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Edited by David Drez, Bernard R. Bach and Charles Nofsinger

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ACHILLES TENDINITIS

GEORGE B. HOLMES, JR., MD

REVISED BY CHARLES NOFSINGER, MD

HISTORY

- Mechanism
 - Overuse, muscle imbalance, poor exercise biomechanics
- Initial complaints
 - Pain, swelling, decreased activity tolerance
- Chronic complaints
 - Pain with activity, difficulty running and jumping
 - Swelling
- Common in runners

PHYSICAL EXAM

- Acute
 - Diffuse swelling, pain with palpation, pain with dorsiflexion
 - Lateral pain – Associated with supination
 - Medial pain – Associated with pronation
- Chronic
 - Pain, decreased dorsiflexion, atrophy
 - Longitudinal swelling rather than well localized
- Classification
 - Insertional vs. noninsertional

STUDIES

- Radiographs
 - AP, lateral, mortise views (lateral most important)
 - Radiographs generally normal
 - Calcifications, traction spurs – Degenerative changes, degenerative changes or partial tear
- MRI
 - Tendinitis – Peritendinous fluid/edema, no tendinous signal changes
 - Differential diagnosis using MRI
 - Tendinosis (intrasubstance signal changes)
 - Partial tear
 - Retrocalcaneal bursitis

DIFFERENTIAL DIAGNOSIS

- Achilles tendinosis

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Achilles Tendinitis

Achilles Tendon Rupture

- Partial tear
- Haglund's deformity
- Retrocalcaneal bursitis

TREATMENT

- Nonoperative
 - Types of nonoperative treatment
 - Immobilization (cast, walking boot)
 - Heel lift
 - Anti-inflammatory medications
 - Achilles stretching
 - Physical therapy (including ice massage)
 - Steroids contraindicated due to risk of rupture
- Operative
 - Debridement if refractory to conservative measures
 - Lysis of adhesions

DISPOSITION

N/A

PROGNOSIS

- Pure tendinitis without associated tendinosis usually responds well to conservative measures.
- Surgical results for insertional Achilles tendinitis are worse than those for noninsertional Achilles tendinitis.
- Long-term complications
 - Tendon ruptures after steroids by mouth or injection
 - Chronic swelling or pain can result even after debridement.

CAVEATS AND PEARLS

- MRI very useful in distinguishing between tendinosis and tendinitis

ACHILLES TENDON RUPTURE

GEORGE B. HOLMES, JR., MD
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HISTORY

- Mechanism
 - Sudden contraction

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Achilles Tendon Rupture

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- Susceptible tendons are weakened by degenerative disease such as obesity, diabetes, hypertension, and the effects of corticosteroids, all of which lead to vascular compromise
- Acute rupture: complaints
 - Stabbing pain in posterior calf
 - Pts often complain that they were “kicked” in calf
 - Pain, swelling, decreased or absent push-off
- Chronic rupture: complaints
 - Difficulty walking, inability to run, chronic weakness, altered gait, pain and swelling

PHYSICAL EXAM

- Acute
 - Palpable defect in posterior calf in area of Achilles tendon, along with ecchymosis and swelling
 - Thompson test
- Chronic
 - ± palpable defect of posterior calf
 - Weakness in pure plantarflexion of foot
- Classification
 - Acute ruptures
 - Diagnosis within 0–4 weeks of injury
 - Chronic ruptures
 - Diagnosis 1–3 months after injury

STUDIES

- Radiographs
 - AP, lateral, mortise views (lateral most important)
 - Radiographs generally normal
 - Calcifications, traction spurs – Degenerative changes, degenerative changes or partial tear (indicative of longstanding disease of the tendon)
- MRI
 - Generally not necessary for diagnosis of acute ruptures
 - May be useful in cases of suspected chronic ruptures
 - Useful in differential diagnosis
 - Partial tendon tear
 - Localization of tear
 - Gastrosoleus tear
 - Plantaris tear

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DIFFERENTIAL DIAGNOSIS

- Achilles tendinosis
- Partial tear
- Avulsion
- Ankle sprain
- Isolated plantaris tear
- Gastrosoleus muscle tear

TREATMENT

- Acute
 - Nonoperative for acute ruptures
 - Cast or brace immobilization (nonweight-bearing, 6–8 weeks)
 - Operative for acute ruptures
 - Open vs. percutaneous repair (Ma procedure)
 - Ma (lower incidence of wound problems)
 - Lower rate of rerupture with direct repair
- Chronic
 - Nonoperative for chronic ruptures
 - AFO or similar bracing (palliative care)
 - Operative for chronic ruptures
 - Achilles reconstruction using graft (salvage procedure)
 - Flexor hallucis longus
 - Fascial graft
 - Peroneus brevis
 - Rehabilitation
 - Goals of physical therapy: ROM and strengthening
 - 5–6 months before return to contact sports
 - Role of earlier ROM gaining greater popularity

DISPOSITION

N/A

PROGNOSIS

- Results of conservative or operative repair generally good (greater strength with repair)
- Results of treatment after chronic rupture not as good as with acute repair
 - Reconstruction generally does not allow for return to competitive sports
- Complications
 - Rerupture (greater with conservative treatment)

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Achilles Tendon Rupture

Acromioclavicular Separation

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- Equinus (heel cord tightness)
- Skin slough, infection, painful scar

CAVEATS AND PEARLS

- Careful handling of the soft tissue is imperative to avoid wound complications.

ACROMIOCLAVICULAR SEPARATION

JAMES D. FERRARI, MD

REVISED BY CHARLES NOFSINGER, MD

HISTORY

- Direct force by far most common mechanism
- Fall onto point of shoulder
- Acromion gets driven downward and clavicle is stabilized by sternoclavicular (SC) ligaments
- Sequence of ligamentous injuries: acromioclavicular (AC) ligaments, coracoclavicular (CC) ligaments, deltoid and trapezial muscle attachments, skin
- Inferior dislocation (type VI separation) likely caused by downward force on clavicle
- Injury may also be caused by indirect force with humeral head being driven into acromion
 - Will cause no damage to CC ligaments
- A common athletic injury
 - Football
 - Hockey
 - Lacrosse
 - Bicycling (esp. mountain biking)
 - Snowboarding
- Motorcycle accidents
 - Tend to be complex with associated injuries
- Patients report pain, swelling at AC
- Chronically may have deformity, clicking, pain

PHYSICAL EXAM

- Inspection of deformity
 - Rule out posterior buttonholing of clavicle through delto-trapezial fascia
- Neurovascular and rotator cuff strength exam

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6 Acromioclavicular Separation

- Palpation of AC and CC regions
- Cross-body adduction
- Injuries to rule out acutely
 - Clavicular shaft fracture
 - Acromion and coracoid fractures
 - Brachial plexus injuries
 - SC joint injuries
 - Pneumothorax
 - Scapulothoracic dissociation
- Chronically must rule out other sources of pain
 - SLAP tear
 - Cervical radiculopathy
 - Rotator cuff tear

STUDIES

- Preferably done standing
- AP (Zanca view)
 - 15° cephalic tilt to avoid superimposition of AC joint on scapula
 - Reduced exposure needed as in AP view of glenohumeral joint
- Axillary view
 - Rule out posterior displacement of clavicle
 - Rule out coracoid and acromion fractures
 - Film other side if questionable
- Standing AP view of both shoulders
 - Measure CC distances and calculate % increase on affected side
 - CC distance normally 1.0–1.3 cm
- Weighted views
 - Help distinguish type II from type III
 - Not needed, as they seldom change treatment plan or decision to perform surgery
- MRI
 - Can delineate ligamentous injury and arthritis, useful for surgical planning

DIFFERENTIAL DIAGNOSIS

- Lateral clavicle fracture
- Periosteal sleeve fracture
- Bipolar AC separation + SC joint injury
- Combined AC separation + coracoid process fracture
- Glenohumeral joint dislocation

TREATMENT

- Classification system based on injury to AC and CC ligaments and severity and direction of displacement of clavicle
 - I: Sprain of AC ligaments; CC ligaments intact; no increase in CC distance
 - II: Disruption of AC ligaments and sprain of CC ligaments; increase in CC distance <25%; weighted views would show equal CC distances
 - III: Disruption of AC and CC ligaments; CC distance 25–100%; deltotrapezial fascia is intact
 - IV: Disruption of AC and CC ligaments; clavicle is posteriorly displaced into deltotrapezial fascia; may not have significant superior displacement
 - V: Disruption of AC and CC ligaments; marked superior displacement of clavicle with CC distance of 100–300%; torn deltotrapezial fascia
 - VI: Disruption of AC ligaments +/- CC ligaments; inferior displacement of clavicle in either subacromial (CC ligaments intact) or subcoracoid (CC ligaments disrupted) location; subcoracoid dislocation associated with severe injury, rib fractures, and clavicle fracture
- Treatment
 - Types I and II
 - Ice and sling for comfort for 1–2 weeks
 - Return to activity when full pain-free range of motion present
 - May take longer in type II injuries
 - Kenny Howard brace – presses down on clavicle and pushes arm upwards
 - Must be worn 24 hours a day
 - Can cause skin breakdown over clavicle and anterior interosseous nerve palsy
 - Pts w/ type II may develop persistent symptoms in future secondary to posttraumatic degeneration, osteolysis of distal clavicle, loose cartilage fragments, or unstable meniscus
 - Treat with distal clavicle excision +/- CC stabilization
 - Distal clavicle excisions fare poorly if grade II injury present
 - Type III
 - Operative vs. nonoperative treatment remains controversial
 - Literature unclear on the matter, but careful review reveals that recent trend is to opt for nonoperative treatment

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[More information](#)**8 Acromioclavicular Separation**

- Patients treated nonoperatively recover sooner, with no difference in strength or pain
- Exceptions to this are in overhead laborers and perhaps throwing athletes
- Nonoperative treatment
 - Sling for 2–4 weeks
 - Early pendulum and ROM exercises
 - Begin strengthening at 4–6 weeks
 - Avoid contact sports for 4–8 weeks
- Types IV and V
 - Operative treatment recommended
 - Early (first 2 weeks) surgery results are better than late surgery
 - Type IV tends to be more painful
 - Type V symptomatology generally relative to degree of displacement
- Type VI
 - Operative treatment recommended
 - Excision of distal clavicle facilitates reduction
- Operative treatment
 - Acute indications are grades IV, V, and VI separations
 - Relative indications include grade III separations in overhead laborers
 - >30 operative techniques described
 - Transfer of coracoacromial ligament with or without CC fixation (Weaver-Dunn)
 - Distal clavicle may or may not be resected
 - Late AC joint degeneration avoided with resection
 - CC fixation achieved with suture or synthetic material through a drill hole in the clavicle
 - Placing cerclage around clavicle causes abnormal anteriorization of clavicle and potential for material to cut through clavicle
 - Avoid use of permanent synthetic tapes (Dacron or Mersilene) due to foreign body reaction and late infection
 - CC fixation
 - Screw placed through clavicle into coracoid
 - Biomechanically strong
 - Perform in conjunction with repair of ligaments when done acutely
 - Requires removal at 8 weeks

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Acromioclavicular Separation

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- Technically difficult
- Easy to drill into coracoid but often screw can “blow out” the coracoid
- May abnormally anteriorize the clavicle
- AC fixation
 - Kirschner wires across AC joint
 - Can be done percutaneously without repair of CC ligaments or open with repair
 - Violates joint and can lead to arthritis
 - Requires second procedure for hardware removal
 - Pins can migrate!
 - Never use smooth pins
- Dynamic muscle transfer
 - Transfer of coracoid with short head of biceps to clavicle
 - Exchange of a dynamic constraint for a static one
 - Half have continued aching
 - Risk of injury to musculocutaneous nerve
- Rehabilitation
 - Sling for 6 weeks
 - Daily pendulum exercises started at week 1
 - No active forward flexion or abduction for 6 weeks
 - No lifting of any kind for 6 weeks
 - Start progressive active range of motion and strengthening at 6 weeks

DISPOSITION

N/A

PROGNOSIS

- Nonoperative treatment of grade III injuries appears to be equivalent to surgery
 - Earlier return with nonoperative treatment
- Nonoperated athletes may return to play when range of motion full and strength normal
- Operatively treated athletes should avoid contact for 6 months
- Complications of surgery
 - Loss of reduction
 - Infection
 - Deltoid dehiscence
 - Calcification of CC ligaments (not a problem; seen also in non-operative treatment)

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Acromioclavicular Separation

Acute Cartilage Injuries of the Knee

- Erosion of fixation through clavicle
- Foreign body reaction to synthetic tapes

CAVEATS AND PEARLS

- Results of surgery done within a few weeks of injury are superior to those done chronically
- Grade IV separations don't always have superior displacement
- No need for aggressive rehabilitation
- A small amount of superior displacement can be expected after reconstruction
- Conoid ligament (medial) controls vertical stability
- Trapezoid ligament (lateral) controls axial load of joint
- Superior and posterior AC ligaments control anterior-posterior motion
- Only 5–8° of motion at AC joint
 - Clavicle does rotate 40–50° with full elevation of shoulder
 - Upward rotation of clavicle is combined with downward rotation of the scapula, controlled by CC ligaments (synchronous scapuloclavicular rotation)
 - AC or CC fixation has little effect on shoulder motion

ACUTE CARTILAGE INJURIES OF THE KNEE

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 BERT R. MANDELBAUM, MD
 REVISED BY CHARLES NOFSINGER, MD

HISTORY

- Work or recreational injury
- Mechanism
 - Landing impact injury with isolated chondral defect
 - Noncontact injury with sudden deceleration or cutting, associated meniscal or ligamentous injury
 - Contact injury with varus or valgus force, associated meniscal or ligamentous injury
- Painful
- May have mechanical symptoms (e.g., locking, catching) from chondral flap

PHYSICAL EXAM

- Moderate effusion