Managing Common Musculoskeletal Complaints: Beyond NSAIDS and Physical Therapy

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Overview

• Quick approach to MSK problems
• Discuss options of conservative and surgical management
• Use common injuries to review treatment options
Good history + Complete physical exam
= Correct diagnosis in 95% of cases

2 steps
• Patient history
• Physical examination
  • (Radiographs)
  • (Advanced imaging)

History is Key

Who?
What?

• Numbness
• Fever
History is Key

When?
• Acute vs Chronic (2 weeks? 6 weeks?)

Where?
• Think anatomy
• One finger test

How?
• Mechanism of injury

Red Flag Symptoms

• Severe disability
• Numbness and tingling
• Night pain
• Constitutional symptoms (fever, wt loss)
• Swelling with no injury
• Systemic illness
• Multiple joint injury
### Why?

<table>
<thead>
<tr>
<th>Intrinsic Risk Factors</th>
<th>Extrinsic Risk Factors</th>
</tr>
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<tbody>
<tr>
<td>• Growth</td>
<td>• Training</td>
</tr>
<tr>
<td>• Anatomy</td>
<td>• Technique</td>
</tr>
<tr>
<td>• Muscle/Tendon imbalance</td>
<td>• Footwear</td>
</tr>
<tr>
<td>• Illness</td>
<td>• Surface</td>
</tr>
<tr>
<td>• Nutrition</td>
<td>• Occupation</td>
</tr>
<tr>
<td>• Conditioning</td>
<td>• TO PREVENT INJURIES!!</td>
</tr>
<tr>
<td>• Psychology</td>
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</tbody>
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### LOOK, FEEL, MOVE

<table>
<thead>
<tr>
<th>LOOK – Observation</th>
<th>SPECIAL TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Swelling, Erythema, Atrophy, Deformity, Surgical Scars (SEADS)</td>
<td>Provocative tests</td>
</tr>
<tr>
<td></td>
<td>• Reproduce patient’s pain</td>
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<table>
<thead>
<tr>
<th>FEEL – Palpate important structures</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Stress tests</td>
</tr>
<tr>
<td></td>
<td>• Stress structures for instability (i.e. ligaments)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>MOVE – Assess Range of Motion</th>
<th>Functional tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Assess functional movements (i.e. weight bearing activity)</td>
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Diagnostic options

Imaging
• X-ray
• Ultrasound
• Bone scan
• CT
• MRI

Others
• EMG/NCS
• Diagnostic injection
• Arthrocentesis
• Bloodwork
• Neuropsych testing
• Arthroscopy

Treatment Options

Conservative
• MICE (Modified activity, Ice, Compression, Elevation)
• Medications/Analgesia
• Rehabilitation therapy
• Casting/ Braces / Orthoses
• Crutches
Treatment Options

Surgery
• Reconstruction
• Repair
• Re-align
• Remove internal derangement

Case
• 56 y.o. coach with a history of a remote ACL tear, a family history of OA, and college football experiences severe knee pain and can’t walk during the final minute of the playoff game.
Physical Therapy Works

- Patient education (A level)
- Weight Loss (B level)
- Physical therapy and exercise (A level)
- TENS (A level)

EULAR standing committee, Ann Rheum Dis, 2000
American College of Rheumatology, Arthritis Rheum, 2000

Pain Control: What is first line?

- Acetaminophen
- NSAIDs
- COX-2 inhibitors
- Glucosamine
Acetaminophen vs NSAIDs

- Acetaminophen = Ibuprofen
  Bradley, RCT, NEJM, 1991
- RCT, double-blind
- Diclofenac 75 mg bid vs. Acetaminophen 1000 mg qid vs. placebo
- Only diclofenac effective at 2 and 12 weeks

The Matrix

Oxford Textbook of Sports Medicine, 2002
NSAIDs - Which one?

- Salicylic acid derivative - ASA
- Propionic acid – Ibuprofen, naproxen
- Acetic acid – Indomethacin
- Oxicams – Piroxicam
- Pyrazalones - Phenylbutazone

Toxicities

**High GI, moderate renal**
- Aspirin
- Indomethacin
- Ketorolac

- Others typically moderate GI and moderate renal toxicities

**High platelet effects**
- Piroxicam (14 days)
- Aspirin (10 days)
- Naprosyn (4 days)

- Others typically 1 day

**Allergies**
- Respiratory symptoms ~ 20%
- Anaphylaxis ~ 1-2%
Rise and Fall of COX-2

VIGOR trial
• 5 times greater risk of MI with Rofecoxib 50 mg (Vioxx)

Adenomatous Polyp Prevention on Vioxx (APPROVe) study
• 1.7 times greater risk with Rofecoxib 25 mg vs placebo
  Bressalier et al, N Engl J Med, 2005

Alzheimer’s Disease Anti-Inflammatory Prevention Trial (ADAPT)
• No increased CV risk with celecoxib 200 mg

COX-2 inhibitors

<table>
<thead>
<tr>
<th></th>
<th>Celecoxib Celebrex*</th>
<th>Rofecoxib Vioxx*</th>
<th>Valdecoxib Bextra*</th>
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<tbody>
<tr>
<td>Half-life</td>
<td>11 hrs</td>
<td>17 hrs</td>
<td>8.0</td>
</tr>
<tr>
<td>Cox1/Cox2 IC_{50} ratio</td>
<td>7.6</td>
<td>35.0</td>
<td>30.0</td>
</tr>
<tr>
<td>Daily dose</td>
<td>200 mg – 800 mg</td>
<td>25 mg – 50 mg</td>
<td>10 mg – 40 mg</td>
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</table>
Are COX-2’s worth it?

• COX-2 selective NSAIDs examined were found to be similar to non-selective NSAIDs for the symptomatic relief of RA and OA
• COX-2 selective NSAIDs offer protection against serious GI events but the effect varied across individual drugs
• Need to compare the effectiveness and cost-effectiveness of COX-2 selective NSAIDs relative to non-selective NSAIDs with a PPI

Chen et al., Health Technology Assessment, 2008

Got Protection?

• Proton-pump inhibitors OR 1.12 (95% CI 0.21-6.07)
• H2-blockers OR 2.26 (0.81-6.36)
• Misoprostol OR 1.91 (0.33-10.9)

### Costs

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Dose</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Ibuprofen</td>
<td>800 mg (30)</td>
<td>$8.99</td>
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</tr>
<tr>
<td>Naproxen</td>
<td>500 mg bid</td>
<td>$17.99</td>
<td></td>
</tr>
<tr>
<td>Naprosyn</td>
<td>500 mg OD</td>
<td>$45.99</td>
<td></td>
</tr>
<tr>
<td>Diclofenac</td>
<td>75 mg bid</td>
<td>$26.99</td>
<td></td>
</tr>
<tr>
<td>Voltaren</td>
<td>75 mg bid</td>
<td>$117.53</td>
<td></td>
</tr>
<tr>
<td>Celebrex</td>
<td>200 mg OD</td>
<td>$74.99</td>
<td></td>
</tr>
<tr>
<td>Vicodin</td>
<td>5/500 mg (30)</td>
<td>$20.99</td>
<td></td>
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### Glucosamine

- Mechanism in vivo unknown
- Liquid chromatography of 14 products showed amount of glucosamine varied from 59 to 138%

Russell et al. J Rheumatol 2002; 19: 2407-2409

**Dose:**
- Glucosamine 1500 mg/day
- Chondroitin 1200 mg/day
- Totalled $730 Million in 2004

"I'm not sure what these are, but take them for a couple of weeks and let me know how you feel."
Glucosamine/chondroitin Arthritis Intervention Trial (GAIT) Trial

- RCT for 24 weeks
- N=1583 with symptomatic knee OA
  1. 1500 mg of glucosamine daily, 1200 mg of chondroitin sulfate daily, or both
  2. 200 mg of celecoxib daily
  3. Placebo


GAIT Trial

- For patients with moderate-to-severe pain at baseline, combined therapy better than placebo (79.2 percent vs. 54.3 percent, P = 0.002)

Are Steroids Evil?

• Crosses cell membrane decreases transcription of cytokines and inflammatory mediators
• Oral vs injection
• 3 injections in a joint
• Per year?
• Ever?

Corticosteroids

Selection based on:
• Potency
  – Low
  – Medium
  – High
• Solubility
• Mineralocorticoid vs inflammatory effects
Steroid injections in OA knee

- Intra-articular steroid injection provides short-term benefit for OA knee (78% vs 45% (placebo)
- Long-term improvement (16-24 weeks) in 45% vs 21% (placebo)


Viscosupplementation

- Improves viscosity
  - Increases molecular weight and quantity of HA synthesized by the synovium
- Decrease pain (mechanism uncertain)
- Decrease cytokines: Interleukin 1, PGE$_2$, MMP
  Altman et al., J Rheumatol, 1998
- HA decreases free radicals
Viscosupplementation for OA knee

- N=63 studies, poor quality
- Improvement from baseline 11-54% for pain, 9-15% for function at 5-13 weeks
- More prolonged effects than corticosteroids


Indications

- “Management of osteoarthritis”
- Co-morbidities affecting other co-morbidity
- Failure of oral medications
- Mild osteoarthritis preferable
Side Effects

- Local transient reactions = 2 - 4%
- Usually intra-articular effusion within 2 days
- No infection from contamination

Plasma Rich Platelets

- Autologous blood
- Normal platelet concentration is 200,000 platelets/μL
- Greater than 4 x platelet concentration of (1 million platelets/μL)
- Limited evidence but growing use
Surgical Treatment

Arthroscopy for OA

• Prospective, Randomized Placebo Controlled Study
• 180 Patients
• 165 VA Patients
• Placebo vs Lavage vs Debridement had similar Knee Specific Pain Scores at 1 and 2 years follow up


Surgical Treatment

• Prospective, Randomized Controlled Study
• N = 86 vs 86 controls
• Patients randomly assigned to surgical lavage and arthroscopic débridement + optimized physical and medical therapy versus physical and medical therapy alone
• No difference in outcomes: WOMAC, SF-36 Physical component summary score

High Tibial Osteotomy
Technique Opening Wedge

Total Knee Arthroplasty
Meta Analysis – 11 Series
• 3 – 18 yr f/u of 682 Knees
• 93% Good – Excellent
• 11% Complications
• 4% Revision
• 21% Radiolucent Lines
• Survivorship 90 – 95% @ > 10 – 15 yrs
Case

Who? 35 year old female runner
What? Extension low back pain
When? Acute flare x 2 weeks since running, LBP on and off x 2 yrs, worse after pregnancy
How? Pain with activity, some numbness and tingling L leg
Where? Left sacroiliac joint pain with radiating pain into left hip

What to do?

• Flexion vs Extension LBP?
• Mechanical Low Back Pain
• Differential Dx – SI joint dysfunction, early OA, DDD, ligament, Muscle strain

• Physical therapy or home exercise program
• Symptomatic treatment
• Education → address biomechanics
Sacroiliac Joint – Pain in the buttock

- Is a Diarthrodial Joint
- Synovial fluid
- Cartilage on both surfaces
- A joint capsule
- Ligamentous connections
- Articular connections allowing movement
Education (B Level)

- Provide accurate information on:
  - Expectations on recovery and recurrence
  - Safe and effective methods of symptom control
  - Risk factors for recurrence (proper lifting techniques, obesity, smoking)
  - Lack of need of specific investigations
  - Effectiveness and risks of common diagnostic procedures
  - Specific indications for follow-up
Mechanical LBP

- 80% resolve within 2 weeks
- 90% resolve with in 6 weeks

- Consider POSTURE
- Improve core stability, conditioning
- Decrease stress

BED REST

- Limited bed rest, if ever recommended should be 2 days or less
- Bed rest longer than 2 days SHOULD NOT be recommended in the treatment of simple LBP (Level A)
- A gradual return to normal activities is proven to be more effective than bed rest (Level B)
Physical Therapy Works

• Aerobic exercise: avoid debilitation (Level C)

• Therapeutic exercise: specific muscle conditioning (Level C)
  – Multifidi
  – Abdominal muscles (transversalis abdominis)

Exercise Therapy

• 43 RCT
  – Effectively reduces pain and functional limitation in Chronic LBP
  – Individually designed strengthening or stabilization programs
  – More effective than usual care
Ice or Heat?

- Superficial: Hot packs, cold pack, paraffin bath
- Deep: Ultrasound, shortwave diathermy
- No significant difference in pain improvement between continuous therapeutic ultrasound and sham therapy after 1 month of treatment
- Poor evidence to include or exclude thermal modalities alone
  
  Philadelphia Panel 2001

Manipulation

- Started within 6 weeks of onset of LBP s/o radiculopathy, better short term outcomes (Level B)
  - Non-progressive radiculopathy may benefit
  - Avoid if Progressive or severe neurological loss – red flag
  - Can be safe over 6 wks, efficacy?
### Assisted Management

- Physical agents (Massage, ice, heat, electrical stim., US laser)
  - No proven to be effective or justify their costs (Level B)
- TENS
  - Insufficient evidence to recommend (Level C)
- Shoe lifts
  - Ineffective in the absence of limb length inequality > 0.5 inch (Level C)
- Corsets and back belts
  - No proven to be effective (Level D)

### Assisted Management

- Traction
  - Not proven to be effective (Level C)
- Biofeedback
  - Not proven to be effective (Level C)
  - May be effective in chronic LBP
- Acupuncture
  - Not proven to be effective (Level D)
Anticonvulsants

Gabapentin (Neurontin)
- Inhibit GABA – possibly stabilizes neuronal membrane
- NNT < 4
- S/E – dizziness, fatigue (hematological abnormality)

Anticonvulsants

First-generation agents
Carbamazepine (Tegretol)
- 200 mg per day; increase by 200 mg per week up to 400 mg three times daily (1,200 mg per day)
- Side effects: dizziness, diplopia, nausea
- Treatment can result in aplastic anemia

Second-generation agents
Gabepentin (Neurontin)
- 100 to 300 mg at bedtime; increase by 100 mg every 3 days up to 1,800 to 3,600 mg per day taken in divided doses three times daily.
- Side effects: drowsiness, dizziness, fatigue, nausea, sedation, weight gain
Anticonvulsants

Topiramate (Topamax) (max 400 mg/day)
• Anticonvulsant
• Inhibit GABA-ergic pathways
• FDA approved for Seizure tx and Migraine prophylaxis
• Used for diabetic neuropathy
• RCT (n=192) VAS 21.8 mm vs. 15.1 mm (placebo)
• S/E – psychomotor slowing, fatigue; (5/18 tx withdrew)- asthenia, confusion

Antidepressants

• Based on 7 RCT (Systematic review)
• Produce moderate symptom reduction with Chronic LBP
• Analgesic effects
  – Tricyclic or tetracyclic antidepressants
    • Inhibition of norepinephrine and serotonin reuptake in spinal cord
  – SSRIs are not beneficial
• This effect is independent of patient’s depression status
  Staiger et al, Spine 2003
Antidepressants

- TCA mechanism of action unclear
- Helps with diabetic neuropathy proportionally with doses up to 150 mg
- State at 25 mg po qhs
- Contraindications: Cardiac (conduction abnormalities, recent cardiac event), or “frail elder”
- S/E – drowsiness, anticholinergic symptoms

Staiger et al, Spine 2003

Antidepressants

Tertiary amines

**Amitriptyline (Elavil), Imipramine (Tofranil)**
- 10 to 25 mg at bedtime
- Increase by 10 to 25 mg per week up to 75 to 150 mg at bedtime or a therapeutic drug level
- Tertiary amines have greater anticholinergic side effects; therefore, these agents should not be used in elderly patients

Secondary amines

**Nortriptyline (Pamelor), Desipramine (Norpramin)**
- 25 mg in the morning or at bedtime
- Increase by 25 mg per week up to 150 mg per day or a therapeutic drug level
- Secondary amines have fewer anticholinergic side effects
Topical Medication

• Lidocaine patch 5%
  – Case reports
  – Safe
    • Minimal risk of systemic adverse effects and drug interaction
  – Application
    • Max 3 patch
    • Apply to intact skin covering the painful area
    • 12 hours/24 hours
    • Apply over dermatomal distribution

Topical Medication

• Compound Transdermal Medications
  – 10% ketoprofen
  – 7% amitriptyline
  – 5% ketamine
• Application guidance
  – Apply small amount to painful area
  – Rub well into skin 1-2 min
  – May re-apply q/2-8 hours
Cognitive Behavioral Therapy

• Education of the patient about a multidimensional view of pain
• Identification of pain-eliciting and pain-aggravating thoughts, feelings and behavior
• Identification and modification of maladaptive cognition
• The use of coping strategies
• Hypnosis
• Relaxation
• EMG biofeedback

Cognitive Behavioral Therapy

• Combined cognitive behavioral therapy and progressive relaxation therapy are effective treatment modalities for short-term pain reduction
• No significant differences were detected among the various types of behavioral treatment
• Future RCTs are needed to find out what type of patients benefit most from CBT and what type of CBT is most effective

Cochrane Review 2005
Narcotics

Use for chronic pain or severe pain
Consider referral to pain clinic for long-term management
Use stepwise approach: mild, moderate, high, potency narcotics

CLASS III (LOW)
• Vicodin, Lortab, Lorcet, Norco (Hydrocodone + Acet)
• Darvon (propoxyphene)

CLASS II (MOD)
• Percocet, Oxycodone, OxyContin

HIGH
• Morphine, Fentanyl
Tramadol

- Multimodal analgesic (Opioid and MAOI)
- It is of particular use in patients with impaired cardiorespiratory, hepatic or renal function
- 50-100 mg po qid
- Similar opioid concerns

Muscle Relaxants

- General sedatives
- Can cause drowsiness and confusion
- Avoid alcohol
- Valium 2-10 mg po tid
- Flexiril 10 mg po tid PRN
- Norflex 1-2 tabs po tid (contains orphenadrine citrate, ASA and caffeine)
- Robaxacet, Robaxisal (ASA) and Robaxin
Question

• What is the most common cause of shoulder pain in patients 40-55 years of age?
  A. Arthritis
  B. Impingement Syndrome
  C. Shoulder Dislocations
  D. Cervical spine pain
  E. Biceps Tendonitis

Impingement Syndrome

• Key questions to ask:
  • 1. Do you have pain at night?
  • 2. Do you have pain with reaching over your head?
  • 3. Do you have difficulty with putting on a jacket?
Impingement Syndrome

Mechanism
- Impingement under acromion with flexion and internal rotation of the shoulder
- Rotator cuff, subacromial bursa and biceps tendon
- ROTATOR CUFF TENDINOPATHY

Impingement/Rotator Cuff Tears

- Partial Cuff Tear
- Full Thickness Tear
- Impingement
Shoulder Basics

• Shoulder pathology by age

• <30—think instability
• 30-50—impingement/SLAP tears
• >50—RTC tears/adhesive capsulitis
• >70—OA

Shoulder Basics

• Shoulder pathology by symptoms

• Night pain—impingement / RC Tendinopathy
• Weakness—RTC tear
• Instability/popping—Labral tear
• Stiffness—OA/Adhesive Capsulitis
• Pain past elbow—Cervical spine
Shoulder Physical Exam

- Flexion & External rotation
- Internal rotation

Impingement Signs

Hawkins test
- Flex shoulder to 90°
- Flex elbow to 90°
- Internally rotate
- Positive - reproduce shoulder pain

Sens = 88%
Spec = 43%
PPV = 38%
NPV = 90%

Impingement Signs

Neer’s Test
• Passive full flexion
• Positive is reproduction of shoulder pain

Sens = 83%
Spec = 51%
PPV = 40%
NPV = 89%


Rotator Cuff strength testing

Supraspinatus
• Empty can
• Thumbs down abducted to 90°
• Horizontally adduct to 30°

For tendonitis
Sens = 77%
Spec = 38%

For tears,
Sens = 19%
Spec = 100%

Rotator Cuff strength testing

Infraspinatus/teres minor
- External rotation
  • Keep elbows at 90º

For tendonitis,
Sens = 57 %
Spec = 71 %
For tears,
Sens = 36 %
Spec = 95 %

Subscapularis – Internal rotation / Lift-off test

For lesions,
Sens = 50 %
Spec = 84 %
For tears,
Sens = 50 %
Spec = 95 %

Rotator Cuff strength testing

Subscapularis – Internal rotation

Bear Hug Test
(upper subscap)

Patient gives themselves a ‘hug’

Positive test: Cannot hold arm on self

Cuff Tear vs Impingement?

• Difficulty lifting
  – Pain vs weakness?
• Drop arm sign
• Fail conservative Tx
• Tears uncommon < 40 y.o.

Sens = 10 %
PPV = 100 %

X-ray AP Scapula

- Avulsion
- Calcific tendinosis
- Enthesopathy (traction spurs)
- Alignment

X-ray Lateral Scapula

Normal

Large acromial spur
MRI

How good for full thickness tears?
• 69 to 100 percent sensitive
• 88 to 100 percent specific

Tx of Rotator Cuff Tendinopathy

• Rest, avoid offending activities
• Physical therapy (6-12 weeks)
  – Rotator Cuff Strengthening
  – Active/Passive ROM
  – Periscapular exercises
  – Upper extremity proprioception
• NSAIDS
• Consider steroid injection (adjunct for pain control)
When to Operate for Impingement?

Pearls for rotator cuff pathology

• Impingement, PT-RCT, FT-RCT are a spectrum of degenerative pathology to the shoulder

• Early signs: pain with overhead activity, night pain, putting shirt on

• Weakness: worry about cuff tear

• Consider early surgical management with full thickness tears
Outcomes of Impingement

• Non-operative
  — Cummins, et al. JSES 2008
    • 100 consecutive patients
    • At 2 years, shoulder score 56$\rightarrow$95
    • 80% did not require surgery, but 30% still had pain

• Operative
  — Henkus, et al. JBJS-Br 2009
    • 2.6 year follow-up
    • 93% good to excellent results

Question

What is the #1 predictor of outcome following surgery for rotator cuff tears?

A. Age of the patient
B. Medical co-morbidities
C. Size of the tear
D. Location of the tear (muscle vs. tendon)
Full Thickness Rotator Cuff Tears

- Management
  - Initial—trial of physical therapy
  - Limited use of corticosteroid injections
  - Surgery—arthroscopic
    - Evaluate joint
    - Subacromial decompression
    - Acromioplasty
    - Fix Cuff Tear

Take Home Points

- Master Look Feel Move (Special tests) of each joint
- Consider function and disability
- Check for Red Flags
- Consider indications – Is it something fixable?
- For treatment only 3 options:
  - Conservative vs Surgical vs Do Nothing
- Include the patient expectations
Thank You

4th UCSF Primary Care Sports Medicine Conference: ABC’s of Musculoskeletal Care
November 13-14, 2009
San Francisco, California