Anatomy and Biomechanics of the Superior Labrum and the Long Head of the Biceps Tendon

The long head of the biceps tendon (LHB) and the glenoid labrum have been accepted as distinct entities for a long time. But several authors postulated doubts about this differentiation. Therefore, recent clinical, anatomical and biomechanical investigations showed different considerations and hypothesized the description biceps-labral-complex (BLC) to be more precise for defining the relevant anatomy and its pathologies.

The BLC can be separated into three clinically relevant zones:

- Inside, which includes the superior labrum and biceps anchor

The glenoid labrum is built on a wedge-shaped collagenous construction and acts to excavate the shallow fossa without varying its radius of curvature. Discrepancies of the normal anatomy are the Foramen sublabrale and Buford complex.

The attachment of the superior labrum is different from the inferior region including more elastic tissue whereas the antero-superior labrum needs to compensate more stress within the rotator interval and therefore contains more elastic fibers than posterior. 40-60% of the biceps tendon arise directly from the superior labrum with the remainder attached to the supraglenoid tubercle. According to Vangsness et al. four types of attachment can be distinguished which is important to know for fixing a SLAP-lesion.

- Junction, which includes the intra-articular portion of the LHB and its stabilizing pulley system

The intra-articular part of the LHB includes a hypovascular and watershed region 12-30 mm from its origin that makes it susceptible for damages. The biceps pulley system is a capsule-ligamentous complex that stabilizes the biceps tendon and is formed by fibers of the SGHL, CHL as well as SSC and SSP. The highest shear forces within this system exist in internal rotation and forward flexion with the arm at side.

- Tunnel, which includes the extra-articular LHB from the articular margin to the subpectoral area

The bicipital tunnel can be divided in three zones from the bony groove to the distal margin of the SSC (zone 1) to the so-called ‘no man’s land’ (zone 2) and the subpectoral region (zone 3).

EMG and cadaver studies suggest that the biceps acts as a humeral head depressor as well as a rotational and joint stabilizer but several clinical studies propose that there is only a minimal influence on stability to the LHB.

The maximum visualization during standard arthroscopy could be reached in 40° of abduction, 30° forward flexion and 90° of elbow flexion. But several studies could show that approximately 65% of pathologic conditions of the BLC were underestimated by arthroscopy and nearly 50% of chronic refractory BLC-lesions were based within the biceps tunnel.

Nevertheless, the current classification system may help surgeons to select their surgical techniques more accurately and to be aware of hidden lesions.