



LATERAL ELBOW CASE STUDY

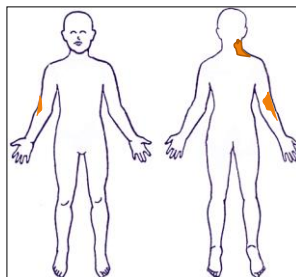
Kristin Kelley, DPT, OCS, FAAOMPT

Orthopaedic Manual Physical Therapy Series
Charlottesville 2017-2018



Orthopaedic Manual Physical Therapy Series 2017-2018

Body Chart Initial Hypothesis?



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Body Chart Initial Hypothesis?

- Lateral epicondylalgia
- RCL injury/Posterolateral Rotary Instability
- (Radial nerve) PIN Entrapment
- Radial tunnel syndrome
- C5, C6 nerve root/radiculopathy
- C5, C6 disc, dural irritation, facet
- Elbow joint dysfunction: RH, UH or prox RU
- Muscular strain: cervical and/or elbow



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Subjective Exam

- 45 y.o. female admin assistant referred to PT w/a script: "Elbow pain"
- Pt states she began having right elbow pain approximately 2 months ago after she began rock climbing.
- CCO right elbow, arm and proximal forearm pain most pronounced laterally
- R UE dominant



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Subjective Exam

- Aggs: elbow ROM (ext>flex), gripping, twisting, typing
- Eases: R UE disuse in mid ROM position, PRN Aleve
- Denies paresthesia in arm or hand and no previous elbow involvement on either side
- PMH: unremarkable
- Upon questioning, she stated she has some R Upper Trap area soreness after working all day “but everyone has that...”
- Had been rock climbing approx 2x/week but had to stop last week b/c pain was too intense.
- Pain with computer work
- DASH = 34.2 (0= no disability, 100 = max disability)



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Subjective Asterisks

- Pain with gripping, twisting, reaching
- MOI—gripping/pulling
- Alleviation of pain with rest
- No paresthesia
- “upper trap” pain
- Her job—prolonged sitting, computer and phone work



Orthopaedic Manual Physical Therapy Series 2017-2018

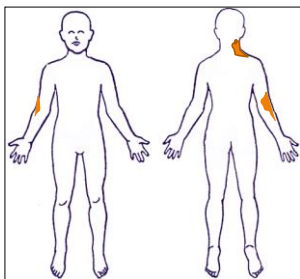
www.vompti.com

Structures at Fault?

-Joints

-Myofascial
Tissue

-Neural
Tissue



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Structure at Fault

- Joints:
 - RH, UH, prox RU, C5-T2 facet, Rib 1,2
- Myofascial Tissue:
 - C 5-T2 paraspinals and multifidus, common extensor tendon, triceps, annular ligament, RCL
- Neural Tissue:
 - Radial nerve, PIN, C6 (possibly C5 or C7), Lateral antebrachial cutaneous nerve
- Other structures?



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Primary Hypothesis After Subjective Exam

- Lateral Epicondylalgia

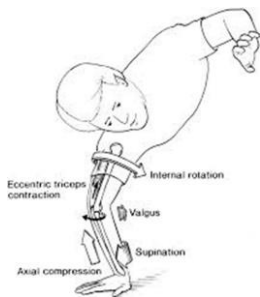


Differential Diagnosis

- Muscular Strain—forearm, UT, scalene, Levator
- RCL injury/PLRI
- PIN Entrapment
- Radial Tunnel Syndrome
- Cervical Radic
- Elbow Joint dysfunction: RH, UH or prox RU

Posterolateral Rotary Instability

- History
 - Result of RCL injury
 - MOI: combo of axial compression, valgus stress, supination forces
- Physical Exam
 - Vague lateral elbow pain, clicking, clunking worse with supination, elbow ext
 - Common to see secondary lateral tendinopathy or neural inflammation w/PLRI



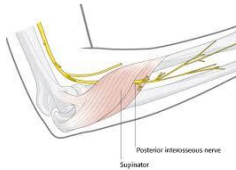
Posterolateral Rotary Instability

- Differential Diagnosis
 - RCL insufficiency
 - Lateral epicondylalgia
 - Radial tunnel syndrome
 - Cervical spine referral
- Treatment
 - Current evidence of preferred rehab n/a
 - Protection of injured structure—hinged elbow brace in pronation for 4-6 weeks w/avoidance of shoulder abd/IR to avoid varus position
 - ?surgical repair



PIN Entrapment

- History
 - Compression of Radial Nerve or PIN at Arcade of Frohse due to repetitive pronation/supination or trauma
 - Radial Tunnel = Pain
 - **PIN = Pain + Weakness**
 - Pain to proximal ext mm
- Physical Exam
 - (+) TTP distal to lateral epicondyle
 - Pain with RSC supination



PIN Innervated Mucles

It supplies all the muscles on the radial side and dorsal surface of the forearm, **except** the Anconæus, Brachioradialis, Extensor carpi radialis longus.

It DOES supply:

- ECRB - deep branch of radial nerve
- Extensor digitorum
- Extensor digiti minimi
- Extensor carpi ulnaris
- Supinator muscle - deep branch of radial nerve
- Abductor pollicis longus
- Extensor pollicis brevis
- Extensor pollicis longus
- Extensor indicis

PIN Entrapment

- Differential Diagnosis
 - Lateral Epicondylitis
 - RCL Instability
- Treatment
 - No resisted supination or wrist extension activities
 - Long-arm splint
 - Elbow 90 deg, neutral forearm
 - May require surgical decompression



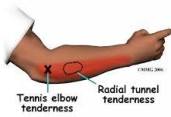
Radial Tunnel Syndrome

- History
 - Compression of Radial Nerve at radial tunnel-from just proximal to the capitellum to edge of the supinator.
 - Neck of radius = Pain (commonly nocturnal pain)
 - RTS = Pain, only weakness *due to pain* (no motor loss)
 - Common w/repetitive forceful sup/pron (power lifters, tennis players, swimmers)



Radial Tunnel Syndrome

- Physical Exam
 - (+) TTP neck of radius, prox forearm extensors
 - Pain with RSC supination w/elbow extended
- Differential Diagnosis
 - Lateral Epicondylalgia, RCL instability, cervical radic
- Treatment
 - NSAIDs
 - No resisted elbow extension, forearm pronation, and wrist flexion
 - Long-arm splint
 - Elbow 90 deg, neutral forearm



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

The Radial Nerve

- Muscles innervated
 - Triceps, extensor carpi radialis and ulnaris, supinator, extensor pollicis
- Motor functions
 - Extension at all arm, wrist, and proximal finger joints below the shoulder; forearm supination; thumb abduction in plane of palm

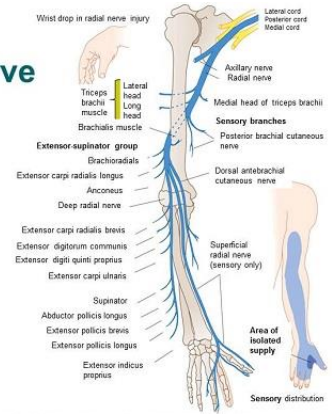
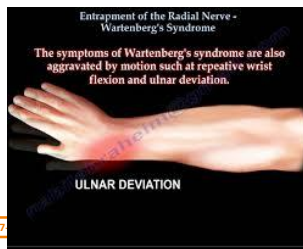
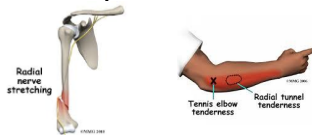


Figure 28-7 The radial nerve (C6-8; T1). In: Waxman SG. Clinical Neuroanatomy, 26th ed. <http://www.accessguytonandhall.com>. Accessed May 16, 2011.

Radial nerve entrapment sites

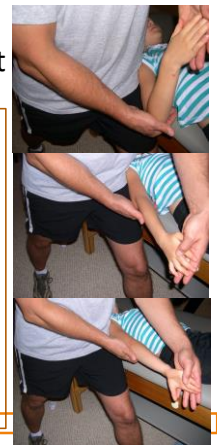
- Juncture of the middle and distal third of the arm (especially with fractures of the humerus),
- Radial tunnel
- Proximal to the wrist between the brachioradialis and ECRL (Wartenberg's Syndrome)
 - numbness, tingling, and weakness of the posterior aspect of the thumb



Orthopaedic Manual Physical Therapy Series 2017-2018

Radial Neurodynamic Test

1. Starting position-pt arm by side, elbow 90 deg, neutral wrist/finger. Perform shoulder depression with anterior hip taking up slack in nerves, NOT stretching.
2. Elbow extension
3. Internal Rotation/pronation



Orthopaedic Manual Physical Therapy Series 2017-2018

Radial Neurodynamic Test

- 4. Wrist/finger flexion
- 5. Shoulder abduction

**Structural differentiation

Distal symptoms: release small amt of scapular depression

Prox symptoms: release wrist flexion

Normal Response:

Symptoms: pulling lateral elbow into forearm, sometimes stretching into posterior wrist

ROM: anything btw 0-45° abduction



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Cervical Radiculopathy

- Disorder of Cervical Nerve Root
- Commonly caused by disc herniation or space occupying lesion
- Result in nerve root inflammation, impingement or both
- CPR for diagnosis (90% probability with all 4 criteria)
 - (+) Spurling
 - (+) Distraction
 - (+) ULTT (medial nerve bias)
 - Presence of < 60 deg cervical rotation toward involved side



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Objective Exam- Elbow

- Posture: sitting in moderate FH posture w/protracted shoulders and increased thoracic kyphosis, cradling R UE in lap
- Palpation
 - TTP lateral epicondyle and CET (reproduction of pain), radial head, R R1 and R2, R C5-T2 and adjacent mm (UT, scalenes, levator)
- R Shoulder Clearing
 - AROM, MMT WNL all planes
- Elbow AROM:
 - Limited R end ROM flexion and extension



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Objective Exam- Elbow

- Wrist AROM:
 - R limited extension due to pain
- Cervical AROM:
 - WNL except 75% flexion, 50% L rotation, 50% L SB
- ANTT:
 - (-) R radial nerve bias test
 - (-) R median nerve bias test
- Special Test:
 - 3rd finger ext test: pos
 - Varus test: neg
 - Cervical compression/distraction: negative



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Objective Exam- Elbow

- Joint mobility testing:
 - RH—limited radial gapping (compared to L) with elbow ext
 - Cervical:
 - Upglide restriction R C 5,6, (+R PPIVMs and PAIVMs for L SB and flexion)
- MMT:
 - Limited R wrist extension and R grip strength



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Elbow Joint Dysfunctions

- UH
 - Typically present with limitations ext > flex
 - May feel “locked” or “pinching” at posterior olecranon
 - Assessment/treatment with UH distraction
- Proximal RU
 - Typical supination/pronation limitations
 - Assessment/treatment with radial head mobilization



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Elbow Joint Dysfunctions

- RH
 - Compressed RH typical in FOOSH injury
 - Limited distal glide of radius upon elbow ext
 - Use distraction glide to correct
 - “Pulled Radius”—traction injury with UE pulling MOI
 - if extreme, radial head may be pulled out of annular ligament



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



Elbow Joint Assessment and Special Tests



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Elbow Lateral Stability Testing



- Varus stress test
 - Tests integrity of LCL
 - Elbow in ~ 5deg flex, supinated
 - Lateral directed force at joint line with proximal hand while distal hand applies varus counterforce
 - Distal hand palpates at prox RH joint (at LCL) to feel for excessive motion



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Elbow Medial Stability Testing



- Valgus stress test
 - Tests integrity of UCL
 - Elbow in ~ 5deg flex, supinated
 - medial directed force at joint line with proximal hand
 - Distal hand applies valgus counterforce while assessing for excessive motion



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Radiohumeral Joint Mobility Assessment

- Bilateral mobility test at radio-humeral joint
 - pt sitting, PT facing pt
- Hands of pt resting on PT proximal forearms
- Palpate RH joint line w/fingertips as PT passively flexes and extends elbows.
- Compare range and end feel
- Assesses proximal/distal radius translation



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Humeroulnar Joint Distraction

- Humero-ulnar
 - 70 deg elbow flex, slight supination
 - Fixation of humerus vs. table w/2nd PT holding distal end of humerus or strapped to table
- Distract by leaning back with contact at joint line
- Used to improve joint restricted elbow end ROM



AP distraction of humero-ulnar jt



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Radiohumeral Joint Long Axis Distraction

- Radio humeral joint: 45 deg flex, forearm neutral
- PT at side of pt facing toward table stabilizing distal humerus vs. table
- Mobilizing hand holds radius in golfer's grip
- Distract by turning trunk away, NOT pulling with your arm
- Used to improve RH joint mobility



Radial long axis traction

Elbow Joint Assessment/Mobilization

- Radial Head PA
 - Improves elbow flexion, supination
 - Pt elbow flexed to 70 deg, forearm neutral
 - PT uses thumbs in PA pressure vs radial head



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Elbow Joint Assessment/Mobilization

- Radial Head AP
 - Improves elbow extension, pronation
 - Pt elbow in relaxed position w
 - PT uses pads of thumbs in AP pressure vs radial head



Functional Movement Patterns

- FMP radial head in WB: while pt flexes/extends elbow, PT applies sustained anterior glide of the posterior aspect of radial head
- Improves PA glide of RH joint in functional WB position



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Objective Exam- Asterisks

- TTP lateral epicondyle and CET
- R wrist ext MMT weakness w/(+) pain
- C 5,6 opening restriction
- Grip Strength deficit
- Wrist/elbow ROM deficits

➤ Rate your assessment of Severity & Irritability
Justify your assessment with examples from the Subjective Exam &/or Objective Exam

○ Severity Non Min **Mod** Max

Work ability affected, unable to perform recreational activity

○ Irritability Non **Min** Mod Max

Can decrease symptoms with activity modification

➤ Stage & Stability?

○ **Acute** **Subacute** Chronic Acute on chronic

○ Stable Improving **Worsening** Fluctuating Red Flags

Identify any potential risk factors (Yellow, Red flags, non MSK involvement, biopsychosocial)

None



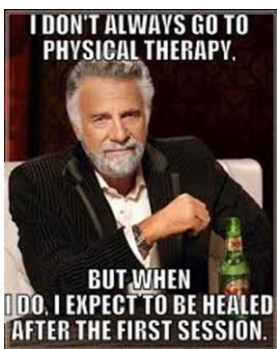
Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



Clinical Reasoning

- Are the relationships between the areas on the body chart, the interview, and physical exam consistent? **yes**
- “Do the “Features Fit” a recognizable clinical pattern?” – If “Yes” – what : **Lateral Epicondylalgia**_____
- **Identify any potential risk factors** (Yellow, Red flags, non MSK involvement, biopsychosocial) **None**



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Lateral Epicondylalgia

- Overload injury to prox ext mm of forearm
- ECRB affected
- Average 35-54 y.o.
- Typical episode 6 mo-2 yrs
- Pain with wrist ext, gripping



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Lateral Epicondylalgia

- Waugh, JOSPT, 2005
- Diagnostic Triad
 - TTP lateral epicondyle
 - RSC wrist ext/RD
 - RSC 3rd digit extension
- Consistent evidence of an absence of inflammatory components
- Somatic pain referral or altered nociceptive transmission in CNS due to:
 - Local articular or ligament structures
 - Nerve lesion
 - Cervical spine structures
- Epicondylalgia—encompasses all lateral epicondyle pain without assuming the exact underlying pathology



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Management of lateral elbow tendinopathy – one size does not fit all.

- FACTORS AFFECTING PROGNOSIS
 - Tendon pathology
 - Severity of pain and disability
 - Central sensitization
 - Concomitant neck or shoulder pain
 - Associated NM impairments
 - Work related and Psychological factors

JOSPT May 2015, Vol.45(5), pp.414-24



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Management of lateral elbow tendinopathy – one size does not fit all.

- Outcome measures
 - Patient Rated Tennis Elbow Evaluation (PRTEE)
 - Reliable, validated measure of pain and disability
 - 15 questions, 5 related to pain and 10 related to functional limitation from ADL's work, and sport
 - ranges from 0 (no pain/disability) to 100 (worst possible pain and disability)
 - scores greater than 54=severe pain and disability, scores <33=mild pain/disability
 - Minimal clinically change in total PRTEE score = dec of at least 11 points or improvement of 37% of baseline score



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Management of lateral elbow tendinopathy – one size does not fit all.

- Outcome measures
 - Pain-free grip test
 - reliable, valid, sensitive measure of physical impairment
 - dynamometer is used to measure grip force applied until pain on onset
 - elbow in relaxed ext, forearm pronation
 - Measure 3x with 1min intervals, using average of 3 reps to compare between affected and unaffected sides (alternative testing position with the elbow flexed to 90° and forearm in neutral rotation)

TABLE	DIFFERENTIAL DIAGNOSES OF LATERAL ELBOW TENDINOPATHY
Differential Diagnoses	Key Features
Local arthritis ¹⁰	<ul style="list-style-type: none"> • Redness, pain, joint stiffness • Pain and restricted motion due to impingement at the extremes of flexion and extension, or in advanced stages, throughout the arc of motion • History of trauma or of heavy use (eg, manual laborers, weight lifters, throwing athletes)
Intra-articular pathology ¹⁰	<ul style="list-style-type: none"> • Clicking or catching with elbow motion • MRI or arthroscopy may detect cartilage defects or intra-articular bodies
Radiocephalar pathology ^{10,11}	<ul style="list-style-type: none"> • Commonly seen in younger athletes following trauma or associated with medial elbow instability (eg, in throwing athletes) • Tenderness posterior to the lateral epicondyle centered over the posterior radiocephalar joint • Painful click or snap with terminal elbow extension and forearm supination; may show restriction of elbow extension • Ultrasound, MRI, or arthroscopy may demonstrate inflammation or hypertrophic synovial plica or radiocephalar chondromalacia
Radial tunnel syndrome ¹⁰	<ul style="list-style-type: none"> • Diffuse aching pain over wrist extensor muscles, possibly radiating to the dorsal aspect of the hand, or sharp, shooting pain along the dorsal forearm region. Pain often worse at night • Rarely sensory or motor changes • Pain may be increased by resisted supination, neurodynamic tests, and/or nerve palpation • Electrodiagnostic testing often inconclusive • Ultrasound may show nerve compression
Posterior interosseous nerve entrapment ¹⁰	<ul style="list-style-type: none"> • Neurological deficit: weakness of posterior interosseous nerve innervated muscles (finger and thumb extensors and abductor pollicis longus) • Electrodiagnostic testing shows abnormal radial nerve conduction in some cases • Pain (when present) is usually in distal forearm and wrist and may refer proximally
Cervical referred pain or radiculopathy	<ul style="list-style-type: none"> • Radiation of pain from cervical spine, reproduced by palpation and/or active or passive movements of the cervical spine • Local motor reflex, or sensory changes associated with the affected nerve
Postlateral rotatory instability ¹²	<ul style="list-style-type: none"> • History of acute trauma (eg, fall onto the outstretched hand) rarely an overuse injury • Painful snapping, clicking, or feeling of instability during elbow flexion/extension with forearm supinated
Non-specific arm pain ^{13,14}	<ul style="list-style-type: none"> • Diffuse forearm pain not associated with any particular structure
<small>Abbreviations: MRI, magnetic resonance imaging.</small>	

Cervical and Thoracic Pain Prevalence with Lateral Elbow Pain??



Available online at www.sciencedirect.com



Manual Therapy 13 (2008) 295–299

Original article

Prevalence of pain and dysfunction in the cervical and thoracic spine in persons with and without lateral elbow pain

K.M. Berglund¹, B.H. Persson, E. Denison*



www.elsevier.com/locate/math

Cervical and Thoracic Pain Prevalence with Lateral Elbow Pain??

- Investigated the prevalence of pain in the cervical and thoracic spine (C2–T7) in persons with and without lateral elbow pain.
- Outcome measures: Pain drawing, provocation tests of the cervical and thoracic spine, Radial Nerve ANTT and Cerv AROM
- 70% of the subjects with lateral elbow pain indicated pain in the cervical or thoracic spine, as compared to 16% in the control group

Cervical and Thoracic Pain Prevalence with Lateral Elbow Pain??

- (+)Pain with provocation tests C-spine and T-spine, (+)Pain with Radial ANTT both significantly higher in the lateral elbow pain (LEP) group
- Cervical flexion and extension range of motion was significantly lower in the LEP group
- **The cervical and thoracic spine should be included in the assessment of patients with lateral elbow pain**



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

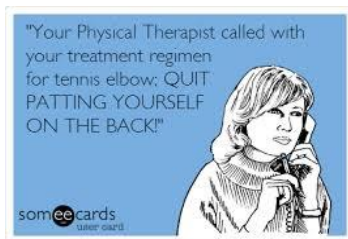
Lateral Epicondylalgia Treatment

- Herd and Meserve, JMMT 2008
- Systematic review of all articles published in 2007
- 13 studies met criteria
- Evidence supported:
 - Mulligan (MWM) technique
 - Cervical Manual Therapy



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



PICO

- **Patient/Problem Intervention Comparison Outcomes**
- **In patients with Lateral Epicondylalgia, does the addition of Mobilization with Movement help reduce pain and improve function?**
- **Assessment of Evidence**



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

The use of joint mobilization to improve clinical outcomes in hand therapy:
A systematic review of the literature

R. Hester et al. / Journal of Hand Therapy 26 (2013) 295–311

- LE mobilization evidence:
 - Moderate evidence MWM will have positive affect on strength in short term
 - Moderate evidence elbow joint mobilization will have positive affect on strength and ROM in short term
 - Moderate evidence joint mobilization has a positive affect on function in the short and long term
 - Moderate to high evidence mobilization is as good or better than injection in the long term



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Joint Manipulation in the Management of Lateral Epicondylalgia

Kochhar et al Physiotherapy 2002

- Mulligan MWM
- Demonstrated immediate, short term (6 week) and long term (3 months) efficacy when compared to US and exercise (VAS, grip, weight lift tolerance)
- Pt instructed to perform painful task while PT provides lateral directed glide.
 - Repeated 6-10 reps/visit
 - Performed as part of HEP btw PT visits



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

CPR-Effectiveness of MWM on Lateral Epicondylalgia

- Vincenzino, Manual Therapy, 2009
- Treatment and “wait and see” groups
- Pre-test probability of success= 79%
- 3 predictors of Success with MWM
 - Age <49
 - Affected UE pain free grip >25#
 - Unaffected UE pain free grip <75.5#
- 3/3: LR infinite, 100% success
- 2/3: LR 3.7, 93% success
- 1/3: LR 1.8, 87% success



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Mobilization with Movement and Exercise, Cortisone Injection, or Wait and See for Tennis Elbow; a Randomized Trial

- Bisset et al, BMJ 2006
- MWM/therex group:
 - Superior to Wait and See in short term, no difference from 26-52 weeks
 - Superior to Cortisone group 12-52 weeks
 - Sought less additional treatment than other groups (NSAIDs, other medical intervention)

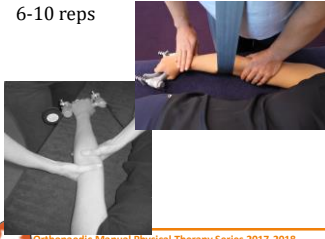


Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

MWM for Lateral Epicondylalgia

- Pt performs painful grip
- PT stabilizes humerus and performs lateral glide of forearm just distal to joint line
- 6-10 reps
- Pt tightens belt around torso and just proximal to elbow joint line
- Pt exerts lateral glide on forearm just distal to "bump" of medial epicondyle
- Performed during painful grip



Cyriax Physiotherapy Versus Phonophoresis with Supervised Exercise in Subjects with Lateral Epicondylalgia: A Randomized Clinical Trial

THE JOURNAL OF MANUAL & MANIPULATIVE THERAPY ■ VOLUME 17 ■ NUMBER 3

- Gp I: 10 min deep transverse friction at lateral epicondyle followed by Mills manipulation:
- Gr II: Phono + exercise
- 12 treatments
- Gp I significantly better pain, PFGT and function than GP II at 8 week f/u



Cyriax Physiotherapy Versus Phonophoresis with Supervised Exercise in Subjects with Lateral Epicondylalgia: A Randomized Clinical Trial

- Mills manipulation:
 - UE in 90 deg abd, IR so olecranon faces up (if can tolerate shoulder ROM)
 - Wrist in full flex/pron
 - HVLA into full elbow ext



Associated Factors for Expected Outcome

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Favorable <ul style="list-style-type: none"> – First occurrence of symptoms – Early initiation of PT – Acute/subacute presentation – DASH score reasonable | <ul style="list-style-type: none"> • Unfavorable <ul style="list-style-type: none"> – Symptoms worsening – Possible double crush – Unable to perform recreational activity and inhibition of work activity |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Other Referral?

- Orthopedics
 - Meds may improve symptoms (Pain meds vs NSAIDs?), antidepressants
 - Cortisone, PRP injection, prolotherapy?



Efficacy and Safety of Cortisone Injections and Other Injections for Management of Tendinopathy, A Systematic Review of RCT's

- Coombs et al, The Lancet 2010
- Strong evidence for cortisone injections for short term outcomes w/tendinopathy
- Worse than other treatments in intermediate and long term
- Clinical dilemma b/c tendinopathy does NOT have inflammatory pathogenesis (altered released of toxins, inhibition of collagen, granulation tissue produces problem)
- Systematic Review: strong evidence for relief of short term pain < 8 weeks, long term negative outcomes 6 months to 1 yr for lateral epicondylalgia



Cervical Manual Therapy for LE

- Cleland, et al, JMMT, 2005
- Pilot Study: Cervicothoracic and local elbow treatment vs. local elbow treatment alone
- Results:
 - Significant for experimental group for all variables (grip, DASH, GROC) at 6 weeks and 6 months post
- Cleland, JOSPT, 2004
- Less visits in experimental group (local elbow treatment and cervical mobilization) vs. control group (local elbow treatment only)
 - Control group average 9.7 visits
 - Experimental average 5.6visits



Cervical Manual Therapy for LE

- Patients with LE who have concomitant cervical articular impairments or neck pain have poorer prognoses
- Smidt et al followed 349 pts from 2 RCT's
 - At 12 month f/u, one of the strongest contributors to persistent symptoms was concomitant cervical pain

Smidt, et al: Prognosis of LE, Journal of Rheumatology 2006



Cervical Technique for LE

- JMMT 2007 technique
 - Pt supine w/involvement UE in ULTT 2b (radial nerve tension) position
 - Lateral glide C 5,6 toward contralateral side of symptoms
- JMMT 2005 technique
 - Gr III or IV PPIVM's or PAIVM's of cervical spine at level(s) of restriction
 - No preference given on affected UE position

JMMT Vol. 15(2007): 50-56, JMMT Vol. 13(2005)143-151



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Pattern Recognition

- Subjective
 - 75% in dominant arm, peak in 4th and 5th decade
 - Associated with overuse and ECRB is most affected
 - Dominant UE typically affected
 - Pain with gripping
 - Pain at cervical and/or thoracic spine
- Physical
 - TTP lateral epicondyle, CET
 - Pain w/resisted wrist ext and gripping
 - Pain w/resisted 3rd digit extension
 - Decreased grip strength (elbow ext>flex)



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Treatment Planning

- Impairments:
 - ROM: Cervical, elbow, wrist
 - Joint mobility: Cervical, elbow
 - Grip Strength
- Functional Limitations:
 - Work-typing, phone use
 - Driving
 - Reaching/gripping activity
 - Dominant UE overall function
 - Rock climbing
- Goals:
 - Pain free work, typing, driving
 - Pain free grip, reaching
 - Pain free dominant UE activity
 - Return to recreational activity



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Initial Evaluation Treatment

- Education:
 - Anatomy
 - Healing process and time/prognosis
 - Compliance with attendance and HEP
 - Meds, rest
 - **Posture**—impact on current dysfunction and correction for work/home (especially computer, driving)
 - Pt's role in being a good historian on symptoms btw visits



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Initial Evaluation Treatment

- Manual Therapy:
 - MWM lateral Radial/ulnar glide
 - Cervical sideglide
- Therex:
 - CTJ AROM
 - Scapular retraction
 - Pain free wrist and elbow therex
- Reassess Subjectively and Objectively AFTER EACH treatment component



FIGURE 5. Sensorimotor palm-slide exercise for retraining of wrist extension. With the forearm resting in pronation on a table, the wrist should be slowly extended by sliding the fingertips along the table and lifting the knuckles. Emphasis is placed on avoiding metacarpophalangeal extension and finger flexion. Return to the starting position and repeat 10 times.

- Sensorimotor retraining
 - Dissociation of wrist from finger extension

Therex Progression

- Emphasis to maintain neutral wrist (no RD/UD)
- Align MC 3 with long axis of forearm
- Begin pain free isometric of 30-60 seconds with wrist in 20-30° of wrist extension, 90° elbow flexion then progress to concentric then eccentric training
- Progress load/resistance



Is eccentric exercise an effective treatment for lateral epicondylitis? A systematic review

- Eccentric exercise, used in isolation or as an adjunctive therapy, **decreases pain and improves function** in lateral epicondylitis patients when compared with baseline
- Following treatment, all groups (7 studies cited) inclusive of eccentric exercise reported **decreased pain and improved function and/or grip strength from baseline** when compared with those excluding eccentric exercise.

Clinical Rehabilitation 2014, Vol 28(1) 3-19

J Shoulder Elbow Surg (2018) 19, 917-922



JOURNAL OF
SHOULDER AND
ELBOW
SURGERY

www.elsevier.com/locate/jse

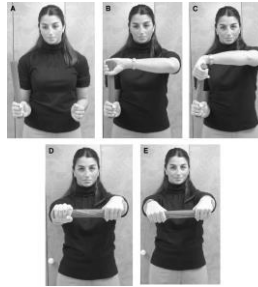
ELBOW

Addition of isolated wrist extensor eccentric exercise to standard treatment for chronic lateral epicondylitis: A prospective randomized trial

Timothy F. Tyler, MSPT, ATC^{a,b,c}, Gregory C. Thomas, DPT, CSCS^a, Stephen J. Nicholas, MD^a, Malachy P. McHugh, PhD^a

- Std treatment (wrist extensor stretching, ultrasound, cross-friction massage, heat, and ice isotonic wrist extensor strengthening) vs Tyler Twist (Std rx + eccentrics)
 - No significant differences in duration of treatment, # PT sessions or duration of symptoms
 - Tyler Twist group had signif reduction in VAS and DASH and signif improvement in wrist/middle finger ext strength and elbow tenderness

Tyler Twist Eccentric Therex for LE



- (A) Rubber bar held in involved (right) hand in maximum wrist extension.
- (B) Other end of rubber bar grasped by noninvolved(left) hand.
- (C) Rubber bar twisted by flexing the noninvolved wrist while holding the involved wrist in extension.
- (D) shoulder flex 90 deg in elbow ext while maintaining bar twist –hold w/noninvolved wrist in full flex, involved wrist in full ext.
- (E) Rubber bar slowly untwisted allowing involved wrist to slowly flex, ie, eccentric contraction of the involved wrist extensors.

Scapular Muscle Performance in Individuals With Lateral Epicondylalgia

MAY 2015 | VOLUME 45 | NUMBER 5 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

- **FINDINGS:** Pts with LE demonstrated significant weakness of the LT and SA and a significant decline in scapular muscle endurance when compared to an asymptomatic control group
- **IMPLICATIONS:** Scapular mm strength and endurance deficits should be considered in the management of patients with lateral elbow pain
- **CAUTION:** study of a small group of only 28 pts with LE; cannot imply a causal relationship between LE and scapular muscle weakness.

Scapular Muscle Performance in Individuals With Lateral Epicondylalgia

MAY 2015 | VOLUME 45 | NUMBER 5 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

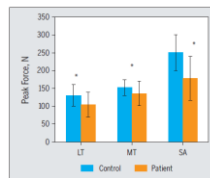


FIGURE 5. Scapular muscle strength. Values are marginal mean ± SD (adjusted for height and weight). Measures represent the involved limb of the patients with lateral epicondylalgia and a matched limb of the control group. The matched limb of the control group was based on arm dominance. LT control, 130 = 29 N; LT patient, 104 = 33 N; MT control, 152 = 22 N; MT patient, 135 = 33 N; SA control, 250 = 50 N; SA patient, 178 = 62 N.

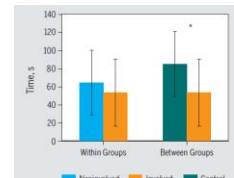


FIGURE 6. Scapular muscle endurance. Values are marginal mean ± SD. The within-group comparison is between the uninvolved and involved limbs of the patients with lateral epicondylalgia. The between-group comparison is between the involved limb of the patients with lateral epicondylalgia and a matched limb of the control group. The matched limb of the control group was based on arm dominance. The

Therex progression

- Simultaneous contraction of wrist and forearm muscles during elbow flex and ext
 - Ball dribbling
 - Body blade



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Therex progression

- Add closed chain therex
- Promotes co-contraction and mimics functional positions and joint approximation



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Functional retraining

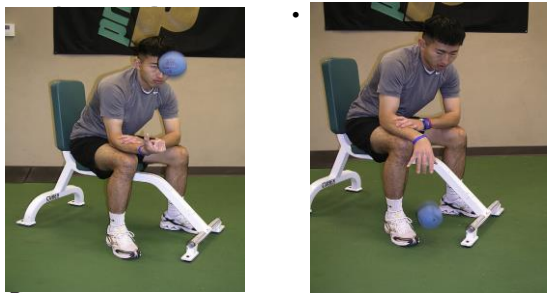
- When pt tolerates distal isotonic painfree (3-5# or medium resistance band), add Plyometrics
- Return to activity/sport
 - Allow when equal strength to contralateral UE and painfree AROM



Orthopaedic Manual Physical Therapy Series 2017-2018

www.vompti.com

Functional Retraining



Orthopaedic Manual Physical Therapy Series 2017-2018 www.vompti.com

Grip Adjustment



Figure 8. Use of the contralateral fifth digit to gauge proper grip size. The width of the fifth digit should fit between the longest finger and the thenar eminence in an optimally sized tennis racquet grip.

Orthopaedic Manual Physical Therapy Series 2017-2018 www.vompti.com

Immediate Effects of 2 Types of Braces on Pain and Grip Strength in People With Lateral Epicondylalgia: A Randomized Controlled Trial



February 2014 | volume 44 | number 2 | JOSPT

Orthopaedic Manual Physical Therapy Series 2017-2018 www.vompti.com

Immediate Effects of 2 Types of Braces on Pain and Grip Strength in People With Lateral Epicondylalgia: A Randomized Controlled Trial

- The application of a forearm brace or a forearm-elbow brace has an immediate positive effect on grip strength and pain
- There was no difference in outcomes between the braces tested
- The choice of brace should not be based on the brace type but, factors, such as patient preference, comfort, and cost.

February 2014 | volume 44 | number 2 | JOSPT

Orthopaedic Manual Physical Therapy Series 2017-2018 www.vompti.com

LET Algorithm of Management

The Journal of orthopaedic and sports physical therapy, May 2015, Vol 45(5), p 424

