Degenerative knee conditions in the injured worker

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Disclosures

- Consultant – Total Joint Orthopedics
- Medical Director – Objective Medical Assessments Corporation
- No conflicts regarding this presentation

Overview

- Common occupational knee injuries
- Determining causality
- Natural history of degenerative knee conditions
- Treatment options
- Impairment/PPI
- Return to work considerations

Common occupational knee injuries

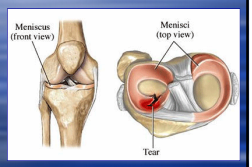
- Knee sprains
- Meniscus tears
- Contusions
- Cartilage injuries
- Aggravation of arthritis

Knee sprains

- Common mechanism - falls/twisting
  - Collateral ligament sprains/tears usually heal without surgery
  - Cruciate ligament tears do not
- Brace, PT, temporary activity restrictions
- Reconstructive surgery for ACL/PCL tears in young, active patients

Meniscus tears

- Usual mechanism: twist or hyperflexion (squatting)
- Rarely heal due to poor vascularity
- Arthroscopic debridement usually successful for isolated tears in pre-arthritic knees



Knee contusions

- Slip and fall onto patella (knee cap)
- Bone contusions painful longer than soft tissue contusions
- Not likely to cause significant cartilage injury

Cartilage injuries

- May occur in conjunction with major knee injuries
  - Patellar dislocation
  - ACL tear
  - Severe varus/valgus/rotational injury
  - Penetrating trauma

Aggravation of arthritis

- Minor injury flares up arthritic condition
- Minimal to no symptoms prior to occupational injury
- Persistent pain despite routine treatment measures

Determining causality

- Both medical records and patient history need to be considered
- Gray areas in many cases
- Imaging not always definitive

A few golden rules

- Diffuse arthritic changes in the knee do not develop overnight
- Meniscal tears in the presence of significant OA are usually not the primary cause of pain
- Routine walking, stairs, lifting, carrying, etc. on the job does not cause OA of the knee

Have you heard this before?

- "Never had any pain in my knee until I twisted it at work."
  - -61 yo male with four previous knee scopes
- "I had arthritis, but it didn't bother me before."
  - -54 yo female (5'4", 240 lbs) w/ xrays showing bone-on-bone OA
- "The wear and tear of 20 years of construction work caused/contributed to his arthritis."
  - -Treating physician

Notable exceptions-injuries leading to OA of the knee

- Meniscus tears resulting in total meniscectomy
- Intra-articular fractures (patella, femoral condyle, tibial plateau)
- Cruciate ligament tears
- Patellar dislocation with chondral injury

Occupational activities leading to knee OA

- Some evidence for jobs involving squatting and kneeling
- No evidence for walking, stairs, hard floors, etc.
- OA of the knee as an occupational disease?
  - The exception, not the rule

Occupational physical activities and osteoarthritis of the knee.

- Arthritis Rheum. 2000 Jul;43(7):1443-9.

- OBJECTIVE: To assess the risk of knee osteoarthritis (OA) associated with kneeling, squatting, and other occupational activities.
- CONCLUSION: There is now strong evidence for an occupational hazard of knee OA resulting from prolonged kneeling and squatting.

Case Example 1

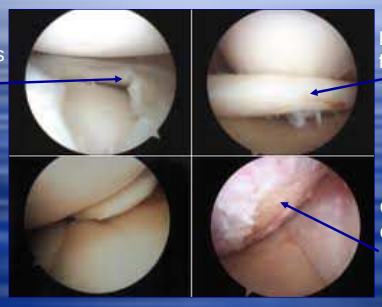
- 58 yo female, tripped over box, twisted left knee
- MRI - LMT
- Knee scope - med & lat meniscectomies, LB removal
  - Grade II - IV changes lat and PF
- Continued pain - HA injections

Case Example 1

- IME - arthritic pain, valgus deformity
- Diagnoses:
  1. LMT/MMT - related
  2. OA - pre-existing, not related

PPI - 10% LE, 4 % WP

Knee arthroscopy



Case Example 2

- 62 yo female grocery clerk, 5'1", 230 lbs
  - 7/2002 - tripped fell on right knee
  - Claim allowed for MMT
- Scope - MMT, Gr 3-4 medial and PF
- Synvisc injections
- 2nd scope 2004 - partial meniscectomy, chondroplasty

Case Example 2

- IME 2004
  - Pre-existing OA
  - MMT/LMT - related
  - PPI 10% LE/4% WP
- 2006 - worsening pain, TKA recommended
- IME 2007 - "removal of portion of medial meniscus…would accelerate medial compartment arthritis which preexisted. Current status of severe DJD,…is at least in part due to the industrial injury."

Case Example 2

- TKA approved 8/2007
- Claim closed with PPI 37% LE
- Persistent pain, no further treatment
- Never returns to work
- My IME 2010 - painful TKA
  - Ligamentous laxity
  - Probable loosening of uncemented femoral component

Natural history of osteoarthritis

- What is OA?
  - Wearing away of articular cartilage
  - Progressive, non-reversible condition
  - Multifactorial - knee alignment, trauma, obesity, metabolic disorders, activity level, genetics

Natural history of knee OA

Is obesity a factor?

Natural history of knee OA

- Development of OA commonly occurs in young patients 5-10 years after ACL/PCL or meniscal injuries
- Rate of progression variable - related to activity level, limb alignment, weight
- Partial thickness cartilage loss responds well to injections/nonsurgical treatment

Natural history of knee OA

- Full thickness loss (bone-on-bone) results in debilitating pain, usually only relieved by arthroplasty
- Further progression leads to bone loss, worsening bow-legged (varus) or knock-knee (valgus) deformity, and loss of motion

Factors affecting radiographic progression of knee osteoarthritis.

- Ann Rheum Dis. 1995 January; 54(1): 53–58.

METHODS--This was a prospective observational study of 350 osteoarthritic knees.

Conclusion: High rate of radiographic progression of knee OA

Clinical and ultrasonographic predictors of joint replacement for knee osteoarthritis: results from a large, 3-year, prospective EULAR study.

- Ann Rheum Dis. 2010 Apr;69(4):644-7. Epub 2009 May 10.

- CONCLUSION: Longitudinal evaluation of this OA cohort demonstrated significant progression to joint replacement. In addition to severity of radiographic damage and pain, US-detected effusion was a predictor of subsequent joint replacement.

Epidemiology of knee OA

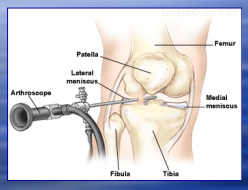
- Very common in North America today
  - Exact incidence unknown
  - Radiographic OA in 60-70% of individuals >age 50 with self-reported knee pain
- Felt to be increasing with aging population and obesity epidemic
- Number of TKA's performed in US has been steadily increasing

Non-surgical treatment

- Activity modifications
- Unloader braces
- NSAIDs
- Physical therapy
- Cortisone injections
- Viscosupplementation injections

Surgical treatment options

- Arthroscopy
- Fracture fixation
- Osteotomy
- Partial/total knee replacements



Partial Knee Replacements

- Unicompartmental arthroplasty
- Patello-femoral arthroplasty
- Bi-compartmental arthroplasty

Partial Knee Replacements

Potential benefits:

- Replace only degenerative portions of joint
- Maintain cruciate ligaments
- More natural biomechanics
- Smaller exposure - quicker recovery
- Bridge to TKA?

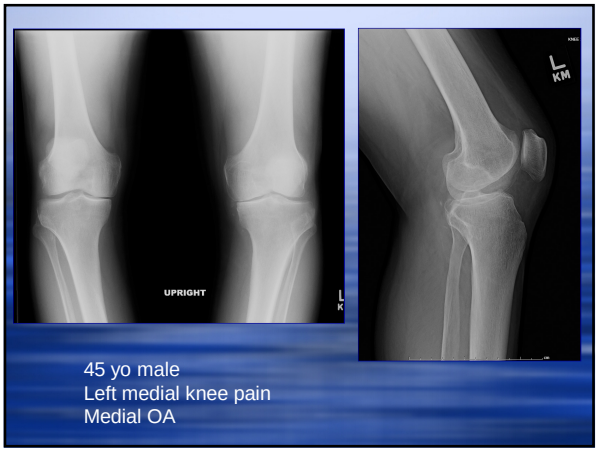
Unicompartmental knee arthroplasty

- Isolated medial compartment disease common - 10-20% knee patients
  - Post-meniscectomy OA
  - Osteochondritis diseccans
  - Osteonecrosis

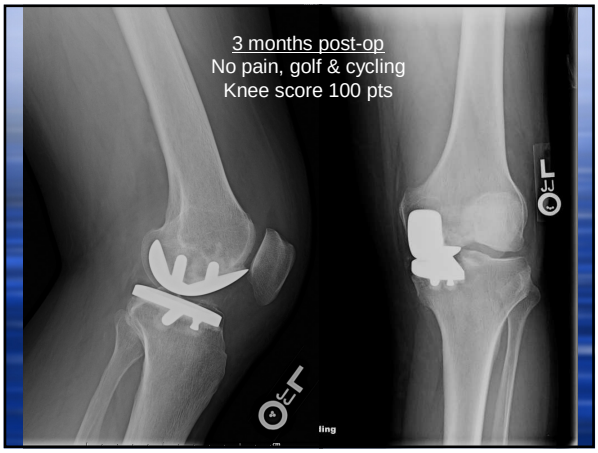
Unicompartmental knee arthroplasty

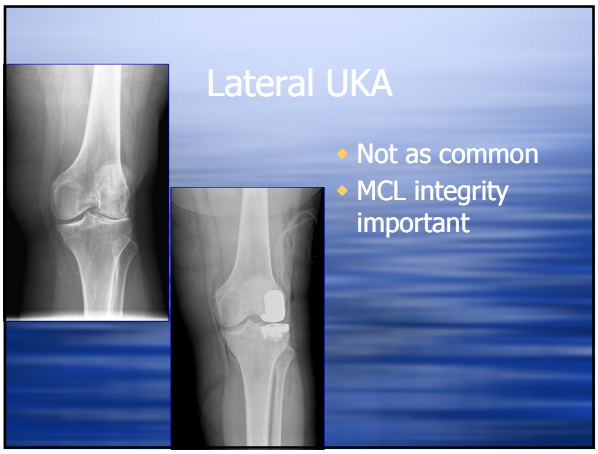
- Approximately 70,000 Partial Knee Resurfacing procedures are done each year in the US*

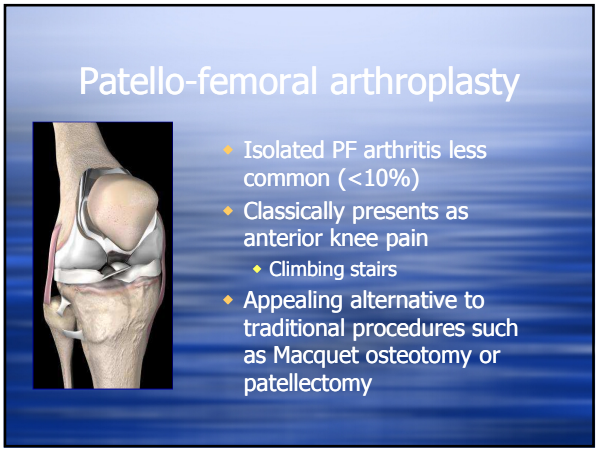
*2008 Projection, Millennium Research Group, 2005.

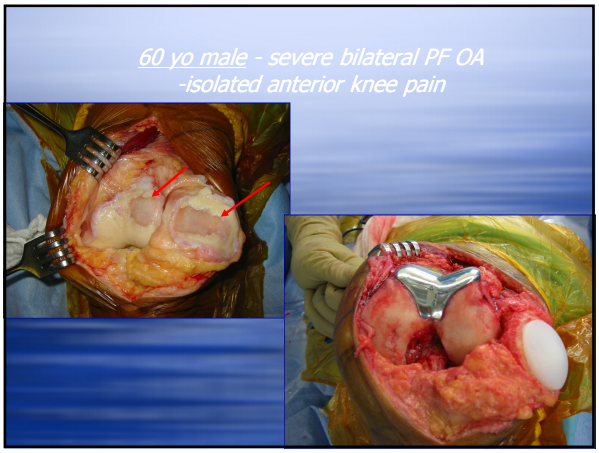


45 yo male
Left medial knee pain
Medial OA



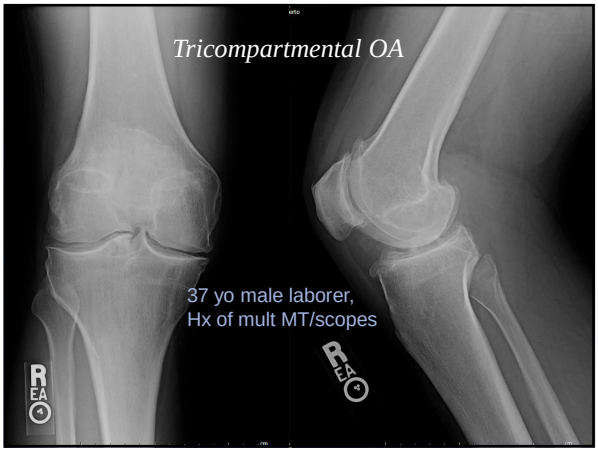

Lateral UKA
Not as common
MCL integrity important


Patello-femoral arthroplasty
Isolated PF arthritis less common (<10%)
Classically presents as anterior knee pain
Climbing stairs
Appealing alternative to traditional procedures such as Macquet osteotomy or patellectomy


60 yo male - severe bilateral PF OA
-isolated anterior knee pain

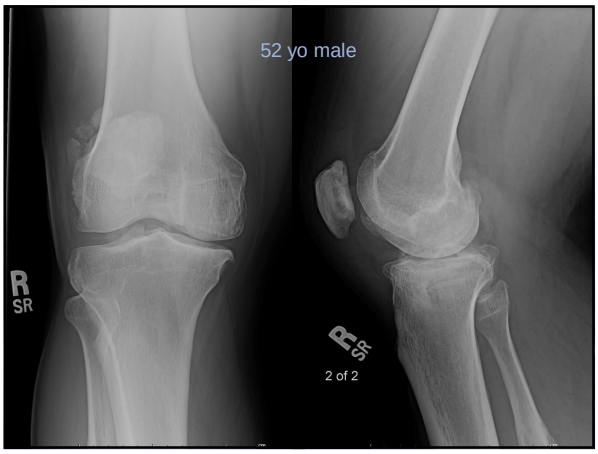
Total Knee Arthroplasty (TKA)

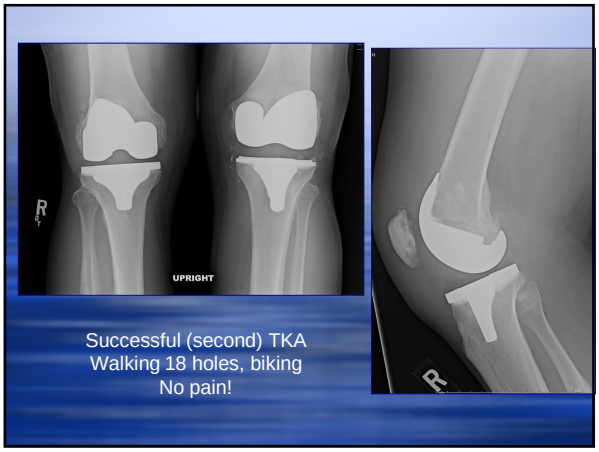
- Most common type of knee replacement
- Indicated for debilitating arthritis pain
- Reliably relieves pain and improves mobility
- "Gold standard" for 30 years
- Low complication rates



Considerations for TKA

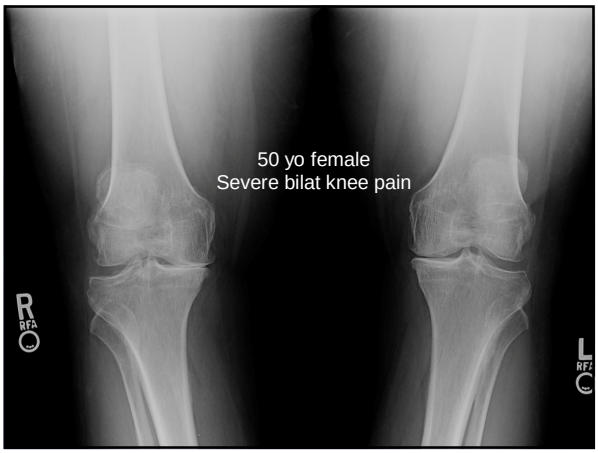
- Cemented vs. uncemented fixation
- Component design
  - Mobile-bearing tibia
  - Single radius axis of rotation
  - High flexion design
- Advanced bearing materials
- Simultaneous bilateral TKA

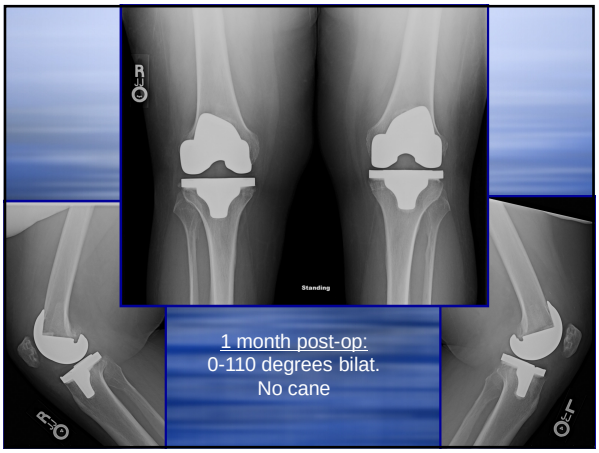




Simultaneous bilateral TKA

- Not for elderly or patients with medical comorbidities
- Safe for some young, healthy patients
  - Risks: increased blood loss, pulmonary complications
  - Benefits: shorter recovery period (less time off work)





Rehabilitation after TKA

- Goals:
  - Decrease in pain
  - Early recovery of muscle function
  - Regaining ROM
  - Optimization of gait

Pain reduction

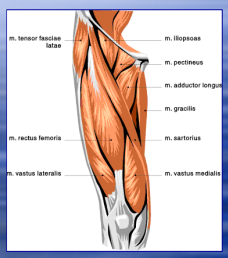
E-stim

Iontophoresis

Cold therapy

Muscle recovery

- Quadriceps weakened
  - Pre-op atrophy
  - Insult of surgery
- Recovery allows
  - Stability during stance/gait
  - Decreased use of assistive devices
  - Regaining extension



Muscle recovery - strategies

Range of motion

- Goals vary patient-to-patient
- Full extension desired
  - Decreased energy requirements
- Flexion 110 degrees (average patient)
  - Rising from chair, stairs
- Flexion >120 degrees (young, active patient)

Recovery of ROM may be accelerated when normal ROM pre-op!

Range of motion exercises

Tailor rehab to individual patient!!

Optimization of gait

- Desired rehab goal in patient with appropriate potential
  - Young active patient
  - Absence of contralateral knee or hip pathology

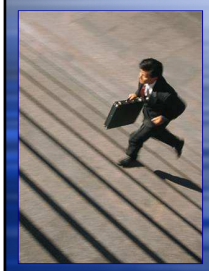
Recovery time after TKA

One week
- quad recovery/active SLR
- Walker to cane

Two weeks
- Flexion 90 degrees

Four weeks
- Full extension
- Minimal use of cane/crutch

Recovery time after TKA



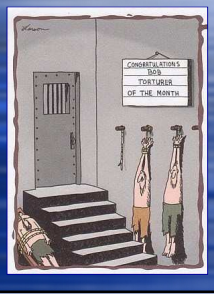
Six to eight weeks
- Flexion 120 degrees
- Reciprocating stairs

Three months
- Normal gait
- Quad strength symmetric with other leg
- Stairs without railing

Improvements seen to 12 months!

Problems will occur…

Negative perceptions of therapy



Apprehension about returning to work

Patient focused on pain

Interventions

- Slow to regain strength - continue PT
  - Adjust frequency
  - Encourage HEP
- Slow to regain ROM - consider MUA!
- Adequate pain control
- Encouragement on RTW

Impairment rating after meniscectomy

- AMA 6th Edition – Class 1 problem (1-13% LE)
  - 2% LE (1% WP) for partial medial OR lateral
  - 7% LE (3% WP) for total medial OR lateral
  - 10% LE (4% WP) for partial medial AND lateral
- Associated chondromalacia, OA, DJD changes
  - *Segregated from knee sprain/strain*

Impairment rating after ligament injuries

- Depends on stability at time of MMI
  - No instability – 0% LE
  - Mild laxity – 7-13% LE
  - Moderate laxity – 14-25% LE
  - Severe laxity – 31-43% LE

Impairment rating after TKA

- Typically rated according to result of the surgery
- Knee scores not used under 6th Edition
  - Class 2 (good result): 21-25% LE
  - Class 3 (fair result): 31-43% LE
  - Class 4 (poor result): 59-83% LE
- OA of opposite knee may be rated and subtracted as the "normal"

Return to work after knee replacement

- Unicompartmental arthroplasty
  - Avoid running, otherwise no restrictions
  - Suitable for all types of work except heavy labor
- Earlier than TKA's
- Time frame: 1-2 months

Return to work after TKA

- Varies considerably
- My treatment goals:
  - 3-4 weeks for desk jobs
  - 2 months for laborers
  - Add 1 month for WC patients

Return to work after knee replacement

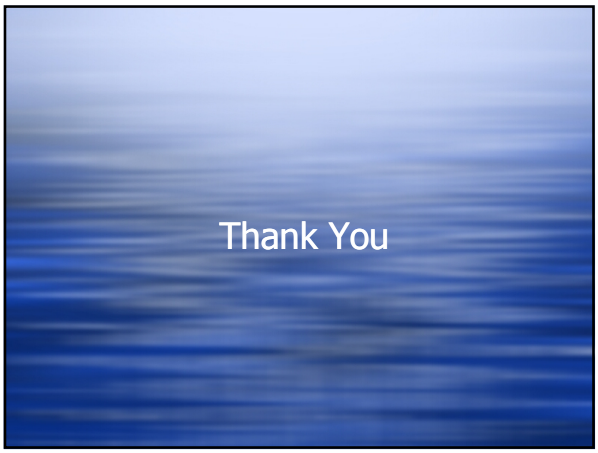
- Total knee arthroplasty
  - No restrictions to walking, stairs, operating machinery
  - Avoid kneeling, squatting (carpenters, technicians, etc.)
  - Possible exceptions for revisions, complex cases
- Usually more limited by overall physical capacities.

Summary

- Knee sprains may cause meniscus/ligamentous tears
  - Rarely are direct cause of OA
- Diffuse articular cartilage damage usually chronic and longstanding
- Minor knee sprains/contusions may temporarily aggravate underlying OA
  - Not proximal cause of need for TKA

Summary

- Partial knee replacements attractive alternative to TKA in young, active patient
- Advances in TKA design and materials offer potential for improved wear performance and increased longevity
- Workers capable of all but most strenuous jobs after knee replacement


Thank You