

THE BICEPS : TREATMENT AND CONTROVERSIES

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THE BICEPS : A APPENDIX OR A PRELUDE !
SACRIFIED OR SAVED !

CONTROVERSIES STARTS FROM ANATOMY TO TREATMENT

Anatomy

- Origin :
 - long head - from the supraglenoid tubercle and posterosuperior labrum
(biceps-labral complex)
 - short head - from the coracoid process base (conjoined tendon)
- Traverses the shoulder joint, covered by a reflection of synovial membrane intra-articular and extrasynovial
- via supratubercular ridge : 67% a partial or complete ridge
92% more than 450
- Pathway : lateral, anterior, inferior
- Stabilizing structures
- Soft tissue restraint : rotator interval, CHL, SGHL,
supraspinatus, subscapularis
transverse humeral ligament
 - the coracohumeral ligament thickens the rotator interval : inserts on either side of the bicipital groove
(Paavolainen et. al,1984)
 - coracohumeral ligament : crescent-shaped roof above the biceps superior glenohumeral ligament :

reflection pulley on the floor (Habermeyer & Walch,1996)

- the floor of biceps sheath is formed by the subscapularis with supraspinatus, and a slip from the supraspinatus tendon along with the coracohumeral ligament forms a roof over the biceps (Clark & Harryman II,1992)

· Osseous restraint (Cone,1983)

medial wall angle : 56 degrees (range of 40 to 70)

depth : 4.3mm (range of 4 to 6mm)

ratio of the width : 1.6

- dominant arm has a wider intertubercular sulcus and more acute medial wall angle due to greater stress passing through the tendon (Vettivel,1992)
- no correlation between the incidence of subluxation and low medial wall angle (Cone,1983)
- the medial wall angle is correlated with the probability of subluxation of the long head of the biceps tendon (Habermeyer,1987)

Function

Mobility

- a strong supinator of the forearm and a weak flexor at the elbow
 - loss of 21% of supination and 8% of elbow flexion strength in ruptured biceps but no loss in repaired biceps (Mariani,1988)
- a weak flexor of the shoulder
- a decelerator during forceful overhead throwing
 - LHB is active in the movement of arm flexion, inactive in arm extension (Furlani,1976)
 - the muscle strength of rotator cuff tended to be weaker in shoulders with increased biceps activities than in those without : a potential supplemental function of the biceps in shoulders with rotator cuff tears (Kido & Itoi,1998)
 - biceps muscle acts as a flexor and an abductor of the shoulder LHB must increase its mechanical output to keep the arm in elevation to a greater extent than do the short head and the deltoid muscle : one of the causes of tendinitis or rupture of the long head (Sakurai & Ozaki,1998)
 - no significant biceps activity was observed in any shoulder, including patients with rotator cuff tears (Yamaguchi,1997)

Stability

- a static and dynamic head depressor
- a dynamic anterior and superior shoulder stabilizer
 - LHB and SHB as anterior stabilizers of GHJ with arm in abduction and external rotation : their role increases as shoulder stability decreases (Itoi,1993)
 - LHB contributes to anterior stability of GHJ by increasing resistance to torsional force LHB helps to diminish the stress placed on the IGHL (Rodosky,1994)
 - no significant effect on AP or SI glenohumeral translation in isolated anterosuperior labral lesion significant increases in AP and SI translations with destabilized biceps anterior translation 6-6.3mm, inferior 1.9-2.5mm (Pagnani,1995)
 - LHB as a stabilizer of the humeral head in the glenoid during abduction of the shoulder in the scapular plane : 2-6mm of superior translation of the humeral head in rupture/tenodesis (Warner,1995)
 - an upward migration of the humeral head was noted after tenodesis but without clinical significance (Berlemann & Bayley,1995)
 - application of a force to the long head of the biceps brachii results in significant decreases in humeral head translation, more pronounced at middle and lower elevation and neutral rotation : reduced anterior translation by 10.4mm, inferior by 5.3mm, and superior by 1.2mm (Pagnani,1996)
 - any function of the long head of the biceps in shoulder motion does not involve active contractions (Yamaguchi,1997)
 - LHB acts as a humeral head stabilizer in superior and anterior directions (Sakurai & Ozaki,1998)
 - biceps is an active depressor of humeral head in shoulders with lesions rotator cuff : a significantly greater proximal migration of the humeral head without biceps contraction, but depression of the head when biceps is functioning (Kido & Itoi,2000)

Pathology

- biceps-labral complex problem at the insertion (SLAP)
- tendinopathy at the biceps in itself (partial or complete rupture)
- medial displacement at the bicipital groove (subluxation or dislocation)
- Biceps-labral complex problem (SLAP)
unstable and symptomatic lesion : instability or loss of activity
- Tendinopathy : at the insertion or bicipital groove

isolated biceps rupture

associated biceps rupture : glenohumeral osteoarthritis

rheumatoid arthritis

rotator cuff tear

- 50% associated with rotator cuff tear (Resch & Breitfuss,1995)

· Medial displacement

isolated subluxation/dislocation

associated subluxation/dislocation : subscapularis rupture

massive rotator cuff tear

lesser tuberosity fracture

- subluxation/dislocation

35% subluxation, 65% dislocation in 71 cases (Walch,1998)

58% subluxation, 42% dislocation in 33 cases (Park & Bigliani, 2000)

- unable to dislocate the biceps even after sectioning the intertubercular transverse ligament as long as the rotator cuff is intact (Paavolainen,1983)

- 33 biceps medial displacement : 67% associated with large/massive RCT

79% associated with SbS rupture

21% SS rupture

with rotator interval and transverse humeral ligament rupture (Park & Bigliani, 2000)

- subluxation(25) 100% partial tearing of subscapularis

70% supraspinatus tear

dislocation(46) 23 complete tear of subscapularis

21 partial tear of subscapularis

2 intact SbS

16% of medial displacement of LHB in 445 RCT

70% associated with massive RCT (Walch,1998)

Clinical Manifestation

- Mild pain/discomfort during ADL : SLAP, rupture, subluxation/dislocation
- Feeling of instability : SLAP
- Bump in midarm : rupture
- Asynchronous scapulohumeral rhythm

- Tenderness on the bicipital groove :
SLAP, tendinopathy, subluxation/dislocation
- Severe pain with snapping during rotation at various abduction
: SLAP, subluxation
- Painful palm-up test : SLAP, tendinopathy
- (+) compression-rotation test : SLAP
- (+) flexion-adduction-rotation test : SLAP
- (+) biceps load test : SLAP

Imaging study

- ArthroCT
- ArthroMRI
- Ultrasonography
 - help to detect 86% of subluxation with dynamic sonography (Farin,1995)

Treatment

- Conservative : anti-inflammatory drugs, physiotherapy, steroid
- Relocation : tubularization, deepening of the groove, repair of subscapularis
- Tenodesis : attachment to the proximal humerus,
transosseous suture, suture anchor, key hole
open/arthroscopic
- Tenotomy : arthroscopic release at the supraglenoid tubercle
 - the key to successful treatment of lesions of the long head of the biceps tendon is recognition of associated pathologic findings in the shoulder (Curtis & Snyder,1993)
 - medial displacement of the LHB can easily be overlooked during open surgery, and opening of the rotator interval is an essential part of rotator cuff repair (Walch,1998)

Controversies

- Tendinopathy
 - a significant diminution of activity in the ruptured long head as well as a reactive hyperactivity in

the short head after conservative treatment (Schmitt,1977)

- tenodesis of LHB for chronic bicipital tendinitis : 50% unsatisfied, 1/3 painfree not recommendable (Becker & Cofield,1989)
- tenodesis of LHB for chronic bicipital tendinitis without management of impingement : unsuccessful
 - a secondary manifestation of impingement syndrome (Dines & Warren,1982)
- 21 arthroscopic biceps tenodesis : satisfied in all (Chams & Snyder,1999)
- arthroscopic biceps tenotomy 70 in associated with rotator cuff disease only 4% : visible evidence of biceps deformity in the anterior arm no affect the clinical performance of the shoulder
BICEPS AUTOTENODESIS (Speer & Osbahr,1999)

· Bicipital instability

- tenodesis does not restore the normal mechanics of the biceps tendon more normal function can be re-established by reimplanting the tendon (Hood B & Ciullo JV, 2000)
- tenodesis for bicipital instability is recommendable (Dines & Warren,1982)
- arthroscopic biceps release from glenoid is the optimal method of treatment in intra-articular subluxation of LHB(Kevin & Speer,1999)
- poor results in reimplantation of biceps favorable results in in-site fixation of biceps (Park & Bigliani,2000)

SUMMARY

· in young, active, strenuous patients

- stabilization for unstable SLAP lesion
- tenodesis for ruptured biceps tendon above the groove
- repair for ruptured biceps tendon below the groove
- relocation for biceps instability

· in old, inactive patients

- no need stabilization for unstable SLAP lesion
- debride/tenotomy for partial ruptured biceps tendon
- leave alone/trimming of stump for complete ruptured biceps tendon
- tenodesis/in-site fixation for biceps instability