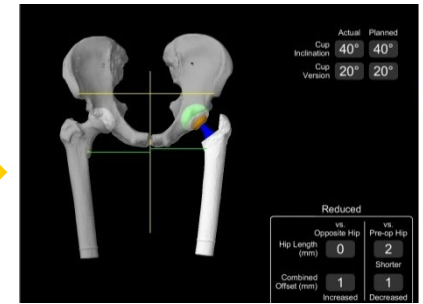
Reaming / cup impaction



Femoral preparation

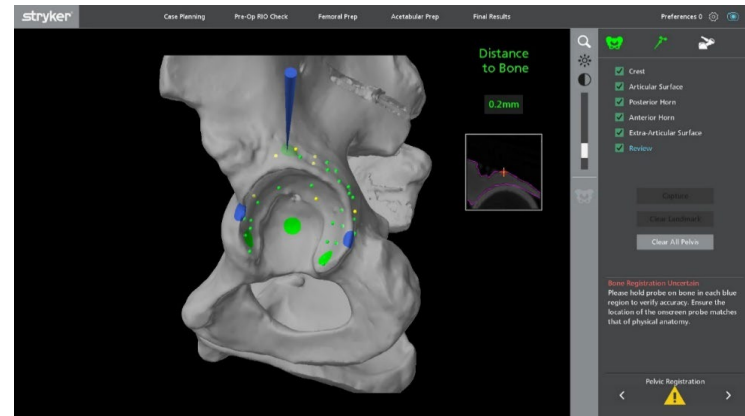
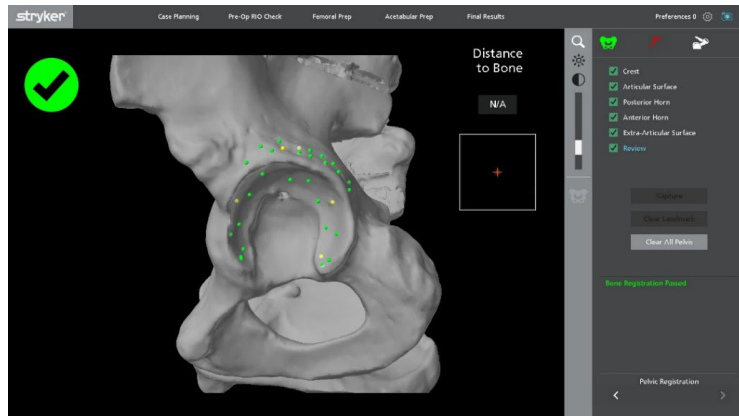
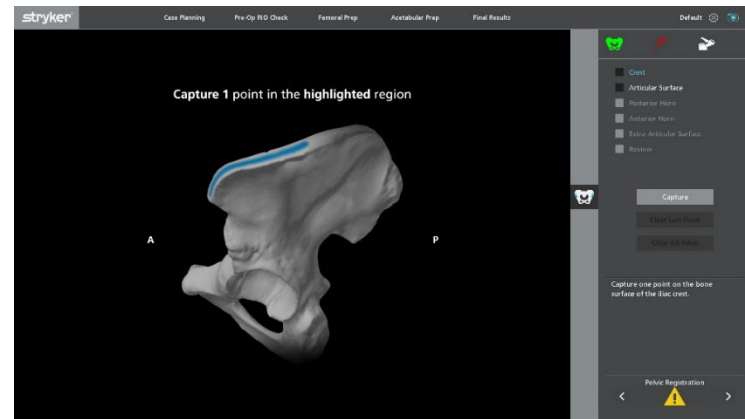
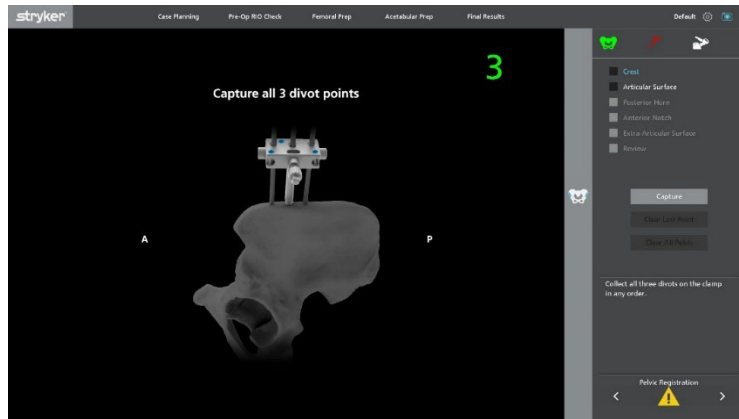


Trial reduction

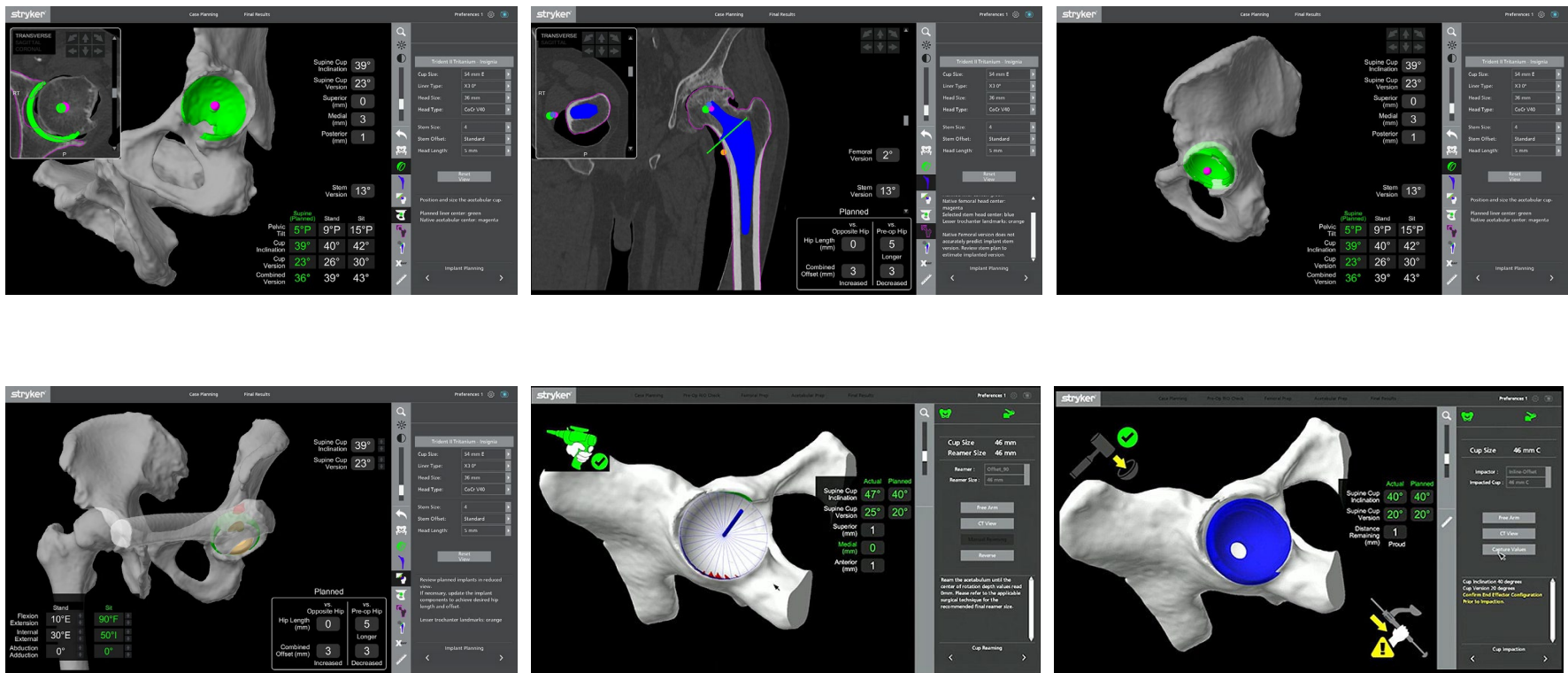


Reduction results

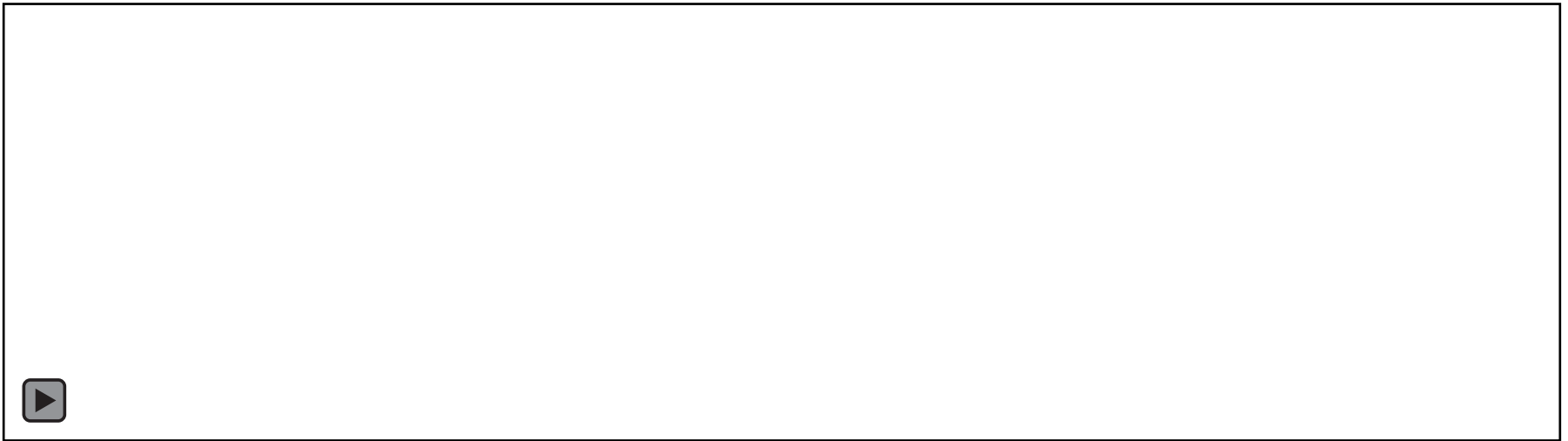
Pelvic crest and landmark registration



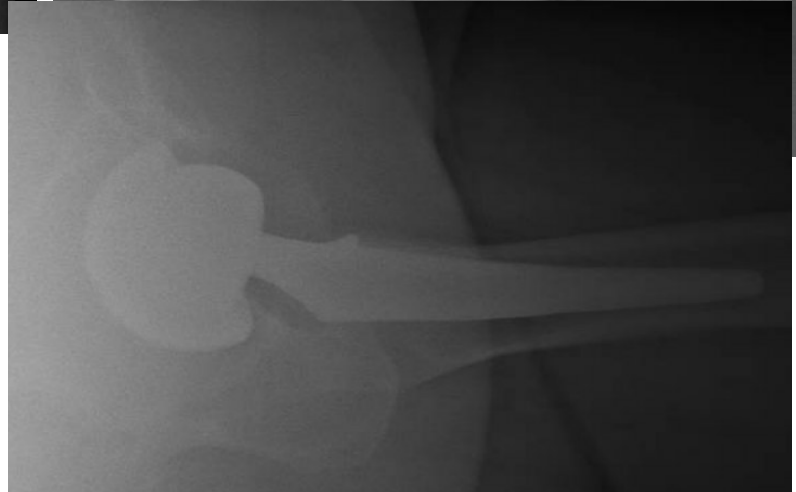
Cup and femoral implant planning, in situ impingement analysis, reaming, and impaction



Robotic arm reaming



Outcomes



Recovery

General workflow

- Transfer from OR to recovery area
 - Assess heart rate, blood pressure, pain, and recovery after anesthesia
 - Xrays will typically be obtained at this time
 - Take small sips of water
- Work with physical therapy or transfer to floor
 - Mobilization with a walker or crutches
 - Assess ability to sit down and get up from seated position
 - Attempt going up and down several stairs
 - Physical therapy will make determination if patient is able to go home safely or if they need additional assistance

Discharge instructions/prescriptions

- Dressing instructions
- Showering instruction
- Ice machine instructions (knees)
- Activity restrictions (mostly for posterior THAs)
- Pain medications
 - Tylenol, NSAIDs, muscle relaxer, narcotics
- DVT/PE prophylaxis
 - Typically aspirin, occasionally Eliquis, Xarelto, or Warfarin
- Physical therapy (knees)
- Warning signs (red, hot, swollen, drainage, and fever)

Recovery at home

- Homebound by not bed-bound
- Careful to avoid falls
- Recommend to have someone available 24/7 for the first week after surgery
- Likely needing significant assistance
- Staying ahead of pain
- Beginning home exercise program
- Assessing for any warning signs
 - Redness, drainage, fevers



<https://hipkneeinfo.org/general/infection-and-your-joint-replacement/>

Typical milestones

- Transition from walker to cane (2 days to 2 weeks)
- Starting physical therapy (1 week)
- Transition from cane to nothing (2- 4 weeks)
- First follow-up appointment (3 weeks)
- Driving around 3 weeks (left side) to 4 weeks (right side)
- Able to perform most low energy activities (4-8 weeks)
- Second follow-up appointment/Return to work (6 weeks)
- Running, jumping, sports (12 weeks)
- Last regular follow-up appointment (1-2 years)

Life after joint replacement

Separating facts from myths



- There are virtually no restrictions after a total hip replacement (posterior hip precautions for 6 weeks)
- You can run/jog after a knee replacement
- It might be more challenging to perform aggressive cutting or lateral movements after a knee replacement
- TKAs have 90-95% survival at 20 years (70-80% for UKAs)
- Three most common reasons for failure/revision (hips and knees)
 - Instability, loosening, infection
- You often won't set off metal detectors at an airport (and you don't need a card stating that you had a replacement)
- Can consider taking antibiotics for routine dental procedures and colonoscopies (very little data supporting this)
- You may continue to have some pain after a hip or knee replacement

Summary

- Osteoarthritis is the loss of articular cartilage
- Conservative treatments should be attempted first
- When conservative treatments are no longer working, request referral to a fellowship trained joint surgeon
- Select a surgeon and facility that you can trust
- Have a care companion join you on your joint replacement journey
- Hip and knee replacements are among the most successful surgeries in all of medicine
- No significant limitations after recovery



REQUEST AN APPOINTMENT



For all requests:

1-319-356-2223



Show additional numbers

- > Refer a Patient
- > Find a Provider
- > Patient instructions (PDF)

IOWA
HEALTH CARE

University of Iowa Health Care
North Liberty Campus

IOWA