

Biceps Tenodesis

The shoulder has two primary joints. One part of the shoulder blade, called the glenoid fossa forms a flat, shallow surface. This is coupled with the humerus (shaped like a golf ball) to make up the joint. The glenoid labrum is a "ring" of cartilage that turns the flat surface of the glenoid into a slightly deeper socket, which is similar to resting a golf ball on a golf tee instead of a table top, providing more shoulder stability. Another part of the scapula, called the acromion, articulates with the clavicle (collar bone) to make the acromioclavicular (AC) joint. The rotator cuff is a group of four muscles: the supraspinatus, infraspinatus, teres minor and subscapularis. The rotator cuff tendons attach around the humeral head (ball) and connects the humerus to the scapula. The long head of the biceps originates from the top of the glenoid fossa and labrum (top of the golf tee). It then runs through a groove in the humerus (upper arm bone) to join the short head of the biceps and inserts on a bone in the forearm (Figure 1). Because of its position, the long head of the biceps is also considered to be a secondary stabilizer of the shoulder joint. The long head of the biceps is at risk of injury and degenerative changes due to its proximity to the rotator cuff and the acromion. Since the long head of the biceps can act as a secondary stabilizer of the shoulder, it is also subject to injury during high speed overhead movements; repetitive overhead movements; or forceful shoulder activities when the elbow is straight.

Specific injuries may include inflammation and irritation of the bicep tendon itself; a problem with the bicep tendon in conjunction with one of the rotator cuff tendons; or detachment of part of the tendon from the attachment point (SLAP tear). Bicep tendon degeneration and/or tearing can cause significant shoulder discomfort and dysfunction (Figure 2). A biceps tenodesis is a surgical procedure which may be performed for treatment of severe symptoms involving the biceps tendon, including inflammation or partial tears. It may be performed in isolation or as part of a larger shoulder surgery, including surgery involving the rotator cuff. During the biceps tenodesis, the normal attachment of the biceps tendon on the shoulder socket (glenoid fossa) is cut and reattachment of the tendon is made on the humerus (upper arm bone). This takes the pressure off the biceps attachment and places the attachment below the actual shoulder joint. The goal is to eliminate the shoulder pain coming from the bicep tendon. Different techniques are used to perform a biceps tenodesis, therefore the initial precautions may vary slightly from surgeon to surgeon.

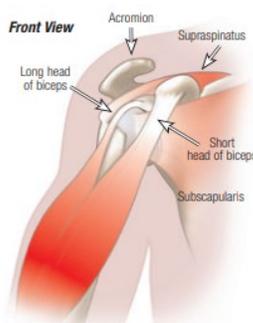


Figure 1 Shoulder anatomy
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Figure 2a Normal long head of bicep. The muscle has a smooth arc from the shoulder to the elbow.



Figures 2b and Figure 2c Torn long head of biceps. The muscle has retracted toward the elbow.

Phase I (surgery to 4-6 weeks after surgery)	
Rehabilitation appointments	<ul style="list-style-type: none"> Rehabilitation appointments begin within 7 to 10 days after surgery and continue 1 to 2 times per week
Rehabilitation goals	<ul style="list-style-type: none"> Protection of the post-surgical shoulder Activation of the stabilizing muscles of the gleno-humeral and scapulo-thoracic joints
Drs. Scerpella Precautions	<p>Sling: as needed for patient comfort. Progressively remove the sling when comfortable, as soon as 1 week.</p> <p>Range of Motion: No restrictions at elbow, avoid extremes of shoulder extension and horizontal abduction.</p> <p>Strengthening: No multiplanar functional motions such as throwing. No long head of the biceps, long lever loading.</p>
Drs. Day and Walczak Precautions	<p>Sling for 2 weeks post op, removing for therapeutic exercises, general hygiene and when awake, alert and in safe environment (i.e. sitting on couch watching TV).</p> <p>Range of Motion: No restrictions at elbow, avoid extremes of shoulder extension and horizontal abduction.</p> <p>Strengthening: Minimize biceps tension for 6 weeks. Avoid long lever arm flexion and no resisted forearm supination or elbow flexion.</p>
Dr. Baer Precautions	<p>Sling as needed for patient comfort. Progressively remove the sling, as soon as 1 week. Remove for rehab exercises, hygiene and when awake, alert and in safe environments.</p> <p>Range of Motion: No restrictions at elbow, avoid extremes of shoulder extension and horizontal abduction.</p> <p>Strengthening: Minimize biceps tension for 4-6 weeks, with a 5lb lifting restriction for 4 weeks. Avoid long lever arm flexion and no resisted forearm supination or elbow flexion.</p>

<p>Dr. Grogan Precautions</p>	<p>Sling: as needed for patient comfort. Progressively remove the sling when comfortable, as soon as 1 week.</p> <p>Range of Motion: No restrictions at elbow, avoid extremes of shoulder extension and horizontal abduction.</p> <p>Strengthening: Minimize biceps tension including 5lb lifting restriction for 8-12 weeks. Avoid long lever arm flexion and no resisted forearm supination or elbow flexion.</p>
<p>Suggested therapeutic exercise</p>	<ul style="list-style-type: none"> ● Begin week 1 with sub-maximal shoulder isometrics for internal rotation; external rotation; abduction; and adduction ● Hand gripping ● Cervical spine and scapular active range of motion
<p>Cardiovascular exercise</p>	<ul style="list-style-type: none"> ● Walking, stationary bike is ok, No treadmill or swimming ● Avoid running and jumping due to the distractive forces that can occur at landing

Phase II (begin after meeting Phase I criteria, usually 6-8 weeks after surgery)	
Rehabilitation appointments	<ul style="list-style-type: none"> • Rehabilitation appointments are 1 time a week for 1-2 weeks
Rehabilitation goals	<ul style="list-style-type: none"> • Full AROM • Full rotator cuff strength in neutral position
Precautions	<ul style="list-style-type: none"> • Progressive and graduated nature of return to activity
Range of motion (ROM) exercises	<ul style="list-style-type: none"> • Full elbow ROM • Shoulder AROM • Shoulder passive range of motion (PROM) for flexion or abduction, if needed
Suggested therapeutic exercise	<ul style="list-style-type: none"> • Scapular stabilization exercises • IR and ER in neutral with Theraband resistance • Gentle bicep and tricep strengthening exercises
Cardiovascular exercise	<ul style="list-style-type: none"> • Progressive return to cardiovascular fitness. Avoid activities where there is a higher risk for falling our outside forces to the applied arm.

Phase III (begin after meeting Phase II criteria, usually 8-12 weeks after surgery)	
Rehabilitation appointments	<ul style="list-style-type: none"> • Rehabilitation appointments are 1-2 times per week
Rehabilitation goals	<ul style="list-style-type: none"> • Full AROM in all cardinal planes with normal scapular-humeral movement • 5/5 (full strength) rotator cuff strength at 90° abduction in the scapular plane • 5/5 peri-scapular strength
Precautions	<ul style="list-style-type: none"> • All exercises and activities begin low to medium velocity • Avoid activities where there is a higher risk for falling or outside forces to be applied to the arm • No swimming, throwing or sports
Suggested therapeutic exercise	<p>Motion</p> <ul style="list-style-type: none"> • Posterior glides if posterior capsule tightness is present <p>Strength and stabilization</p> <ul style="list-style-type: none"> • Flexion in prone, horizontal abduction in prone, full can extension and D1 and D2 diagnosis in standing • Theraband, cable column and/or dumbbell (light resistance/high repetitions) in IR and ER in 90° of abduction • Scapular stabilization exercises • Balance board in push-up position (with rhythmic stabilization), prone Swiss ball walkouts, rapid alternating movements in supine D2 diagonal and closed kinetic with narrow base of support
Cardiovascular exercise	<ul style="list-style-type: none"> • Walking, biking, Stairmaster and running (if Phase II criteria is met) • No swimming
Progression criteria	<ul style="list-style-type: none"> • Full rotator cuff and bicep strength on manual muscle testing

Phase IV (begin after meeting Phase III criteria, usually 12 weeks after surgery)	
Rehabilitation appointments	<ul style="list-style-type: none"> • Rehabilitation appointments are once every 2-3 weeks
Rehabilitation goals	<ul style="list-style-type: none"> • 5/5 (full strength) rotator cuff strength with multiple repetition testing at 90° abduction in the scapular plane • Patient to demonstrate stability with higher velocity movements and change of direction movements that replicate sport specific patterns (including swimming, throwing, etc.) • No apprehension or instability with high velocity overhead movements • Improve core and hip strength and mobility to eliminate any compensatory stresses to the shoulder • Cardiovascular endurance for specific sport/work demands
Suggested therapeutic exercise	<p>Motion</p> <ul style="list-style-type: none"> • Posterior glides if posterior capsule tightness is present <p>Strength and stabilization</p> <ul style="list-style-type: none"> • Dumbbell and medicine ball exercises that incorporate trunk rotation and control with rotator cuff strengthening at 90° abduction • Begin working towards more functional activities by emphasizing core and hip strength and control with shoulder exercises • Theraband, cable column and dumbbell in IR and ER in 90° of abduction • Scapular stabilization exercises • Higher velocity strengthening and control, such as inertial, plyometrics and rapid Theraband drills. Plyometrics should start with 2 hands below shoulder height and progress to overhead, then back to shoulder with one hand, progressing again to overhead • Initiate throwing program, overhead racquet program or return to swimming program depending on the athlete's sport
Cardiovascular exercise	<ul style="list-style-type: none"> • Design to use sport specific energy systems
Progression criteria	<ul style="list-style-type: none"> • Patient may return to sports after receiving clearance from the orthopedic surgeon and the physical therapist/athletic trainer

Phase V (begin after meeting Phase IV criteria, usually 20 weeks after surgery)	
Rehabilitation appointments	<ul style="list-style-type: none"> • Rehabilitation appointments are once every 2-3 weeks
Rehabilitation goals	<ul style="list-style-type: none"> • Patient to demonstrate stability with higher velocity movements and change of direction movements that replicate sport specific patterns (including swimming, throwing, etc.) • No apprehension or instability with high velocity overhead movements • Improve core and hip strength and mobility to eliminate any compensatory stresses to the shoulder • Cardiovascular endurance for specific sport/work demands
Precautions	<ul style="list-style-type: none"> • Progress gradually into sport specific movement patterns
Suggested therapeutic exercise	<p>Motion</p> <ul style="list-style-type: none"> • Posterior glides if posterior capsule tightness is present <p>Strength and stabilization</p> <ul style="list-style-type: none"> • Dumbbell and medicine ball exercises that incorporate trunk rotation and control with rotator cuff strengthening at 90° abduction • Begin working towards more sport specific activities • Theraband, cable column and dumbbell in IR and ER in 90° of abduction • Initiate throwing program, overhead racquet program or return to swimming program depending on the athlete's sport • High velocity strengthening and dynamic control, such as inertial, plyometrics and rapid Theraband drills.
Cardiovascular exercise	<ul style="list-style-type: none"> • Design to use sport specific energy systems
Progression criteria	<ul style="list-style-type: none"> • Patient may return to sports after receiving clearance from the orthopedic surgeon and the physical therapist/athletic trainer

References

1. Robert C. Manske, PT, DPT, SCS, ATCa and Dan Prohaska, MD. Pectoralis Major Tendon Repair Post Surgical Rehabilitation. *N Am J Sports Phys Ther.* 2007 Feb; 2(1): 22–33.
2. Yu et al. Outcomes and Return to Sport After Pectoralis Major Tendon Repair: A Systematic Review. *Sport Health.* 2019 11(2): 134-141.

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