Common Upper Extremity Tendinopathies

R. Colin Brabender, M.D.
April 8, 2017
Orthopaedic Update

Disclosures

• I have no disclosures relevant to this presentation

What is a tendinopathy?

• Tendinopathy refers to a disease of a tendon. The clinical presentation includes tenderness on palpation and pain, often when exercising or with movement.[1]

• Three terms have evolved in the medical terminology to refer to injuries that cause tendon pain:

  • Tendinitis - acute tendon injury accompanied by inflammation
  • Tendinosis - chronic tendon injury with degeneration at the cellular level and no inflammation
  • Tendinopathy - chronic tendon injury with no implication about etiology
Common Upper Extremity Tendinopathies

- Trigger Finger
- De Quervain’s tenosynovitis
- Lateral epicondylitis

Trigger digits

- Stenosing tenosynovitis
  - Inability to smoothly flex/extend digit
  - Ring finger>thumb>long>index>small
  - Patient describe inability to comfortably make a fist

Pathophysiology

- Double synovial sheath facilitates smooth gliding
- Proximal edge of A1 pulley acts as fulcrum for flexor tendons
- Disproportion between volume of retinacular sheath and its contents
Pathophysiology cont’d

- A1 pulley has 2 layers
  - Vascular outer layer
  - Collagenous inner layer
- In diseased A1 pulley the inner collagenous layer hypertrophies
- Similar changes are seen in the tendon on the avascular side

Diagnosis

- Women>men
- May initially present as painless click progresses over time
- Commonly perceived as snapping in PIP joint
- History
  - RA, DM, gout, carpal tunnel, dupuytrens, hypertension

Diagnosis cont’d

- On exam
  - Pain at palmar base of involved digit
  - Once tendon deformed ‘catching’ of digit evident
  - In severe cases finger may lock in palm
  - Palpate for nodular vs. diffuse type
Classification

- Quinnell Classification
  - 5 grades based on occurrence in flexion/extension
  - Did not guide treatment
- Patel and Moradia
  - Grade 0: mild crepitus, no triggering
  - Grade 1: uneven movement of the digit
  - Grade 2: clicking without locking
  - Grade 3: correctable locking of digit
  - Grade 4: Locked digit

Nonsurgical Treatment

- Observation with avoidance of inciting event my relieve mild cases
- NSAIDs should be initial form of treatment
  - Can be combined with massage, ice therapy, splinting, injections
- Splinting
  - Focus on MCP joint at 0-15 degrees flexion
  - Allow free PIP/DIP motion
  - Poor results may be due to patient compliance

Corticosteroid Injections

- All grades have been injected with success rates 42-92%
- Many agents available
  - Betamethasone sodium most commonly used
    - Water soluble
    - Does not precipitate in sheath
- 2 approaches
  - Lateral: not commonly used
  - Palmar approach
- 3cc syringe with 27 gauge needle
  - Commonly use 0.5-1ml of steroid with 0.5-1ml of local anesthetic
  - Looking to inject into tendon sheath
Surgical Treatment

• Open treatment
  – Variety of incisions
• Percutaneous treatment
  – ? Quicker recovery
  – Decreased cost

Surgical technique

• Local anesthetic with or without epi
• Tourniquet
• Longitudinal incision starting at distal palmar crease or transverse in crease
• Protect neurovascular bundles
• Divide A1 pulley
  – Ask patient to move and check for triggering
• Care not to divide A2 pulley
• In severe cases may need to cut slip of FDS or entire tendon to regain motion

Percutaneous Technique

• Hand anesthetized
• 20gauge 1 inch needle inserted 1/3rd distance between distal palmar crease and base of finger
• Bevel of needle parallel to tendon
• A1 pulley cut with gentle swiping movement
• Patient asked to move finger if trigger persists process repeated
Complications

- Injection of steroid into neurovascular bundle can cause permanent damage to digital nerve
- Surgical complications
  - Nerve transection
  - A2 pulley release with bowstringing
  - Bothersome scarring
  - Recurrent symptoms
  - Stiffness

De Quervain’s Tenosynovitis

- Stenosing tenosynovitis of first dorsal compartment
- Gradual onset of pain
  - Exacerbated by grasping, thumb abduction, ulnar deviation
- First described by Fritz de Quervain in 1895
- Finkelstein described PE maneuver in 1930
- Termed de Quervain disease in 1936

Anatomy

- 1st dorsal compartment is 2cm long
- Located over radial styloid
- APL and EPB pass thru compartment
Pathophysiology

• Caused by attritional forces secondary to friction
  – Causes swelling and thickening of extensor retinaculum

• Histopathology
  – Thickening of tendon sheaths up to 5x normal
  – Deposition of dense fibrous tissue
  – Accumulation of mucopolysaccharides indicative of myxoid degeneration

• Cause unclear, many theories exist
  – Trauma
  – Increased friction
  – Biomechanical compression
  – Anatomy variants
  – Inflammatory disease
  – Increased volume states (pregnancy)

Diagnosis

• Gradual onset of pain over radial wrist exacerbated by grasping

• Diff Dx
  – Intersection syndrome, radial styloid fracture, scaphoid fracture, CMC arthritis, radial neuritis

• Exam
  – Pain over first dorsal compartment
  – Finkelstein maneuver
  – Eichoff maneuver

Imaging

• Wrist imaging required in presence of associated process
  – Previous distal radius or scaphoid fracture
  – CMC arthritis
  – Instability of wrist

• Routine imaging is not required when presentation is clear
Treatment

• Nonsurgical
  — Patient with mild to moderate pain
    • Rest, splinting, NSAID and/or corticosteroid injection
• Corticosteroid injection most common and effective treatment of de Quervain disease
  — 1ml of corticosteroid with 1ml of local agent
  — Richie and Briner reported 83% complete resolution of symptoms with single CSI
    • Failures attributed to poor technique/anatomic variants
  — Zingas et al looked at accuracy of injection
    • 84% accuracy
    • EPB was missed in 68% of time

Technique

• Prep with betadine/alcohol
• Wrist in neutral to ulnar deviation
• Borders of 1st compartments straddled with opposite thumb/index
• 25 gauge needle introduced into tendon sheath-if resistance probably in tendon
• Should see compartment fill as you inject
• Warn of side effects 5-10%
  — Neuritis
  — Subdermal fat atrophy
  — Hypopigmentation

Nonoperative treatment

• Most common regimen
  — CSI
  — Splint
  — Tendon gliding exercises and stretching
• May offer repeat CSI at 6-8 week mark if symptoms improved but not resolved
• Surgery recommended for surgery that does not resolve after 2 CSI and/or 6months nonsurgical intervention
Surgery

- Variety of incisions proposed
  - Transverse, longitudinal, oblique
- Goals of surgery
  - Decompressing stenosed APL and EPB
    - Expect anatomic variants
    - APL normally larger and 2 or more slips
    - EPB dorsal, smaller and lies in separate compartment
  - Avoid injury to dorsal radial sensory nerve
    - Usually 1-3 branches through surgical field
- Surgical outcomes
  - >91% cure rate with surgery
  - Length of symptoms correlates with satisfaction
- Complications
  - Radial sensory nerve injury-best avoided
    - Management controversial
      - Microsurgical repair
        - Neurectomy with proximal bury in muscle
  - Incomplete release
    - Most common if to release separate compartment of EPB
  - Volar subluxation of tendons
    - Volar release of compartment can destabilize
      - Treat with reconstruction of compartment with slip of extensor retinaculum
  - Incorrect diagnosis
    - CMC arthritis
    - Intersection syndrome
    - Wartenburg's syndrome

Lateral Epicondylitis

- Affects 1-3% of adults every year
- "lawn tennis arm" coined in 1883 due to association with sport
- "There is much witchcraft and pseudoscience involved in the treatment of patients with lateral tennis elbow."
  Martin Boyer MD and Hill Hastings MD, 199
Epidemiology

- Adults in 4-5th decade of life
- Men=Women
- Symptoms mostly in dominant arm
- Onset of symptoms to overexertion of the extremity with repetitive wrist extension
- Most patients improve within 1 year
  - 80% improve
  - 4-11% experience residual symptoms but do not seek medical treatment

Sources of pain

- Multifactorial
  - Intra and extra-articular sources
  - Nerve endings in aponeurosis
  - Plica or joint synovitis

Histology

- ECRB is most common cited location of pathology
  - Histology demonstrates non-inflammatory angiofibroblastic tendinosis with neovascularization, disordered collagen scaffold and mucoid degeneration
PE and Differential Diagnosis

- Max tender distal and anterior to lateral epicondyle
- Reproduce pain with resisted wrist and finger flexion/extension
- Differential
  - Radial tunnel, cervical radiculopathy, capitellar OCD, elbow plica, posterolateral elbow instability

Imaging

- Plain radiographs can show calcifications within extensor mass
  - Associated with patients requiring surgery
- MRI
  - Evaluate intra-articular
  - Evaluate LUC
  - Extent of tearing of extensor
  - Does not always correlate with symptoms
    - 45-54% of asymptomatic patients have MRI findings
- Ultrasound
  - Only moderate sensitivity and specificity
  - Useful only in experienced hands

Treatment

- Want to enhance natural healing
  - Ordered treatment progression
    - Control of exudation and hemorrhage
    - Promotion of tissue healing
    - Encourage general fitness
    - Control force loading
  - Final step only required in minority of patients is removal of pathologic tissue
Nonsurgical

• Rest and NSAIDs
  – Reduce inflammation, relieve strain and provide time for healing
  – Topical NSAIDs mixed support in literature
• Labelle and Guibert RCT comparing NSAID to placebo
  – NSAID reported lower pain but no difference in function
• Multiple studies comparing different NSAID
  – No one has been shown to be more effective than another

Physical Therapy

• Classic regimen described by Nirschl focused on increasing forearm strength, flexibility and endurance
• Eccentric muscle training gaining traction
  – Induces hypertrophy of musculotendinous unit
  – Good results in Achilles tendinopathy
  – No good studies for lateral epicondylitis yet

Injections

• Most common injections are corticosteroids
  – Literature very mixed
  – Multiple studies demonstrate questionable improved early pain control but no long-term benefit versus placebo or no injection regimens
• Platelet rich plasma
  – Mixed literature if helpful or not
  – Expensive to patient
• Prolo therapy
  – Mixed literature
  – Study from Scarpone and Snell demonstrated improvement in symptoms and clinical outcomes
  – Inexpensive
• Botox injections
  – Partial paralysis of extensors allows for healing
  – Studies demonstrate decreased pain scores initially but no difference at 3 months
Orthoses

- Cock-up wrist splints
  - Mixed literature
  - Some report improved pain relief/allows healing
  - Others report delay in healing
- Counterforce brace
  - No definitive studies
  - EMG analysis does demonstrate decreased muscle activity with brace

Surgical options

- ECRB origin debridement w/wo reattachment
  - Open Debridement
  - Arthroscopic Debridement
  - Lateral release
- Ultrasonic percutaneous tenotomy
- Denervation
- Revision Cases
  - Anconeus transfer

Operative Intervention

- Open surgery
  - 3cm incision just distal to lateral epicondyle
  - Split common extensor exposing ECRB
  - Degenerative tissue of ECRB debrided and underlying epicondyle is decorticated
- Multiple modifications described
- Anconeus flap can be used in revision situations
Post Op regimen

- Splint or sling for 10 days
- Range of motion exercises
- Strengthening started after 6 weeks

Arthroscopic Debridement

- Advantage of being able to address other intra-articular pathology
- Debride extensor and lateral capsular infolding
- Distal extent of debridement remains parallel to superior half of radial head to protect LUCL

Complications

- Open Treatment
  - Elbow instability
  - Neuroma of posterior cutaneous nerve of forearm

- Arthroscopic
  - Nerve injury
    - Well documented with elbow scopes
  - Heterotopic ossification
  - Elbow instability
Tennis Elbow

THE SURGICAL TREATMENT OF LATERAL EPICONDYLITIS

BY ROBERT P. NICHOL, M.D., AND FRANK A. PETTIERI, M.D., ARLINGTON, VIRGINIA

From the Department of Orthopedic Surgery, Georgetown University, Washington, D.C., and Arlington Hospital, Arlington

• 88 underwent operative treatment
• Identified immature fibroblastic and vascular infiltration at ECRB origin with excision of the ECRB origin

Results
• Improvement rate – 97%
• 85% returned to full activity
• Complete pain relief – 2.6 months
• Full strength – 4.2 months
• Grading
  • Excellent – 66 (75%)
  • Good – 9
  • Fair – 11
  • Failed – 2

57 patients underwent lateral release of ECRB origin and followed for a mean of 59 months
• Still largest prospective study to date

Lateral Extensor Release for Tennis Elbow

A PROSPECTIVE LONG TERM FOLLOW-UP STUDY

BY JAN VERESS, M.D.; MARK WAGENMANN, M.D.; ARNOLD V. RUTS, M.D.; HENK VAN MANEFEN, M.D.; AND TON VAN DER LIENEN, M.D.; MAASTRICHT, THE NETHERLANDS

Investigation performed at University Hospital Maastricht, Maastricht

• Still largest prospective study to date
Lateral Extensor Release for Tennis Elbow

A PROSPECTIVE LONG-TERM FOLLOW-UP STUDY

BY JAN VERBAAR, M.D.; GABRIJL WAGEMANS, M.D.; ARNOLD DEERROR, PH.D.; HEIN VAN MANEN, M.D.;
AND TIM VAN DER LUNEN, M.D., MAASTRICHT, THE NETHERLANDS

Investigation performed at University Hospital Maastricht, Maastricht

- 76% had no pain or slight pain at 1 year
- 91% had no pain or slight pain at 5 years
- At 1 year, only 32% had an excellent result, 66% were satisfied, 1/3 returned to work

Results continued

- 3 arthroscopic series
  - 90-100% patients were “better” a 2 years
  - 62-80% experienced complete resolution of symptoms
  - Average return to work 11 days
- Szabo et al compared open vs scope
  - No statistical difference in outcomes between groups found
- Pearl et al
  - Similar results no difference in outcomes

Arthroscopic debridement of the extensor carpi radialis brevis for recalcitrant lateral epicondylitis

Christian Lattermann, MD, Anthony A. Romeo, MD, Ammar Anbari, MD, Alexander K. Nettinger, MD, L. Pearce McCarty, MD, Brian J. Cole, MD, Mark S. Cohen, MD

underwent arthroscopic release of ECRB

- Avg. F/u of 3.5 years

Results

- 3.8 weeks to return to regular activities
- 7 weeks to return to full work
- No serious complications
Arthroscopic debridement of the extensor carpi radialis brevis for recalcitrant lateral epicondylitis

Christian Lattermann, MD1, Anthony A. Romeo, MD2, Ammar Anbarli, MD3, Alexander K. Metzinger, MD1, L. Pearce McCartney, MD2, Brian J. Cole, MD3, Mark S. Cohen, MD7

• Results cont’d...
  • VAS pain improved from 8.1 to 1.5
  • 31% reported mild pain with strenuous activity
  • 6% had no benefit from procedure
  • 28% with synovitis, 1 pt. with loose body, no chondral damage


FAST Procedure

• Make stab incision over lateral epicondyle
• Use ultrasound to identify diseased tissue
• Using ultrasonic energy
  – Diseased tissue broken down and removed via probe

Results

• Seng et al. AJSM 2015
  – 20 patients complete resolution of symptoms at 3 years final follow-up
• Moore et al
  – Direct compare open surgery to FAST
  • Pain relief 77% to 91%
  • Time off from work 8.5 weeks to 1.1 weeks
Conclusion

• Most upper extremity tendinopathies are chronic degenerative conditions
• Best practice to start with conservative treatment
• For those patients who fail to improve surgery typically improves symptoms with good short and long term results

Questions?

• I can be reached for any questions/comments at Robert.Brabender@ahn.org