Evidence based treatment recommendations for lateral epicondylalgia

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Objectives

• 1) Select the most appropriate clinical tests to rule in a diagnosis of lateral epicondylalgia and to rule out other conditions such as cervical radiculopathy.
• 2) Understand the difference between tendinitis, tendinosis, and tendinopathy and how this affects treatment strategies.
• 3) Describe the current research on which interventions are most effective for lateral epicondylalgia.
• 4) Perform manual therapy techniques that have been demonstrated to be useful for patients with lateral epicondylalgia.
• 5) Develop an evidence based treatment plan for patients with lateral epicondylalgia.
• 6) Describe the most relevant and commonly used functional outcome measures for patients with lateral epicondylalgia.
Review

- Very common
  - Most common cause of elbow/forearm pain in adults
  - Prevalence of 1-3% of adults and 7% in workers
  - Only 5-10% of cases involve tennis players
- Peak incidence between 40-50 years
  - If over 50 consider C-spine or OA of elbow
- Repetitive overuse injury/insidious onset
  - Handling tools heavier than 2kg (2.2lbs)
  - Lifting load heavier than 20kg (44lbs) more than 10 times per day
  - Repetitive movements more than 10 times per day
- Dominant arm more common
- Smoking, obesity, diabetes increase risk
- Self limiting condition
  - 12-18 month resolution
- Pain over common extensor tendon
  - ECRB
  - EDC

Important Terminology

- Often confusing as terms are commonly misused and used interchangeably
- Tendonitis (Epicondylitis)
  - Commonly used incorrectly as a blanket term for all tendon injuries
  - Indicates presence of inflammation
  - Not typical except with acute conditions
- Tendinosis (Epicondylosis)
  - Absence of inflammation
  - State of tendon degeneration
  - More common clinically
- Tendinopathy
  - General descriptor for any tendon injuries with resultant pain and dysfunction
  - This is the term we will primarily use today
  - Has been suggested that -osis and -itis be reserved for cases where underlying pathology has been proven
  - Epicondyalgia (pain)

Stages of development

1) Slight pain a few hours after activity
2) Pain immediately after activity
3) Pain during activity that increases after stopping
4) Constant pain that limits activity
Etiology/Pathogenesis

• Still some uncertainty
• Classically believed to be an inflammatory process hence the term epicondylitis
  — Histology studies show minimal to no inflammation present
• Findings
  — Microscopic tearing
  — Degenerative changes
  — Incomplete healing
  — Tissue necrosis
  — Neovascularization and neural ingrowth
  — Presence of disorganized and immature collagen formation with increased immature fibroblastic and vascular elements

Examination/Diagnosis

Common Findings:
— Tenderness over the lateral epicondyle and common extensor tendon
— Pain with resisted wrist extension
— Discomfort at end range of wrist flexion
— Pain with decreased grip strength
— Positive middle digit extension test
— Positive Cozen’s test
— Positive Mill’s test

Special Tests (Sn/Sp not reported)

• Middle digit extension (Maudsley’s)
  — Elbow extended and wrist in neutral
  — Palpate over lateral epicondyle
  — Manual resistance applied over distal middle digit
  — Positive if pain over lateral epicondyle
• Cozen’s
  — Stabilize patients arm in 90 degrees of flexion while palpating over lateral epicondyle
  — Patient's makes fist while placing forearm/wrist into radial deviation and pronation
  — Manual resistance to wrist extension applied
  — Positive if painful over lateral epicondyle
• Mill’s
  — Palpate lateral epicondyle while pronating forearm, flexing wrist, and performing radial deviation with elbow extended
  — Positive if pain over lateral epicondyle
Special Test Videos

- Maudsley’s
  - [https://www.youtube.com/watch?v=JPHUQfxweI0](https://www.youtube.com/watch?v=JPHUQfxweI0)
- Cozen’s
  - [https://www.youtube.com/watch?v=3Sx6d3D-YEA](https://www.youtube.com/watch?v=3Sx6d3D-YEA)
- Mill’s
  - [https://www.youtube.com/watch?v=d9pRld-1sU44](https://www.youtube.com/watch?v=d9pRld-1sU44)

Differential Diagnosis

- Radiculopathy
  - Screen C-spine ROM
  - Clinical Prediction Rule
    - <60 degrees rotation, positive cervical distraction, positive Spurling’s with SB, positive LASEM
- OA
  - Men over 50
  - Pain at endrange of ROM
  - Reduced ROM and subjective stiffness
  - Crepitus
- Radial Nerve/Radial Tunnel Syndrome
  - Pain is distal and/or lateral to epicondyle
  - Pain with resisted supination

Imaging

- Imaging generally not needed
- Radiographs
  - Typically normal findings
  - Calcifications in extensor muscle mass in up to 20% of patients
- MRI
  - Increased signal intensity
  - Tendon thickening/edema/degeneration
- Ultrasound
  - ECRB thickened with hypoechoic signal (less well defined/clear image)
- Ultrasound video:
  - [https://www.youtube.com/watch?v=Q5BvJ30DBHg](https://www.youtube.com/watch?v=Q5BvJ30DBHg)
Treatment Options

- Lots of research, mixed results
- PT is generally considered to be an effective treatment option
- Multi-modal approach most likely to result in positive outcomes
  * Systematic review suggests exercise, soft tissue mobilization, and mobilization/manipulation recommended treatment

Exercise

- Strengthening- Strong recommendation
  - Wrist extensors
    * Type of exercise
      - Evidence supports eccentrics over concentrics/isometrics
        - Head to Head RCT: faster pain reduction and 10% higher success rate ecc vs con
        - Not as clear-cut as it is with Achilles
        - Some benefit of each has been found
      - May use combination of both
      - Ideal parameters unclear
        - 2-3 sets of 10-15 repetitions 1-2 times per day
Why Eccentrics

- No definitive answers
  - Most research on Achilles tendon injuries
- Improved tendon structure/remodeling to allow proper healing hypothesized
- Studies have demonstrated:
  - Increased type I collagen synthesis rate
  - Decreased tendon thickness
  - Normalized collagen structure
  - Destruction of neovascularity
- Likely a combination of these and possibly other factors involved

Why eccentrics

[Image: Flexbar eccentric Video]

• [https://m.youtube.com/watch?v=gsKGbqA9aNo](https://m.youtube.com/watch?v=gsKGbqA9aNo)
Exercise

• Stretching
• Evidence supports combined stretching and strengthening program
  – Wrist extensors and flexors
    • Add finger flexion for EDC

Images from webmd.com and teachpe.com

Manual Therapy

• Less evidence/support than exercise
• Favorable outcomes when combined with exercise
  – Soft tissue treatments
  – Mobilization with movement
  – Mill’s manipulation
  – Scaphoid Manipulation
  – Cervical/thoracic manual therapy

Images from: Sevier and Stegink-Janes, physio-pedia.com, Blachhette and Normand

Soft tissue treatment

• Hands only (transverse friction) or instrument assisted techniques
  – Long term benefits when combined with exercise but unclear if one approach is best
  – Recent area popularity and research focus, may see more clarity with future studies
• Goal: tissue regeneration/remodeling

Images from: Schild and Trampolinic, physio-pedia.com, Blacknd and Blandnd
Astym

- 78% response rate for Astym (plus exercise) vs 41% for exercise
- Greater improvements in DASH scores and grip strength for Astym (plus exercise)

Graston

- 27 subjects
- Group 1
  - STM treatment with Graston 2x/week 5 weeks
- Group 2
  - Education that LE is self limiting
  - Ergonomics education
  - Wrist flexor/extensor stretches for HEP
- Patient Rated-Tennis Elbow Evaluation, VAS, and pain free grip
- Both groups improved significantly at 6 week and 3 month follow ups
  - Improvements favored the Graston group but sample size was too small – no significant difference between groups

Soft tissue mobilization

- Suggested to stimulate affected soft tissue to regenerate and heal and a cellular level
- Increased fibroblast recruitment and activation has been demonstrated in multiple studies of rat tendons
- Possible role in destruction of neovascularity?
- Similar explanations as provided for eccentric exercise
  - Lends support for combined treatment program
Mobilization with Movement

- Mulligan technique
  - Lateral glide at elbow while patient performs a previously identified painful task (gripping or wrist extension)
  - Several studies demonstrate short term benefit
  - Long term benefit when combined with other treatments

Images from: clinicalgate.com and researchgate.net

MWM

- Video 1: https://m.youtube.com/watch?v=aEzBL5t2h3s

- Self Treatment: Elbow/Wrist Manipulations

Elbow/Wrist Manipulations

- Immediate short term symptom relief
- Long term benefit unclear

- Mill's Manipulation
  - Forearm pronation
  - Wrist flexion
  - Ipsilateral SB
  - Elbow extension thrust

- Scaphoid Manipulation
  - Palm down and supported on table
  - Grip scaphoid between thumb and index finger
  - Wrist into extension with thrust of scaphoid ventrally

Images from: physio-pedia.com
Videos

- Mill's Manipulation
  - Video 1:
    [https://m.youtube.com/watch?v=nNIH0sYcZnw](https://m.youtube.com/watch?v=nNIH0sYcZnw)
  - Video 2:
    [https://m.youtube.com/watch?v=t8VaMFWUjM](https://m.youtube.com/watch?v=t8VaMFWUjM)

- Scaphoid Manipulation
  - [https://m.youtube.com/watch?v=edJpqY0Yr7g](https://m.youtube.com/watch?v=edJpqY0Yr7g)

CT Spine Manual Therapy

- Short term benefits demonstrated
  - Immediate improvements in grip, tenderness, and pain lasting up to 24 hours
- Long term benefits unclear
- Cervical > thoracic
- Large retrospective study found no notable improvement in outcomes when adding c-spine treatment but patients receiving c-spine treatment had fewer visits

Why manual therapy?
Ultrasound

- Mixed and inconclusive results
- Ultrasound less effective than exercise
- 2/3 US studies showed no benefit vs placebo in short term, more favorable results in mid term (13 weeks) but inconclusive
- Some studies look at US 5 days/week

Ionto

- 1 study found similar results between ionto and injection in short and long term
- 3 studies found short term benefits vs placebo but no evidence of mid or long term benefit

Wrist Splint or Counterforce Brace

- Mixed results regarding effectiveness
- 2/3 head to head studies found splint to be more effective on pain relief
  - Other showed no difference between the two
- Splint
  - decreases activity of wrist extensors
- Brace:
  - reduces force transmission across extensor tendon...second origin point
Laser

- Inconsistent results in several studies
  - Short term evidence inconclusive, mid and long term shows no benefit
  - Discrepancies with parameters
  - May be more clear with additional research
  - 4/6 studies vs placebo found no difference

E-stim

- Low level evidence showing benefit in short term versus placebo only

Multi-modal approach

- **Tier 1** – All patients
  - Exercise – eccentric and stretching

- **Tier 2** – Consider for most patients
  - Soft tissue treatment
  - Elbow mobilization with movement
  - MI/PS manipulation
  - Scaphoid manipulation

- **Tier 3** – Consider in specific situations
  - More inconsistent results and/or demonstrated short term benefits only
  - Considered based on exam findings, pain limiting ability to perform exercises, not progressing as expected
  - Manual therapy directed a CT spine
  - Ionto /US
  - Counterforce strap or wrist extension brace
  - Laser
Non PT interventions

- Steroid injections
- PRP
- Autologous whole blood
- Polidocanol
- Botox
- Shockwave therapy
- Tenex

Corticosteroid Injections

- Short term benefit
- High recurrence rate (34-74%)
- PT has been shown to be more effective in moderate and long term in multiple studies
- May be of most benefit for patients having too much pain to tolerate PT interventions
  - Should start PT shortly afterwards
  - Also consider for patients not responding to PT within ~6-8 sessions

PRP

- Platelet rich plasma
- Suggested to help stimulate tissue regeneration
- Good results reported in case series
- Mixed results on overall effectiveness
- More effective than whole blood autologous injections
- Inconclusive results overall when compared to corticosteroid injections
  - Steroid injections have more widespread availability, more insurance coverage, and cost less
  - May be worth a try if all other available conservative interventions have failed
Polidocanol injections

- Used to treat varicose veins
- Sclerosing agent has been shown to be potentially useful in Achilles and patellar tendinopathy
  - Destroy neovascularization/neural ingrowth
- Introduces an inflammatory response
- Early evidence is promising but insufficient to recommend routinely

Botox injection

- 3 of 4 studies found improvements in pain when compared to placebo
- 1 study found Botox injection was less effective at reducing pain compared to a corticosteroid injection
- Accompanying transient extensor muscle weakness not acceptable to many patients especially when considering the studies showing less effective than steroids

Shockwave Therapy

- Based on treatments used for kidney stones
- Uses intense short energy waves travelling faster than speed of sound
- Promising results with LE
- Suggested to help stimulate healing process to occur in degenerative tendons
- Costly
  - Limited insurance coverage
- Limited availability in many areas
Tenex

- Ultrasound Percutaneous Tenotomy
  - Also called FAST (fasciotomy and surgical tenotomy)
- Minimal invasive in-office procedure with local anesthesia
  - Incision ~1/8 to 1/4 inch
  - Insert microtip which uses ultrasonic energy for target microresection of damaged tendon tissue
  - Procedure takes ~15 minutes
- 2 large case series only
- Good short and long term (1-3 years) results reported

Surgical procedures

- Multiple surgical procedures have been described with 75-90% success rates reported in various studies

Outcomes

- Outcomes collection highly recommended and may be required in the future (sort of is already with Medicare G-codes)
- Upper extremity functional index
- Disabilities of the arm, shoulder, hand shortened
- Patient Rated tennis elbow evaluation
- Patient specific functional scale
# UEFI

**THE UPPER EXTREMITY FUNCTIONAL INDEX (UEFI)**

We are interested in knowing whether our test being easy or difficult, in terms of the various levels of severity of the upper extremity function index. Please read and answer the questions:

**Today, do you or would you have difficulty with any of the following?**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
<th><strong>UEFI score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dry hair with my hand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Comb my hair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Buttoning my shirt</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Putting on or taking off my clothes</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5. Opening the cap of a bottle</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6. Writing a check</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Twisting a faucet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Using a computer mouse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Changing channels on a TV or radio</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Feeding myself</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Setting the table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Opening a jar of peanut butter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Shaving my legs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Holding a baseball bat or tennis racket</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15. Holding a golf club</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Dressing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Minimum Level of Discrimination (50% Confidence):** 5 points

**QDASH**

**QHADASH**

Please circle your answer to the following activities that last month:

1. Driving the car
2. Doing housework
3. Typing
4. Cooking
5. Gardening
6. Using a computer
7. Swimming
8. Playing a musical instrument
9. Doing heavy lifting
10. Participating in sports
11. Participating in recreational activities

**Patient Rated tennis elbow evaluation**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Playing tennis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Lifting weights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Throwing a ball</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Typing on a keyboard</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**UEFI**

**QHADASH**

**QHADASH**

**Patient Rated tennis elbow evaluation**
PSFS

- Have patient list 2-3 activities that they have difficulty with because of their pain
- Have them rate each activity based on level of difficulty on scale below
- Total score= sum of scores/number of activities

<table>
<thead>
<tr>
<th>Patient-specific activity scoring scheme (Point to one number):</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>8 7 6 5 4 3 2 1 0 9 10</td>
</tr>
</tbody>
</table>

Summary

- Physical therapy effective for most patients
  - Multimodal treatment approach
    - Eccentrics and stretching
    - Soft tissue mobilization
    - Manual therapy (extremity/spine)
    - Modalities
    - Bracing
  - Injections may be a reasonable option in certain cases
    - Steroid injections first option
    - PRP/ Polidocanol worth considering if available
  - Tenex or Shockwave may be considered before surgery

Questions

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References


References

- Singh, M. 2011;75(3):443-448; discussion 448-449.