Understanding Hip & Knee Arthritis
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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

Relieving Arthritis Knee Pain
Michael J. Repine MD
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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

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.
The Hip Joint - Musculature

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

Stability

- Complex array of ligaments
- Augments stability to the ball and socket
The Hip Joint - Cartilage

Cartilage is critical in understanding arthritis.

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

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

• Transmits applied loads across mobile surfaces
• Lines the ends of bones
• Surfaces roll or slide during motion
It reduces friction coefficient to 0.0025.

“Like the frosting on a piece of cake”

“Like the frosting on a piece of cake”
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?

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

Normal Anatomy

Normal Xrays
What is ARTHRITIS?

Arthritis Anatomy

Arthritic Xrays

Normal Anatomy

Arthritic Xrays

Clinical Evaluation of Hip and Knee Arthritis

Normal Anatomy

Arthritic Anatomy

Boulder Community Health
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?

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

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

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

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

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

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

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

Viscosupplement

CONS
• Currently, approved for knees only
• Currently being studied in other joints

PROS
• Protects remaining cartilage
• Improves biochemical environment of joint
• Reliable reduction in pain
Nonsurgical treatment options

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

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
- Moderate or extensive arthritis
- Age, strength, range of motion
- Anatomy
- Physiology
- Expectations
Surgical Treatment Options for Hip Arthritis

Advanced Arthritis

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

- 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?

Anterior Hip Replacement

What is it?
• The DIRECT ANTERIOR approach

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

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

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

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*

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**Surgical Treatment Options for Knee Arthritis**

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**Algorithm for Treatment**

- **Focal Wear**
- **Global Wear**

- Mild < Moderate < Severe
Treatment options can be defined by these categories:

- **Patient specific discussion is critical for successful outcome**

Once conservative therapy fails...

**Surgery becomes an option**

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**A Word about Focal Arthritis**

Numerous techniques for cartilage “patching”

**Most people at these presentations are not candidates.**

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**Partial Versus Total Knee**

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

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

Primary Indication: Isolated compartment arthritis or Not?
**Algorithm for Treatment**

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

**My Philosophy:**
Do **ONE** surgery well
Individualize with each patient

**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

Technique:

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

Planned resection is made with dremel type attachment

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

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

Computer Assisted Knee Replacement Makoplasty

Same CT based setup as partial knee replacement
Computer Assisted Knee Replacement Makoplasty

Allows balancing of knee ligaments through range of motion

- Feels more natural
- Wears more slowly

Rehab and Recovery

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

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

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!