Osteoarthritis of the Knee

A PRIMARY CARE APPROACH

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Disclosures

- Nothing to disclose

Objectives

1. Describe the pathology of OA
2. Recognize exam findings consistent with diagnosis of OA
3. Describe non-surgical options for OA treatment

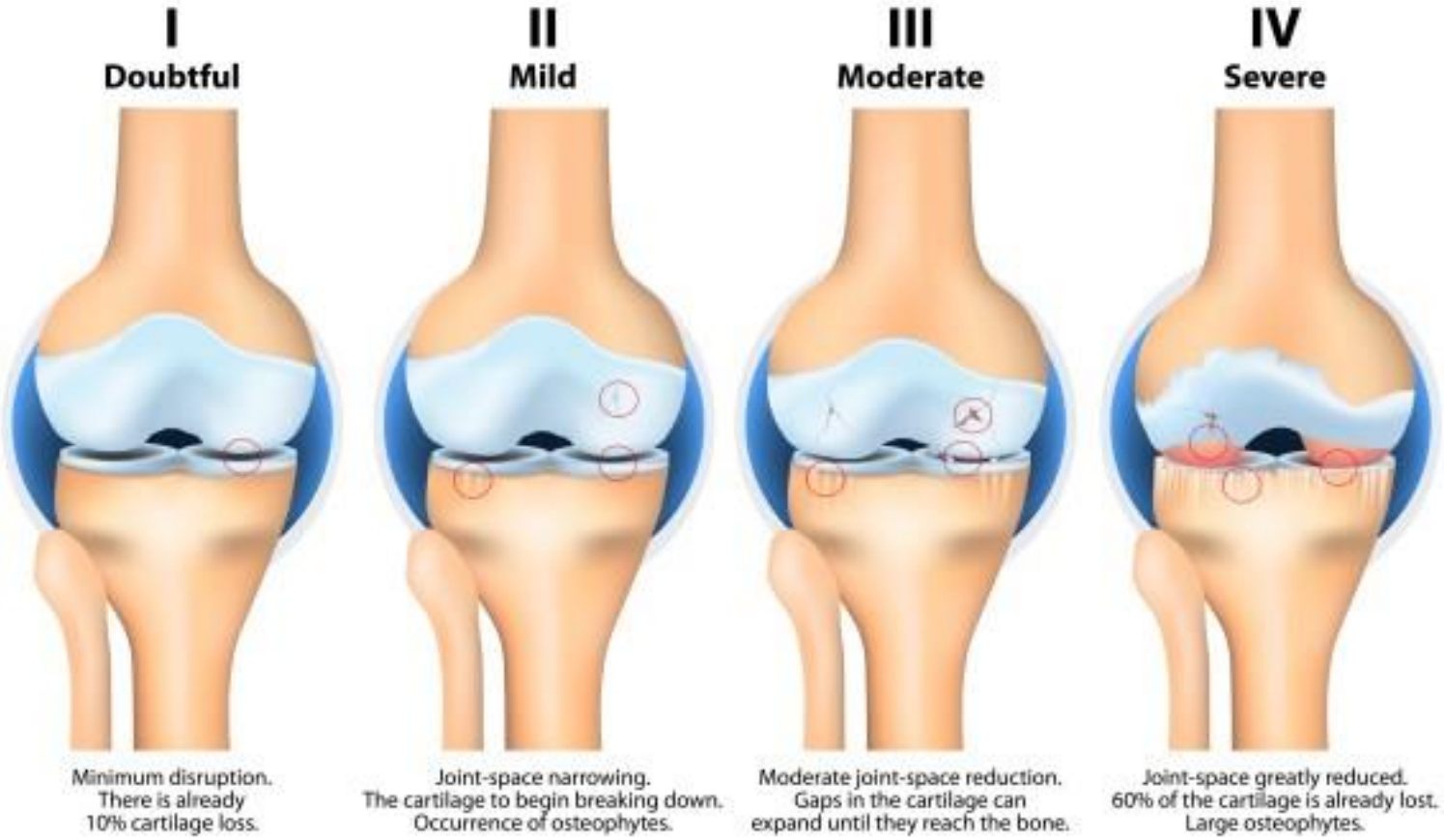
Pathology

- Articular cartilage erosion
- Hypertrophy of bone margins (osteophytes)
- Subchondral sclerosis

Pathology

- Osteoarthritis in name implies inflammatory disease
- Inflammatory cells may be present
- Considered intrinsic disease of cartilage
  - Biochemical and metabolic alterations occur resulting in breakdown
  - Age related changes in proteoglycans and collagen, decreasing tensile strength, shorten fatigue life
- Chondrocytes produce IL-1 and TNF-a
  - Stimulate catabolic metalloproteinases
  - Inhibit synthesis of type 2 collagen and proteoglycans

STAGE OF KNEE OSTEOARTHRITIS




Acute
OA, 1 grade
OA, 2 grade
OA, 3 grade
OA, 4 grade

Epidemiology

- Affects >33% of adults 65 and older
- Nearly 27 million person in US affected
- Risk Factors:
  - Female gender
  - Age over 50
  - Obesity
  - History of joint injury
  - Family history
  - Occupation involving squatting, kneeling
  - Sport participation with repetitive impact (soccer, football)
  - Inflammatory joint disease

Prevalence and limitations

Age (years)	Prevalence of physician-diagnosed OA (%)	Prevalence of activity limitation due to OA (%)
18 to 44	7.3	2.7
45 to 64	30	13
65 and older	50	22

Clinical signs and symptoms

- Most common- pain worse with activity
- Stiffness up to 30 minutes
- Crepitus
- Swelling
- Limping
- Limited range of motion

Diagnosis of OA-Clinical criteria

- Age over 50
- Bony enlargement
- Bony tenderness
- Crepitus
- Stiffness lasting less than 30 minutes
- No palpable warmth

Diagnosis of OA-Labs and Imaging

- Laboratory Criteria
  - ESR <40 mm/hr
  - RF < 1:40
  - Synovial fluid: clear, viscous, WBC <2,000 µL
- Radiographic Criteria
  - Presence of osteophytes

Radiographs and OA

- Not required to diagnose OA in patients with risk factors and typical symptoms
- Do not always correlate well with symptoms
- One study showed 16% of patients with frequent pain had evidence of OA
- Another showed 21% of patients who met radiographic criteria of OA had frequent pain
- Typical findings
  - Osteophytes
  - Joint space narrowing
  - Subchondral sclerosis

Radiographs and OA

- Radiographs can help determine severity for surgical planning
- MRI can detect joint abnormalities in 90% of patients 50+ y/o, even without joint pain

Diagnostic Accuracy

Criteria	Sensitivity %	Specificity %
Knee pain +3 clinical criteria	95	69
Knee pain +5 clinical or laboratory criteria	92	75
Knee pain +5 clinical or laboratory criteria + osteophytes	91	86

Treatments

- Physical Modalities and Exercise
- Pharmacological therapies
- Complementary and Alternative therapies
- Intraarticular injections
- Surgery

Physical modalities and Exercise

- Physical therapy
- Exercise
- Weight loss
- Braces or shoe inserts

Review of PT Interventions

- Exercise and weight loss reduce pain, improve function
- High and low-intensity exercise equal in improving pain, gait, function and aerobic capacity
- Water and land-based therapy reduce knee pain and physical disability
  - Aquatic therapy has small short-term benefits
- Small RCT shows Tai Chi 3x/week for 12 weeks effective for women > 50
- Insufficient evidence to support yoga

Review of PT interventions

- 54 studies of patients with mild to moderate symptomatic OA
- Land-based exercise therapy included strengthening, functional training and aerobic conditioning
  - Exercise moderately reduced pain
  - Moderately improved physical functioning
  - Slightly improved quality of life
- Improvement sustained 2-6 months posttreatment for pain and physical function

Strengthening therapy

- Quadriceps strengthening, lower limb strengthening, combined strengthening, walking programs
  - Improve pain and physical functioning
  - Combined strength and aerobic exercise programs reduced pain and improve function in the medium-term, reduce pain in the long term based on 4 RCT
- Home-based exercise and self-management program
  - Combine strength, agility, pain-coping
  - Beneficial effects in the short and medium-terms

Physical Therapy

- American College of Rheumatology strongly recommends all patients with symptomatic OA be enrolled in exercise program that matches their ability to participate in required activities
  - No preference with aquatic vs. land-based therapy
- American Academy of Orthopedic Surgeons 2013 practice guidelines
  - Self-management program
  - Low-impact aerobic exercise
  - Weight loss if BMI > 25 kg/m^2

Physical Modalities

- Use of lateral heel wedge may reduce use of NSAIDs
  - Evidence for lateral wedge ineffective for medial knee OA
- Shoe inserts do not show any benefit on pain or function based on 8 RCTs
- Knee bracing has insufficient evidence to recommend use
- Knee taping may provide some short-term benefit

Physical modalities

- TENS unit reduces pain in the short term
- Does not improve function or pain after 12 weeks
- Compared to sham controls

Physical modalities

- Beneficial interventions for long-term (>26 weeks) benefit
  - Weight loss
  - Agility training
  - Combined exercise programs
  - Manual therapy (massage, acupressure, self-massage)

Pharmacologic Treatments

- Topical
- Oral
- Intra-articular

Topical Treatments

- Advantage of topical is avoidance of systemic adverse effects
- Review of placebo controlled trials of capsacin cream 0.025%
  - Statistically more effective than placebo, less effective than topical NSAIDs
  - Associated with transient burning sensation
- Meta-analysis of RCTs comparing topical NSAIDs to placebo, oral NSAIDs
  - Topical NSAIDs superior to placebo, but only in first 2 weeks of treatment
  - Topical NSAIDs less effective than oral NSAIDs

Oral Treatments

- Acetominophen preferred in American College of Rheumatology guidelines
  - More effective than placebo
  - Low risk of liver toxicity
  - Use with caution in patients who consume alcohol daily
  - Regular kidney and liver monitoring in patients taking 3-4 g per day
- NSAIDs superior to Acetominophen in moderate to severe pain
  - Diclofenac 150mg daily likely to be most effective, followed by Naproxen

Oral Treatments

- Cyclooxygenase-2 inhibitors
  - Celebrex (celecoxib) only prototype available
  - Associated with increased risk of stroke and MI
  - Systematic review shows similar symptoms control as NSAIDs; does not reduce risk of serious GI adverse effects
  - Overall, no increased risk with COX-2 compared to NSAIDs
  - May not provide much benefit over NSAIDs

Oral Treatments

- Duloxetine (Cymbalta)
  - Selective norepinephrine reuptake inhibitor
  - Approved for treatment of painful conditions
  - Most common side effect is nausea
  - NNT=7 for clinically significant pain reduction
  - NNH=6

Oral Treatments

- Opioids
  - American College of Rheumatology support opioids when other treatments ineffective
  - American Geriatric Society recommends considering opioids in older individuals with moderate to severe pain, decreased function, diminished quality of life
  - Risks of NSAID use in older patients may exceed risk of addiction to opioids

Opioids

- Tramadol (Ultram)
  - Decreases pain intensity
  - Relieves symptoms
  - Improves function
  - Increased seizure risk, especially with alcohol
  - 11 RCT report moderate improvement with treatment
  - NNT=6 for one person to report moderate improvement
  - NNH=8 for one person to stop taking it
- Because of similar harms and benefits to duloxetine, use only in selected patients

Opioids

- Other oral and transdermal opioids have modest benefits that are of questionable clinical significance
- Due to significant adverse effects, long-term use is discouraged
- Daily dose recommendations
  - 50 mg or less of hydrocodone per day
  - 30 mg or less of oxycodone per day

Complementary and Alternative Treatments

- Acupuncture
  - Benefit is not clear
  - Meta-analysis did not demonstrate clinically relevant improvement in pain or function score comparing acupuncture to sham acupuncture
  - Short-term (6 weeks) or long-term (6 months) acupuncture or sham acupuncture resulted in patients "feeling better" compared to usual treatment
  - 1 study of 6 months of traditional Chinese acupuncture
    - Decreased pain and increased functionality by 40 points on average

Complementary and Alternative Treatments

- Glucosamine and Chondroitin
  - Marketed since the 1990's as disease modifying agents
  - 3 moderate-strength RCT of glucosamine with chondroitin
    - Little benefit with mild OA
    - Greater benefit in those with moderate to severe pain
    - Can improve medium-term outcomes (<26 weeks) but no benefit beyond
  - No evidence they slow cartilage loss
  - Glucosamine alone is safe, benefit is variable
  - Chondroitin alone does not decrease pain from hip or knee OA
  - Not regulated by FDA

Complementary and Alternative Treatments

- S-adenosylmethionine (SAM-e)
  - Meta-analysis of RCT found SAM-e as effective as NSAIDs in reducing pain, disability
  - Better safety profile
- Ginger
  - 255 mg of ginger twice daily
  - Reduction in pain 63% compared to 50% with placebo
- Tumeric
  - Historically used for pain
  - No RCT

Intra-Articular Injections

- Corticosteroid injections
  - Short-term symptomatic relief, do not improve overall quality of life
  - Low risk of adverse effects
  - 28 clinical trials show significant short-term pain reduction, improvement in patient self-assessment
  - Good evidence for long-term benefit lacking

Corticosteroids

- Exact mechanism in joint is unknown
- Presumed to
  - Inhibit accumulation of inflammatory cell lines
  - Reduce prostaglandin synthesis
  - Inhibit leukocyte secretion from synovial cells
  - Decrease interleukin secretion by synovium

Intra-Articular Injections

- Hyaluronic acid injections
  - Hyaluronic acid produced by synovium
  - Decreased in persons with OA
  - Exogenous supplementation thought to support and restore elastoviscous properties of the joint
  - No study shows these drugs alter disease course
  - Meta-analysis of studies show poor study design or were industry sponsored
  - No demonstrable clinical improvement in function

Intra-articular injections

- Platelet-rich plasma (PRP)
  - Volume of autologous plasma with platelet concentration above average
  - Soft tissue healing enhancement occurs with concentrations >1,000,000 platelets/µL
  - Based on low strength of evidence from 4 RCTs
    - Reduce pain on the medium term (12-26 weeks) compared to placebo
    - Improves quality of life
  - No evidence to support soft tissue healing in OA
  - Associated with pain and stiffness in 44% of patients who received 2 injections in 1 study

Surgical Treatments

- Arthroscopic surgery
  - Not appropriate unless loose bodies, mechanical symptoms
  - 2 well-designed RCT showed no benefit on OA
  - Not effective for patients with degenerative meniscal tears
- Total knee replacement
  - Last resort
  - AAOS- main indication for relief of pain when non-surgical treatments fail
  - Studies show improvement in pain and function with moderate OA compared to usual care
  - Outcomes from surgery similar between obese and non-obese

Conclusion

Clinical recommendation	Evidence Rating
Radiography can confirm the diagnosis of OA and may be helpful before surgical referral, but findings tend NOT to correlate with symptoms	C
Exercise, PT, knee taping and tai chi are all beneficial for OA	B
Ineffective treatments for OA include braces, special shoes, lateral wedges for medial OA, hyaluronic acid injections	B
Medical therapy for OA should begin with full-strength acetaminophen and topical therapy, then proceed to NSAIDs and selectively to tramadol and other opioids. NSAIDs and opioids may reduce pain and improve function, but have significant potential harms	A
Joint replacement should be considered for patients with moderate to severe pain and radiographically confirmed OA	A
Corticosteroid injections may be helpful in the short-term, but evidence is mixed	B

Information from reference 2

References

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