

# Elbow Tendinopathies and Tendon Ruptures

Joseph P. Cullen M.D.  
Hand and Upper Extremity Center of  
Northeast Wisconsin

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## Elbow Tendinopathies

- Epicondylitis
  - Lateral (Tennis Elbow)
  - Medial (Golfer’s Elbow)
- Biceps Tendinitis or Rupture
- Triceps Tendinitis or Rupture (rare)

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## Elbow Tendinopathies

- Anatomy
- Diagnosis
- Epidemiology
- Causation
- Treatment

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## Epicondylitis

- Lateral (Tennis Elbow)
- Medial (Golfer’s Elbow)
- Not a “tendinitis” – the ending “itis” implies inflammation but there are no inflammatory cells seen in lateral and medial epicondylitis
- Tendinosis where the tissue shows signs of degeneration, micro-tears, and an incomplete repair response – angiofibroblastic hyperplasia

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## Epicondylitis - Etiology

- Direct trauma
- Isolated Event: Eccentric Contraction – lengthening a muscle while it is contracting
- Insidious Onset: Overuse Syndrome
  - Repetition: wrist flexion/extension as well as forearm rotation
  - Force: Lift, Grip, Twist

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## Epicondylitis - Etiology

- Center for Disease Control (CDC): Causation
  - Force (grip, wrist flex/extend, forearm pronation/supination, finger motion)
  - Repetition
  - Posture
 Combination of factors increases risk  
 Highest incidence in occupations requiring high force repetitive use with dynamic posture (especially elbow extended)

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## Epicondylitis - Etiology

- Examples:
  - Mechanics
  - Carpenter
  - Roofer
  - Plumber
  - Machinist
  - Butcher
  - Factory Worker

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## Epicondylitis - Etiology

- Non-occupational Factors:
  - Obesity
  - Smoking
  - Deconditioning
- “Enthesopathies of middle age”:
  - “Right of passage through middle age”

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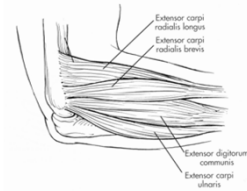
## Lateral Epicondylitis

- Affects 1-3% of the population/year
- Classically seen in the 4<sup>th</sup> and 5<sup>th</sup> decades
- More common in dominant extremity
- Male: Female ratio is equal 1:1
- Only a small number (4-11%) require surgical treatment
- 80% are asymptomatic at one year without treatment

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## Lateral Epicondylitis: Anatomy

- Micro-tearing of the common extensor origin with incomplete healing
- Primarily the Extensor Carpi Radialis Brevis (ECRB) tendon origin
- Extensor Digitorum Communis (EDC) is also involved one third of the time



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## Lateral Epicondylitis: Anatomy

- Tendinopathy not a tendinitis
  - No inflammatory cells
  - Micro-tearing with subsequent repair process
  - Angiofibroblastic tendinosis (Nirschl)
    - Immature fibroblasts
    - Nonfunctional vascular buds

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## Lateral Epicondylitis: History

- Lateral arm pain beginning at the epicondyle and radiating into the forearm
- Difficulty lifting or gripping especially with the palm down
- Pain with elbow extension especially after periods of rest (morning)



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### Lateral Epicondylitis: Exam

- Tenderness beginning at the lateral epicondyle and just distal and anterior to the epicondyle
- Pain with resisted wrist extension
  - Usually worse with elbow extension
- Decreased grip strength



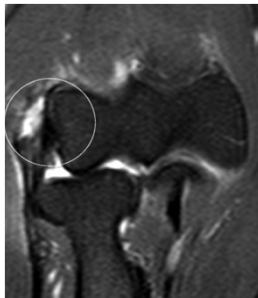
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### Lateral Epicondylitis: Imaging

- X-rays of the elbow are usually normal – Rule out other conditions
  - 16% show reactive bone around lateral epicondyle
- MRI is the “gold standard” imaging study
  - Edema (23/23)
  - Thickening (19/23)
  - Tearing (13/23)

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### Lateral Epicondylitis: MRI



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### Lateral Epicondylitis: Differential Diagnosis

- Intra-articular Joint Pathology
  - Arthritis
  - Fracture
  - OCD
  - plica
- Radial Tunnel Syndrome
- Ligamentous Instability
- Snapping lateral triceps over epicondyle

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### Lateral Epicondylitis: Treatment Non-operative: Mainstream

- Observation
- Activity Modification
- Non-steroidal anti-inflammatory drugs (NSAID)
- Counterforce Brace
- Wrist Brace
- Injections
- Therapy



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### Lateral Epicondylitis: Treatment Non-operative: Mainstream

- Steroid Injection:
  - Controversial
  - Appears to provide early pain relief in most patients yet does not alter the natural course of the condition
  - It needs to be combined with a stretching and strengthening program to provide long term benefit

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### Lateral Epicondylitis: Treatment Non-operative: Mainstream

- Therapy: The Mainstay of Successful Non-operative Treatment
  - Stretching
  - Strengthening (isometric, concentric, eccentric)
    - Build strength and endurance
  - Deep pressure massage
  - Modalities (Ultrasound, Iontophoresis, Electrical stimulation)
  - Work hardening

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### Lateral Epicondylitis: Treatment Less Common

- Autologous Blood Injection
- Platelet Rich Plasma (PRP)
- Extracorporeal Shock Wave Therapy (ESWT)
- Radiofrequency Microtenotomy (RF)
- Botox
- Denervation

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### Lateral Epicondylitis: Treatment Operative

- Only considered after a failure of prolonged non-operative treatment (6-12 months)
- Tenotomy of the common extensor origin
  - Open, Arthroscopic, Percutaneous
- Debridement of the pathologic tissue of the common extensor origin (ECRB +/- EDC)
  - Open or Arthroscopic
- No statistical difference in results for any of these procedures – Approximately 85% (69-100%) good and excellent results

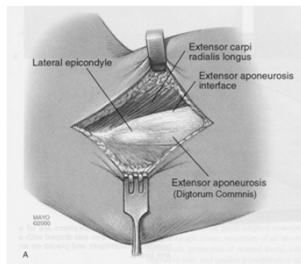
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### Lateral Epicondylitis: Treatment Operative

- Open Debridement of Pathologic Common Extensor Origin (ECRB): Nirschl Procedure
- Nirschl and Pettrone: 97.7% improved and 85.2% complete relief of all symptoms
- Later studies: 83-94% pain relief

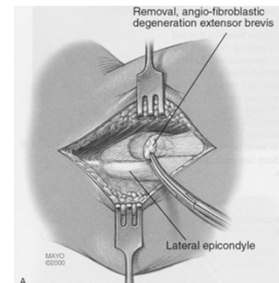
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### Lateral Epicondylitis: Operative Open Debridement



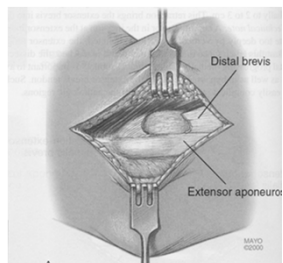
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### Lateral Epicondylitis: Operative Open Debridement



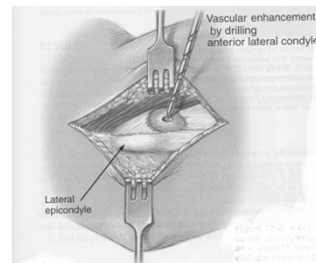
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### Lateral Epicondylitis: Operative Open Debridement



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### Lateral Epicondylitis: Operative Open Debridement



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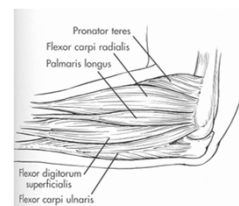
### Lateral Epicondylitis: Treatment Operative

- Post op protocol – variable
  - Immobilization for 3-14 days
  - Strengthening at 4-8 weeks
  - Return to full activity at 3-6 months
- Return to work
  - 7-14 days (after first post-operative visit) one hand duty only
  - Light use of the operative hand at 6-8 weeks depending on their occupation and symptoms
  - Full use 3-6 months

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### Medial Epicondylitis

- Similar to Lateral Epicondylitis but involves the medial aspect of the elbow
- Less common 4-7:1
- Medial elbow pain at and just distal/anterior to the medial epicondyle
- Pain with grip or wrist flexion (Flexor Carpi Radialis)
- Pain with pronation (Pronator Teres)



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### Medial Epicondylitis

- 23-50% have ulnar nerve symptoms
  - Ulnar nerve runs just behind the medial epicondyle
  - Numbness and tingling in the ring and small digits
  - Possible weakness in the intrinsic muscles
- Flexor/Pronator origin: Micro-tears of the Flexor Carpi Radialis (FCR) and/or Pronator Teres (PT) origin
- Similar Histology to Lateral Epicondylitis

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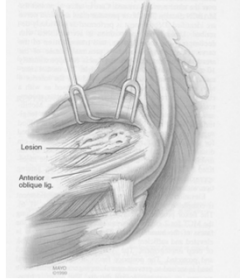
### Medial Epicondylitis: Treatment Non-operative

- Observation
- Activity Modification
- Non-steroidal anti-inflammatory drugs (NSAID)
- Counterforce Brace
- Wrist Brace – Does not prevent rotation
- Injections
- Therapy

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### Medial Epicondylitis: Treatment Operative

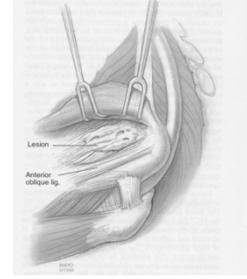
- Release or lengthening of the flexor/pronator origin with or without debridement of pathologic tissue.



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### Medial Epicondylitis: Treatment Operative

- 23-50% have ulnar nerve symptoms along with their medial epicondylitis
- May require treatment of ulnar nerve at the same time (decompression or transposition)



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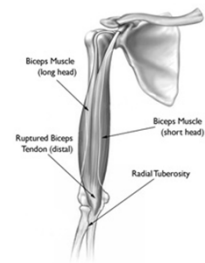
### Medial Epicondylitis: Treatment Operative

- Similar post-operative protocol
- Frequently a more prolonged recovery following surgery when compared to lateral epicondylitis
- Approximately 70% complete pain relief
- Results are worse in patients with ulnar nerve symptoms along with their medial epicondylitis

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### Biceps Tendinitis and Ruptures

- Spectrum of injury
  - Tendinitis
  - Partial distal biceps rupture
  - Complete distal biceps rupture
- All present with:
  - Anterior elbow pain
  - Weakness of elbow flexion and supination
- Do not want to miss a complete tear



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### Biceps Tendinitis and Ruptures Causation

- Direct trauma
- Isolated Event: Eccentric Contraction – lengthening a muscle while it is contracting
- Insidious Onset: Overuse Syndrome
  - Repetition: Elbow flexion forearm supination
  - Force: Lifting and twisting (supination) against resistance

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### Biceps Tendinitis and Ruptures

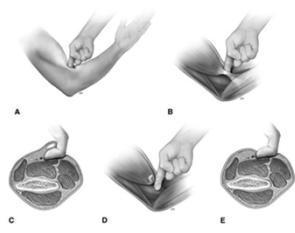
- Signs of a complete or partial rupture
  - Pain following an eccentric load
  - Feeling a “pop”
  - Ecchymosis
  - Visible retraction of the biceps
  - Weakness
  - Pain with active supination or passive pronation



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### Biceps Tendinitis and Ruptures: Rupture Diagnosis


- No palpable biceps tendon
- Hook Test
  - Elbow at 90 degrees
  - Index finger feels biceps at lateral edge
  - 100% sensitive and specific



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### Biceps Tendinitis and Ruptures: Rupture Diagnosis

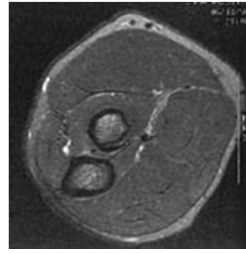
- MRI:
  - 92% sensitive and 85% specific at diagnosing a Biceps tendon rupture



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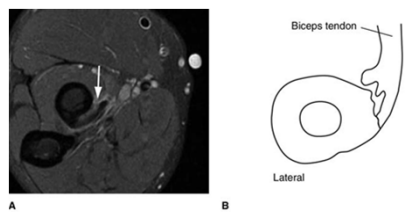
### Biceps Tendinitis and Ruptures: Rupture Diagnosis

- MRI of the normal insertion of the distal biceps into the radial tuberosity



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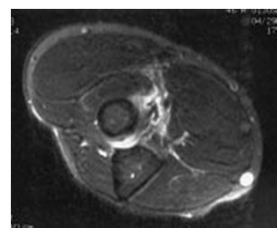
### Biceps Tendinitis and Ruptures: MRI and diagram of partial biceps rupture



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### Biceps Tendinitis and Ruptures: Rupture Diagnosis

- MRI: near complete rupture of the biceps tendon – no normal appearing tendon at radial tuberosity



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### Biceps Tendinitis and Ruptures: Treatment

- Tendinitis:
  - Activity modification
  - NSAIDs
  - Therapy
- Partial Tendon Rupture:
  - Conservative management until 6 months then consider repair
- Complete Tendon Rupture:

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### Biceps Tendinitis and Ruptures: Treatment

- Complete biceps tendon rupture: Treatment
- Non-operative:
  - Low demand individual
  - 74% supination strength, 88% flexion strength
- Operative Repair:
  - Improved techniques with faster recovery
  - Not without risk
  - Significantly improved supination +/- flexion

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### Biceps Tendinitis and Ruptures: Treatment

#### Operative Repair:

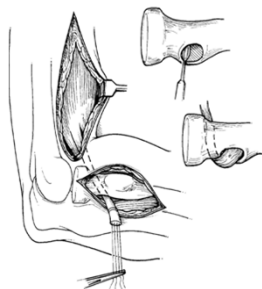
- Single Incision:
  - Higher rate of nerve injury (LACN)
- Two Incision:
  - Higher rate of heterotopic bone/ synostosis

AJSM 2008 – Chavan et al.

- 94% success with 1 incision vs. 69% with 2 incision technique
- 2 incision: Loss supination and unsatisfactory results
- 1 incision: 13% incidence of nerve injury (LACN)

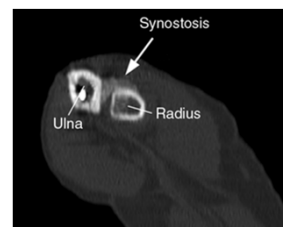
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### Biceps Tendon Repair Two Incision Technique



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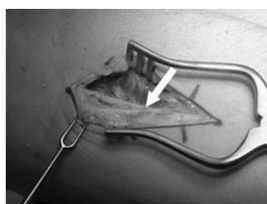
### Biceps Tendon Repair Two Incision Technique



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### Biceps Tendon Repair One Incision Technique

- Higher risk of nerve injury
- Most commonly the lateral antebrachial cutaneous nerve seen on the right which must be identified and retracted



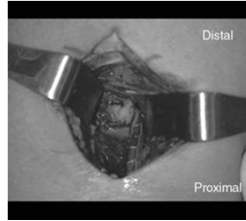
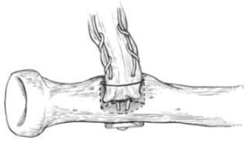
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### Biceps Tendon Repair One Incision Technique



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### Biceps Tendon Repair One Incision Technique



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### Biceps Tendon Repair One Incision Technique



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### Biceps Tendon Repair

- Post Operative Protocol: highly variable depending on technique and surgeon
- Endobutton is the strongest repair
  - May initiate active and active assist motion within 2 weeks of surgery (endobutton)
  - Splinting variable 0-6 weeks
  - Strengthening at 6-12 weeks
  - Return to normal activity 3-6 months

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### Triceps Tendinitis and Rupture

- Rare in comparison to epicondylitis and biceps tendonitis
- Tendinitis more likely than tendon rupture
- Rupture more common in anabolic steroid use or patients with renal failure

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### Triceps Tendinitis and Rupture Causation

- Direct trauma
- Isolated Event: Eccentric Contraction – lengthening a muscle while it is contracting
- Insidious Onset: Overuse Syndrome
  - Repetition: Elbow extension
  - Force: Lifting overhead and pushing against resistance

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### Triceps Tendinitis and Rupture

- History:
  - Pain posterior elbow near triceps insertion
  - “Pop” with triceps tendon rupture
- Exam:
  - Swelling and ecchymosis
  - Tenderness at triceps insertion
  - Palpable defect at triceps insertion
  - Pain and weakness with elbow extension

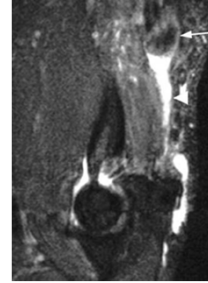
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## Triceps Tendinitis and Rupture

- Imaging: Tendon Rupture
  - X-ray may show olecranon fracture
  - MRI will show triceps rupture which may be partial or complete

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## Triceps Tendon Rupture



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## Triceps Tendinitis and Rupture

- Tendinitis:
  - Activity modification
  - NSAIDs
  - Therapy

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## Triceps Tendon Rupture

- Partial Tears:
- Nonsurgical Management: Indicated for those with normal or near normal strength
  - Splint in 30 degrees of flexion for 4 weeks
  - Gentle strengthening at 4-6 weeks depending on symptoms
  - Return to full activity between 6-12 weeks
  - Normal strength yet may have loss of endurance

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## Triceps Tendon Rupture

- Partial tears with weakness or complete ruptures need to be treated surgically



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## Triceps Tendon Rupture

- Post-operative Recovery:
  - Immobilization 30-45 degrees flexion for 2 weeks
  - Initiate passive extension and active flexion at 2 weeks
  - Initiate active extension at 4 weeks
  - Strengthening at 8 weeks
  - Full activity at 4-6 months

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### Triceps Tendon Rupture

- Results: Operative Repair Acute Ruptures
  - 92% strength
  - 8 degree loss of extension
  - Normal function

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### Triceps Tendinitis and Rupture

- Primary repair is done within 2-3 weeks of rupture for best results
- Reattach through bone tunnels in olecranon
- Delayed repair or reconstruction is difficult and has poorer results



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Thank You!

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