

Understanding Hip & Knee Arthritis

Michael J. Repine MD
Boulder Medical Center Orthopedics
303-900-4710



You're Not Alone

More than 43 million people have some form of arthritis. It is estimated that the number of people affected by arthritis will increase to 60 million by 2020.



Source: CDC



Originally *TWO* presentations

Understanding Hip Arthritis

Michael J. Repine MD
Boulder Medical Center Orthopedics



Relieving Arthritis Knee Pain

Michael J. Repine MD
Boulder Medical Center



Originally *TWO* presentations

Merging together

Lot of information

But great deal of overlap



This program will overview the following topics:

- Review of Hip and Knee anatomy
- Discussion of arthritis
- Clinical evaluation of patients with arthritis
- Conservative treatment options for both Hip and Knee arthritis

This program will overview the following topics:

- Latest Treatment Options for Hip Arthritis
- Latest Treatment Options for Knee Arthritis
- Rehab protocols and Timeline
- Expectations/Outcomes

About My Practice

- Undergraduate at CU Boulder
- University of Colorado School of Medicine for medical school and residency
- Board certified in 2005, 2015
- Fifteen years at the Boulder Medical Center
- In addition to the management of arthritis, I enjoy trauma, and sports-related injuries.

ANATOMY

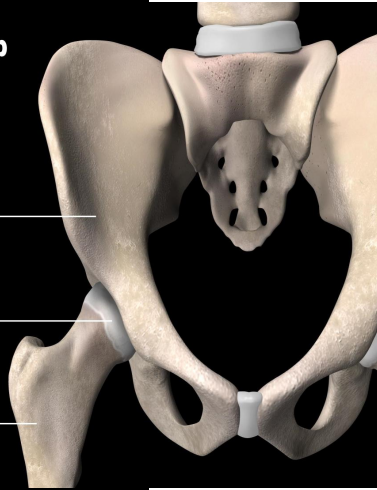
Normal Hip

A Normal Hip

Pelvic Bone

Healthy Cartilage

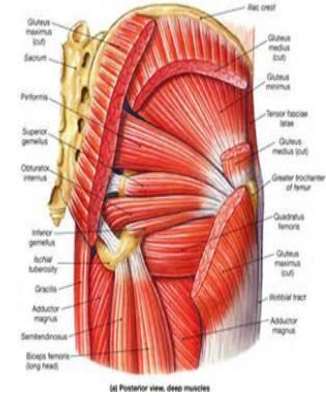
Femur (thigh bone)



The Hip Joint - Musculature

- Multiple muscles enveloping the hip joint
- Provide additional stability to the hip joint

Posterior

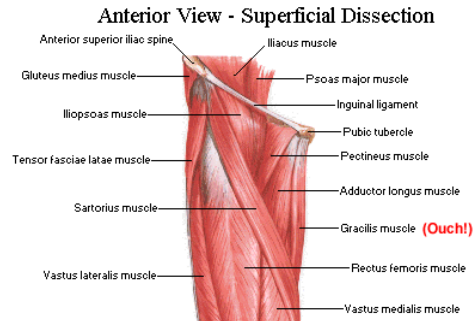


The Hip Joint - Musculature

- Multiple muscles enveloping the hip joint
- Provide additional stability to the hip joint

Anterior

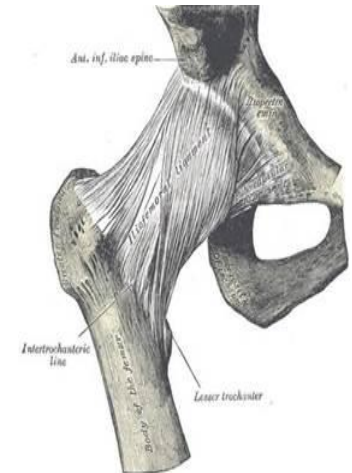
Muscles of Thigh



The Hip Joint - Ligaments

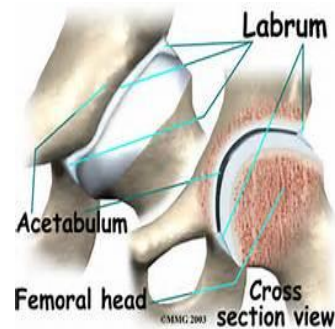
Stability

- Complex array of ligaments
- Augments stability to the ball and socket



The Hip Joint - Cartilage

Cartilage is critical in understanding arthritis

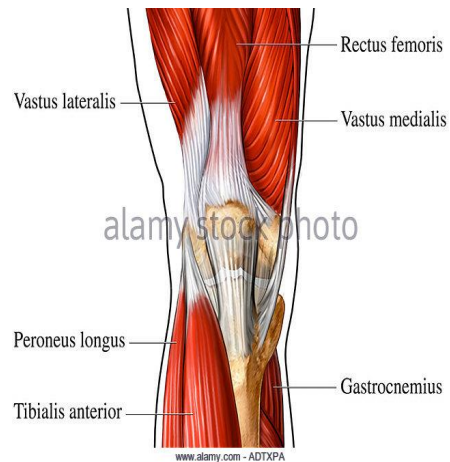


Normal Knee



The Knee Joint - Musculature

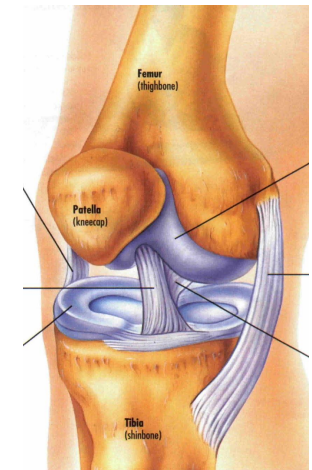
Multiple muscles enveloping the knee joint



The Knee Joint - Ligaments

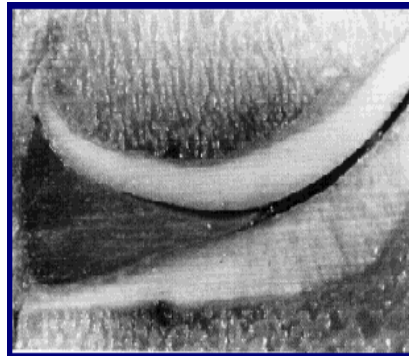
Stability

- Complex array of ligaments
- Simplified to four
- Critical to function of knee joint



The Knee Joint - Cartilage

Cartilage is critical in understanding arthritis

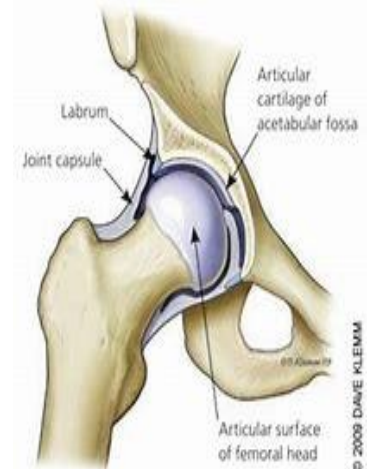


Anatomy - KEY POINTS

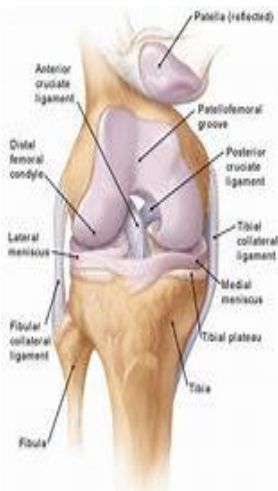
HIP

Inherent “ball and socket” stability

“Deeper” joint buried under muscular layers



Anatomy - KEY POINTS



KNEE

Relatively “sloppy” joint that is reliant on ligaments for balance and stability

Three joints in one

Earlier range of motion restrictions with bone spurs

CARTILAGE

“Like the frosting on a piece of cake”

- Transmits applied loads across mobile surfaces
- Lines the ends of bones
- Surfaces roll or slide during motion

It reduces friction coefficient to 0.0025.



Normal Cartilage

“Like the tires on your car”



- Healthy, normal cartilage rolls easily
- Smooth motion

Damaged Cartilage



- When the cartilage is thinned or absent, problems such as pain, instability, limited motion occur.
- This mechanical wearing of the cartilage surface leads to deterioration in the joint or **ARTHRITIS**.

What is Arthritis?

What is ARTHRITIS?

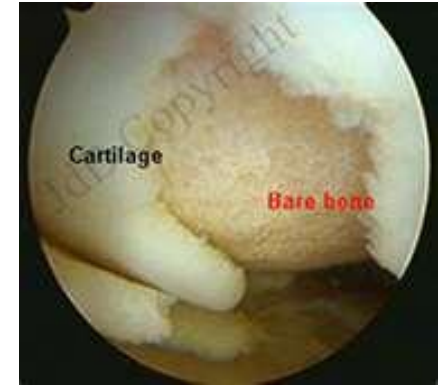
Definition: Inflammation of a joint, usually accompanied by pain, swelling, and stiffness.

What Causes Arthritis?

Destruction of **Cartilage**, either focal or general, leads to mechanical and biochemical changes that create arthritis.

What is ARTHRITIS?

Definition: The mechanical wearing of cartilage surface resulting in pain and limited function.



Arthritis Damage

- Chemical cascade that worsens deterioration within the joint
- Joint fluid becomes watery
- Poorly able to protect cartilage

Chemical changes



What is ARTHRITIS?

Normal Anatomy



Normal Xrays



What is ARTHRITIS?

Arthritis Anatomy

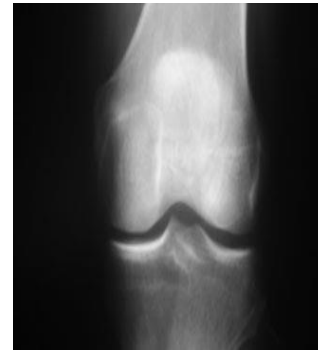


Arthritic Xrays



What is ARTHRITIS?

Normal Anatomy

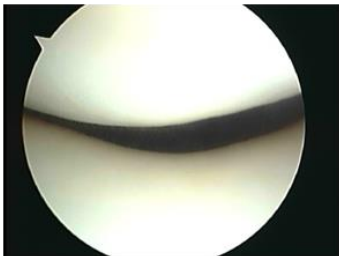


Arthritic Xrays

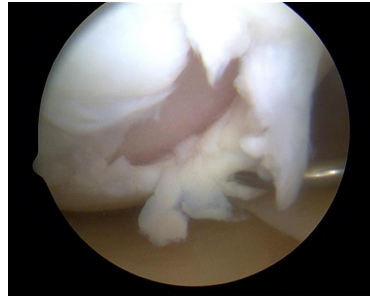


What is ARTHRITIS?

Normal Anatomy



Arthritic Anatomy



Clinical Evaluation of Hip and Knee Arthritis

Diagnosing Joint Pain

- Medical history
- Physical examination
- X-rays, Radiographic Studies
- Other tests

Symptoms

PAIN

- Weight-bearing activities
- While sleeping at night
- Location

**Important to evaluate for spinal source*



Diagnosis

Medical History

- How and when did the pain start?
- If the pain has occurred before, how was it treated?
- What activities aggravate the pain?
- What activities relieve the pain?

Diagnosis

Physical Examination

- Tenderness to the touch
- Weakness in the muscles
- Extent of passive and active range of motion
- Crepitation



Diagnosis

X-ray Evaluation

- Narrowing of the joint space
- Cystic changes in the bone
- Bone spurs



Diagnosis

Additional Tests

- Blood tests
- Computerized Tomography (CT) scans
- **Magnetic Resonance Imaging (MRI) scans**

Best non-surgical modality to identify focal cartilage defects



Non-Surgical Treatment Options for Arthritis

Nonsurgical treatment options

Physical Therapy

- Almost always start with physical therapy
 - Improve range of motion
 - Improve strength
 - Decreases pain



Nonsurgical treatment options

Medications

- NSAIDS
 - Decreases inflammation
 - Decreases pain



Nonsurgical treatment options

Supplements

- *Lots of claims*
- **NONE** have passed FDA testing as proven
- Personal trials



Nonsurgical treatment options

CBD

- *Cannabidiol*
- Naturally occurring extract from hemp
- Oils, capsules, salves



Nonsurgical treatment options

Cortisone injection

PROS:

- Relatively easy procedure under fluoroscopy
- Excellent diagnostic tool
- Well-tolerated
- Very predictable reduction in pain



Nonsurgical treatment options

Cortisone injection

CONS:

- Must be placed carefully
- Masks symptoms
- Can soften cartilage
- Used to “buy” time



Nonsurgical treatment options

Viscosupplement

- Purify Hyaluronic acid from rooster combs or bacterial growth
- “Oil-additive” to joint fluid

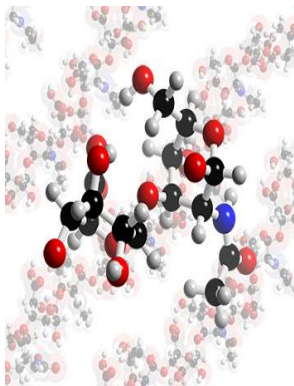


Nonsurgical treatment options

Viscosupplement

PROS:

- Protects remaining cartilage
- Improves biochemical environment of joint
- Reliable reduction in pain



Nonsurgical treatment options

Viscosupplement

CONS:

- Currently, approved for knees only
- Currently being studied in other joints



Nonsurgical treatment options

Clarix

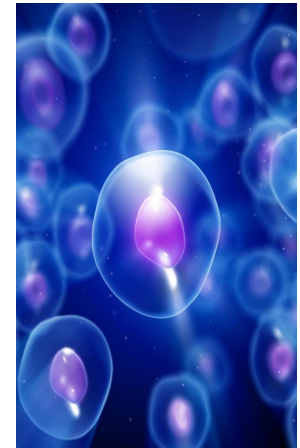
- Regenerative therapy
- Umbilical cord tissue
 - Rich in growth factors
- Creates controlled inflammation to repair tissue



Nonsurgical treatment options

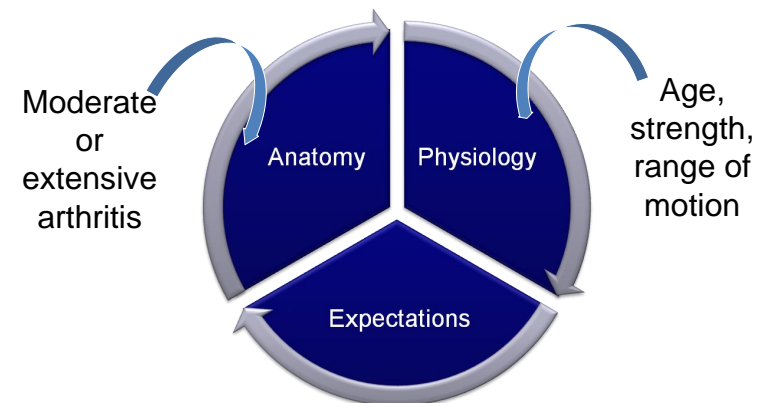
Stem Cell Therapy

- Great claims of what can be treated
- Promising early anecdotal reports
- Expensive
- ***Pain relieving injection***
- Likely the best future option for moderate arthritis



Surgical Treatment Options for Hip and Knee Arthritis

Decision Variables



Decision Variables



Surgical Treatment Options for Hip Arthritis

Surgical treatment

Advanced Arthritis

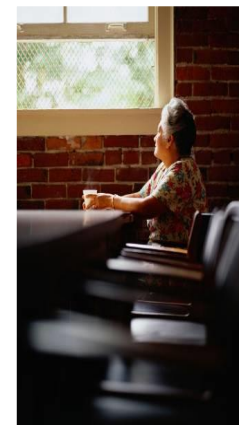
Because hip replacement is predictably so good in restoring function and pain relief, the choice is really replacement when appropriate.



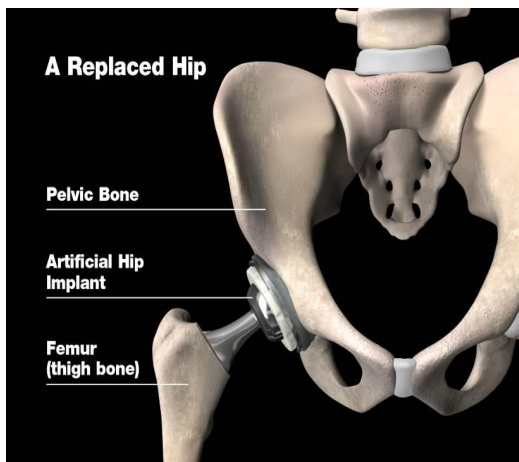
Surgical treatment

Advanced Arthritis

- Patient determines the appropriate time for surgical intervention
- Not determined by x-ray
- Can't really "miss the boat" with hip arthritis



What is a HIP REPLACEMENT?



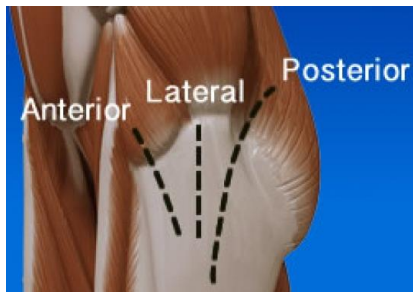
Surgical treatment

ANTERIOR HIP REPLACEMENT

Anterior Hip Replacement

What is it?

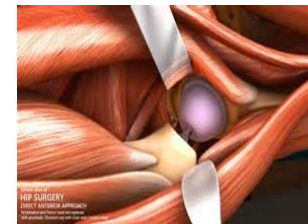
- The DIRECT ANTERIOR approach



Anterior Hip Replacement

Advantage(s)

- True intermuscular approach to the hip joint
- *Originally described in 1883*
- Regained popularity



Anterior Hip Replacement

Advantage(s)

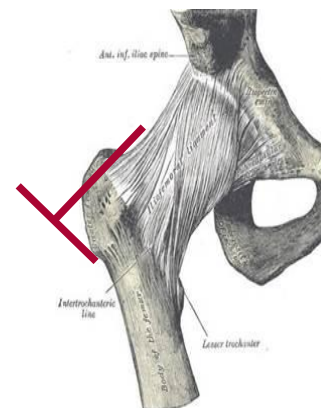
- Patient is positioned supine (on their back)
- Sometimes use specialized leg holder
- Easier for patient, surgeon and anesthesia



Anterior Hip Replacement

Advantage(s)

- Limited trauma to muscles and tissue
- Anterior capsular incision
- No disruption of the posterior structures to the hip at all



Anterior Hip Replacement

Advantage(s)

- Allows excellent visualization
- With more limited surgical dissection
 - Faster recovery
 - Less pain



Surgical Treatment

COMPUTER ASSISTED HIP REPLACEMENT

Computer Assisted Hip Replacement Makoplasty

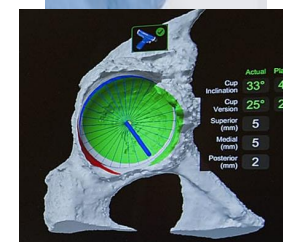
- Preoperative CT scan data is synced to intraoperative data with a probe.
- Implant positioning and surgical resection can be planned before any cuts are actually made .



Computer Assisted Hip Replacement Makoplasty

Technique:

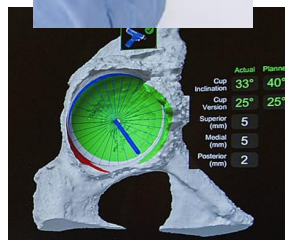
Robotic arm *assists* with controlled resection of bone
Real-time evaluation



Computer Assisted Hip Replacement Makoplasty

Technique:

Allows single stage reaming
Solid, stable fit of the acetabular component



Computer Assisted Hip Replacement Makoplasty

Rationale:

Allows extreme precision
when performing hip replacement surgery



Computer Assisted Hip Replacement Makoplasty

Rationale:

Correct positioning of the components leads to lower wear rates and reduced risk of dislocation.



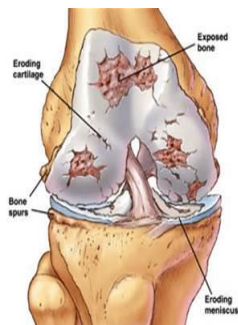
Surgical Treatment Options for Knee Arthritis

Algorithm for Treatment

Focal Wear

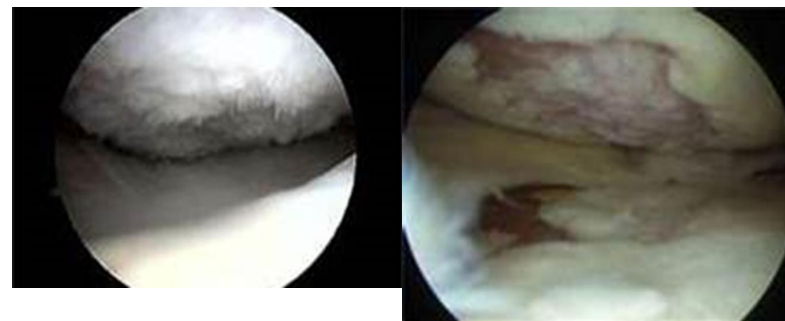


Global Wear



Algorithm for Treatment

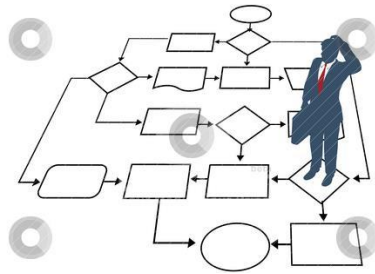
Mild < Moderate < Severe



Algorithm for Treatment

Treatment options can be defined by these categories.

Patient specific discussion is critical for successful outcome.



Algorithm for Treatment

Once conservative therapy fails...

Surgery becomes an option.

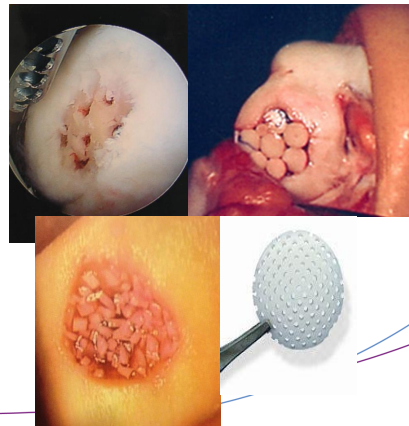


Algorithm for Treatment

A Word about Focal Arthritis

Numerous techniques for cartilage “patching”

Most people at these presentations are not candidates.



Algorithm for Treatment

Partial Versus Total Knee

At this point decision is between a **partial** knee replacement versus a **total** knee replacement.



Algorithm for Treatment

Partial Versus Total Knee

Three distinct compartments



Algorithm for Treatment

Partial Versus Total Knee

Makoplasty technique allows for partial resurfacing of $\frac{1}{3}$ or $\frac{2}{3}$ of the knee.



Algorithm for Treatment

Partial Versus Total Knee



Versus
TOTAL
knee
replacement

Algorithm for Treatment

Partial Versus Total Knee

Primary Indication:
Isolated compartment
arthritis
or Not?



Algorithm for Treatment

Patient Variables

- Age
- Weight
- Range of motion
- Alignment/Stability
- Additional arthritis?
- X-rays



Algorithm for Treatment

My Philosophy:

Do *ONE* surgery well

Individualize with each patient



Algorithm for Treatment

WHEN NOT WHAT

- Interference with daily activities
- Loss of motion
- Decreased quality of life
- Pain
- I will encourage patients to proceed with replacement if waiting will compromise outcome.



Surgical Treatment

COMPUTER ASSISTED *PARTIAL* KNEE REPLACEMENT

Computer Assisted Knee Replacement Makoplasty

- Preoperative CT scan data is synced to intraoperative data with a probe
- Implant positioning and surgical resection can be planned before any cuts are actually made



Computer Assisted Knee Replacement Makoplasty

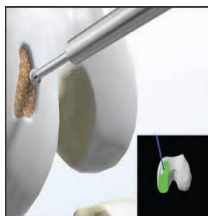
Technique:

Robotic arm *assists* with controlled resection of bone
Real-time evaluation



Computer Assisted Knee Replacement Makoplasty

Planned resection is made with dremel type attachment



Computer Assisted Knee Replacement Makoplasty

Technique:

Implants are positioned flush with surrounding cartilage

Resurfacing technique



Surgical Treatment

COMPUTER ASSISTED *TOTAL* KNEE REPLACEMENT



Computer Assisted Knee Replacement Makoplasty

Truly the LATEST and GREATEST!



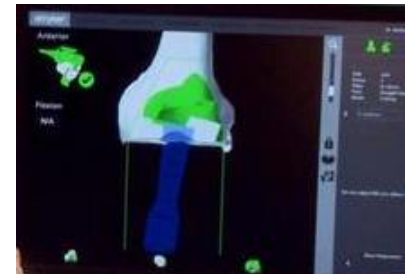
Computer Assisted Knee Replacement Makoplasty

Same CT based setup as partial knee replacement



Computer Assisted Knee Replacement Makoplasty

- Position and sizing of components PRIOR to surgery
- Less invasive
- Faster
- Eliminates need for cementing interfaces



Computer Assisted Knee Replacement Makoplasty

Allows balancing of knee ligaments through range of motion

- Feels more natural
- Wears more slowly



REHAB and RECOVERY

Recovery

- **Surgery takes on average less than one hour**
- Spend approximately one hour in recovery room
- Transferred to orthopedic floor



Recovery

Improvements in anesthesia also facilitate immediate mobility

- Most cases performed with a **spinal anesthetic**
 - Less medicine
 - Less nausea
- **Intraoperative joint cocktail**
 - 48 hour pain blockade



Therapy

- ***Begins immediately***
- Start working with therapy to get out of bed
- WBAT
- Anterior hip precautions for hips
- Range of motion as tolerated for knees



Therapy

Most patients spend one night in the hospital

- At discharge you are able to go up and down stairs, dress yourself and go to the bathroom independently.



Therapy

- Discharged home with a home therapist for first two weeks
- Then begin outpatient therapy for as long as you need
 - Typically 6 weeks



Summary

You choose the time to intervene for hip or knee replacement.



Summary

Combining techniques of computer assistance with less invasive surgical approaches utilizes the best of current technologies to maximize your recovery and outcome.



KNEE Key Points

- Unlike the hip, you can **WAIT TOO LONG** and compromise the full potential outcome
- **Have to work hard at rehab to restore motion and function**
- Because of knee laxity “wobble” there is a greater sense of mechanical replacement that with hips



HIP Key Points

Due to inherent stability of a hip replacement and immediate full weight bearing status...

- A hip replacement is relatively straightforward to recover from
- Slight weakness for several weeks

Expectation is for FULL FUNCTION, NO PAIN and NO AWARENESS



CONCLUSION

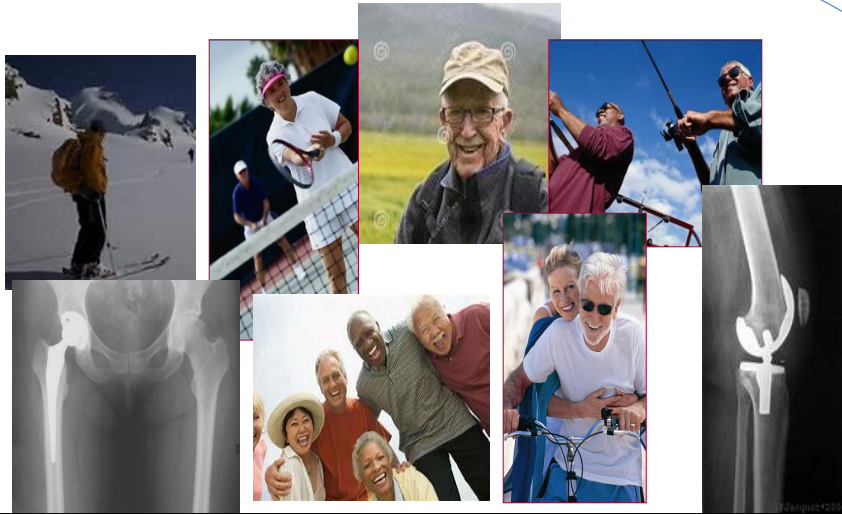
There is no reason to **“put up with the pain”** and dysfunction anymore.

There are excellent conservative and surgical options to improve your symptoms.

When daily activities are compromised, when quality of life is diminished... **intervene. Do not wait!**



Thank You!



Understanding Hip & Knee Arthritis

Michael J. Repine MD

Boulder Medical Center Orthopedics

303-900-4710

