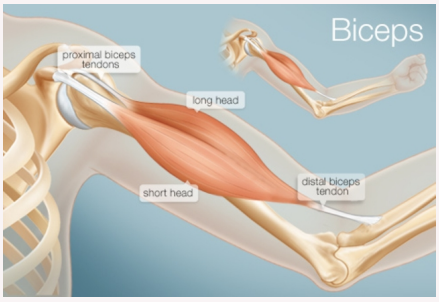
## Bicep Anatomy




- Short head connects medial bicep muscle to coracoid process of the scapula (not suspectable to tendinopathy)
- Long head - connects to supraglenoid tubercle of the scapula and superior glenoid labrum - blood supply = anterior humeral circumflex artery.
- Inserts onto radial tuberosity
- Innervated by the Musculocutaneous nerve (C5-C6)

## Bicipital Tendinitis

- Avascular parts of the long head of bicep tendon = deep undersurface of the tendon in the groove and proximal near insertion at the superior glenoid
- Avascularity makes the long head of bicep tendon prone to injury at the bicipital groove in the proximal humerus
- Can be acute inflammatory tendinitis to degenerative tendinopathy
- Can be Primary (microtrauma, insidious)/Secondary (Primary more common)
- **Secondary:**
- Rotator cuff tendinitis/tendinopathy (especially subscapularis)
- Subscapularis injuries
- LHB tendon instability/dislocation
- Direct/indirect trauma
- Inflammatory conditions
- Internal impingement of the shoulder (GIRD, superior labral lesions)
-External impingement/subacromial impingement
- GH OA

## Pathology

- Early tenosynovitis and inflammation when repeitive traction, friction and shoulder rotation occurs
- Swelling occurs in the tendon due to inflammation tendon becomes mechanically irritated in the confined space
- Tendon exposed to pathologic shear forces due to increased pressure and traction
- Then the LHB sheath thickens as fibrosis and vascular compromise occurs
- LHB starts to degenerate - scarring, fibrosis and adhesions, anchoring the tendon onto the groove, shear forces and traction increases
- Tendon can rupture due to this anchoring

## Demographics

- Common in young adults (18-35)
- Repetitive overhead activity (abduction and external rotation- peel back phenomenon, bicep muscle eccentrically contracts to decelerate elbow extension)
- Throwers, swimming, gymnastics, martial arts, racquet sports, contact sports
- Smokers
- Biomechanical risks: Repetitve overhead activity, repetitive shoulder activity, improper lifting, shoulder girdle muscle imbalances, poor posture, inflexability, scapulothoracic or eccentric overload, trauma, osseous anatomical abnormalities (narrowing of bicepital groove - f#, OA and congenital disorders)

## Classification

**Grade 0:**
- Tenocytes normal
- Myxoid degenerative material not present
- Collagen remains arranged in tight, cohesive bundles
- Blood vessels arranged inconspiciously between collagen bundles

**Grade I:**
- Tenocytes rounded
- Myxoid degenerative material present (small amounts)
- Collagen reminds arranged in discrete bundles with slight separation
- Capillary clustering (<1 cluster/ten high power fields)

**Grade II:**
- Tenocytes rounded and enlarged
- Myxoid degenerative material evident (moderate-large amounts)
- Collagen bundles lose discrete organisation - separation between individual fibres and bundles increase
- Capillary clustering increased (1-2 clusters/ten high-power fields)

**Grade III:**
- Tenocytes rounded and enlarged with abundant cytoplasm and lacuna
- Myoxid degenerative material abundant
- Collagen disorganised - loss of microarchitecture
- Capillary clustering increased (>2 clusters/ten high-power fields)

**Other changes:** Tenosynovium: Synovial hypertrophy, hyperplasia and proliferation of the bicipital sheath/synovium

## Presentation

- Deep Throbbing ache over anterior shoulder or bicipital groove
- May radiate to deltoid insertion/toward elbow/hand)
- Provoked by overhead activity, flexion of elbow and shoulder, forearm supination
- Can occur at night - sleeping on affected shoulder
- Relief from heat, ice, stretching and massage

## Presentation (cont)

- Rule out tendon rupture (painful audible pop then relief, popeye muscle on observation)

**Risks:** Chronic tendinopathy
Concurrent rotator cuff tear
Contralateral bicep tendon rupture
Age >40
Poor conditioning
RA or other rheumatologic pathology

- Limited ROM - Active/resisted movements may provoke pain (forearm supination, elbow flexion, shoulder flexion) **Consider labral injury if popping, catching or locking during AROM occurs**
- Tenderness in rotator interval and bicipital groove
- +ve Yergasons, Speeds (most specific), Bear hug (most sensitive), Belly press(most specific), Upper cut (most sensitive), Backward Traction, Lippman test
- Assess for dysfunction in Cx and Tx spine, Scapula dyskinesis, Upper crossed, AC joint, labral tear
- Consider posterior capsule tightness
- Consider Cx/Shoulder exam
- Patient's occupational hx/current job/ hx of injury/trauma to the shoulder/neck, hand dominance, surgical hx
- AROM, PROM Cx, AROM, PROM, RROM Shoulder
- Strength of rotator cuff (strength tests and IR lag sign)
- Check for Impingement signs (may be +ve due to swelling of the tendon)

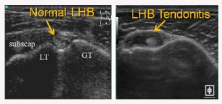
## DDx

- Adhesive Capsulitis
- Biceps tendon rupture
- Cx radiculopathy
- Brachial neuritis
- AC joint pathology
- GH Arthritis/ instability
- Osteonecrosis of humeral head
- Subacromial impingement syndrome
- f#
- Neoplasm
- Rheumatologic disease
- SLAP
- GIRD

## DDx (cont)

- Calcific tendonitis
- RC tears
- AVN
- Supracapular neuropathy
- TOS
- QSS
- Rupture of pecs, deltoid, lats)
- Scapulothoracic dyskinesia

## Imaging




- Tendon thickening, hypertrophy of synovial sheath and fluid surrounding tendon
- Only if need to rule out osseous impingement/bony pathology (A-P, Y view)
- US- Gold standard
- MRI - if rupture/labral tears

## Management

- Rest, ice, activity modification, functional retraining (limit motion that requires repetitive overhead activity, elbow flexion, forearm supination)
- 1st Phase: Pain relief and restoration of normal ROM, scapula stabilisation exercises (lower traps and serratus anterior), resisted internal and exernal rotation, low rows and cencentric bicep strengthening
- STW: Transverse friction massage over biceps tendon
- Myofascial release and stretching exercises of biceps, cx, shoulder and periscapular musculature
- Pendulum circumduction, wall walking, cane/wand stretching in flexion and abduction, sleeper stretchers
- 2nd Phase: Strengthen from isometric to concentric then eccentric
- Advanced strengthening - Bear hug, reverse fly and resisted internal/exernal rotation at 90 degrees of abduction
- SMT for Cx and Tx, scapula dyskinesis (strenghten periscapula, mobilisation of scapula)
- NSAIDs
- Surgical referral is considered if no better with conservative care greater than 3 months, intra operative findings of inflammed tendon (lipstick lesion, significant fraying, tearing, hypertrophy, partial thickeness tears, medial LHB subluxation and LHB subluxation with subcapularis tear/b-icipital groove soft tissue compromise

## Management (cont)

- Corticosteroids if symptoms persistent and no better with conservative care

## Surgical complications

**Tenotomy:** Popeye deformity
Muscle spasm/cramping
Biceps pain

**Biceps Tenodesis:** Groove pain
Popeye deformity
Muscle spasm/cramping
Biceps pain
Humeral shaft fracture (spiral when humerus is stressed torsionally)

## Post surgical Rehab

**Tenotomy:** Sling for 1-2 weeks
- AROM 2-4 weeks post op, sling discontinued
- Strengthening 4-6 weeks
- Light work 3-4 weeks post op
- Full return 1-3 months post op
- Unrestricted activities 3-4 months post op

**Tenodesis:** Sling 3-4 weeks
- PROM and grip strengthening
- Avoid active elbow flexion and forearm supination for 6 weeks
- Full AROM and PROM should be achieved by six weeks
- Light work 3-4 weeks post op
- Full duty 2-4 months post op
- Unrestricted activities 3-4 months post op