Evidence Based Evaluation & Treatment of 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 1kg (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
  - Epicondylalgia (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=JPHUQfxweiQ](https://www.youtube.com/watch?v=JPHUQfxweiQ)
- Cozen’s
  - [https://www.youtube.com/watch?v=J3sJ6d31D-YEA](https://www.youtube.com/watch?v=J3sJ6d31D-YEA)
- Mill’s
  - [https://www.youtube.com/watch?v=8p91d-1sU44](https://www.youtube.com/watch?v=8p91d-1sU44)

Differential Diagnosis

- Radiculopathy
  - Screen C-spine ROM
  - Clinical Prediction Rule
    - ≤ 60 degrees rotation, positive cervical distraction, positive Spurling’s (with SB), positive L5T9TA
- OA
  - Men over 50
  - Pain at end range 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=458V3BDBN2g](https://www.youtube.com/watch?v=458V3BDBN2g)
Treatment Options

- Lots of research, mixed results
- PT/OT 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
      - Recent studies suggest this may be most beneficial
        - Ideal parameters unclear
        - 2-3 sets of 10-15 repetitions 1-2 times per day
Flexbar eccentric Video

- https://m.youtube.com/watch?v=gsKGbqA9a

No

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 of Flexbar eccentric Video screenshot]

Fig. 5. Histological appearance of Achilles tendon before and after a long-term eccentric loading programme. (A) Typical appearance of a hypoechoic Achilles tendon prior to commencing an eccentric loading programme. (B) The appearance after a long eccentric loading programme. Loss of hypoechoic appearance and reduced tendon thickness are demonstrated. (Reproduced from Öktem L, Lannering C, Nilsson W. Sonographic testing in patients with chronic Achilles tendinosis: normalised tendon structure and decreased thickness at follow up. Br J Sports Med 2003;37:11 with permission from the BMJ Publishing Group.)
Exercise

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

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

Soft tissue treatment

• Hands only (transverse/deep friction) or instrument assisted techniques
  – Research suggesting some effectiveness for each
  – 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
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

• 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: physiopedia.com
Videos

- Mill’s Manipulation
  - Video 1: https://m.youtube.com/watch?v=nNIH0sYcZnw
  - Video 2: https://m.youtube.com/watch?v=t8VaMFWLI

- Scaphoid Manipulation
  - 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 of either. More recent studies seem to suggest minimal to no more effect than placebo
- 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

Kinesiotaping

- 4/5 studies have found some potential benefit vs placebo in the short term
- May be worth considering when combined with other treatment options
Multi-modal approach

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

- **Tier 2** – Consider for most patients
  - Soft tissue treatment
  - Elbow mobilization with movement
  - MRI 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 at the spine
  - Ionto/US
  - Kinesiotaping
  - 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

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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

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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
- Some early promising results but more recent studies showing limited effectiveness
- Suggested to help stimulate healing process to occur in degenerative tendons
- Costly
  - Limited insurance coverage
- Limited availability in many areas

Tenex

- Ultrasonic 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
Patient Rated tennis elbow evaluation

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<th>Y-Strain</th>
<th>Year</th>
<th>Inertial</th>
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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

**Patient-specific activity scoring scheme (Point to one number):**

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<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Able to perform activity at the same level as before, adjust as needed</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
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</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/taping
- 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
References

References


