

## Partial Tear of the Long Head of the Biceps Tendon

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### I. The Long Head of the Biceps Tendon

#### ■ Introduction

##### Recent Update

- Prominent role as a source of shoulder pain
- Possible 2nd. role of LHB tendon
  - : Preserve, whenever possible
- Symptomatic significance of a chronically inflamed or pathologic tendon
  - : Require directed treatment plan

##### Historical Review

- 1920s Meyer: infl. lesion & instability from bicipital groove
- 1948 Hitchcock: anatomy, pathophysiology, tenodesis
- 1950s DePalma: a source of shoulder pain, tenodesis
- 1970s Neer: important head depressor, preserve
- 1974 Wolfgang: sublaxing biceps
- As the focus shifted to RCT, tenodesis became less popular.
- 1987 Post: pri. bicipital tenosynovitis
- 1991 Levinsohn: biceps pathology, 22% chr. undiagnosed pain
- 1998 Sakurai: 30% prevalence at autopsy
- 1999 Kempt: 77% pathology at ASD

#### ■ Anatomy of LHB

##### Biceps Anchor

- Post.-sup. labrum and supraglenoid tubercle
  - 25~50%: attach to supraglenoid tubercle
  - 50~75%: attach to labrum, more post. than ant.
- Variation in the biceps origin (Vangness etc, JBJS, 1994)
  - Type I: labral attachment is entirely post. (22%)
  - Type II: most of labral contribution is post. (33%)
  - Type III: equal to ant. & post. labrum (37%)
  - Type IV: most of contribution is ant. (8%)

#### Size

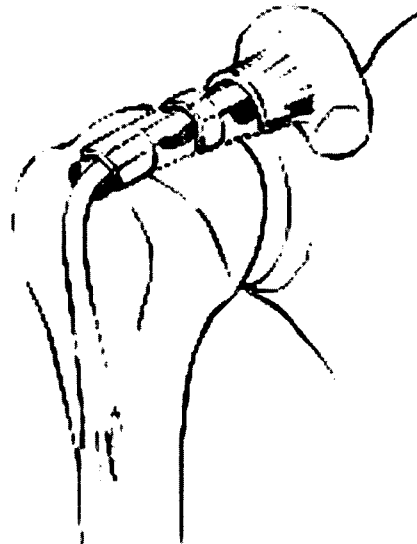
- Length: 9 cm
  - Intraarticular length(: in hanging arm & ER position (*Glousman, JBJS, 1988*))
- Width
  - Its origin: 8.5 mm
  - Narrowed down: 4.5 mm

#### Location & Zone

- Intraarticular & Extrasynovial
- Traction zone & Sliding zone

#### Restraint

- Bicipital groove
- Surrounding soft tissues: mainly
  - Supraspinatus
  - Subscapularis
  - Coracohumeral lig.
  - Sup. glenohumeral lig.



Relations of the CH ligament (roof)  
& SGHL (floor) to LHB

#### ■ Role in Shoulder & Elbow Mechanics

##### Mover

- Flexor
- Abductor
- Int. rotator

##### Stabilizer (Depressor of HH)

- Kumar (*Clin Orthop, 1989*)
  - : Suppress sup. migration of humerus
- Glousman (*JBJS, 1988*)
  - : Ant. stabilizer
- Rodosky (*Ortho Trans, 1991*)
  - : Increase torsional rigidity
- Rodosky (*AJSM, 1994*)
  - : Decrease the strain on the IGHL
- Itoi (*JSES, 1994*)
  - : Some stabilizer in all directions, esp. ant.-post. (with hanging arm position)
- Warner (*JBJS, 1995*)
  - : Stabilizer during abd. in scapular plane

#### Debate

- Cadaver study
  - : Role in stability
- EMG study (Yamaguchi & Neviasser, Clin Orthop, 1997)
  - : Silent during elevation

Summary (*Abrams, AANA, 2003*)

- Role in joint stability: controversial
- Biceps & sup. labrum: role in assisting ant.-inf. stability
- Dynamic role in cocking phase
- Shoulder deceleration

Role in Elbow Mechanics

- Strong supination of forearm
- Weak flexion at elbow

#### ■ Pathophysiology

3 Major Group of Pathologic Process

(*Neviaser, 1980 & 1987, Habermeyer & Walch, 1996*)

- Inflammatory
  - Pri. bicipital tenosynovitis or tendinitis
  - Biceps tenosynovitis concurrent with RC disease
- Instability
  - subluxation
  - Dislocation
- Traumatic rupture
  - Complete
  - Partial

## II. Partial Tear of LHB

#### ■ Pathophysiology

Traumatic Isolated Rupture

- In a normal LHB
  - Extremely uncommon
  - Significant trauma
    - ◆ Powerful supination
    - ◆ Powerful deceleration of the forearm during pitching
    - ◆ Fall on outstretched arm
- In degenerated tendon: generally

#### Overlapping Causes

- Trauma of the biceps
  - : Often precedes an instability problem
- Instability or traumatic problems of the biceps
  - : Always accompanied by infl. changes

#### Biceps Tenosynovitis or Tendinitis

- Causes of secondary tendinitis
  - Impingement syndrome (*Neer, JBJS, 1972*)
  - Related to RC disease (*Neviasser, Clin Orthop, 1982*)
  - Large tear of RC: mechanical entrapping biceps
  - Bicipital osteophyte
  - Internal impingement
  - Rotator interval lesion
  - Instability of biceps tendon
- Causes of primary bicipital tenosynovitis
  - Abnormality of the bicipital groove
  - Repeated trauma
  - Degenerative change
- Changes of tendon
  - In early stage
    - ◆ Dull, swollen, discolored
    - ◆ Still mobile in the groove
  - In later stage
    - ◆ Sheath: thickened, fibrotic
    - ◆ Tendon: rough, atrophic or hypertrophic, lie in hemorrhagic adhesive bed
  - Atrophic tendon
    - ◆ Thin, frayed
    - ◆ Prerupture stage
    - ◆ Proceed to partial tear

#### ■ Intraoper. Pathology of LHB Lesion

##### 3 Types of LHB Lesion (*Flatow, AANA, 2002*)

- Classic: most common
  - Biceps fraying or partial tear
  - Supraspinatus impinge or RCT
- Interval lesion
  - Biceps subluxed
  - Upper edge subscapularis torn
- Dislocated

-Complete subscapularis avulsion

Concomitant LHB Lesions in Complete RCT (Chen CH, AANA, 2003)

- Asso. biceps tendon pathology: 89%
  - Tendinitis :55%
  - Subluxation :11%
  - Dislocation: 7%
  - Partial tear :11%
  - Complete rupture: 5%

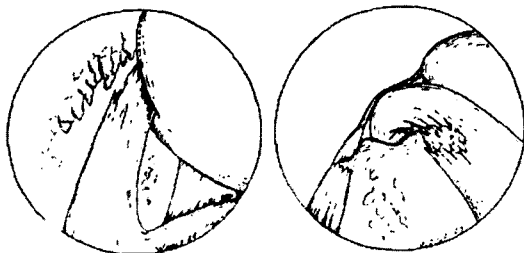
My Study (LHB Lesions ass. with FTRCT) (Congress of KOA, 2003)

- LHB pathology: 63/82 (77%)
  - Tenosynovitis: 22%
  - Fraying or flattening: 24%
  - Tear: partial 17%, complete 5%
  - Instability: S/L 5%, D/L 4%

■ Biceps Failure

According to the Site

- Sup. labrum: SLAP Lesions
- Proximally: sup. labrum intact with tear adjacent
- Biceps tear near greater tuberosity
  - Articular lesion
  - Hidden lesion
- Bicipital groove
  - Extraarticular lesion



Partial tear and flattening of the biceps tendon as it enters the bicipital groove

■ Clinical Evaluation

Characteristics of the Pain

- Partial thickness traumatic tear
  - Context of previous tendinitis or bicipital-like pain
  - Significant pain in upper & ant. brachium

- Full thickness traumatic rupture
  - Less consequential from pain
  - Bruising down the biceps tendon
- Pain from tenosynovitis or S/L
  - Always pain at bicipital groove
  - Pain on ant. arm, especially with extension & IR
  - Difficult to distinguish from impingement

#### Clinical Diagnosis of Biceps Pathology

- Palpation over the sulcus with arm in 10° IR
  - Non-specific
  - Confused with subdeltoid bursitis, cuff pathology
  - Tenderness point
    - ◆ Impingement synd.: ant. acromion & SS insertion site
    - ◆ Bicipital tendinitis: in the groove
- Provocative test
  - Speed: non-specific
  - Yergason's: specific
  - Elbow extension, shoulder ext. & IR or ABER
- Other test
  - Biceps instability test
  - Shoulder compression test
  - O'Brien test
- Injection
  - Subacromial injection
    - : No direct effect on biceps tendon pathology except FTRCT
  - Intraarticular injection
    - : Resolve pain at the groove
- Imaging
  - Plain film
    - ◆ Bicipital groove view (Fisk method)
  - Ultrasonography
    - ◆ Effusion within the bicipital sheath
    - ◆ Presence or absence of biceps, RCD
  - MRI
    - ◆ Isolated biceps lesion: more difficult dx.
    - ◆ Detective some criteria
      - fluid out or lots of fluid in sulcus
      - thickening of tendon
      - increased intensity on T1 & T2

- Arthro-CT (JSES, 1998)
  - ◆ Arthrography: S/L & D/L (28%), groove lesion (58%)
  - ◆ Arthro-CT: S/L & D/L (76%)
- Arthroscopy
  - ◆ Pull down intertubercular portion into the joint
  - ◆ Intertubercular groove: flattening, widening
  - ◆ Tendon: synovitis, erosion, flattening, fraying, partial tear
  - ◆ S/L & D/L
- closure of biceps-subscapularis triangle
- tenting of SGHL

■ Treatment

Non-operative

- NSAID
- Injection
- PT

Operative

- Tendon debridement
  - Stable
  - Frayed to <50% partial tear involve (?)
- Tenotomy
  - >50% partial tear
  - Arthroscopic
- Tenodesis
  - Open or arthroscopic

Past Indication of Tenodesis for LHB Lesion (*Crenshaw, JBJS, 1966*)

- Pain present for 5 months
- Bicipital tenderness
- Restriction of motion

Current Indication for Biceps Tenotomy (*Wolf, AANA, 2003*)

- Erosive tendinosis
- Unstable biceps
  - S/L & D/L
  - Subscapularis split
  - Complete tear of SS
- Rotator cuff tears
  - Severe hypertrophy

-Relative stenosis

Current Controversy for Partially Torn Biceps Tendon (*Yamaguchi, JSES, 1999*)

· Recommend surgical treatment

: As little as 25% of the tendon involve

· Background

: Persistent pain from BLH is a greater problem than any negative functional consequence resulting from loss of the tendon.