Non-operative Approach to Knee Arthritis

Michael Stiller, MD
Primary Care Sports Medicine Physician
Allina Health Orthopedics

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Allina Health

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Disclosures

- None

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Objectives

Upon completion of this lecture, participants should be able to:

1. Define osteoarthritis (OA) and describe how this definition is evolving.
2. List risk factors for developing knee osteoarthritis (KOA).
3. Diagnose KOA clinically and stage severity using radiographs.
4. Reinforce knowledge on non-pharmacological and pharmacological treatments for KOA according to most up to date clinical guidelines
5. Recognize newer and emerging injectable treatments for KOA

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Definitions

- Traditional:
  - "Wear and tear disease"
  - Progressive, irreversible disease resulting in loss of articular cartilage that leads to pain and deformity in primarily weight-bearing joints[1]
- Evolving:
  - **"Whole joint disease"**
  - All tissues of the joint likely serve a role[2, 3]
    - Roles of synovium, muscles, ligaments are likely being underestimated
    - Subchondral bone also affected by the disease
  - Leading to new and emerging KOA treatment options being investigated

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Statistics

- OA affects more than 300 million people globally[4]
- KOA, accounts for 85% of the OA burden worldwide[4]
- Prevalence in men over 60 years is 5-15% and in women over 60 years, 10-25%[5]
- Up to 10% of men and 13% of women 60 years and older have symptoms[5]
- Numbers expected to increase with aging population and growing rates of obesity[4]
- A significant source of pain, disability, and socioeconomic cost[4]

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Risk Factors[6]

- Age
- Female sex
- Overweight/obesity
- Knee injury
- Work-place demands (heavy lifting, squatting, knee bending)
- Varus/valgus malalignment

- **NOT with recreational physical activity**

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Diagnosis

- **Clinical diagnosis**
- American College of Rheumatology (ACR) Clinical Criteria for Diagnosis of KOA[7]:
  - Knee pain plus 3 of the following:
    - > 50 years of age
    - < 30 minutes morning stiffness
    - Crepitus with knee motion
    - Bony tenderness
    - Bony enlargement
    - No palpable warmth

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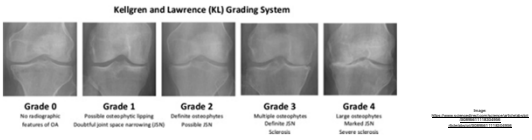
Diagnosis

- Kellgren-Lawrence Grading Scale for OA[1]
  - Grade 0 - No features of osteoarthritis
  - Grade 1 - Doubtful: questionable osteophytes or questionable joint space narrowing
  - Grade 2 - Minimal: definitive small osteophytes, little or mild joint space narrowing
  - Grade 3 - Moderate: definitive moderate osteophytes, joint space narrowing greater than or equal to 50%
  - Grade 4 – Severe: joint space impaired severely; cysts and sclerosis of subchondral bone



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Diagnosis

- Often a discrepancy exists between symptom severity and severity of KOA radiographically[6]
- All patients with radiographic KOA do not necessarily have clinical disease[8]
- All patients with joint symptoms do not necessarily demonstrate radiographic findings[8]

- **Treat the patient and not images**
- **Trust in the history and your exam skills**

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Non-operative Treatment

- Over the years, treatment focus recommendations are shifting away from mainly pharmacologic to more nonpharmacologic therapies[6, 9]
  - Lack of curative treatment
  - Limited benefits of pharmacological treatments
  - Nonpharmacological treatments are more likely to help symptoms over the long term and prevent or delay functional decline
- **Only 48.7% of general practitioners prescribe physical activity for OA but 95.8% prescribe acetaminophen[9]**

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Clinical Guidelines for Treatment of KOA

- 2019 ACR/Arthritis Foundation Guideline for the Management of OA of the Hand, Hip, and Knee[10]
  - https://assets.contentstack.io/v3/assets/bltee37abb6b278ab2c/blt6aa092f0134cac9a/63320f4750c8e90e3bf512c2/osteoarthritis-guideline-2019.pdf
- 2019 Osteoarthritis Research Society International (OARSI) guidelines for the non-surgical management of knee, hip, and polyarticular OA[11]
  - https://www.sciencedirect.com/science/article/pii/S1063458419311161/pdfft?md5=21446afb26e5803a9619433f7fc8bd93&pid=1-s2.0-S1063458419311161-main.pdf
- 2022 American Academy of Orthopedic Surgeons (AAOS) Management of Osteoarthritis of the Knee (Nonarthroplasty), Third Edition[12]
  - Full version: https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak3cpg.pdf
  - Summary[13]: https://journals.lww.com/jaaos/Fulltext/2022/05010/AAOS_Clinical_Practice_Guideline_Summary_.10.aspx

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Core Treatments

- Education
- Exercise
- Weight management

- Topical NSAIDs

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Patient Education

- Continually provide our patients with[10, 11, 6]:
  - Information about OA
  - Disease progression
  - Joint protection measures
  - Importance of and approaches to fitness, exercise, and weight loss
  - Self-care techniques (goal-setting, problem-solving, pain coping, and positive thinking skills) to encourage optimism and positive expectations with treatments
- Self-efficacy and self-management programs[10]:
  - Multidisciplinary and group-based format
  - In person or virtual
  - Consistent benefit demonstrated across studies with minimal risk

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Exercise and Physical Therapy

- Unsupervised and supervised land-therapy and aquatic therapy all have strong evidence to improve pain and function[13]
- Insufficient evidence to support the "best" type and ideal dosage (intensity, duration, and frequency) of exercise[10]
- The vast majority of KOA patients can participate in and benefit from some form of exercise[10]
  - Evidence Report, Supplementary Appendix 2[10]: http://onlinelibrary.wiley.com/doi/10.1002/acr.24131
  - Supervised (physical therapy, class setting) > unsupervised at home[10]
  - Tai Chi and Yoga[10, 11]
  - **No uniformly accepted level of pain at which a patient should or shouldn't exercise[10]**
- **"Motion is lotion" and "Don't exercise harder, exercise smarter"**
- **Keep in mind patient preference, availability, and financial situation**

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Weight Management

- **Every pound of weight loss helps**
- A dose-response in symptom and functional improvement is seen with amount of weight loss[10]:
  - Loss of greater than or equal to 5% of body weight = start seeing improvement in clinical and functional outcomes
  - This continues to increase with weight loss of 5-10%, 10-20%, and >20% of body weight
- A meta-analysis in 2021 comparing efficacy of different weight loss treatments showed[14]:
  - Most effective in reducing pain: bariatric surgery > low-calorie diet and exercise > intensive weight loss and exercise
  - For every 1% of weight loss, Western Ontario and McMaster Universities Osteoarthritis (WOMAC) scores deceased by about 2% points
- **Best results when you can combine efforts with diet and exercise**

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Pharmacological Treatments

- Topical NSAIDs
- Acetaminophen
- Oral NSAIDs
- Intra-articular injections
  - Corticosteroid
  - Hyaluronic acid
  - Platelet-rich plasma (PRP)

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Topical NSAIDs

- **Strong recommendation from all 3 guidelines**
- **Medications with lower systemic exposure are more favorable to oral NSAIDs[10]**
- High quality evidence involving a large number of patients showed modest benefits over the course of 12 weeks[11]
- Adverse events minimal, most common was temporary and minor local skin reaction[11]
- Good alternative for KOA patients with gastrointestinal (GI), cardiovascular (CV) comorbidities, or frailty[11]
- **Have to use regularly for continuous benefit (4 times/day) and may take 7-10 days to start working**

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Acetaminophen

- Strong recommendation from AAOS
- Conditional recommendation from ACR[10]
  - Meta-analysis has suggested the use as monotherapy may be ineffective
  - Longer term treatment is no better than treatment with placebo for most individuals
  - More appropriate for patients who show intolerance or have contraindication to oral NSAIDs for short term and episodic use
  - Regular monitoring for hepatotoxicity is required if taken on regular basis at recommended maximum dosing (3,000 mg daily)
- Not recommended by OARSI due to evidence suggesting little to no efficacy in patients with OA and can cause possible hepatotoxicity[11]
- **Not best option as solitary treatment, but can be used to augment topical or oral NSAID use**

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Oral NSAIDs

- Strong recommendation by AAOS and ACR
  - Nonselective and selective cyclooxygenase(COX)-2 oral NSAIDs are effective[13]
  - The initial oral medication of choice for OA and recommended over all other available oral medications[10]
- Conditional recommendation by OARSI for those who don't have comorbid conditions[11]
  - No comorbidities = Nonselective NSAIDs with use of a proton pump inhibitor (PPI) or COX-2 inhibitors
  - GI comorbidities = Selective COX-2 inhibitors
  - CV comorbidities = no oral NSAIDs of any class
- **Use lowest possible dose and for shortest possible treatment duration[10, 11]**

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Intraarticular Corticosteroid Injections

- Strong recommendation by ACR
- Conditional and moderate recommendation by OARSI and AAOS respectively
- Shown to have short-term efficacy in KOA, often about 3 months[10, 11, 13]
- A recent randomized trial showed that physical therapy was similarly effective in the short term and better in the long term when compared to steroid intraarticular injection[6]
- Regular intraarticular triamcinolone injection (every 3 months for 2 years) for symptomatic KOA results in greater loss of cartilage volume than saline injections[6]
- **Good for temporary pain relief, usually not a permanent treatment**
- **Good adjunct to physical therapy to help manage joint pain or to give short-term relief for an upcoming important event**

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Hyaluronic Acid Intraarticular Injections

- Conditional recommendation for use by OARSI given possible benefit on pain at and beyond 12 weeks of treatment and a more favorable long-term safety profile than regular intraarticular corticosteroid injections[11]
- Not recommended for routine use by the AAOS and ACR (moderate/conditional strength recommendations) given lack of efficacy seen in studies
- A meta-analysis showed modest effect sizes and risk of serious adverse events (injection-site reaction and joint swelling)[6]
- **"The use of hyaluronic acid injections for KOA in a patient who has had a poor response to nonpharmacologic therapies, topical and oral NSAIDs, and intraarticular steroids may be viewed more favorably than offering no further interventions[10]"**

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PRP Intraarticular Injections

- Limited recommendation for use by AAOS[13]
  - Studies have shown reduced pain and improved function for patients with KOA
  - Not consistently in patients with severe KOA
- Strongly recommended against use by ACR given concern of heterogeneity and lack of standardization in PRP preparations and technique protocols[10]
- No recommendation for use or against use by OARSI
- **An option for patients with mild-moderate KOA after understanding financial risk and potential lack of benefit**
- **Ideally, would want to wait at least 3 months out from a steroid injection before injecting PRP**

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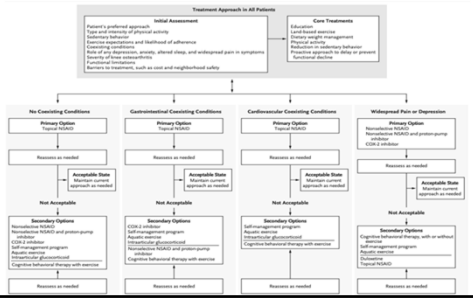
Nonoperative KOA Treatment Summary[6]



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New and Emerging Treatment Options

- The pathophysiology of KOA is becoming more clearly understood[2]
- New treatment targets at the cellular and intra-cellular level to treat pain and regenerate tissue[3]
  - Intraarticular biologic treatments:
    - Targeting IL-1 and TNF
    - Growth factor therapies (rhBMP7 and sprifermin)
  - Intraarticular cell therapies:
    - PRP
    - Bone marrow aspirate concentrate (BMAC)
    - Adipose tissue (fat grafts)
    - Stromal vascular fraction (SVF)
    - Mesenchymal Stem Cells (MSC)
  - **Showing promising results, but number of studies are limited and more research is needed to establish efficacy, safety, and standardization before becoming more mainstream**

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REFERENCES

1. "Chronic Inflammatory Conditions of the Musculoskeletal System: Osteoarthritis." *AAOS Essentials of Musculoskeletal Care*, Sixth ed., Jones & Bartlett Learning, Burlington, MA, 2022, pp. 42–48.
2. Primorac, Dragan, et al. "Knee osteoarthritis: A review of pathogenesis and state-of-the-art non-operative therapeutic considerations." *Genes*, vol. 11, no. 8, 2020, p. 854, https://doi.org/10.3390/genes11080854.
3. Jones, Ian A., et al. "Intra-articular treatment options for knee osteoarthritis." *Nature Reviews Rheumatology*, vol. 15, no. 2, Feb. 2019, pp. 77–90, https://doi.org/10.1038/s41584-018-0123-4.
4. Bichsel, Daniela, et al. "Cross-sectional analysis of recommendations for the treatment of hip and knee osteoarthritis in clinical guidelines." *Archives of Physical Medicine and Rehabilitation*, vol. 103, no. 3, 2022, pp. 559–569, https://doi.org/10.1016/j.apmr.2021.07.801.
5. Mintarjo, Jessica Amelinda, et al. "Current non-surgical management of knee osteoarthritis." *Cureus*, vol. 15, no. 6, 26 June 2023, https://doi.org/10.7759/cureus.40966.
6. Sharma, Leena. "Osteoarthritis of the Knee." *New England Journal of Medicine*, vol. 384, no. 1, 7 Jan. 2021, pp. 51–59, https://doi.org/10.1056/nejmcp1903768.
7. Harrast, Mark A., and Jonathan T. Finnoff. "Cartilage and Joint Injuries and Conditions." *Sports Medicine: Study Guide and Review for Boards*, Third ed., Demos Medical Publishing, New York, NY, 2022, pp. 193–196.
8. Jang, Sunhee, et al. "Recent updates of diagnosis, pathophysiology, and treatment on osteoarthritis of the knee." *International Journal of Molecular Sciences*, vol. 22, no. 5, 5 Mar. 2021, https://doi.org/10.3390/ijms22052619.
9. Gay, C., et al. "Educating patients about the benefits of physical activity and exercise for their hip and knee osteoarthritis. Systematic literature review." *Annals of Physical and Rehabilitation Medicine*, vol. 59, no. 3, 2016, pp. 174–183, https://doi.org/10.1016/j.rehab.2016.02.005.
10. Kolasinski, Sharon L., et al. "2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee." *Arthritis Care & Research*, vol. 72, no. 2, Feb. 2020, pp. 149–162, https://doi.org/10.1002/acr.24131.
11. Bannuru, R.R., et al. "OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis." *Osteoarthritis and Cartilage*, vol. 27, 2019, pp. 1578–1589, https://doi.org/10.1016/j.joca.2019.06.011.
12. *American Academy of Orthopedic Surgeons Management of Osteoarthritis of the Knee (Non-Arthroplasty) Evidence-Based Clinical Practice Guideline*, 31 Aug. 2021, www.aaos.org/oak3cpg.
13. Brophy, Robert H., et al. "AAOS Clinical Practice Guideline Summary: Management of Osteoarthritis of the Knee (Nonarthroplasty), Third Edition." *Journal of American Academy of Orthopedic Surgeons*, vol. 30, 2022, pp. e721-729, https://doi.org/10.5435/JAAPS-D-21-01233.
14. Panunzi, Simona, et al. "Comparative efficacy of different weight loss treatments on knee osteoarthritis: A network meta-analysis." *Obesity Reviews*, vol. 22, no. 8, 2021, https://doi.org/10.1111/obr.13230.

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TO CONTACT ME

Email: Michael.Stiller@allina.com

AllinaHealth

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