

## The Long (not the short) of It - Biceps Brachii

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I loooooove biceps brachii. You too? Well read on!

Biceps brachii is a beauty. He makes his home in the land of anterior humerus and traverses across glenohumeral, humeroulnar and humeroradial. He's a bit indecisive in the genohumeral regions so he makes a big split to cover more ground. This is where it gets interesting!

The proximal portion of biceps brachii splits into a short head and a long head. The tendons of each, attaching at different locations around the shoulder. For this article, I will be exploring the amazing anatomy of the long head.

So the short story is, the long head (LH) of biceps brachii attaches to the supraglenoid tubercle of the scapula, and is held in place by the transverse humeral ligament as it runs through the bicipital groove. This gives therapists/fitness professionals a good understanding about the action and role of biceps brachii. However, it oversimplifies the anatomy and undervalues the impact it, and related structures, can have on biomechanics. So lets dig a little deeper....

1) The LH attaches to the supraglenoid tubercle of the scapula AND the superior labrum. While the position of this labral attachment varies, experts agree that it is typically found more posterior on the superior part of the labrum.

Ever heard of a SLAP tear? It's labrum and LH baby. SLAP (superior labrum anterior to posterior) tears are often associated with repetitive overhead movements like those you would see in swimming, or sports involving throwing. These activities are said to cause repetitive pull on the LH. Using arthroscopy, researchers have electrically stimulated the biceps brachii and observed that the LH became taut, particularly near its attachment to the labrum, and lifted the labrum off the scapula.

Can you start to see a more complex picture? Is it just repetition, or could it be that the LH doesn't have the support staff it needs to get the job done? Could the thoracic spine be stiff and immobile, resulting in excess stress on LH? Could other shoulder girdle and trunk muscles be over or under-active leading to more pull at the LH origin? You betcha!

2) The LH tendon is both intra & extra-articular. But you already knew that, right? Well, did you know that the intra-articular LH tendon is stabilized by a group of structures collectively referred to as the reflection pulley? Oh yeah it is. This reflection is made up of parts of the superior GH ligament, coracohumeral ligament and fibers from the subscapularis and supraspinatus tendons. Mind blown? Yeah. Awesome, huh? This reflection allows the tendon to take a pretty sharp turn as it exits the glenohumeral joint. The extra-capsular portion of LH now travels in the bicipital/intertubercular groove to join its buddy, short head (SH), at the muscle belly. It's around here where the transverse humeral ligament shows up. It crosses the intertubercular groove to secure LH in place as it makes its way to the belly. Old news? Well, there's more. This transverse humeral ligament is partly formed by fibers from subscapularis, supraspinatus and the coracohumeral ligament. There are so many shared fibers here that its like a connective tissue orgy around this intertubercular groove! This is what makes dysfunction of the LH so interesting. A study published in 2003, found that LH disorders are associated with rotator

cuff tears in up to 90% of cases. 90%! Even more exciting is that the fibers from subscapularis split as they make their way to their insertion on the humerus. The superficial fibers run to the greater tubercle of the humerus and the deeper fibers to the lesser tubercle. This is significant when we look at dislocation of the LH. Medial dislocation results when the deep fibers of subscapularis tear, causing the tendon to move underneath or towards the subscapularis. The anterior fibers of subscapularis may or may not be torn. It is only tearing of the deep fibers that are necessary for medial displacement of LH.

Does this mean you better look at the rotator cuff if there are biceps brachii complaints (and vice versa)? Absolutely. Should we also consider that maintenance of healthy rotator cuff musculature is an integral part of optimal biceps brachii function? Absolutely.

3) A perhaps lesser known structure offering LH a little stability is something called the biceps vinculum. Should we just take a moment to scream out loud? Go ahead. Jump up and down, and scream a bit. This structure is described as a loose membrane that consists of fat, and blood vessels, and helps anchor LH to the periosteum of the intertubercular groove. Awwwww what a great little helper, huh? Don't brush this off as an unimportant little accessory structure just yet. A group of researchers decided to test the strength of the vinculum to see how much of a role it played in keeping LH in place following severing of the LH tendon. They did biomechanical testing of the vinculum, following tenotomy, and found that it was able to prevent distal migration of the biceps tendon past the groove entrance in all cases. They concluded that this explains the relatively rare manifestation of Popeye arm deformity following LH tenotomy.

The long head of biceps brachii has so many relationships around the shoulder. It's these relationships that allow for a balance between mobility and stability in the shoulder joint. When this delicate balance is compromised, however, the result can be pain and dysfunction that affects the shoulder girdle, neck and beyond. If you have a client or patient with symptoms of LH trauma, think beyond just the tendon. It is likely not the only player in the dysfunction. If you are a patient, and your therapist is only treating your tendon, send them to this blog post.

But wait, there's more!

As if biceps brachii isn't cool enough, it is also credited with the assignment of the word muscle to all those neatly arranged bundles all over our body containing actin and myosin, all contractile and stuff, and allowing us to move. Yes. It's true. The word muscle comes from the Latin *musculus*, "a muscle", which is formed by the word *mus*, or "mouse". Muscles were called such because the shape and movement of some muscles, most notably biceps brachii, were said to resemble mice. As wicked awesome as this is, I can't see "gun show" being replaced by "mouse frolic" at your local gym any time soon.

So, in honour of biceps brachii, this #flexfriday dedicate the flex to your #armmice

## References/Further Reading

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