Chapter 40:
Exercise prescription in those with arthritis

Specific Functional Activity Limitations for Adults with Arthritis

Number of adults (in millions) limited in specific functional activities:

- Stoop/bend: 7.8
- Stand: 7.5
- Walk: 6
- Push: 5.2
- Climb: 4.8
- Carry: 3.6
- Sit: 2.8
- Reach: 2.4
- Grasp: 1.9

Type of Functional Limitation

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Osteoarthritis (OA)

• Clinical Features and Diagnosis
  – Degenerative joint disease
  – Common in hands, knees, and hips
    • Joint pain and stiffness, usually associated with degeneration of the joint cartilage
  – 25% to 50% with OA will have symptoms.
  – Diagnosis: May include:
    • Both laboratory and clinical tests,
    • Radiographic and clinical results, or
    • Purely clinical features
    • For the knee, the criteria for a clinical diagnosis include: age over 50 years, stiffness lasting <30 minutes, crepitus (crackling sound), bony tenderness, bony enlargement, and no palpable warmth of the joint.
Healthy and Osteoarthritic Knees
Etiology

- Primary etiology is unknown.
- Risk factors:
  - Aging
  - Previous injury
  - Malalignment
  - Obesity
- Altered loads due to the risk factors result in:
  - Microcracks in the subchondral tissue, leading to a cascading cycle of:
    - Thinning of the articular cartilage
    - Increased joint stresses and loads
    - Radiographic evidence of progression of arthritis is observed as:
      - Joint space narrowing
      - Followed by changes in the subchondral bone
      - Osteophyte (bone spur) formation along the joint line
Theoretical Biomechanical Pathways for Knee Osteoarthritis (OA) and Subsequent Disability
• Treatment
  – Exercise Prescription
    • Exercise recommended
    • 3 days/week for up to 60 min; CV exercise often recommended; might benefit from 5-7 days per week
    • Otherwise, follow normal/healthy intensity recommendations.
    • Resistance training and flexibility exercises are vitally important.
  – Pharmacologic Treatment
    • COX-2 selective inhibitors
    • Nonsteroidal anti-inflammatory drugs (NSAIDs)
    • Acetaminophen
    • Dietary supplements: glucosamine and chondroitin
  – Surgical Treatment
    • Arthroscopic surgery to “clean” joints via washing or debridement
    • Joint replacement
Clinical Features and Diagnosis

- Affects more women than men
- Considered a rheumatologic syndrome characterized by chronic widespread pain in muscles, ligaments, and joints as well as a heightened tenderness at discrete anatomic locations called “tender points”
- Diagnosed when the subject experiences widespread chronic pain in the absence of other identifiable pathology
Tender Points for the Diagnosis of Fibromyalgia.
# Table 40.1. American College of Rheumatology 1990 Criteria for Fibromyalgia

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>1. History of widespread pain</td>
<td>Pain is considered widespread when all of the following are present: pain in the left side of the body, pain in the right side of the body, pain above the waist, and pain below the waist. In addition, axial skeletal pain (cervical spine or anterior chest or thoracic spine or low back) must be present. In this definition, shoulder and buttock pain is considered as pain for each involved side. “Low back” pain is considered lower segment pain.</td>
</tr>
</tbody>
</table>
| 2. Pain in 11 of 18 tender-point sites on digital palpation (Fig. 40.4) | Pain on digital palpation must be present in at least 11 of the following 18 tender-point sites:  
  - Occiput: Bilateral, at the suboccipital muscle insertions  
  - Low cervical: Bilateral, at the anterior aspects of the intertransverse spaces at C5-C7  
  - Trapezius: Bilateral, at the midpoint of the upper border  
  - Supraspinatus: Bilateral, at origins above the scapula spine near the medial border  
  - Second rib: Bilateral, at the second costochondral junctions, just lateral to the junctions on upper surfaces  
  - Lateral epicondyle: Bilateral, 2 cm distal to the epicondyles  
  - Gluteal: Bilateral, in upper outer quadrants of the buttocks in the anterior folds of muscle  
  - Greater trochanter: Bilateral, posterior to the trochanteric prominence  
  - Knee: Bilateral, at the medial fat pad proximal to the joint line  
  Digital palpation should be performed with an approximate “force” of 4 kg. For a tender point to be considered “positive,” the subject must state that palpation was painful. “Tender” is not to be considered “painful.” |

• Etiology
  – No known specific cause
  – Possible causes:
    • Abnormal levels of nociceptive hormones
    • Hypothalamic-pituitary-adrenal (HPA) axis and its associated chemical pain mediators
      • Cortisol, growth hormone
      • Insulin-like growth factor-1
      • Substance P, serotonin
    • Genetics and environmental factors (e.g., muscle trauma, certain infections such as hepatitis C, Lyme disease, Epstein-Barr virus) are also possible mechanisms.
• Treatments
  – Exercise Prescription
    • Individualization is very important.
    • Goals: improve function, mood, self-efficacy, and pain
    • Assessment of functional capacity and associated pain important to reduce risk of overexertion and exacerbation of symptoms
    • Suggest beginning at 1-2 times/week, with a goal of 3-4 days/week at a low to moderate HR-based intensity
    • Walking, jogging, and water exercise
    • Consider intensity decreases during symptom flare-up
    • Resistance and flexibility training may be useful, but there are little data currently addressing these modes.

  – Pharmacologic Treatment
    • Most common: tricyclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs), and dual reuptake inhibitors
Rheumatoid Arthritis

- Clinical Features and Diagnosis
  - An inflammatory disease associated with autoimmune dysfunction that attacks the joint capsule
  - Increased mortality risk (2-3 times general population)
  - Prevalence has been reduced over the past several decades.
  - Major symptoms: pain, swelling, stiffness, reduced joint mobility
  - Periods of inflammatory process mark disease progression:
    - Abnormal increase in the cells of the synovial membrane along with thickening, increase in joint swelling
  - Disease progression:
    - Cartilage and bone that participate in joint articulations are degraded.
    - With severe cases, bones fuse and function is lost with increased pain and deformity.
Normal and Rheumatoid Arthritic Joints

Normal joint

Joint affected by rheumatoid arthritis

- Bone
- Synovial sheath
- Synovial fluid
- Cartilage
- Joint capsule
- Bone loss (generalized)
- Bone loss/erosion
- Inflamed synovial sheath
- Cartilage loss
- Swollen joint capsule
<table>
<thead>
<tr>
<th>CRITERION</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Morning stiffness</td>
<td>Morning stiffness in and around the joints, lasting at least 1 hour before maximal improvement</td>
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<tr>
<td>2. Arthritis of three or more joint areas</td>
<td>Swelling of at least three joint areas for at least 6 weeks. The 14 possible areas are right or left PIP, MCP, wrist, elbow, knee, ankle, and MTP joints.</td>
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<tr>
<td>3. Arthritis of hand joints</td>
<td>Swelling of the wrist, MCP, or PIP joint for at least 6 weeks</td>
</tr>
<tr>
<td>4. Symmetrical arthritis</td>
<td>Simultaneous involvement of the same joint areas (as defined in #2) on both sides of the body (bilateral involvement of PIPs, MCPs, or MTPs is acceptable without absolute symmetry)</td>
</tr>
<tr>
<td>5. Rheumatoid nodules</td>
<td>Subcutaneous nodules over bony prominences or extensor surfaces or in juxta-articular regions</td>
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<tr>
<td>6. Serum rheumatoid factor</td>
<td>Abnormal level of serum rheumatoid factor as detected by a method that is positive in &lt;5% of normal control subjects</td>
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<tr>
<td>7. Radiographic changes</td>
<td>Radiographic changes typical of rheumatoid arthritis on posteroanterior hand and wrist radiographs, which must include erosions or unequivocal bony decalcification localized in or most marked adjacent to the involved joints</td>
</tr>
</tbody>
</table>

MCP, metacarpophalangeal; MTP, metatarsophalangeal; PIP, proximal interphalangeal.

*At least four criteria must be fulfilled for classification as rheumatoid arthritis.

• Etiology
  – Genetic (60%) and environmental involvement
    • Nongenetic factors:
      • Age
      • Hormonal factors
      • Infection
      • Smoking
      • Obesity
• Treatments
  – Exercise Prescription
    • No official guidelines
    • Aerobic, resistance, and range-of-motion exercises are important
    • Aerobic: Suggest three times per week for 30 to 60 minutes per session at an intensity of 60% to 85% of maximum heart rate
      • Walking, pool use, bicycling
    • Resistance: Two to three times weekly at 50% to 80% of maximal voluntary contraction
      • Weight machines, dumbbells, elastic bands
    • Constant diligence to program modification to avoid and manage symptom flare-up
  – Pharmacologic Treatment
    • NSAIDS, disease-modifying antirheumatic drugs (DMARDs), glucocorticoids (steroids), and biologic therapies are mainstay treatments.
  – Surgical Treatment
    • Synovectomy (excision of inflamed synovial tissue)
    • Tendon realignment
    • Arthroscopic debridement
    • Joint replacement
# Table 40-3. Medications Used in the Treatment of Rheumatoid Arthritis

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples (Trade Names)</th>
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</thead>
<tbody>
<tr>
<td>NSAIDs</td>
<td>Aspirin</td>
</tr>
<tr>
<td></td>
<td>Ibuprofen (Advil, Motrin IB)</td>
</tr>
<tr>
<td></td>
<td>Ketoprofen (Orudis)</td>
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<tr>
<td></td>
<td>Naproxen (Naprosyn)</td>
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<tr>
<td></td>
<td>Celecoxib (Celebrex)</td>
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<tr>
<td>DMARDs</td>
<td>Gold, injectable or oral</td>
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<tr>
<td></td>
<td>Antimalarials (Plaquinil)</td>
</tr>
<tr>
<td></td>
<td>Penicillamine (Cuprimine, Depen)</td>
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<tr>
<td></td>
<td>Sulfasalazine (Azulfidine)</td>
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<tr>
<td></td>
<td>Methotrexate (Rheumatrex)</td>
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<td></td>
<td>Azathioprine (Imuran)</td>
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<td></td>
<td>Cyclosporine (Sandimmune, Neoral)</td>
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<tr>
<td></td>
<td>Lefluomide (Arava)</td>
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<tr>
<td>Glucocorticoids (steroids)</td>
<td>Prednisone (Deltasone, Orasone)</td>
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<tr>
<td></td>
<td>Methylprednisolone (Medrol)</td>
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<tr>
<td>Biologic therapy</td>
<td>Etanercept (Enbrel)</td>
</tr>
</tbody>
</table>

DMARDs, disease-modifying antirheumatic drugs; NSAIDs, nonsteroidal anti-inflammatory drugs.