

Osteoarthritis of the Knee:

Current Concepts in Conservative Management

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Osteoarthritis of the Knee: Conservative Management

- Pharmacologic
 - Oral Agents
 - Simple analgesics, NSAIDs, COX II
 - Topical Agents
 - Intra-Articular Injections
 - Corticosteroid
 - Hyaluronic Acid
- Non-pharmacologic
 - Heat & Cold Therapy
 - Weight Loss
 - Activity Modification & Joint Protection
 - Physical Therapy & Exercise
 - Complementary & Alternative Medicine

Knee Osteoarthritis: Conservative Management

What's New?

- Pharmacologic
 - Oral Agents
 - Intra-Articular Injections
- Non-pharmacologic
 - Heat & Cold Therapy
 - Weight Loss
 - Activity Modification & Joint Protection
 - Physical Therapy & Exercise
 - Complementary & Alternative Medicine

Intra-Articular Injections

Intra-Articular Injections for Knee OA

- IA Injections
 - Indications
 - When joint not responsive to more conservative management
 - Types
 - Corticosteroid
 - Hyaluronic Acid (HA)
 - Technique
 - Post-injection activity guidelines
 - Clinical Efficacy

IA Corticosteroid Injections

- Introduced in 1951
- Widely accepted treatment for knee OA
- Goals
 - Reduce pain
 - Reduce inflammation
 - Restore ROM
 - Improve patient function
- Adjunct to other management in a comprehensive program

IA Corticosteroid Injections

- Indications
 - Moderate to severe pain
 - Inflammatory synovitis/effusions
 - Joint not responsive to more conservative methods
 - Patient cannot tolerate oral systemic therapy
- Contra-indications
 - Local or systemic infection
 - Anticoagulant therapy
 - Hemorrhagic effusions
 - Severe joint destruction/deformity

IA Corticosteroid Injections

- Complications
 - Infection
 - Post-Injection Flare/synovitis
 - Rare
 - Subsides in few hours
 - Charcot-like Arthropathy
 - Reduced pain → overwork joint → cartilage/bone destruction → arthropathy

IA Hyaluronic Acid (HA) Injections

- What's in a name?
 - Hyaluronan
 - Hyaluronate
 - Hyaluronic Acid
 - Viscosupplementation
- Commercial names
 - Hyalgan®
 - Synvisc®
 - Orthovisc®
 - Euflexxa®

What is HA?

- Compound found in synovial cells
- Functions
 - Lubricates joint
 - Viscoelastic shock absorber → reduces cartilage wear
 - Binds to inflammatory mediators
 - Coats pain receptors
 - Modulates synovial cell and chondrocyte behavior

IA HA Injections

- HA in joint affected by OA
 - Molecular weight decreases
 - Functions noted reversed
 - Accelerated wear, disease progression
- HA replacement therapy (viscosupplementation)
 - Restore
 - Cushioning
 - Lubrication
 - Improve
 - Pain levels
 - Patient function
 - Efficacy
 - Research → knee OA

IA Injections: Technique

- Local anesthetic
- Enter joint space
 - Supine or sitting
 - Medial or lateral
- Aspirate synovial fluid
 - Reduce effusion
 - Reduce dilution factor
 - Diagnostic aide
- Instill corticosteroid/HA
- Move joint through ROM to disperse medication

IA Injections of the Knee:

Does Approach Matter?

- **“Accuracy of Needle Placement into the Intra-Articular Space of the Knee” (Jackson, et al, JBJS, 2002)**
 - Evaluated accuracy of needle placement via 3 approaches
 - anteromedial, anterolateral & lateral mid-patellar
 - 1 surgeon, 3 injections on 80 consecutive patients
 - Placement confirmed with fluoroscopic imaging
 - Accuracy Rates
 - Anteromedial → 75%
 - Anterolateral → 71%
 - Lateral mid-patellar → 93%

IA Injections of the Knee:

Does Sonography Improve Outcomes?

- **“Does Sonographic Needle Guidance Affect the Clinical Outcome of Intraarticular Injections?” (Sibbitt, et al, Journal of Rheumatology, 2009)**
 - 148 patients with painful joint, randomized into 2 groups
 - Conventional palpation-guided anatomic injection

- Sonographic image-guided injection
- Sonographic guidance significantly improved outcomes
 - Procedural pain
 - Pain 2 weeks post-injection
- Authors suggest more research required to assess
 - Long-term outcomes
 - Functional measures
 - Overall health-care costs

IA Injections of the Knee:

Does Sonography Improve Outcomes?

- **“Sonographic Needle Guidance and Cost-Effectiveness of Intraarticular Injections for Osteoarthritis of the Knee”** (Chavez-Chiang, et al, ACR abstract session, Nov 2010)
 - Evaluated longer term efficacy and cost-effectiveness of sonography
 - 94 patients with non-effusive, OA knees randomized into 2 groups
 - Conventional palpation-guided anatomic injection
 - Sonographic image-guided injection
 - Sonographic guidance significantly improved
 - Procedural pain
 - Pain @ 2 weeks & 6 months post-injection
 - Reduction in cost/patient/year

IA Injections: Frequency

- Corticosteroids
 - 1 injection, then reassess
 - OARSI evidence-based consensus guidelines (2008)
 - No more than 4/year
 - Systemic & catabolic effects
- HA
 - From 1-5 injections
 - 1-3 (Synvisc ®)
 - 3-5 (Hyalgan ®)

Post-Injection Activity Guidelines

- Physician-specific
 - No research examines post-injection activity protocols and effect on outcomes
 - Informal poll of HSS MDs
 - Rest the remainder of the day then no limitations
 - 2-5 days of light activity
 - Limit walking and prolonged standing
 - Light exercise only

Intra-Articular Injections For Knee OA: Clinical Efficacy

Are using IA steroids safe over the long-term?

- **“Safety and Efficacy of Long-Term Intraarticular Steroid Injections in Osteoarthritis of the Knee** (Raynauld, et al, Arthritis and Rheumatism, 2003)
 - Randomized, double-blind, placebo-controlled trial
 - 68 patients with knee OA randomized to 2 groups
 - IA steroid injections every 3 months up to 2 years
 - IA saline injections every 3 months for up to 2 years
 - Results
 - No adverse effects of repeated injections noted over 2 years
 - Radiologic assessment of joint narrowing → no difference @ 1 & 2 years

How do IA steroids compare to a placebo?

- **“The Efficacy and Duration of Intraarticular Corticosteroid Injection for Knee Osteoarthritis: A Systematic Review of Level 1 Studies** (Hepper, et al, J Am Acad Orthop Surg, 2009)
 - Analysis of 6 randomized controlled trials
 - Compare effectiveness of IA corticosteroids versus placebo for knee OA
 - Primary outcome = VAS
 - Results
 - Week 1 → statistically significant improvement in pain scales for steroid groups
 - Weeks 4-28 → no significant difference between groups

How does IA HA compare to a placebo?

- **“Single, Intraarticular Treatment with 6 ml Hylan G-F 20 in Patients with Symptomatic Primary Osteoarthritis of the Knee: A Randomized, Multicenter, Double-Blind, Placebo Controlled Trial”** (Chevalier, et al, Ann Rheum Dis, 2010)
 - Compare efficacy of single IA HA injection and placebo for knee OA
 - 253 patients with symptomatic knee OA randomized to 2 groups
 - Single IA HA or single IA saline injection
 - HA group → statistically significant improvements over 26 weeks
 - WOMAC pain and function scales
 - Patient Global Assessment
 - Clinical Observer Global Assessment

How does IA HA compare to IA steroids?

- **“Therapeutic Trajectory of Hyaluronic Acid Versus Corticosteroids in the Treatment of Knee Osteoarthritis: A Systematic Review and Meta-Analysis”** (Bannuru, et al, Arthritis and Rheumatism, 2009)
 - Analysis of 7 randomized controlled trials
 - Compare effectiveness of IA HA to corticosteroids for knee OA
 - Outcomes = WOMAC, VAS @ rest and with walking
 - Results
 - Week 2 → all outcomes significantly greater for corticosteroids
 - Week 4 → equal
 - Weeks 8-26 → all outcomes significantly greater for HA

IA Injections: Take Home Message

- Widely used
- Few reported complications
- Corticosteroids
 - Fast acting
 - Short duration of relief
- Hyaluronic Acid
 - Slower onset relief
 - Long lasting

Non-Pharmacologic Management

Non-Pharmacologic Management of Knee OA

- Physical Therapy & Exercise
- Complementary & Alternative Medicine
 - Nutraceuticals
 - Tai Chi
 - Acupuncture

Physical Therapy & Exercise

Benefits of Exercise for Knee OA

- Strong evidence
- First line treatment
- Multi-modal exercise
 - Strength
 - Flexibility/ROM
 - Balance/Proprioception
 - Cardiovascular
 - Manual Therapy
 - Functional Training
 - Home Exercise Program
- Individualized to
 - Address specific patient impairments
 - Optimize patient function

Proprioception vs. Strength

- **“Efficacy of 2 Non-Weight-Bearing Interventions, Proprioception Training Versus Strength Training, for Patients With Knee Osteoarthritis: A Randomized Clinical Trial”** (Lin, et al, JOSPT, 2009)
 - 108 patients with knee OA randomized into 3 groups
 - Proprioceptive training (seated foot taps to targets)
 - Strength training (seated conc/ecc quad exercise)
 - Control – no exercise
 - WOMAC pain/function, timed walk on 3 surfaces (level, stairs, spongy surface), knee strength
 - Results
 - Significant improvements in WOMAC pain/function in both exercise groups
 - Proprioception training group → significantly greater improvements in walking

- time on spongy surface
- Strength training group → significantly greater knee extension strength

Hydrotherapy vs. Land

- “Hydrotherapy Versus Conventional Land-Based Exercise for the Management of Patients With Osteoarthritis of the Knee: A Randomized Clinical Trial (Silva, et al, Physical Therapy, 2008)
- 64 patients with knee OA randomized into 2 groups
 - 18 weeks of water-based exercise (3x/week)
 - 18 weeks of land-based exercise (3x/week)
 - Similar exercises (land adapted to water)
- WOMAC pain/function & VAS @ rest/after 50 ft walk
- Results
 - Reductions in pain/improvements in WOMAC scores similar between groups
 - Water-based group experienced significantly greater decrease in pain before and after the 50 ft walk @ 18 weeks
 - Water-based exercises are an effective alternative for the management of OA of the knee

Exercise for Knee OA

- Create program that addresses specific impairments
- Compliance is key
 - Keep it simple
 - Choose interventions that patient enjoys
 - Connect the dots
 - Intervention → functional goal
 - Education
 - Modify based on symptoms

Complementary & Alternative Medicine

Complementary & Alternative Medicine (CAM)

- Growth of CAM
 - 2007 National Health Interview Survey
 - Approximately 38% of adults in US use CAM
- Patients with Knee OA
 - More active → want to stay that way
 - Information-savvy
 - Looking for alternatives
 - Seeking guidance from health-care providers

Nutraceuticals

- Glucosamine & Chondroitin
 - Natural substances
 - Found in/around chondral cells
 - In US, sold as dietary supplements
 - 5 million users & \$750 million in sales/year in US in 2004
- Glucosamine
 - Amino sugar → produced/distributed in cartilage and other connective tissue
 - Reduced in OA cartilage
- Chondroitin sulfate

- Complex carbohydrate that helps cartilage retain water
- Levels are altered in OA cartilage & synovial fluid

Clinical Efficacy of Chondroitin

- **“Chondroitins 4 and 6 Sulfate in Osteoarthritis of the Knee: A Randomized, Controlled Trial”** (Beat, et al, Arthritis and Rheumatism, 2005)
 - Determine whether chondroitin sulfate (CS) is effective in inhibiting cartilage loss in knee OA
 - Randomized, double-blind, placebo-controlled trial
 - 300 patients with knee OA
 - Received either 800 mg CS or placebo once daily for 2 years
 - Primary outcome
 - Joint space loss assessed by an A/P radiograph of the knee
 - CS group had significantly smaller change in mean joint space width
 - Secondary outcomes
 - No statistically significant differences in WOMAC pain/function
 - No statistically significant differences in rates of adverse events

Efficacy of Glucosamine vs. Chondroitin vs. Cox II vs. Placebo

- **“Clinical efficacy and safety of glucosamine, chondroitin sulphate, their combination, celecoxib or placebo taken to treat osteoarthritis of the knee: 2-year results from GAIT”** (Sawitzke, et al, Annals of Rheumatic Disease, 2010)
 - Evaluate efficacy and safety of glucosamine, chondroitin sulphate, celecoxib and placebo over 24 months
 - Randomized, double-blind, placebo-controlled trial
 - 662 patients with moderate to severe knee OA
 - Glucosamine, chondroitin or combination of both/Celecoxib/Placebo
 - Results
 - All treatment groups experienced improvement in WOMAC pain and function scores
 - None of the treatments significantly better than placebo
 - Adverse reactions were mild/occurred among all treatment groups/serious adverse events were rare

Acupuncture

- Acupuncture has been used as a therapeutic modality for more than 2000 years
- Over 2 million people use acupuncture annually in the US
- Chronic pain is the most common condition treated by acupuncturists
- Needles may be stimulated by hand, moxibustion, or by electrical current
- Increase in research evaluating efficacy in patients with knee OA

Acupuncture: Clinical Efficacy

- **“Acupuncture in Patients with Osteoarthritis of the Knee: A Randomized Trial”** (Witt, et al, Lancet, 2005)
 - Investigate efficacy of acupuncture in patients with knee OA

- 294 patients with chronic knee OA randomized to 3 groups
 - Acupuncture → 12 sessions over 8 weeks
 - Superficial needling @ non-acupuncture points → 12 sessions over 8 weeks
 - Waiting list/no-treatment control
- Results
 - Patients in acupuncture group had significantly improved WOMAC pain/function scores after 8 weeks
 - Differences were no longer significant at 26 and 52 weeks
 - Suggests that single course of acupuncture treatment has limited long-term point-specific effects

Acupuncture: Clinical Efficacy

- **“Immediate Effects of Acupuncture on Gait Patterns in Patients with Knee Osteoarthritis”** (Tung-wu Lu, et al, Chinese Medical Journal, 2010)
 - Investigate effects of acupuncture on gait patterns in patients with knee OA
 - 20 patients with bilateral, medial knee OA randomized to 2 groups
 - Control group → 30 minute sham acupuncture therapy
 - Experimental group → 30 minute electro-acupuncture stimulation
 - Outcomes
 - Pre/post VAS scores
 - Pre/post gait analysis (level surface @ self-selected pace/ 7camera system w/28 markers)
 - Results
 - Significant decrease in VAS scores after acupuncture in both groups
 - Mean change of VAS in experiment group 2 times greater than sham group
 - Experimental group had significant improvements in gait pattern
 - gait speed & step length
 - hip & knee flexion and ankle plantarflexion angles at toe-off

Tai Chi

- Originated in China as martial art
- Mind-body practice
 - “Moving meditation”
- For patients with knee OA
 - Improves fluidity of movement
 - Improves balance & strength
 - Focuses on self-awareness and quality of life
 - Many classes modified for patients with OA

Tai Chi: Clinical Efficacy

- **“Tai Chi Is Effective in Treating Knee Osteoarthritis: A Randomized Controlled Trial** (Wang, et al, Arthritis and Rheumatism, 2009)
 - Investigate efficacy of Tai Chi in treating symptoms of knee OA
 - 40 patients with knee OA randomized into 2 groups
 - Tai Chi → 60 minutes, 2 times/week, 12 weeks
 - Wellness education/stretching 2 times/week, 12 weeks
 - Outcomes measured at baseline & 12, 24, 48 weeks
 - Results
 - Tai Chi group had statistically significant decrease in WOMAC pain scores and improvements in WOMAC function scores, self-efficacy scores & depression

index

- Non-statistically significant improvement in 6 minute walk

Knee Osteoarthritis: Conservative Management

- Future Directions
 - Focus on Wellness
 - Expansion of wellness classes
 - Group Exercise Classes
 - Education Lectures
 - Know your community resources
 - Arthritis Foundation
 - Collaborative research

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