Knee Arthritis

Sunny Cheung, MD
Disclosures

- No financial affiliation with industry or pharmaceuticals
What’s causing your pain?

It’s estimated 70 million people in the U.S. have some form of arthritis.⁴ Osteoarthritis is one of the most common types.

- **Osteoarthritis**
  - Wear and tear that deteriorates the “cushion” in your joints
  - A degenerative condition—it won’t get better and may get worse

- **Rheumatoid arthritis**
  - An autoimmune disease that attacks the lining of joints, causing swelling, possibly throbbing pain and deformity

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Understanding Osteoarthritis

Normal Cartilage
Understanding Osteoarthritis

NORMAL MENISCUS
Understanding Osteoarthritis

- Osteoarthritis: The destruction of the articular cartilage resulting in pain, deformity, and disability
Understanding Osteoarthritis

**Healthy knee**

The end of each bone in the joint is covered with cartilage, acting as a cushion so the joint functions without pain.

**Diseased knee (osteoarthritis)**

Wear and tear deteriorates natural cushion, leading to bone-on-bone contact, soreness and swelling.
Treatment Options for Early Arthritis

- Physical Therapy
- NSAID DS (ibuprofen, alleve)
- Corticosteroid Injections
- Synvisc Injections
- Bracing (for some patients)
- Arthroscopy (for meniscal tears)
- Osteotomy (for some patients)
- Knee Replacement
Physical Therapy

- Improved pain, stiffness, function, walking distance compared to placebo at 1 year
  - 8 sessions, 2x/week
    - Home exercises in between
  - Active ROM
  - Muscle strengthening Hip & Knee
  - Muscle stretching lower extremity
  - Stationary bike

### Stretching Exercises

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Standing calf stretch.</td>
<td>Three repetitions with 30-sec hold.</td>
</tr>
<tr>
<td>2. Supine hamstring stretch.</td>
<td>Three repetitions with 30-sec hold.</td>
</tr>
<tr>
<td>3. Prone quadriceps stretch.</td>
<td>Three repetitions with 30-sec hold.</td>
</tr>
</tbody>
</table>

### Range-of-Motion Exercises

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In long sitting position, knee mid-flexion to end-range extension.</td>
<td>Two 30-sec bouts with 3-sec hold at end range.</td>
</tr>
<tr>
<td>2. In long sitting position, knee mid-flexion to end-range flexion.</td>
<td>Two 30-sec bouts with 3-sec hold at end range.</td>
</tr>
<tr>
<td>3. Stationary bike.</td>
<td>Five min. Increase time as tolerated.</td>
</tr>
</tbody>
</table>

### Strengthening Exercises

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Measures</th>
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<tbody>
<tr>
<td>1. Static quad sets in knee extension.</td>
<td>One set of 10 repetitions with 6-sec hold. 10-sec rest between repetitions.</td>
</tr>
<tr>
<td>2. Closed-chain progression*:</td>
<td></td>
</tr>
<tr>
<td>A. Standing terminal knee extension.</td>
<td>One 30-sec bout. Increase resistance as tolerated.</td>
</tr>
<tr>
<td>B. Seated leg press.</td>
<td>One 30-sec bout. Increase resistance as tolerated.</td>
</tr>
<tr>
<td>C. Dips weight-lessened.</td>
<td>One 30-sec bout. 1 sec during concentric phase and 2 sec during eccentric phase. Progress from 2 legs to 1 leg as tolerated.</td>
</tr>
<tr>
<td>D. Step-ups.</td>
<td>One 30-sec bout. Increase step height as tolerated.</td>
</tr>
</tbody>
</table>
Physical therapy

- Follow up randomized control trial
  - Supervised PT visits superior to Home exercise regimen alone
    - 8 week follow up
    - No major differences at 1 year though

Physical Therapy

- Improved function, pain, quality of life measures compared to control
  - Individual PT vs Group sessions – no difference
  - 8 weeks treatment
  - Very short follow up – 2 months

M Fransen et al Journal of rheumatology, 2001
Aquatic Therapy

- Improved pain, stiffness, function, quality of life, hip muscle strength
- 6 weeks treatment
- Very short 6 week follow up
- Cannot rule out placebo effect of pool

RS Hinman et al *Physical Therapy*, 2007
Pills

- **Glucosamine/Chondroitin**
  - Recent meta-analysis from BMJ did not show reproducible benefit
  - Buyer beware:
    - “Nutritional supplement” - Not FDA regulated
    - Actual dose of active ingredients can vary significantly

- **Non Steroidal Anti-Inflammatories (NSAIDs)**
  - Decrease pain but does not alter arthritis
Injections

- Steroids
  - Every 3-4 months
  - Gradually loses efficacy
  - Can transiently increase blood sugar in diabetics
Injections

- Viscosupplementation
  - Synvisc, Euflexa, Hyalgan
  - Helps symptoms in earlier stage osteoarthritis
Orthotics

- Heel wedges
  - No evidence showing reproducible benefit
Orthotics

- Unloader brace
  - Improved function, pain, walk distance at 6 months compared to control and neoprene sleeve

A Kirkley, et al JBJS 1999
Osteotomy

- High Tibial Osteotomy
  - For medial arthritis
  - Changes mechanical alignment to off-load knee
  - 80% 10 year survival at best
  - 60% 15 year survival
  - Ok if ACL deficient
Partial Knee Arthroplasty

- Must have intact ligaments
- Medial arthritis only
- 84-91% 10 year survival for the Oxford knee
  - 96% survival if age $>60$
- Many other manufacturers
  - 73% 10 year survival

Total Knee Arthroplasty

- Finnish Registry
  - 50,493 knee replacements!
  - 90% 10 year survival
  - 80% 15 year survival

Koskinen et al Acta Orthopaedica 2008
How does it work?

Healthy knee

Knee replacement
How does it work?

- Diseased areas at top of shin bone (tibia) and bottom of thigh bone (femur) are removed and reshaped.
- Femoral component covers the thigh bone (femur).
- Tibial component covers the shin bone (tibia).
- Polyethylene insert placed between femoral and tibial components.
- Patellar component replaces the kneecap (patella).
Sigma® Fixed-Bearing Knees

- Femoral Component
- Polyethylene Bearing
- Tibial Component
- Fixed Bearing Implant
Gender Specific Total Knee Arthroplasty

- Do women do worse? No
  - Slightly better functional and pain scores vs men after 2 years
    - MacDonald et al CORR 2008
- No difference between standard vs gender specific implants in 138 women
  - Kim et al J BJ S Br 2010
Meniscus Tears
Meniscal Tears

Shock absorber that decreases force between the femur (thigh bone) and tibia (shin bone)
MENISCUS TEAR

Lateral meniscus
Medial meniscus
Articular cartilage
Patella

©MMG 2001

MENISCUS TEAR
Epidemiology

- Asymptomatic meniscus tears
  - Prevalence 25%
  - age <40: 5.6%
  - Contralateral side of a symptomatic knee: 63%

Arthroscopy: Degenerative Tears

- Partial meniscectomy is controversial
- No surgery vs surgery: 40% vs 61% progression of OA on xray at 5 yrs
  - But clinically 90% “good/excellent” results
    - Codvall et al. Arthroscopy 1992
- 38% had worse arthritis on xrays
  - Rangger et al AJ SM 1995
## Arthroscopy: Degenerative Tears

<table>
<thead>
<tr>
<th>Age</th>
<th>Excellent/Good results</th>
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<tbody>
<tr>
<td>40-49</td>
<td>87%</td>
</tr>
<tr>
<td>50-59</td>
<td>82%</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>77%</td>
</tr>
</tbody>
</table>

Matsusue et al.  *Arthroscopy* 1996
Arthroscopy: Degenerative Tears

- Age >70 with partial menisectomy
  - Pre-existing grade 0-2 cartilage damage
    - 83% satisfaction at 2 years
  - Pre-existing grade 3-4 cartilage damage
    - only 69% satisfaction at 2 years

Crevoisier et al. Arthroscopy 2001
Thank you!