



Understanding Knee Arthritis

Michael J. Repine MD

Boulder Medical Center Orthopedics

(303) 872-4018



Arthritis is COMMON

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



This program will touch upon the following topics:

- Review of Knee Anatomy
- Discussion of Arthritis
- Latest Treatment Options for Knee Arthritis
- Expectations/Outcomes

About Myself

- Oldest of six
- Identical twin
- Colorado native
- Two young boys



About Myself

Oldest of six
Identical twin
Colorado native
Two boys
I enjoy traveling and languages



Your Treatment Options
Knee Pain



About My Practice

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

Your Treatment Options
Knee Pain



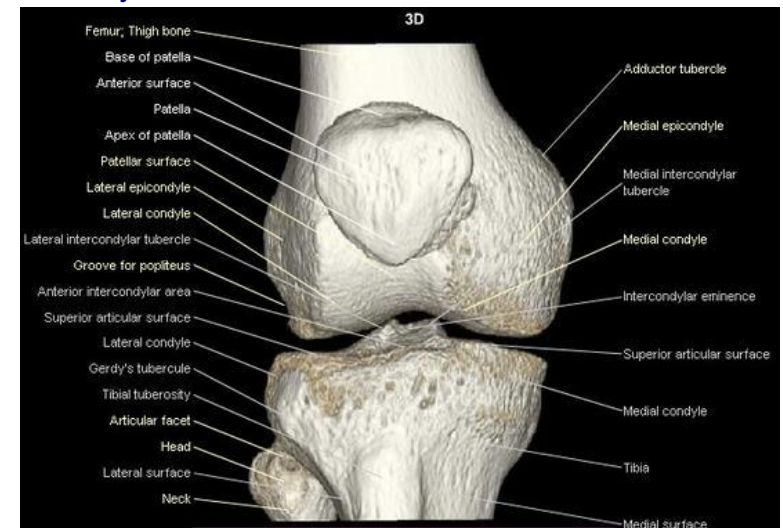
ANATOMY

Your Treatment Options
Knee Pain



Normal Knee

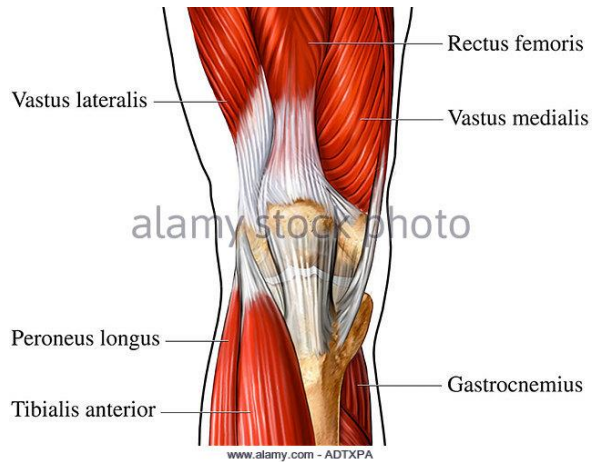
Bony Anatomy



The Knee Joint

Musculature

- Multiple muscles acting upon knee joint



Your Treatment Options
Knee Pain

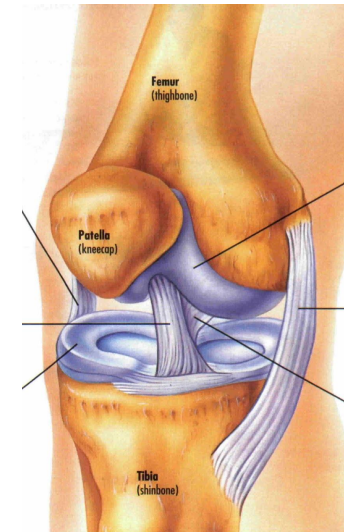


The Knee Joint

Ligaments

Stability

- Complex array of ligaments
- Critical for knee stability and function



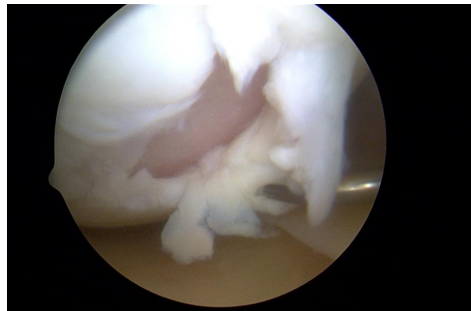
Your Treatment Options
Knee Pain



The Knee Joint

Cartilage

Cartilage is critical in understanding arthritis



Your Treatment Options
Knee Pain



The Knee Joint

Cartilage

- Transmits applied loads across mobile surfaces
- Lines the ends of bones
- Surfaces roll or slide during motion
- Hyaline cartilage is fluid-filled wear-resistant surface
- It reduces friction coefficient to 0.0025.

“Like the frosting on a piece of cake”



Your Treatment Options
Knee Pain





Normal Cartilage

“Like the tires on your car”



Healthy, normal cartilage rolls easily

Smooth motion



What is ARTHRITIS?

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



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



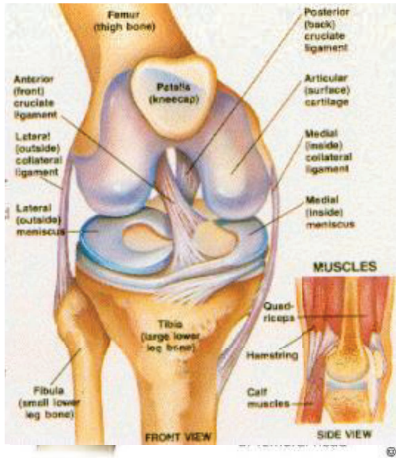
What is ARTHRITIS?

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

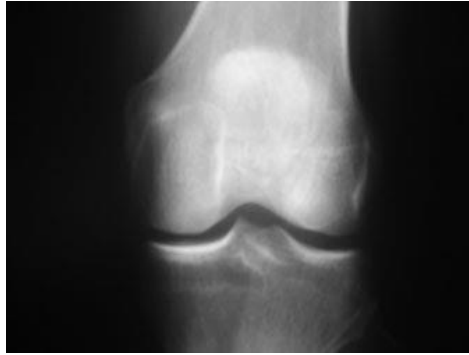
Importantly, this mechanical change is accompanied by biochemical changes

What is ARTHRITIS?

Normal Anatomy



Normal Xrays



What is ARTHRITIS?

Arthritis Anatomy



Arthritic Xrays



Most Common Causes of Arthritis

Degenerative – “wear and tear”

Osteoarthritic – traumatic

Rheumatoid – inflammatory

Bacterial - infectious

Evaluation of Knee Arthritis



Diagnosing Knee Pain

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



Symptoms

PAIN

- Weight-bearing activities
- While sleeping at night
- Located across entire knee or focally to an area
- Usually slow in onset



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

X-rays of an arthritic knee:

- narrowing of the joint space
- cystic changes in the bone
- formation of bone spurs (osteophytes)



Diagnosis

Additional Tests

- Blood tests
- Computerized Topography (CT) scans
- **Magnetic Resonance Imaging (MRI) scans**
 - **Best non-surgical modality to identify focal cartilage defects**
- Arthroscopy
 - Small areas of traumatic arthritis, loose bodies



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

Cortisone injection

PROS

- Relatively easy
- 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 Hylauronic acid from rooster combs or bacterial growth

“Oil-additive” to joint fluid

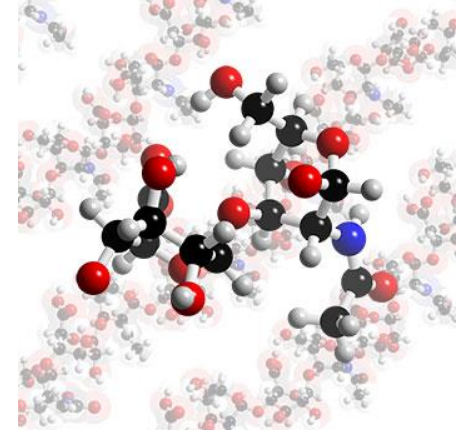


Nonsurgical treatment options

Viscosupplement

PROS

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

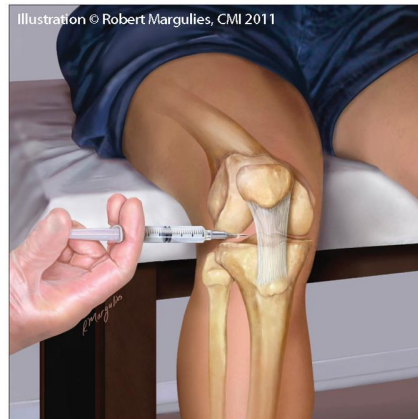


Nonsurgical treatment options

Viscosupplement

CONS

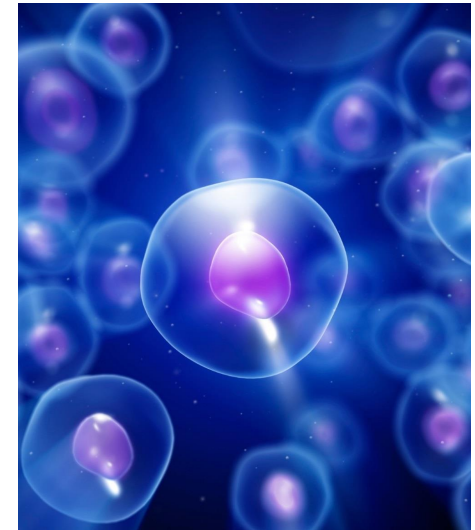
- NONE
 - * With appropriate patient selection
- Small potential for reaction with repetitive administration



Nonsurgical treatment options

Stem Cell Therapy

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





Surgery Treatment Options

Surgical Treatment Algorithm



Focal

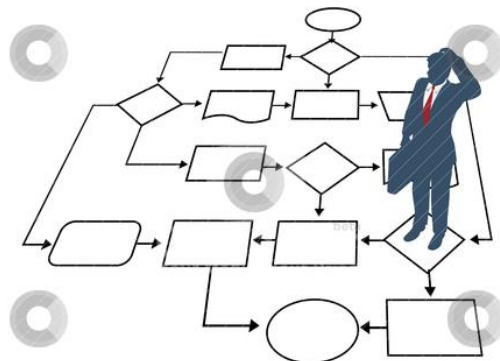
versus

Global



Surgical Treatment Algorithm

Individualized with each patient



Decision Variables



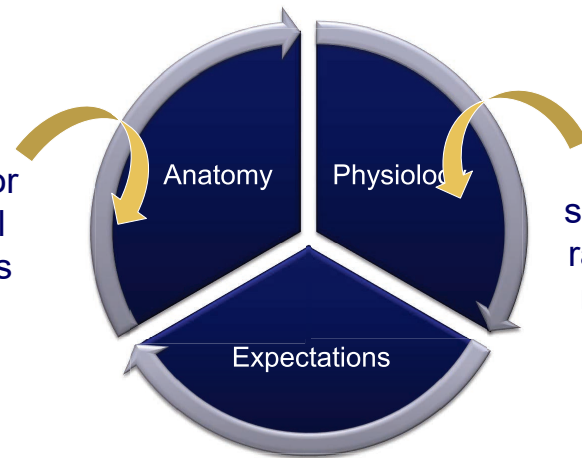
Focal or
Global
arthritis

Anatomy

Physiology

Expectations

Age,
strength,
range of
motion



Decision Variables



Your Treatment Options
Knee Pain

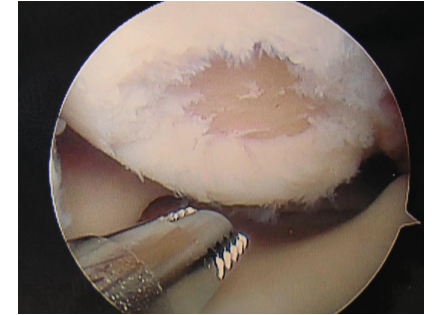


Surgical treatment

Focal cartilage damage

- Must catch damage early
- Best treated before secondary bony changes occur

“Pothole”

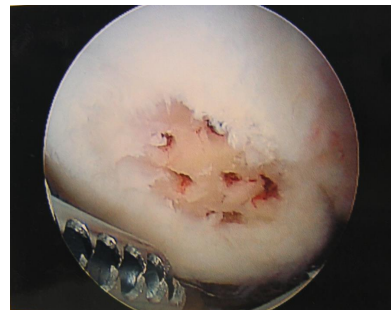


Surgical treatment

Focal cartilage damage

Microfracture

- Largely treated arthroscopically



Your Treatment Options
Knee Pain



Surgical treatment

Focal cartilage damage

Cartilage Transplantation



Your Treatment Options
Knee Pain

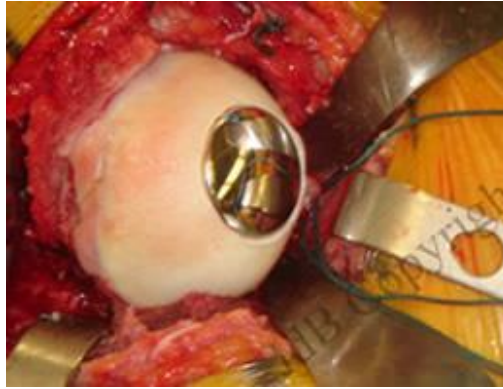




Surgical treatment

Focal cartilage damage

Resurfacing



Surgical Treatment

Global Arthritis



Surgical treatment

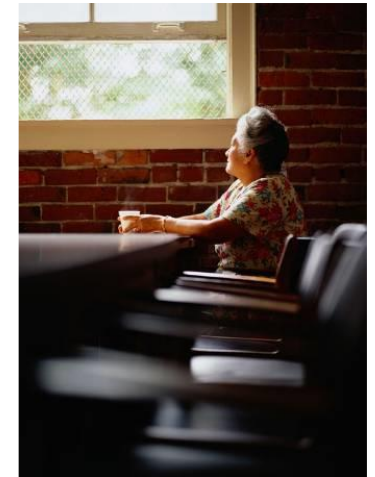
More advanced
arthritis requires
more advanced
surgical options



Surgical treatment

Advanced Arthritis

- Patient determines the appropriate time for surgical intervention
- *Influenced by Xray*
- Unlike hip arthritis, You **CAN** “miss the boat” for certain procedures





Surgical treatment

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



Surgical treatment

Partial versus Total

Patient Variables

Age

Weight

Range of motion

Alignment

Additional arthritis?

X-rays

Expectations



Surgical treatment

My Philosophy:

Do ONE surgery well



Surgical treatment

Partial Knee Replacement

- Three distinct compartments





Surgical treatment

Partial Knee Replacement

Makoplasty technique



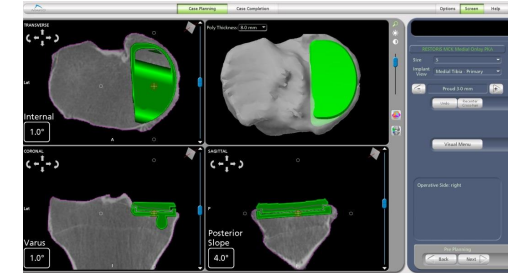
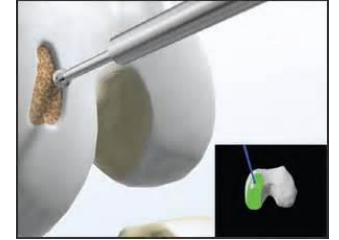
Surgical treatment

Partial Knee Replacement

Computer assisted

Preoperatively template
from CT Scan

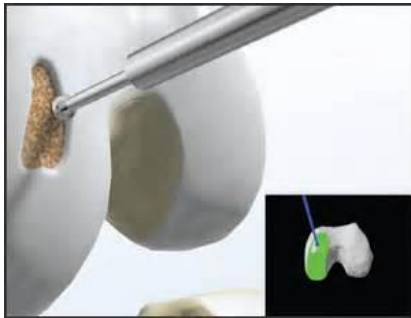
Extreme precision



Surgical treatment

Partial Knee Replacement

Resurfacing



Partial Knee Replacement



Surgical treatment

Total Knee Replacement

Tri-compartmental arthritis

Mal-alignment

Knee contractures

Patient factors



Your Treatment Options
Knee Pain



Surgical treatment

Total Knee Replacement

Makoplasty technique



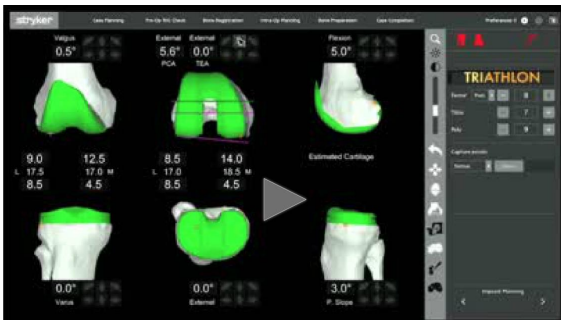
Your Treatment Options
Knee Pain



Computer Assisted Knee Replacement Makoplasty

● Technique:

- 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



Your Treatment Options
Knee Pain



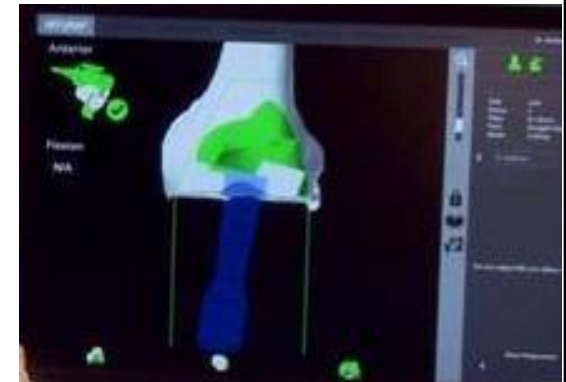
Surgical treatment

Total Knee Replacement

Computer assisted

Preoperatively template
from CT Scan

Extreme precision



Your Treatment Options
Knee Pain



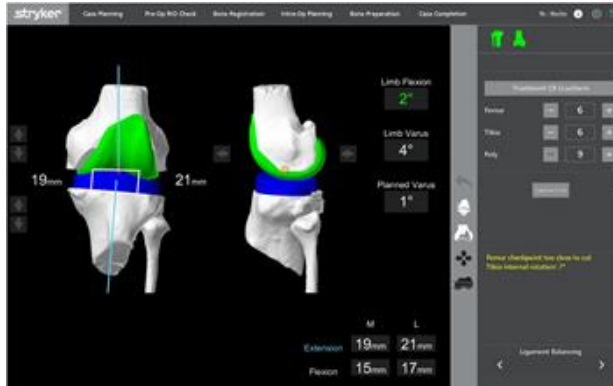
Surgical treatment

Total Knee Replacement

Real time guidance

Balance knee ligaments

Less invasive



Your Treatment Options
Knee Pain



Surgical treatment

Total Knee Replacement

“Game changer”



Your Treatment Options
Knee Pain



Surgical treatment

Total Knee Replacement

“Game changer”



Your Treatment Options
Knee Pain



Recovery



Your Treatment Options
Knee Pain





Recovery

- Begins immediately
- Improvements in anesthesia/pain control also facilitate immediate mobility
- Start working with therapy to get out of bed
- WBAT



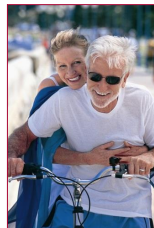
Summary

- You choose the time to intervene for knee replacement
- *Have to work hard at recovery*
- Very predictable outcome with a painless and fully functional knee joint



Thank You

Michael J. Repine MD
Boulder Medical Center Orthopedics
(303) 872-4018



Replaced Knee X-ray

