Pain Management of Knee Osteoarthritis

Zachary McCormick, M.D.
Assistant Professor
Physical Medicine and Rehabilitation
Department of Orthopaedic Surgery
University of California, San Francisco

Objectives

Review:
- What is knee osteoarthritis (OA)?
- What causes pain in knee OA?
- Scope of the problem
- Spectrum of care; treatment options

What is Knee OA?

Degenerative condition:
- Synovial inflammation
- Loss of articular cartilage
- Subchondral sclerosis and cysts
- Joint hypertrophy/osteophytes
What causes pain in knee OA?

**Inflammation**
- Synovitis

**Mechanical Changes**
- ↑ friction
- ↓ shock-absorption
- Ligament + capsule stretch
- Joint Instability

**Pain Sensitization**
- Peripheral
- Central
Scope of the Problem

Chronic Pain due to knee OA is common:
- >25 million (US alone)¹
- 13% of adults >65 years of age²
- 10-20%: chronic pain after knee replacement³

Spectrum of Care

Continued Pain and Disability Despite Treatment

- Weight loss
- Bracing
- Cane/assistive device
- Ice/cryotherapy
- Heat
- Oral Anti-inflam meds
- Targeted Exercise:
  - Quad, hip girdle
  - Bike/swimming
- Formal Physical Therapy:
  - Strength, mobility
  - Gait
  - Ergonomics
  - Range of motion
  - Gradual home exercise program
- Joint Injection:
  - Steroids
  - Hyaluronic Acid
  - Regenerative agents
- Joint Denervation:
  - Radiofrequency
  - Phenol/alcohol
- Surgery:
  - Total Knee Replacement
  - Partial Knee Replacement

Footnotes:
¹ http://www.nature.com/nrrheum/journal/v10/n6/images/nrrheum.2014.47-f2.jpg
² http://www.allinahealth.org/mdex/en3054071.jpg
³ https://www.health.harvard.edu/media/content/images/NSAID-ibuprofen-pills.jpg
Formal Physical Therapy
- Strength, mobility
- Gait
- Ergonomics
- Pacing
- Graded home exercise program

Individualized to unique anatomy and biomechanics
Active > Passive
- Quadriceps, hip girdle, core strength
- Address imbalances
Gait, movement, lifting mechanics
Techniques for pain exacerbations, pacing
Graded independent exercise program

Joint Injection
- Steroid
- Hyaluronic Acid
- Regenerative agents

Steroid
- Anti-inflammatory
- Nerve membrane stabilizing
- ≤3 per year

Hyaluronic Acid
- Reduces loading/sheering forces on joint
- Supplement + stimulate production
- 1-5 injections/6 months

Regenerative Treatments
- Platelet Rich Plasma
- Stem Cells
  - Adipose
  - Bone marrow
  - Placental
- Chondrogenesis
- Early evidence
Joint Denervation - Radiofrequency

Indications
• Continued pain and functional disability despite conservative management
• Desire to avoid surgery
• Inability to undergo surgery

• Thermocoagulation of sensory nerves

• Radiofrequency Energy
  – Vibration of H$_2$O molecules → heating
  – Predictable + Controlled lesion size

Joint Denervation - Radiofrequency

• Genicular nerves
  — Sensory
  — No motor fibers

• Defined anatomic locations

Diagnostic nerve injections
Small volume of local anesthetic
>80% pain relief = positive response
Radiofrequency Denervation of the Genicular Nerves

- Light sedation
- Well tolerated
- Safe

Spectrum of Care

Continued Pain and Disability Despite Treatment

Weight loss
Bracing
Canes/assistive device
Knee cryotherapy, heat
Oral anti-inflammatories
Targeted Exercise
- Quad, hip girdle
- Cycling/swimming

Formal Physical Therapy
- Strength, mobility
- Gait
- Ergonomics
- Packing
- Graded home exercise program

Joint Injection
- Steroid
- Hyaluronic acid
- Regenerative agents

Joint Denervation
- Radiofrequency
- Phenol/alcohol

Surgery
- Total Knee Replacement
- Partial Knee Replacement

Summary

- Knee OA is a common degenerative condition
- Major cause of pain and disability
- Treatments range from conservative to surgical
- Regenerative and joint denervation techniques provide a novel approach to treatment
References


Thank You

Questions?