Musculoskeletal Exam Techniques: Evidence-Based Treatment for Upper Extremity Injuries

Anthony Beutler, MD, FAAFP

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Nitroglycerin topical patches for treatment of lateral epicondylitis and other tendinopathies.

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In Dr. Beutler’s current positions at Intermountain Healthcare, his job is to reimagine sports medicine care, practice state-of-the-art sports medicine, and train the next generation of sports medicine physicians. A Hoosier by birth, he spent 21 years in the U.S. Air Force practicing family medicine and comprehensive primary care sports medicine for active-duty service members, retirees, and their families. He is an award-winning educator and teacher on the team that developed and implemented a new musculoskeletal curriculum for the Uniformed Services University of the Health Sciences’ medical school. The author of numerous articles and a sports medicine textbook, Dr. Beutler has lectured throughout the world. One of his favorite activities is helping family physicians make their musculoskeletal practices more rewarding and profitable.
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. Apply appropriate treatment strategies for patients with musculoskeletal injuries of the upper extremities that include pain management, application of the RICE strategy, casting, splinting, joint injection/aspiration, dislocation reduction and/or emergency stabilization.

4. 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.

Associated Sessions

- (PBL) Musculoskeletal Exam Techniques: Evidence-Based Treatment for Upper & Lower Extremity Injuries
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
Poll Question #1

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

Poll Question #2

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?
Poll Question #3

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
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?

Depends on you...

- 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 R 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

Diagnosis?
Poll Question #4

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
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

• 4 Daughters in a minivan…..

• History is KEY!

Rotator Cuff Syndrome

Non-Shoulder Stuff Causing Shoulder Pain
Rotator Cuff Syndrome

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

- RC strengthening
- Radiographs/MRI
- Correct training
- Find a good PT
Rotator Cuff Syndrome

Shoulder & Golf

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

Rotator Cuff Syndrome

Dynamic Stabilizers

- Rotator Cuff
  - Smaller than more superficial muscles
  - “Steering” mechanism for humeral head
  - Depresses humeral head into glenoid
What Happens if my Stabilizers aren’t so Dynamic?

Victims:
– Rotator Cuff
– Subacromial Bursa

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

Treatments
• NSAIDs
• Iontophoresis / Ultrasound
• Steroid Injection
• RC strengthening
• Radiographs/MRI
• Correct training
• Usually high level athletes
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

Poll Question #5
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

- Ekeberg, BMJ, Jan 2009
- Holmgren, BMJ, Feb 2012
- Litchfield, Clin J Sport Med, Jan 2013
Rotator Cuff Syndrome

Differential Diagnosis

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

1st Line Treatment:
Rotator Cuff Strengthening

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:
  - 93% of patients improved
- No difference between Acupuncture and Steroid Inj Groups


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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


“Great Research; And…”

Best Treatment For Rotator Cuff:

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

“Maybe Practice-Changing”
Not Surgical Decompression

- 32 hospitals, 51 surgeons UK
- 300+ patients randomized to:
  - Decompression surgery
  - Arthroscopy only
  - No treatment
    (Excluded full thickness rotator cuff tear)

- Results:
  - Decompression vs Arthroscopy only = no difference
  - No treatment vs others = no clinically important difference
    - Beard, Lancet, Jan 2018

Treatment of Rotator Cuff Syndrome with Injection

- Steroid Injection?
- Dextrose?
- Platelet Rich Plasma?
- Organic Bear Snot?
- Ultrasound Guidance?
- Shockwave?

**Three Questions:**
- Evidence of help vs harm?
- Cost?
- What can I do in my clinic?
Treatment of Rotator Cuff Syndrome with Injection

• Randomized Controlled Clinical Trial
• Double-blind and Placebo-controlled
• Steroid vs Saline Injection

Results: Steroid better than Saline, but…

Victims:
– Rotator Cuff
– Subacromial Bursa

Culprits:
– Subacromial spurs
– Overuse
– Scapula or core dysfunction

Treatments
– NSAIDs
– Iontophoresis / Ultrasound
– Steroid Injection
– RC strengthening
– Radiographs/MRI
– Correct training
– Usually high level athletes
#1 Rot Cuff Strength, #2 Mo’ RTC Strength, #3 +/-Steroid
Overview

• Facts and Philosophy
• 3 Common Conditions
  – Victims and Culprits
  – Myths, Legends & Mystical Truths
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• Annoying Editorial Comments

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

Diagnosis?
Poll Question #6

What is Your Diagnosis?

A. Elbow Osteoarthritis  
B. Lateral Epicondylitis (Tennis Elbow)  
C. Medial Epicondylitis  
D. Olecranon Bursitis

Lateral Epicondylitis

Pathoanatomy

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

& Pain!!
Lateral Epicondylitis

Diagnosis

Clues to Diagnosis

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

Differential Diagnosis

Intra-articular:
- OA, Infection
- Loose Body

Lateral Epicondylitis (tennis elbow)

PIN Syndrome
(posterior interosseous)
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
- Bracing
- Novel Injections
- Surgery

Myths, Legends & Magical Truths About Treatment
Poll Question #7

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

Poll Question #8:

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

“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

Injection vs Physical Therapy

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

Lateral Epicondylitis:
Novel Treatment Studies

• **Topical Nitric Oxide Application at the Elbow**
  A Randomized, Double-Blinded, Placebo-Controlled Clinical Trial

• 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”

It is the Wild, Wild West for Lateral Epicondylitis

- Platelet Rich Plasma
- Autologous Blood
- Needle Tenotomy
- Botox Injection
- Cross Friction Massage
- Extracorporal Shockwave Therapy
- Tenex

- All limited by natural course of lateral epicondylitis (most better in 8-12mo)
**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 3: Steroid + Rehab
  - Group 2: Placebo Injection Group 4: Placebo + Rehab
- 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

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**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.)

It is the Wild, Wild West for Lateral Epicondylitis

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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

Lateral Epicondylitis

Treating Victims and Culprits

Victims:
- Wrist Extensor Tendons (ECRB)

Culprits:
- Overuse
- Eccentric Contraction

Treatments
- NSAIDs
- Steroid Injection
- Physical Therapy
- PT + Nitro Patch
- Bracing

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

Overview

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    - Case 1 – Rotator Cuff Syndrome
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    - Case 3 –
- Coding Minute
- Annoying Editorial Comments
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!”

Poll Question #9

What is your diagnosis?

A. Trigger finger
B. Carpal tunnel
C. de Quervain’s tenosynovitis
D. Post-partum depression
Clues to Diagnosis

- Sharp radial wrist pain
- Atraumatic
- Thumb movement
- Classic patient: new breastfeeding mom
  - Why??

Can Men Get de Quervain’s?
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

Victims:
– Abductor/Extensor Pollicis Tendons

Culprits:
– Overuse
– Hormones
– Baby

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?
Poll Question #10
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%

(Level of Evidence: B+)

Ritchie, J Am Board Fam Pract. 2004
Treatment Studies

Rest vs NSAIDs vs Brace vs Steroid

- Pooled analysis of 7 studies
- **Cure rates:**
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  - Injection + brace – 65%

**Level of Evidence: B+**

Ritchie, J Am Board Fam Pract. 2004

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de Quervain’s Tenosynovitis

**Treating Victims and Culprits**

**Victims:**
- Abductor/Extensor Pollicis Tendons

**Treatments**
- NSAIDs
- Steroid Injection
- Bracing

**Injection Safe in Pregnancy & Breastfeeding!**

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2016 Review –
- Injection + Hand Therapy better than solo txs
- Weak studies & small benefits
  - Calaveri, J Hand Ther, 2016 Jan-Mar;29(1)

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Injection Safe in Pregnancy & Breastfeeding!

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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

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

#1- Steroid Injection, #2 – Mo' Steroid Injection, #3 – U/S Inj
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    • Case 3 – de Quervain’s Tenosynovitis
• NSAID Minute

Thinking About NSAIDs

• Real Drugs
  – Real Effects
  – Real Side-effects
    Nonselective - more GI, Renal
    Cox 2 selective – more CV and Renal

• Quite effective for acute and chronic pain
Precision Trial

• Randomized, multicenter, double-blind
• Noninferiority trial
• Patients at increased CV risk with RA or OA

• 24,000 pts worldwide
  – Naproxen, ibuprofen, or celecoxib
  – 10 year follow-up for adverse effects
CV Outcomes

- No difference in severe CV outcomes

GI Outcome

- Celecoxib (green) slightly better than naproxen or ibuprofen
- Statistically sig; clinically?
Renal outcomes

- Celecoxib (green) & naproxen (blue) better than ibuprofen (red)
- MAYBE

Official Result: celecoxib noninferior to ibuprofen and naproxen

- Unofficial Results:
  - 24K people
  - Took 10+ years
  - 70% of participants stopped taking free meds!
    - Side effects
    - Lack of efficacy
    - 20% (1:5) total side effect rate
Re-Thinking About NSAIDs

• Real Drugs
  – Real Effects
  – All Have Similar & Real Side-effects for 20% (1:5) people over 10 months

• Quite effective for acute pain
• Limited efficacy for chronic pain

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• NSAID Minute
Practice Recommendations

• **Rotator Cuff Syndrome**
  1<sup>st</sup> Line: Rotator Cuff Strengthening
  2<sup>nd</sup> Line: Supervised Rotator Cuff Strengthening
  3<sup>rd</sup> Line: Steroid Injection (anywhere!) and Mo' Rotator Cuff Strengthening

• **Lateral Epicondylitis**
  1<sup>st</sup> Line: Stretching and Strengthening Exercises
  2<sup>nd</sup> Line: Nitro Patch + Stretching and Strengthening Exercise
  3<sup>rd</sup> Line: Novel Injections + Eccentric Exercise

• **de Quervain’s Tenosynovitis**
  1<sup>st</sup> Line: Steroid Injection
  2<sup>nd</sup> Line: Mo’ Steroid Injection
  3<sup>rd</sup> Line: Ultrasound guided exam and injection

Contact Information

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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)
## 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
   - Most injections - CPT 20610
3. Do use a 25 or 29 modifier
   - Diagnosis and treatment in same visit requires the modifier in many states
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 29 modifier
4. Don’t forget to bill Durable Medical Equipment
   – Ankle braces, crutches, etc…
5. Do phone a friend
   – Orthopedic coder
   – Ortho P.A.
   – Ortho R.N.
Contact Information

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Questions