Prevention and Treatment of OA

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Osteoarthritis or DJD

• Complex interplay
  • Mechanical forces
  • Joint integrity
  • Biochemical alterations
  • Local inflammation
  • Genetic predisposition
  • Aging

Classification

• Primary
  • Contributing factors
    • Genetic
    • Inflammation
    • Immunology
    • Hands, feet, knees, and spine

• Secondary
  • Post traumatic: Macrotrauma or repetitive microtrauma.
  • Post inflammatory
  • Post infectious
  • Endocrine and metabolic

Pathogenesis

• Articular cartilage
  • Initial focus of disease: Chondrocytes
    • Primary induction
    • Secondary induction
    • Consequences
  • Bone
    • Subchondral thickening (sclerosis)
    • Edema
    • Progressive damage

Clinical Manifestations

• Pain
  • Increased with activity
  • Relieved by rest
  • May be progressive with advancing disease
  • Correlation with x-ray changes?
  • Mitigating factors
    • Individuals pain threshold
    • Central sensitization
    • Depression

• Stiffness
  • Am and after inactivity
  • Duration: Less than 1 hour
Physical Findings

- Tenderness to palpation
- Boney enlargement
- Crepitus
- Joint effusion
- Typical joint deformity
- Distribution of joint involvement

Diagnosis

- History
- Physical Findings
- Laboratory Findings
- Joint Fluid
- Exclusion of other causes of joint disease
- X-ray
- MRI
Risk Factors

• Age
• Mechanical forces
• Joint integrity
• Cellular and biomechanical processes
• Local inflammation
• Genetic

Risk Factors

• Aging: A primary risk factor
  • Multifactorial:
    • Cell senescence with reduced regeneration capacity
    • Reduction in muscle mass
    • Hormonal changes
    • Proprioception, Vestibular and other sensory mechanisms
    • Micro trauma accumulation

Risk Factors

• Obesity
  • 38% of population
  • Doubled in past 30 years
  • Metabolic inflammatory disorder
    • Fat cells produce pro inflammatory cytokines that impact chondrocytes that produce cartilage
    • This is taking place years before the OA becomes clinically apparent
  • Secondary consequences
    • Diabetes Mellitus
    • Neuropathy
    • Arteriosclerotic vascular disease
    • Aggravation of Inflammatory joint disease

Risk Factors

• Exercise
  • Neuro anatomically normal joint
    • Not at increased risk with repetitive low impact
    • Risk increased with repetitive high impact exercise
  • Neuro anatomically abnormal joint
    • Risk increase even with repetitive low impact recreational activity

Risk Factors

• Trauma
  • Macro trauma (excluding acute injury)
    • Once damaged the structural integrity is permanently compromised
  • Repetitive micro trauma
    • Often unrecognized and accumulative
  • OA will likely be accelerated in both with preceding biomechanical abnormality
    • Alignment
    • Muscular or neurologic
    • Congenital
**Risks Factors**

- **Metabolic diseases**
  - Diabetes Mellitus
  - Gout
- **Inflammatory Joint disease**
  - Rheumatoid arthritis
  - Psoriatic arthritis
  - Others

**Preventing & Modifying Risks**

- **Injury prevention**
  - Recognition of limitations and consequences
  - Preventive exercises to strengthen muscle, ligaments and surrounding tissues
  - Proper mechanics
- **Injury intervention**
  - Seek professional help early
  - Develop a program to address the issues
  - Select appropriate alternatives

**Modifying Risks**

- **Muscle Weakness**
  - Weight bearing joints: Knees, LS spine, Hips
  - Provides support for alignment
  - Reduces load
  - Stabilizes joint
- **Neuropathy**
  - Sensory
    - Peripheral neuropathy
    - Proprioception loss
- **Inflammatory and Metabolic joint disease**
  - Rheumatoid arthritis, Psoriatic Arthritis, etc.
  - Gout
  - Diabetes Mellitus

**Treatment of OA**

- **Professional evaluation**
  - Determine extent of pain and disability attributable to OA
  - Exclusion of other possible causes for pain and disability
  - Determine comorbid diseases and risks in creating treatment options and goals
  - Obtain necessary testing and consultations
  - Create treatment plan

**Treatment Plan**

- **Address and Incorporate:**
  - Vocational and occupational needs
  - Expectations
  - Limitations
  - Goals
  - Prevent progression
  - Control pain
  - Minimize disability
  - Improve quality of life
### Treatment Options

**Non Pharmaceutical:**
- Weight loss
- Physical Therapy
- Exercise
- Joint protection
- Diet and vitamins
- Modalities

### Weight Loss

- **Knee Osteoarthritis:**
  - Risk proportional to weight
  - Increasing weight associated with increase joint space narrowing
  - Earlier onset of osteoarthritis in obese
  - Often bilateral
  - Enhanced with aging and heavy physical work
- **Lumbar Spine**
  - Weight proportional
  - Postural alignment
- **Hip**
  - Weight less enhancing than knees

### Weight Loss

- **IDEA** (intense diet intervention and exercise)
  - Diet plus exercise results in:
    - Greatest weight loss
    - Reduction in pain
    - Improved physical function
  - Though exercise alone did not further enhance the benefit of weight loss in either pain relief or functional improvement

### Weight Loss

- **MRI** results with weight loss:
  - Demonstrates reduction in cartilage degeneration
  - Proportional to weight loss
  - 10% seems to be critical loss before appreciable benefit demonstrated

### Physical Therapy

- Professional knowledge and understanding of muscle and joint physiology
- Capable of individualizing best program for muscle strengthening, joint protection, improving function and flexibility
- Provides modalities to facilitate pain relief and enhance function
- Evaluate and provide assistive devices if needed
- Requires patient’s commitment both acutely and long term

### Exercise

- Appropriate for disability
- Avoid aggravating existing disease
- Goal:
  - Decrease pain
  - Improve function
  - Range of motion
  - Muscle strengthening
## Diets and Vitamins

- **Prevention of OA**
  - No diet or dietary supplement that will prevent OA development

- **Modification of OA**
  - Glucosamine/Chondroitin Sulfate
  - Vitamins
    - Vitamin D. Low levels may increase risk of falls in elderly, are associated with muscle weakness and may provide certain benefits for our innate immune system.

## Modalities

- **Heat**
  - Superficial heat can raise pain local pain threshold

- **Cold**
  - Reduces muscle spasm
  - May increase peripheral pain threshold

- **Massage**
  - Increases local blood supply

- **Ultra Sound**
  - Generates deep heat and may increase tissue extensibility

- **Tens**
  - May provide pain relief

## Pharmaceutical

- **NSAIDS**
  - Oral
    - Provide pain relief and have anti-inflammatory properties
  - Multiple choices
    - All essentially equally effective, but individual variances in patient response
  - Cautions
    - CVD, GI, renal, drug interactions, allergic reactions
  - Topical
    - Effective for local applications
    - Low side effects because of poor systemic absorption

## Pharmaceuticals

- **Cortisone Injections**
  - Effective with rapid response
  - Benefits generally not sustained
  - May be repeated but tend to lose response with repeated injections
  - Probably not harmful to joint if done infrequently
  - Low risk of infection
  - Does not provide any benefit to reduce progression of OA

## Pharmaceutical

- **Viscous Supplements**
  - Hyaluronates of varying molecular weights
  - Benefits often gradual in onset
  - May be repeated, usually 1 or 2 times/year
  - Comparable in benefits to steroid injections
  - Mechanism of action
    - Improves visco-elasticity of synovial fluid
    - May reduce mediators of inflammation
  - Do not alter disease progression
  - Low side effects

## Pharmaceutical

- **Cellular and Tissue Transplants**:
  - Directed at repairing or reducing cartilage degeneration: Applicable to limited disease of the cartilage
    - Stem cell and tissue transplants
    - Human fibroblastic growth factors
      - May improve chondrocyte growth and cartilage matrix formation
    - Platelet rich plasma
      - Derived from autologous blood
      - Delivers factors that may promote growth of chondrocytes and stem cells
Pain Control

- Acetaminophen
  - No anti-inflammatory properties
  - Maximum dose 3 grams /d
  - Potential liver toxicity
- NSAIDS
  - Topical
    - Anti-inflammatory
    - Anesthetic
- Codeine, Hydrocodeine, etc.
  - Potential for abuse
  - Side effects
- Depression
- Centralization

Surgery

- Consider:
  - When unsuccessful in obtaining sufficient relief of pain or improvement in function.
  - Relative contraindications for surgery in major weight bearing joints:
    - Marked obesity
    - Unstable CAD
    - Advanced pulmonary disease
    - Recent CVA
    - Uncontrolled DM
    - Advanced motor or sensory impairment

My Advice

- Understand the disease and your risks
  - Seek professional evaluation
- Develop an action plan
  - Weight loss
  - Appropriate exercise and physical therapy
  - Pain control
  - Medications
- Set goals and expectations
  - Time lines and targets
- Emotional issues
  - Frustration
  - Physical limitations
  - Depression
  - Compliance

Osteoarthritis

- Leading cause of disability among adults
- 32 million adults in US have clinical OA
- Knee is most common joint