Upper Extremity Musculoskeletal Exam Techniques: Evidence-Based Treatment of Common Upper-Extremity Injuries

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• Nitroglycerin patches for the treatment of lateral epicondylitis

Learning Objectives
1. Distinguish musculoskeletal conditions that result from overuse/repetitive motion injuries in the upper extremities, with particular attention to those that occur in pediatric patients.
2. Assess an injured patient’s range of motion, stability, bone alignment, soft tissue swelling, palpable warmth or mass(es), pain or tenderness and crepitation in the upper extremities.
3. Identify red flags from the physical examination of upper extremity injuries that warrant referral to a sub-specialist (e.g. surgery, physical therapy) or for diagnostic imaging.
4. Apply evidence-based treatment strategies for patients with musculoskeletal injuries of the upper extremities.

Associated Sessions
• Upper & Lower Extremity Musculoskeletal Exam Techniques: PBL
Audience Engagement System

Step 1
Step 2
Step 3

Overview

• Facts and Philosophy
• 3 Common Conditions
  – Victims and Culprits
  – Myths, Legends & Mystical Truths
  – Evidence-Based Treatment
• Coding Minute
• Annoying Editorial Comments

Better Diagnose, Treat, and Code for Musculoskeletal Medicine

AES Question
Tell me about you...
Who are you?
1. Family Medicine Resident
2. Family Medicine Staff or Family Med Trained
3. Peds
4. Other

AES Question – Have You Previously Attended an MSK Session That I Have Taught?
1. Yes, at this AAFP conference
2. Yes, at a previous AAFP or other conference
3. No. And why is your nose so big?

AES Question
How Comfortable Are You Diagnosing & Treating Common MSK Problems?
1. Not at all comfortable
2. Comfortable with the basics
3. Fairly comfortable with MSK
4. Confidently diagnose & treat MSK

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• Annoying Editorial Comments
Facts and Philosophy

Editorial Comment

How much Musculoskeletal Medicine (MSK) do you see?

- 22-34% of outpatient visits (civilian) for MSK complaints

- How much Musculoskeletal Medicine will you know?

- MSK = 2% of Medical School Curriculum (US & Canada)

Two Areas of Difficulty

- Proper History and Physical leading to correct Diagnosis

- Proven-Effective Treatments for the Correct Diagnosis

Overview

- Facts and Philosophy
- 3 Common Conditions
  - Victims and Culprits
  - Myths, Legends & Mystical Truths
  - Evidence-Based Treatment
  - Case 1
  - Case 2
  - Case 3
- Coding Minute
- Annoying Editorial Comments

3 Common Cases

Case #1

- 44 yo male with right shoulder pain for 3 weeks
- No trauma, felt a little twinge after football game
- Pain runs from shoulder down to lateral arm
- Pain wakes him up at night, hurts with overhead activities
- Pain getting worse despite babying it for 3 weeks

AES - What is Your Diagnosis?

A. Subacromial Shoulder Pain
B. Impingement Syndrome
C. Rotator Cuff Tendonitis
D. Rotator Cuff Tear
E. AC Joint Sprain
F. Biceps Tendonitis

Differential Diagnosis

Rotator Cuff Syndrome

- Subacromial Pain
- Impingement Syndrome
- Degenerative Rotator Cuff Tear
- Rotator Cuff Tendonitis

- AC Joint
- Dislocation
- Frozen Shoulder
Another Shoulder? Why Me??

Why we fear the Rotator Cuff...

"If you can’t do a GOOD shoulder exam, just learn to enjoy doing it POORLY..."

Rotator Cuff Syndrome

Bony Anatomy

Clavicle
Coracoid process
Acromion
Glenoid cavity
Scapula
Humerus

Rotator Cuff Syndrome

Non-Shoulder Stuff Causing Shoulder Pain

• 4 Daughters in a minivan.....
• History is KEY!

Rotator Cuff Syndrome

How to Diagnose It

Rot/Cuff/Impingement

Key History
• Age (> 40)
• No/Minimal/Repetitive Trauma
• Overhead Activities
• ↓ Activity, but ↑ Pain
• Night Pain
• Radiates to Deltoid

Supporting Exam
• + Hawkins or Neers
• Painful Arc of Motion

Victims & Culprits

• Identifying The VICTIM
  – That’s easy

• Identifying The CULPRIT
  – Most common error:
  Not Identifying/Treating the Culprit
Rotator Cuff Syndrome

**Treating Victims and Culprits**

**Victims:**
- Rotator Cuff
- Subacromial Bursa

**Culprits:**
- Rotator cuff weakness
- Subacromial spurs
- Overuse
- Scapula or core dysfunction

**Treatments**
- NSAIDs
- Iontophoresis / Ultrasound
- Steroid Injection

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Rotator Cuff Syndrome

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Rotator Cuff Syndrome

**Shoulder & Golf**

- Glenohumeral Joint
  - Extreme mobility
  - 30% humeral head in contact with glenoid
  - Static and dynamic stabilizers

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Rotator Cuff Syndrome

**Dynamic Stabilizers**

- Rotator Cuff
  - Smaller than more superficial muscles
  - "Steering" mechanism for humeral head
  - Depresses humeral head into glenoid

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Rotator Cuff Syndrome

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Rotator Cuff/Impingement Syndrome

Treating the Culprits

Must Strengthen Rotator Cuff!!
• Finding a good physical therapist

What about Pain Control?
– NSAIDs vs Steroid Injection (anywhere?)
  – Hard to do good therapy and sleep while in pain
  – Rotator cuff rehab takes time, 6-24 weeks

If patient not improving, not responding…
Find & Treat the Culprit

AES Question
What is the “First Line, Must Do Treatment” for Rotator Cuff Syndrome?
A. Strengthen rotator cuff
B. Control inflammation with ice, NSAIDs
C. Give a steroid injection
D. Rest for 3 weeks, then slowly return to activity

Rotator Cuff Syndrome

Differential Diagnosis

- Impingement Syndrome
- Degenerative Rotator Cuff Tear
- Rotator Cuff Tendonitis
  - AC Joint
  - Dislocation
  - Frozen Shoulder

Welcome to the GRAMP-C’s

“Great Research; And Maybe Practice-Changing”

A Favorite Article on Subacromial Pain–

“Subacromial corticosteroid injection or acupuncture with home exercises when treating patients with subacromial impingement in primary care—a randomized clinical trial”

• Open label, multicenter randomized clinical trial
• 117 patients visiting Swedish GP’s received:
  – Steroid injection + Home PT
  – Acupuncture + Home PT
Findings:
• At 3, 6, 9 months:
  – No difference between Acupuncture and Steroid Inj Groups

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• Open label, multicenter randomized clinical trial
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  – Kinesiotaping + Home PT
Findings:
• At 3, 6, 9 months:
Piling On Award – Exercises Work!
Effect of Specific Exercise Strategy on Need for Surgery in Patients with Subacromial Pain: A Randomized Controlled Study

Progressive Strengthening Exercises for Subacromial Impingement Syndrome
• Randomized trials of Specific Rotator Cuff Exercises versus General Shoulder Stretches
• 200+ patients, all on waiting list for surgery
Findings:
• Exercises take time (12+ weeks of exercise therapy)
• Exercises:
  – Reduced Pain
  – Improved Function
  – Decreased Subsequent Surgery
• Specific Rotator Cuff MUCH BETTER than General Shoulder Stretches
  – Holmgren T, BJSM, 2014

1st Line: Rotator Cuff Strengthening
2nd Line: Supervised Rot Cuff Strengthening
Next Step: ?

Treatment of Rotator Cuff Syndrome with Steroid Injection
• Randomized Controlled Clinical Trial
• Double-blind and Placebo-controlled
• Steroid vs Saline Injection
Results: Steroid better than Saline, butt…

Ekberg OM et al. BMJ 2009

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    – Case 1 – Rotator Cuff Syndrome
    – Case 2 –
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Rotator Cuff Syndrome
Treating Victims and Culprits
Victims:
  – Rotator Cuff
    – Subacromial Bursa
Culprits:
  – Rotator cuff weakness
  – Subacromial spurs
  – Overuse
  – Scapula or core dysfunction

Suicide!!

#1 Rot Cuff Strength, #2 Mo’ RTC Strength, #3 +/- Steroid

3 Common Cases
Case #2
• Just over 40 yo female with L elbow pain for 6 weeks
• Felt a little twinge after tennis 6 weeks ago
• Pain gradually progressed, stopped playing tennis 2 wks ago
• Aches at night, hurts with any wrist/elbow activities
• Pain getting worse despite babying it for 2 weeks
AES Question

What is Your Diagnosis?
A. Elbow Osteoarthritis
B. Lateral Epicondylitis (Tennis Elbow)
C. Medial Epicondylitis
D. Olecranon Bursitis

Pathoanatomy

- NOT an inflammatory condition (not an “–itis”)
- Microtears of the wrist extensor tendons
- Subsequent collagen degeneration

Clues to Diagnosis

- No numbness/tingling
- Lateral elbow
- Tennis
- Age

Diagnosis

Differential Diagnosis

Victims:
- Wrist Extensor Tendons (ECRB)

Culprits:
- Overuse
- Eccentric Contraction
- Tennis Racquet
- Scapula or core dysfunction (weakness)

Treatments

- NSAIDs
- Steroid Injection
- Physical Therapy
- Bracing
- Novel Injections
- Surgery

Myths, Legends & Magical Truths About Treatment
AES Question
Classical Teaching For Lateral Epicondylitis:
_______ provides best pain relief for initial 6 weeks;
_________ is best beyond 6 weeks.
1. NSAIDs; Counterforce Brace
2. Steroid Injection; Physical Therapy
3. Counterforce Brace; Steroid Injection
4. NSAIDs; Steroid Injection

AES Question:
What therapy has been shown to improve Lat Epicondylitis outcomes in patients already doing PT?
1. Topical Nitroglycerin Patch
2. Steroid Injection
3. NSAIDs
4. Friction Massage
5. Yoga

NSAIDS
Remember that lateral epicondylitis pain is non-inflammatory!
• “Very limited evidence to recommend the use of NSAIDs…”
• Topical NSAIDs possibly more effective than oral
• “Injection may be more effective than oral NSAID in the short term.”
  – Pattanittum, Cochrane Database 2013 May

Injection vs Physical Therapy
Steroid vs Physical Therapy:
• Steroid: best short-term pain relief (< 6wks)
• PT: best results > 6wks
  – Stretching
  – Eccentric Strengthening
• Combination Therapy?

“To Brace or Not to Brace…”
Brace vs Physical Therapy:
• Brace might decrease symptoms for first 6 wks
• PT better throughout study
• Combination therapy?
• No studies suggest harm

Lateral Epicondylitis:
Novel Treatment Studies
• Topical Nitric Oxide Application at the Elbow
• All patients got Physical Therapy
• 81% cure with nitro at 6 months
  – ¼ of a 0.1mg or 0.2mg ntg patch daily
• 60% of the placebo group. P=.005
Welcome to the GRAMP-C’s
“Great Research, And Maybe Practice-Changing”

Game Changer Study
“Steroid injection, physiotherapy, or both for lateral epicondylagia”
- 165 patients with new Lateral Epicondylitis
- 1 Year Follow-up
  - Group 1: Steroid Injection
  - Group 2: Placebo Injection
- Lower recovery and higher relapse rate in steroid group than placebo group at 6 & 12 months
- Both placebo groups did equally well at all times
- Only caveat: Rehab program really NOT very good
  - Coombes BK, JAMA, 2013 Feb

2nd Game Changer
Systematic Review of Exercise Therapy for Lateral Epicondylitis
- 12 RCTs and 1 Review of Exercise Therapy for LE
- “Good evidence for efficacy of stretching plus strengthening exercise”
- “Good evidence for eccentric strengthening”
- Stretching plus strengthening outperformed all other modalities (friction massage, ultrasound, etc.)

Wow! You Really Got That Thru an IRB?
“Effectiveness of Leech Therapy in Chronic Lateral Epicondylitis”
- Randomized Controlled Trial (Imagine the suspense….)
- 2-4 Leeches applied daily
- Versus diclofenac topical cream

Findings:
- Leeches less pain, maybe less disability

Not Worth the Electrons, Let Alone the Paper – 2012
“Platelet-Rich Plasma Versus Autologous Whole Blood for the Treatment of Chronic Lateral Elbow Epicondylitis: A Randomized Controlled Clinical Trial”
- 28 patients with new Lateral Epicondylitis
  - Group 1 – Autologous Blood Injection & Rehab
  - Group 2 – Platelet Rich Plasma (PRP) Injection & Rehab
- ~50% of patients got better
- No real differences between groups
  - Rome JD, J Bone Joint Surg Am, 2010 Nov 3;92(15):2514-22

Lateral Epicondylitis
Treating Victims and Culprits

Victims:
- Wrist Extensor Tendons (ECRB)

Culprits:
- Overuse
- Eccentric Contraction
- Tennis Racquet
- Scapula or core dysfunction (weakness)

Treatments
- NSAIDs
- Steroid Injection?
- Physical Therapy
- PT + Nitro Patch
- Bracing
- Novel Injections
- Surgery

#1– PT (eccentric), #2– PT+NTG patch, #3– Leeches or Novel Inject
Overview

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  • Case 3 –
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AES Question

What is your diagnosis?
A. Trigger finger
B. Carpal tunnel
C. de Quervain’s tenosynovitis
D. Post-partum depression

4 Common Cases

Case #3

• 25 yo G1P1, four weeks post-partum
• Right wrist painful for 8 days, no trauma
• Hurts with any thumb movement
• Can’t change diapers, can’t pick up baby, can’t breastfeed, can’t sleep
• (Here she collapses into sobs) ‘I’m just a bad mom!’

Diagnosis?

Clues to Diagnosis
• Sharp radial wrist pain
• Atraumatic
• Thumb movement
• Classic patient: new breastfeeding mom
  – Why??

de Quervain’s Tenosynovitis

Pathoanatomy

• FINALLY, an “–itis” that IS inflammatory!!!
• Tendon sheaths and Brake Cables
• Inflammation between sheath and tendon causes

Pain with Any Motion!!
### Lateral Epicondylitis

#### Treating Victims and Culprits

<table>
<thead>
<tr>
<th>Victims:</th>
<th>Culprits:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abductor/Extensor Pollicis Tendons</td>
<td>Overuse</td>
</tr>
<tr>
<td></td>
<td>Hormones</td>
</tr>
<tr>
<td></td>
<td>Baby</td>
</tr>
</tbody>
</table>

#### Treatments

- NSAIDs
- Steroid Injection
- Bracing
- Surgery

### Myths, Legends & Magical Truths

#### About Treatment

### NSAIDs

- Inflammation present pathologically

### Bracing

- Insufficient as a solo therapy
- Is it a helpful adjunct?

### Steroid Injection

- Is this a good idea?
- What are the risks?

### AES Question

What is the best first-line treatment for de Quervain’s?

- A. NSAIDs and Rest
- B. Brace and Rest
- C. Steroid Injection
- D. Steroid Injection, Brace and Rest
Treatment Studies

Rest vs NSAIDs vs Brace vs Steroid

- Pooled analysis of 7 studies
- Cure rates:
  - Rest – 0%
  - NSAIDs – 0%
  - Bracing alone – 17%
  - Steroid injection (X1) – 83%
  - Injection + brace – 65%

Victims:
- Abductor/Extensor Pollicis Tendons

Culprits:
- Overuse
- Hormones
- Baby

Treatments
- NSAIDs
- Steroid Injection
- Bracing
- Surgery

Injection Safe in Pregnancy & Breastfeeding!
- Acici, J Hand Surg, 2002

Welcome to the GRAMP-C’s

‘Great Research; And Maybe Practice-Changing’

Best Treatment For de Quervain’s

1st Line: Steroid Injection
2nd Line: Mo’ Steroid Injection
Next Step:

1-Point versus 2-Point Injections For de Quervain’s

- 10mg triamcinolone + 1cc lidocaine
- 40 pts (43 hands)
- 36 month f/u
- Results:
  - 1-pt injection: 89% “good” efficacy
  - 2-pt injection: 100% “good” efficacy

Sawaizumi T, Int Orthop. 2007 April; 31(2): 265–268

2-Point versus 4-Point Injections For de Quervain’s

- 6mg Celestone + 1cc lidocaine
- 48 pts (all male??)
- 2, 4, 8, & 52 wk f/u
- Results:
  - 4-point injection had:
    - Better sx scores
    - Less surgeries
    - Fewer relapses
At all f/u time points

What's Going On?

- Real effect?
- Needle phobia
- Tenotomy?

Effects likely due to variations in anatomy/multiple sheaths

Treating Victims and Culprits

Victims:
- Abductor/Extensor Pollicis Tendons

Culprits:
- Overuse
- Hormones
- Baby

Treatments:
- NSAIDs
- Steroid Injection
- Bracing
- Surgery

Injection Safe in Pregnancy & Breastfeeding!

#1 - Steroid Injection, #2 - Mo' Steroid Injection, #3 - U/S Inj

de Quervain’s Tenosynovitis

Treating Victims and Culprits

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    - Case 3 - de Quervain’s Tenosynovitis
- Coding Minute

Coding Minute

Take Credit For What You Do

- Military Disclaimer

5 Do’s and Don’ts of Coding

1. Do capture time required for:
   - Exercise Teaching (E&M or CPT 97110)
   - Crutch Training (E&M or CPT 97116)
   - Brace Fitting and Care Coordination (E&M)

2. Don’t forget to code injections
   - Most injections - CPT 20610
Coding Minute
Taking Credit For What You Do
5 Do’s and Don’ts of Coding
1. Do capture time required
2. Don’t forget to code injections
3. Do use a 25 or 29 modifier
   – Diagnosis and treatment in same visit requires the modifier in many states
4. Don’t forget to bill DME
   – Ankle braces, crutches, etc…
5. Do phone a friend
   – Orthopedic coder
   – Ortho P.A.
   – Ortho R.N.

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    🔹 Case 1 – Rotator Cuff Syndrome
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    🔹 Case 3 – de Quervain’s Tenosynovitis
• Coding Minute

Practice Recommendations
• Rotator Cuff Syndrome
  1st Line: Rotator Cuff Strengthening
  2nd Line: Supervised Rotator Cuff Strengthening
  3rd Line: Steroid Injection (anywhere!) and Mo’ Rotator Cuff Strengthening
• Lateral Epicondylitis
  1st Line: Stretching and Strengthening Exercises
  2nd Line: Nitro Patch + Stretching and Strengthening Exercise
  3rd Line: Novel Injections + Eccentric Exercise
• de Quervain’s Tenosynovitis
  1st Line: Steroid Injection
  2nd Line: Mo’ Steroid Injection
  3rd Line: Ultrasound guided exam and injection

Questions
Evidence-Based Treatments for Upper Extremity Injuries

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Think I’ve Stretched the Truth?

Very Special Thanks to our models:
Kathy Fields, Melanie McGrath, Quinton Sawyer, and Michelle Boling

4 Common Cases

Case #4

• 42 yo postal worker
• Right hand/fingers go numb at night, shakes them out
• Pain and tingling starting at work when sorting mail
• Dr. Google: carpal tunnel?
• Wearing brace, but not helping
• “Don’t want to be a workman’s comp guy…”

Carpal Tunnel Syndrome

Diagnosis

Clues to Diagnosis

• Nighttime numbness and pain
• Vocation
• Shaking it out

• How do you know it’s carpal tunnel?

Clinical “Syndrome” = Clinical Diagnosis

Clinical Findings

Typical “Median” Distribution
– ~93%

Clinical Findings

“Median” distro 93%
Phalens versus Tinnels
– P – 68%, 73%
– T – 50%, 77%
**Clinical “Syndrome” = Clinical Diagnosis**

**Clinical Findings**
- “Median” distro 93%
- Pha/Tin 60%, 70%
- Hand Symptom Diagram
  - 64% sensitive
  - 73% specific

**EMG Findings**
- Nerve Conduction Tests
  - 70% Specific
  - 78% Sensitive

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**Myths, Legends & Magical Truths About Treatment**

**NSAIDs**
- 2003 Systematic Review
  - 1 RCT on NSAIDs
  - Trial showed NO EFFICACY of NSAIDs
    
    - O’Connor, Cochrane Rev, 2003
- Conclusions:
  - Limited evidence suggests NSAIDs not effective
- Why?

**Bracing/Splinting**
- **Effective** for mild or moderate symptoms
  - Duration of symptoms
  - Night-time vs 24 hr?
  - Neutral vs Cock-up

**Steroids**
- **Injections**:
  - Modestly effective for mild – mod symptoms
  - Lasts 4-6 weeks
- **Oral Steroids**
  - Less effective than steroid injection
  - Benefit lasts 6-8 wks
Combination Therapy

- Symptoms < 3 months
- Normal sensory exam at presentation
- Bracing
- Steroid Injection
  Predicts good response to conservative treatment


Surgery

- Very Successful
  - 75% overall “success”
- Minimal Risk/Invasive
- Absolute Indications
  - Muscle weakness
  - Thenar atrophy
  - Baseline sensory abnl
  - Severe pain/symptoms
  - Severe EMG findings
- Relative Indications
  - >6 months of symptoms
  - No response to adeq. conservative treatment
  - Recurrent symptoms

Welcome to the GRAMP-C’s

“Great Research; And Maybe Practice-Changing”

Carpal Tunnel Synthesis 2013

- Gabapentin (still) Not Effective
- Acupuncture Systematic Review = Not Likely Effective
- Astaxanthin (beta-carotinoid) Not Effective
  - Macdermid JC, Hand, 2012 Mar

Carpal Tunnel Synthesis 2013 (Continued)

What is Effective?

- Surgery still works VERY well (Shi Q, J Orthop Surg Res 2011)
  - So should we just skip everything else and operate on all?
- Steroid injection may work better than we thought....
  - 824 carpal tunnel patients over 6 years
  - Each received steroid injection
  - Followed for 5 years
- Rate of carpal tunnel surgery at 1 year: 15%
- Rate of carpal tunnel surgery at 5 years: 33%
  - Jenkins PJ, Hand, 2012 Jun

Carpal Tunnel Syndrome

Treating Victims and Culprits

Victims:
- Median Nerve

Culprits:
- Overuse
- Hormones
- Unneighborly flexor tendons
- Bad karma

NSAIDs B
Steroid Injection B+
Bracing B+
Yoga B
Mobilization B-
Nerve Gliding B-

If Short Duration, Mild St: Bracing and Injection. Otherwise: Surgery