Diagnosis and Management of Elbow Injuries

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ABC’s of MSK Care
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Outline

- Review basic anatomy
- Review common problems
  - Diagnosis
  - Management

Elbow Anatomy

Ginglymus Bones:
- Humerus, ulna and radius
- Trochlea, coronoid, olecranon, capitellum, radial head

3 articulations:
- 1) the radiocapitellar joint, 2) the ulnohumeral joint and 3) the proximal radioulnar joint

Elbow – Static Stabilizers

Bony = Ligament stability
- Below 20° and greater than 120° of flexion → osseous stability
- Between 20° and 120°, ligaments and capsule are the primary restraints
- Medial – Ulnar collateral ligament complex
Elbow – Static Stabilizers
- Radial collateral ligament (RCL)
- Lateral ulnar collateral ligament (LUCL)
- Accessory lateral collateral ligament (ALCL)
- Annular ligament (AL)

Elbow – Dynamic Stabilizers
- Lateral
  - Extensors (wrist and digits)
  - Supinator
- Medial
  - Flexors (wrist and digits)
  - Pronator teres

History: Demographics
- Age
- Occupation
- Recreation / Sports
- Hand Dominance

History is Key
- Pain
- Instability
- Dysfunction
- Stiffness
- Numbness,
  - Mechanical symptoms: catching, locking
**Traumatic vs Atraumatic**

- FOOSH = fall on the outstretched hand
- Throwing?
- Repetitive motion

**LOOK**

“SEADS”

- Swelling
- Erythema
- Atrophy
- Deformity
- Surgical Scars

**FEEL**

- Surface Anatomy
  - Lateral and medial epicondyles
  - Olecranon
  - Ulnar Nerve
- Crepitus / Motion
- Swelling

**MOVE**

- Average flexion 0° to 145° +/- 10°
- Pronation ~ 80° and supination 85°
Generalized Laxity

Special Tests
- Pain
- Instability
- Dysfunction
- Numbness

Provocative Tests
- Stress Tests
- Functional Tests
- Neurological tests
- Radicular signs

Cervical Spine
- Referred or radicular pain
  - C4
  - C5
  - C6
  - C7

Cervical Spine - Differentiation
- Location of Referral
  - Neck pain
  - Scapular pain
  - Pain distal to elbow
  - Paresthesia
- Aggravating factors
  - Ask about the neck
  - Spurling’s Test
Ulnar nerve – Funny Bone
- Elbow Flexion test
- Tinel sign
- Ulnar nerve subluxation

Atraumatic Elbow Pain
- Lateral = Lateral epicondylitis
- Medial = Medial epicondylitis
- Lateral > Medial (5-8 : 1)

Lateral “epicondylitis”
- Males > Females
- More common in dominant arm = 2:1
- Incidence = 9.1%
- Prevalence = 40 – 50%
- ECRB

3 Basic P/E findings for tendinopathy
1. Tenderness on direct palpation
2. Reproduction of pain with resisted contraction (eccentric loading)
3. Reproduction of pain with passive stretch
Elbow Tendinopathies

Lateral epicondylosis
- Tender lateral epicondyle
- Resisted third digit extension
- Resisted wrist extension
Medial epicondylosis
- Resisted wrist flexion
Distal biceps
- Resisted supination

Conservative treatment

- Passive stretches (Wrist flexion, extension; keep elbow extended; hold 30 seconds)
- Gradual light resisted weight program (start 1-2 lbs, up to 5-10 lbs)
- Supination, pronation exercises
- Ice, NSAIDs

Ng & Chan, J Orthop Sports Phys Ther, 2004

Conservative treatment

Elbow Counterforce brace
- No clear evidence
- Affects wrist joint proprioception and increases the pain threshold to passive stretching of the wrist extensors

Ng & Chan, J Orthop Sports Phys Ther, 2004

Tendinosis

- Hyaline degeneration
- Mucoid degeneration
- Fibrillation of collagen
- Absence of inflammatory cells

Figure 1: Courtesy of S. F. Borel, MD

Ng & Chan, J Orthop Sports Phys Ther, 2004
Treatment of Tendinosis

- Education
- Modify Activities
- Alter Biomechanics / Decrease tendon load
- Eccentric exercise programs stimulate collagen synthesis and cross-linkage
- Icing helps
- No evidence that NSAIDs improve healing


Tendon Healing

- Requires around 100 days to synthesize collagen
- Mild – 2 to 4 weeks
- Moderate – 4 to 6 weeks
- Severe – 6 to 12 weeks

To inject or not inject

- Injections can be a useful adjunct
- Injections can be performed safely in the office

Conservative vs Injection?

- RCT, n= 198
  - 8 sessions of PT
  - Steroid injection
  - Wait and See
- At 6 weeks, injection benefits regressed; PT better than both groups
- At 52 weeks, no difference among groups

Bisset et al; BMJ, 2006
**Epicondylitis Injections**

Lateral and Medial
- Use 25 (or 22) gauge needle
- 2 mL local anesthetic
- 1 mL steroid solution
- Insert needle toward point of maximal tenderness (tendon insertion into epicondyle)
- May fan injection around tendon insertion
- Do not inject if resistance

**Results of “Epicondylosis” interventions**
- Limited evidence to support:
  - Autologous blood injection
  - Phonophoresis
  - Accupuncture
  - Dynamic extension brace
  - Extra-corporeal shockwave therapy
  - Botulinum Toxin A
  - Arthroscopic debridement

**Little League Elbow or Thrower's Elbow**
- Medial epicondyle apophysitis or avulsion (or UCL ligament sprain)
- Radial head hypertrophy
- Avascular changes in the capitellum (osteochondritis dissecans)

**Growth Plates**
- Capitellum (age 1-2)
- Radial head (age 3)
- Internal (medial) epicondyle (age 5)
- Trochlea (age 7)
- Olecranon (age 9)
- External (lateral) epicondyle (age 10 in girls and 11 in boys)

(mnemonic “CRITOE”)

Medial Apophysitis

MRI

Conservative Treatment
- Rest from valgus loading activity
- NO THROWING
- Batting and first base often OK
- NSAIDs, Ice
- May take 6 to 12 weeks
- Gradual return to throwing

If Medial Apophysitis is avulsed,
- Non-operative treatment typically involves
casting for 2 to 3 weeks at 90° followed by
protected motion with a hinge brace for at
least 6 weeks.
- 31 out of 35 healed with fibrous non-union
with good function and range of motion

Josefsson PO, Nilsson BE. Incidence of elbow
Medial Apophyseal Avulsion

Current recommendations for surgical treatment include:
1) Fragment displacement greater than 2 mm
2) Valgus instability greater than 3 mm
3) Entrapment of the fragment in the joint
4) Ulnar nerve dysfunction.


Osteochondritis Dissecans

- Typically present with symptoms between 11-16 y.o.
- Gradual pain with activity
- Locking, catching and swelling if fragment unstable
- Etiology unclear
- Often repetitive stress (throwers, gymnast etc)
- MRI can assess stability
- May need surgical stabilization or removal

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Baseball

Consider limiting pitchers under 14 years old
1. 75 pitches a game
2. 600 pitches per season
3. 15 batters/game, 120 batters/season
4. One league at a time
Avoid curveball and slider pitches under 14


Suggestions adopted by USA baseball

Ulnar Collateral Ligament

- Between 20° and 120°, ligaments and capsule are the primary restraints
- MRI

Ulnar Collateral Ligament

Between 20° and 120°, ligaments and capsule are the primary restraints
MRI
Valgus stress test
- The patient’s wrist and hand are fixed and a valgus stress is applied with the patient’s elbow at 30 degrees.

Milking Maneuver
- Arm at 70°
- Apply valgus force applied by supporting the elbow and tractioning the thumb
- Similar to milking a cow.

Conservative Treatment
- RICE, Elbow Hinge brace
- Conservative treatment better in younger athletes than in adults
- In throwing athletes with UCL injury (n=31, average age 18), 42% were able to return to their previous level of play at an average of 24.5 weeks (13-54 weeks) of conservative management

Ulnar Collateral Ligament Sprain
- Tommy John Surgery
  - UCL reconstruction using autologous grafts of the palmaris longus or gracilis
**Ulnar nerve – Funny Bone**

- Numbness and tingling over 4th and 5th fingers
- Weak finger adduction, abduction
- Traction
- Compression
- Friction

**Elbow flexion test (Traction)**
- Tinel sign (Compression)
- Ulnar nerve subluxation (Friction)

**Treatment for ulnar neuropathy usually conservative**
- Surgery: transposition of ulnar nerve

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**Future of Sports**

**Elbow dislocation vs fracture?**

- Aged (5 to 10 y.o.) supracondylar fracture
- Adolescent (13-14 y.o.) posterior dislocation
- Adults
  - Dislocation
  - Coronoid fracture
Elbow dislocation

- Dislocate following axial load and:
  1. Hyperextension
  2. Valgus
  3. Valgus/external rotation

- Respectively these can lead to:
  1. Posterior dislocation
  2. Disruption of the anterior UCL
  3. Posterolateral instability

Immobilize Acutely

- Posterior Splint
  - Apply with elbow at 90°
  - Hand supinated

- Cast
  - Can be converted to cast when swelling stops progressing

- Hinge Brace
  - Can use a hinge brace if range of motion needed

Tips for Elbow Fracture

Management

- If intra-articular fracture has 2 mm displacement, refer early for surgery
- Start Physical Therapy early
- Don’t sling older patients more than 2-3 weeks

Radial Head Fractures

- Suspect fracture if good history and effusion, even if x-rays non-diagnostic
- Sail sign
- Do not all need casting
- Intraarticular fracture with >2 mm step off
- Surgery if significant angulation
Complications

- Arthrofibrosis
- Myositis Ossificans
- Osteoarthritis

Take home messages

Think about:
- Mechanism of Injury
  - Traumatic vs Atraumatic
- Age of patient
  - Different problems
  - Older move early!
- Refer fractures early especially if intra-articular fracture (> 2 mm)
- Functional demands
- Patient expectations

Thoracic Spine

Thoracic Outlet Syndrome

- Repetitive upper extremity use
  - shoulder, elbow, hand
  - assembly line
  - computer with mouse and phone
- Poor posture
- Reaching
- Stress
Moving Valgus Stress Test

- Shoulder abducted to 90°
- Apply valgus force to the elbow until the shoulder is fully externally rotated
- While maintaining the valgus torque, quickly extend the elbow to approximately 30°
- Positive test: reproduces pain at the UCL, typically occurring maximally between 120° and 70° of flexion