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Shoulder Impingement

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The glenohumeral joint is a highly complex articulation. It has the greatest range of motion of any joint in the body. However, its increased motion occurs at the expense of stability, requiring the soft tissues to play a more critical role in maintaining joint integrity.
As a result of increased mechanical demands, numerous soft-tissue injuries occur in the shoulder. In fact, shoulder pain is the third most common musculoskeletal disorder, following low back and cervical pain.[1]

Chronic injuries are common in the shoulder, and develop from the movement requirements in repetitive upper-extremity activities such as sports (e.g., tennis, swimming) and assorted occupations. Also problematic are activities requiring that the shoulder be held in an elevated position for prolonged periods. One of the adverse effects of repetitive motion or holding the shoulder in a static position for long periods is shoulder impingement. Shoulder impingement involves compression of soft tissues between the head of the humerus and the underside of the acromion process or coracoacromial ligament. Impingement might lead to tendinosis, rotator cuff tears, calcific tendinitis, bone spurs or subacromial bursitis.

There is a region in the shoulder composed of the acromion process, coracoacromial ligament, and coracoid process known as the coracoacromial arch (**Figure 1**). Several tissues are susceptible to compression under the arch: the upper margin of the glenohumeral joint capsule, coracohumeral ligament, supraspinatus muscle-tendon unit, tendon from the long head of the biceps brachii, and the subacromial bursa. Any of these tissues might be compressed against the acromion process or coracoacromial ligament.

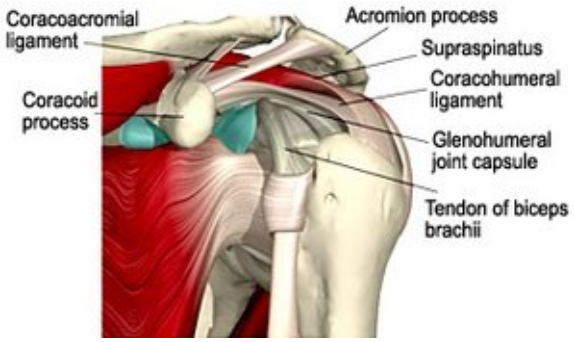

Figure 1

Anterior-lateral view of the shoulder showing the coracoacromial arch and tissues at risk of impingement. (3-D anatomy image courtesy of Primal Pictures Ltd. www.primalpictures.com). Impingement might result purely from the structure of the coracoacromial arch, but commonly results from a combination of architecture and repetitive motions, especially those involving flexion and internal rotation of the humerus. In some cases, bone spurs or osteophytes develop on the underside of the acromion process and serve to further decrease the subacromial space and impinge tissues.

There are three progressive stages of impingement syndrome.[2] Stage 1 is more common in patients 25 years old or younger. It is characterized by acute inflammation, edema and hemorrhage in the affected tissues. Repeated overhead use of the upper extremity usually is involved. Stage 2 occurs more often in patients between the ages of 25 and 40. There is a progressive degeneration in the rotator cuff structures that involves fibrosis and tendinitis. Stage 3 usually affects patients older than age 40. Tears of the supraspinatus and long head of the biceps tendon might occur. In addition, bone spurs and osteophytes might develop along the underside of the acromion and further contribute to subacromial impingement.

A further classification of impingement pathologies divides them into primary or secondary. Primary impingement is predominantly caused by the architecture of the subacromial region.[3] Primary impingement is directly related to the variations in shape of the acromion process. There are three variations in the shape of the acromion process (**Figure 2**),[4] which are described as Types 1, 2, and 3. A Type 1 acromion has a flat undersurface; Type 2 has a curved undersurface; and Type 3 is referred to as a hooked acromion. The hooked acromion is associated with a greater incidence of impingement syndrome.[5]

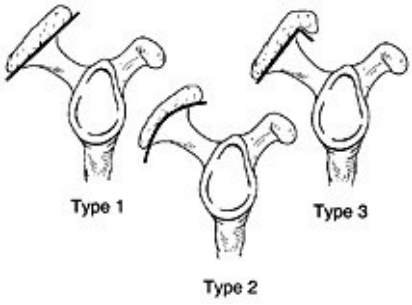

Figure 2

Three types of acromion process Magee D. Orthopedic Physical Assessment. 3rd ed. Philadelphia: W.B. Saunders; 1997.

Secondary impingement occurs without any specific alterations in the shape of the acromion process.

It is mostly a result of dysfunctional shoulder biomechanics, and is exacerbated by excessive motion or long periods of compression. Several biomechanical factors can contribute to secondary impingement, including rotator cuff muscle weakness, joint capsule restrictions and dysfunctional coordination of scapulothoracic muscles.[6]

Shoulder impingement is a challenging problem to treat because many of the affected tissues lie underneath the acromion process. However, in many cases, such as secondary impingement problems, repetitive motion and altered shoulder biomechanics aggravate the condition. In these cases, massage is a highly effective treatment to address the muscular dysfunction that leads to the biomechanical stress. Identifying which tissues underneath the acromion are affected is essential for constructing an effective treatment plan. A future installment of this column will investigate how to determine which of the different tissues are affected.

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