Treatment Options for Knee and Hip Arthritis- Arthroplasty

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Introduction

- We are the program directors of Samaritans DNV Certified joint replacement program
- We specialize in hip and knee replacement as well as revision hip and knee replacement
- We perform 600-700 joint replacements per year
- Through our DNV certification we continuously monitor outcomes and modify our practices to provide the highest quality surgical care

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Outline

- Arthritis Overview
- Non-surgical treatment options
- Total knee replacement
  - Procedure
  - Technology
- Total hip replacement
  - Procedure
  - Approaches
  - Technology
- Questions and discussion

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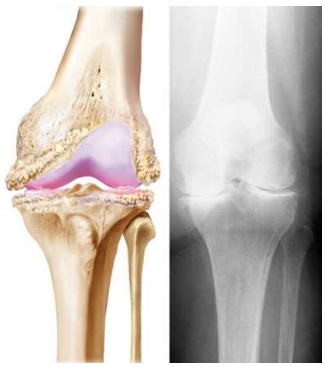
What is Osteoarthritis or OA?

- The most common form of arthritis and often called “wear and tear” arthritis.
- The common activities of daily living become limited by extreme pain.
- Most of the people who have osteoarthritis are older than age 45, and women are more commonly affected than men.
- Other forms of inflammatory or post traumatic arthritis also can lead to joint replacement



Arthritic Knee

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Osteoarthritis Symptoms

- The main symptom of osteoarthritis is **PAIN**.
- May feel pain during movement and even at rest.
- Stiffness, swelling, loss of motion.
- The symptoms of osteoarthritis may interfere with normal activities, such as walking and dressing.

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Non-Surgical Options

- Lifestyle modification
- Weight Control
- Exercise and physical therapy
- Oral medication
- Injections
- Bracing

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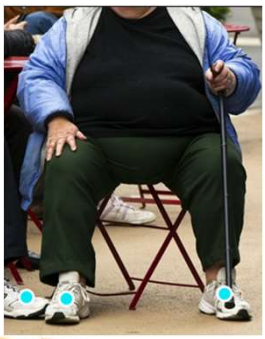
Patient Selection

- In general, active patients have similar options compared to more sedentary patients
- Arthroplasty being performed on patients of all ages
- Weight is significant factor in patient selection process
  - Close to all patients indicate they cannot lose weight because of their arthritic pain
  - Cause of obesity is multifactorial
  - Excess adipose tissue at the site of surgery makes the surgery more challenging
  - Unfortunately, most patients do not lose weight after arthroplasty



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THE JOURNAL OF ARTHROPLASTY | AAHKS AMERICAN ASSOCIATION OF HIP AND KNEE SURGEONS

Obesity and Total Knee Arthroplasty

Is Obesity Really a Hard Stop in Knee Arthroplasty? An Editorial Viewpoint
Giles R. Scuderi, Zuhdi E. Abdo, Michael A. Mont
Published online: September 21, 2023
p2482-2483
Full-Text HTML | PDF | Supplemental Materials

Obesity is Associated With Greater Improvement in Patient-Reported Outcomes Following Primary Total Knee Arthroplasty
Ashton C. Bosler, Evan R. Deckard, Leonard T. Buller, R. Michael Meneghini
Published online: August 16, 2023
p2484-2491
Full-Text HTML | PDF | Supplemental Materials

Obesity Severity Predicts Patient Dissatisfaction After Total Knee Arthroplasty
Ennio A. Rizzo, Rachel D. Phillips, J. Turner Brown, Emily V. Leary, James A. Keeney
Published online: June 03, 2023
p2492-2496
Full-Text HTML | PDF | Supplemental Materials

Does Obesity Impact Outcomes of Total Knee Arthroplasty When Treated by High-Volume Surgeons? A Propensity-Matched Analysis From a High-Volume Urban Center
Itay Ashkenazi, Kyle W. Lawrence, Jeremiah Thomas, Scott Marwin, Joshua C. Rozell, Ran Schwarzkopf
Published online: April 30, 2023
p2497-2503

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Total Knee Replacement

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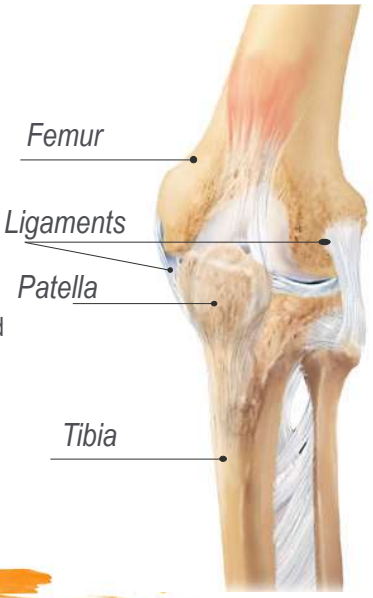
Knee Anatomy

- The lower femur and upper tibia are covered in cartilage
- LCL/MCL ligaments provide stability
- The patella tracks through the groove on the end of the thigh bone, aligning the quad muscle during flexion and extension



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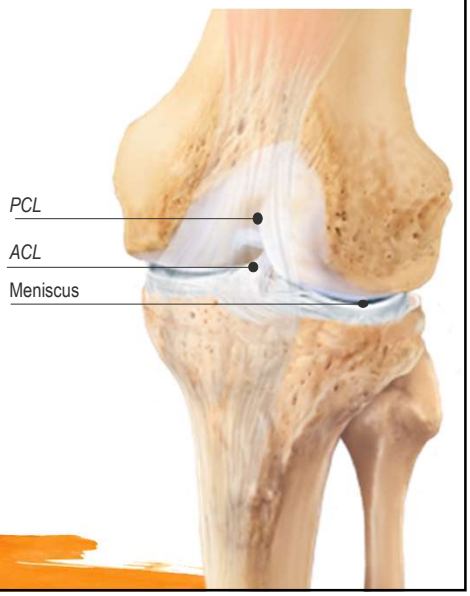
Knee Anatomy

- Hinge joint (but not really)
- Two menisci - cushion pads
  - Stabilize
  - Distribute body weight
- ACL/PCL – ligaments that stabilize knee from front to back



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Total Knee Replacement

- When patients have exhausted conservative treatments, have pain which limits activities and affects quality of life, they may be ready for knee replacement.
- Many patients want to bypass conservative measures

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Total Knee Replacement

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Total Knee Replacement

- Surgery takes approximately 1 to 1.5 hours
- The majority of knee replacements go home same day
- Therapy is initiated in the hosptital with outpatient PT starting 7-10 days after discharge
- Follow-up with surgery team at 3 weeks, 8 weeks and then 1 year

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Surgical Technology - Implants

- Posterior Stabilized
- Cruciate Retaining
- Cemented
- Cementless
- ACL and PCL Sparing
- Medial Congruent
- Kinematic vs. Mechanical
- Medial Pivot
- Constrained
- High Flexion
- Hinge
- Distal Femoral Replacement

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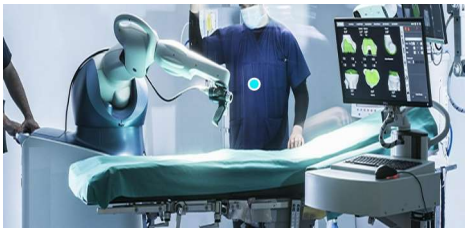
Surgical Technology for Implant Placement

- Patients very excited about it
- Medical device companies very excited about it
- Some surgeons very excited about it
- Results dependent on skilled application of technique and adherance to known surgical principals



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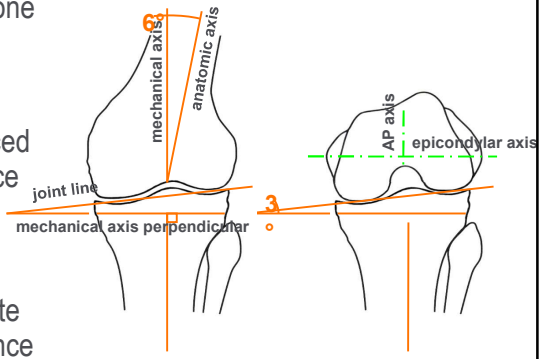
Traditional Component Placement

- Traditionally, implantation relies on generic measurements of bone alignment
- Traditionally, requires rods placed into the bone canals to reference the patient's anatomy
- Can be imprecise and inaccurate depending on surgeon experience



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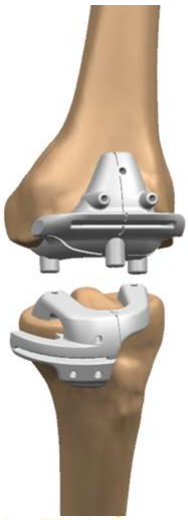
Patient Specific Instrumentation

- Patient Specific Instrumentation or patient matched technology uses your MRI/CT and x-rays to design surgical instruments that are unique to you
- Custom cutting blocks are created to match the exact shape of your bones
- Provides a custom-fit, more accurately aligned knee
- Eliminates time in the operating room, which reduces time under anesthesia and the risk of infection



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Minimum 5-Year Outcomes of a Multicenter, Prospective, Randomized Control Trial Assessing Clinical and Radiological Outcomes of Patient-Specific Instrumentation in Total Knee Arthroplasty

Matthew J. Hampton, FRCS (Tr&Orth) [a,*], Caroline M. Blakey, FRCS (Tr&Orth) [b], Alex A. Anderson, FRCS (Tr&Orth) [c], Wassim M. Tomouk, FRCS (Tr&Orth) [a], Simon C. Buckley, FRCS (Tr&Orth) [a], Andrew J. Hamer, FRCS (Tr&Orth) [a], Paul M. Sutton, FRCS (Tr&Orth) [a]

Journal of Arthroplasty 2022

- Multicenter, randomized control trial with minimum 5-year follow-up
  - 38 knees in the PSI group and 39 in the conventional instrumentation
- Results:
  - no significant difference implant positioning in any plane knees implanted using PSI and those implanted with traditional cutting blocks.
  - Clinical outcomes at both 1-year and 5-year follow-up demonstrated statistically significant and clinically relevant improvement in scores from baseline in both groups

Conclusion: no additional benefit to PSI in terms of improved alignment or functional outcomes at minimum 5-year follow-up over traditional techniques.

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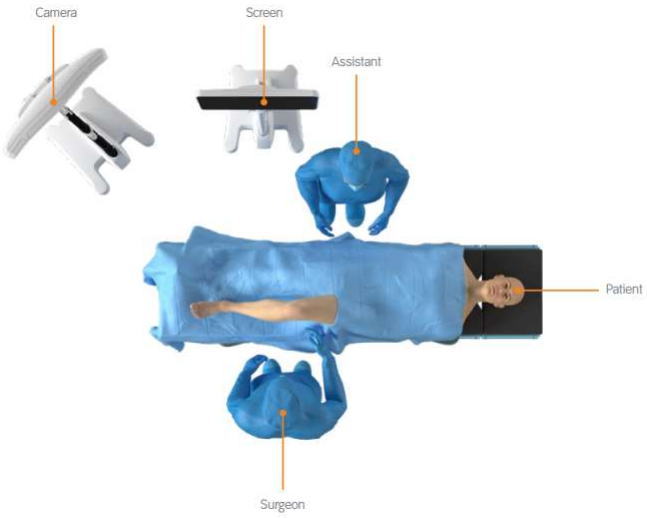
TKA: Robotics/Navigation: set up



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TKA: Robotics/Navigation

The surgeon then utilizes sensors along with computer assistance to execute the operation

Additional steps to place sensors and register information into the computer are often required

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Navigated and Robot-Assisted Technology in Total Knee Arthroplasty: Do Outcome Differences Achieve Minimal Clinically Important Difference?

Armin Arshi, MD [a,*], Troy Sekimura, MD [b], Benjamin V. Kelley, MD [b], Erik N. Zeegen, MD [b], Jess H. Lonner, MD [a], Alexandra I. Stavrakis, MD [b]

Journal of Arthroplasty 2022

- Systematic review was performed to identify all studies reporting perioperative PROMs for either primary N-TKA or RA-TKA with a C-TKA comparison cohort with a minimum 1-year follow-up
- Conclusion: While most studies comparing RA-TKA and N-TKA with C-TKA demonstrate improved radiographic alignment outcomes, a minority of studies reported PROM differences that achieve clinical significance.

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Does the Use of Intraoperative Technology Yield Superior Patient Outcomes Following Total Knee Arthroplasty?

Vivek Singh, MD, Benjamin Fiedler, BA, Trevor Simcox, MD, Vinay K. Aggarwal, MD, Ran Schwarzkopf, MD MSc, Morteza Meftah, MD *

Journal of Arthroplasty 2021

- Retrospective review of 7096 with TKA from 2016-2020.
  - stratified depending on the technology utilized: navigation, robotics, or no technology
  - 287(4%) navigation, 367(5%) robotics, and 6442(91%) manual cases were included
- Surgical-time significantly differed (113.33 vs 117.44 vs 102.11; P < .001).
- Discharge disposition significantly differed
  - more manual TKA patients discharged to a skilled nursing facility (12% vs 8% vs 15%; P < .001) than those who had technology utilized.
- FJS scores did not statistically differ at three-months and one-year
- 3 month KOOS, JR scores differed significantly (59.48 vs 60.10 vs 63.64; P ¼ .001)
- 1 year scores did not statistically differ between all groups (P ¼ .320).
- Conclusion: This study demonstrates shorter operative-time in cases with no utilization of technology and clinically similar PROMs associated with TKAs performed between all modalities. **While the use of technology may aid surgeons, it has not currently translated to better short-term outcomes.**

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Surgical Technology – Pain Control

- Multimodal Pain Management
  - Pre-Surgery
    - Patient Specific
    - Anxiety Screening
    - Cryoneurolysis
  - Intra/Peri-Operative
    - Peri-articular injection
    - Nerve block
    - Spinal anesthesia
  - Post-Operative
    - Tylenol, NSAID, Gabapentin/Pregabalin
    - Tramadol, Opiods

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Total Hip Replacement

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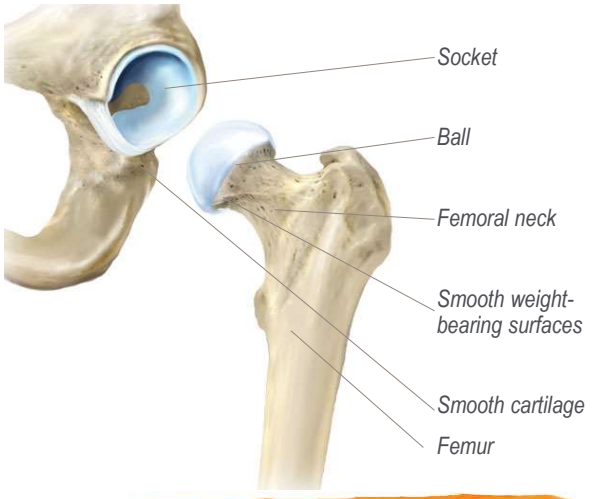
Hip Anatomy



-Pelvic cup (acetabulum) and femoral ball covered in cartilage

-Ball and socket joint

-Surrounded by stabilizing ligaments and muscles

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Surgery - Total Hip Replacement

Cuts

Implant components

Implanted

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Total Replacement

After surgery

- The procedure takes approximately 1 – 1.5 hours
- Physical therapy begins immediately after surgery
- Discharge from the hospital typically same day
- Follow-up with surgeon at 3 weeks, 8 weeks, 1 year

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Total Hip: Surgical Approaches

Anterior vs Posterior

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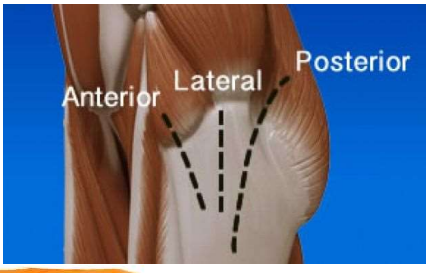
Anterior vs Posterior Approach

- Debate of which is better has largely been proven in the literature as all approaches yield similar outcomes with similar complication rates
- Many of the potential complications and potential benefits of one approach versus another stemmed from early data as the anterior approach grew in popularity
- The general consensus is for surgeons to perform the procedure in the way they are most comfortable to ensure the best outcomes



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MRI Assessment of Muscle Damage After the Posterolateral Versus Direct Anterior Approach for THA (Polada Trial). A Randomized Controlled Trial

Kyrill Rykov, MD [a,*], Tim W.G.M. Meys, MD [b], Bas A.S. Knobben, MD, PhD [a], Maurits S. Sietsma, MD [a], Inge H.F. Reininga, PhD [c], Bas L.E.F. ten Have, MD [a]

- Controversy over muscle sparing nature of anterior vs posterior approaches
- 46 patients underwent MRI evaluation post anterior or Posterior THA
- Results:
  - Both: external rotators, glute med, rectus, sartorius, quadratus all show similar damage
  - Posterior: obturator muscles significantly more atrophy
  - Anterior: TFL and psoas had atrophy
- Different muscle groups were affected in the two approaches. After PLA, the external rotators were more affected, whereas the tensor fascia latae and psoas muscles were more affected after DAA

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Assessment of Early Gait Recovery After Anterior Approach Compared to Posterior Approach Total Hip Arthroplasty: A Smartphone Accelerometer–Based Study

Nathaniel J. Nelms, MD [a,*], Christopher E. Birch, MD [a,b], David H. Halsey, MD [a], Michael Blankstein, MD, MS [a], Ryan S. McGinnis, PhD [c], Bruce D. Beynnon, PhD [a]

Journal of Arthroplasty 2020

- Prospective study 35 DA and 34 PA with 20 control patients
- At 1 month postoperatively, the only significant difference is DAA group had significantly faster gait speed and longer step length
- At 4 months, there were no differences in DAA and PA gait measures.
- Conclusion: There were minimal differences between the two approaches in the recovery of gait mechanics with some gait parameters particularly gait speed and step length recovery favoring the DAA at 1 month postsurgery in this nonrandomized study.

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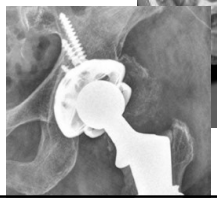
Surgical Technology - Implants

- Cemented vs uncemented
- Mini stems
- Dual mobility
- Revision systems/constrained
- Larger femoral heads
- Metal on metal





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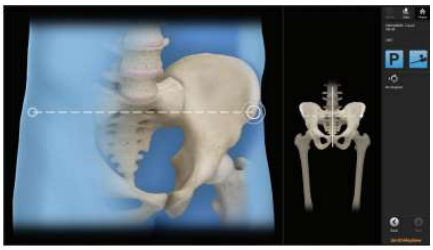
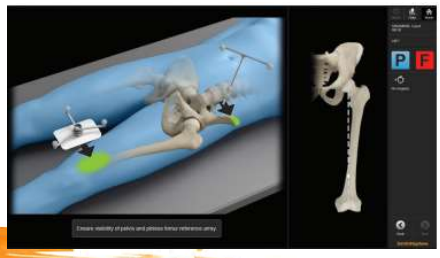
Surgical Technology Implant Placement
Computer navigation/Robotics



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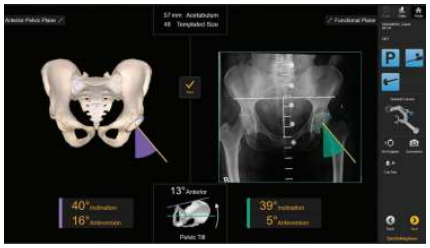
Computer Navigation/Robotics

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Robotics Versus Navigation Versus Conventional Total Hip Arthroplasty: Does the Use of Technology Yield Superior Outcomes?

Vivek Singh, MD, John Realyvasquez, MD, Trevor Simcox, MD, Joshua C. Rozell, MD, Ran Schwarzkopf, MD, MSc, Roy I. Davidovitch, MD *

Journal of Arthroplasty, 2021

- Retrospective review of hip scores
- 1960 cases identified, 896 used navigation, 135 used robotics, and 929 use no technology

Conclusion

Statistical differences observed between all modalities are not likely to be clinically meaningful with regard to early patient-reported outcomes. Although intraoperative use of technology may improve the accuracy of implant placement, these modalities have not yet translated into improved early reported functional outcomes.

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Hip Precautions and Recovery

- Hip precautions are typically given to lower risk of dislocation
  - These include limited flexion past 90 degrees, no adduction past neutral and avoiding internal rotation. Additionally, limiting extension in anterior approaches
- Our practice gives generalized precuations for the firs 6 weeks including limited flexion beyond 90, limited extension beyond normal walking and avoidance of internal rotation
  - This simplifies inpatient care as our patients have both approaches
  - We feel this time period allows for practice and patient education to hopefully prevent activities in the future that would increase risk for dislocation

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Are Postoperative Hip Precautions Necessary After Primary Total Hip Arthroplasty Using a Posterior Approach? Preliminary Results of a Prospective Randomized Trial

Matthew W. Tetreault, MD [a, b, c, *], Faisal Akram [a], Jefferson Li, MD [a], Denis Nam, MD, MSc [a], Tad L. Gerlinger, MD [a], Craig J. Della Valle, MD [a], Brett R. Levine, MD, MS [a]

- 587 patients with posterior approach randomized to hip precuations or NO hip precautions
- NO difference in dislocation rates at 6 weeks
- Conclusion: Preliminary analysis suggests that removal of hip precautions after primary THA using a posterior approach was not associated with early dislocation and facilitated return to daily functions. Investigation to appropriate power is warranted.
- Other studies looking at anterior approach note same findings**

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Life after hip or knee replacement

- With successful surgery and appropriate rehabilitation most patients should expect to resume an active life depending on per operative level of fitness
- With hip and knee replacement patients can return to hiking, biking,weight lifting, hunting, swimming, skiing, tennis and similar
- There are no significant studies looking at running and high impact activities with regards to implant longevity we therefore typically discourage these exercises at high volume or repetition.

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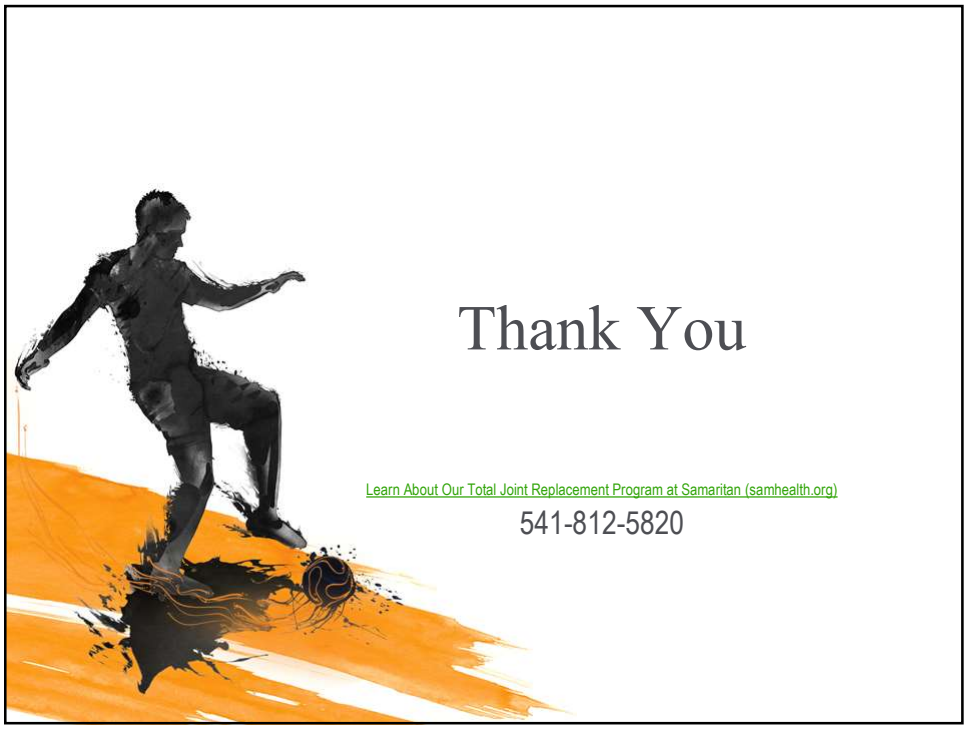
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