What is the anatomy of the shoulder complex?

The shoulder complex is made up of three bones, which are connected by muscles, ligaments, and tendons. The large bone in the upper arm is called the humerus. The shoulder blade is called the scapula and collarbone is called the clavicle. The top of the humerus is shaped like a ball. This ball sits in a socket on the end of the scapula. The ball is called the head of the humerus and the socket is called the glenoid fossa, hence the term "glenohumeral" joint. The glenoid fossa has a rim of tissue around it called the glenoid labrum. The glenoid labrum makes the glenoid fossa deeper. The glenohumeral joint is the most mobile joint in the body.

The glenohumeral joint is surrounded by a large, loose "bag" called a capsule. The capsule has to be large and loose to allow for the many movements of this joint. Ligaments reinforce the capsule and connect the humeral head to the glenoid fossa of the scapula. These ligaments work with muscles to provide stability to the glenohumeral joint. The glenoid labrum also helps provide stability to the joint.

Tendons connect muscles to bone. There are four muscles (supraspinatus, infraspinatus, subscapularis and teres minor) that surround the glenohumeral joint. These four muscles are attached to the scapula. They turn into tendons, which in turn attach to the humerus. The tendons of these four muscles make up the "rotator cuff" that blends into and helps support the glenohumeral joint capsule. The muscles of the rotator cuff and their tendons provide stability to the glenohumeral joint when the arm is in motion. The biceps muscle is located in the front of the upper arm. It has two tendons, one of which attaches above the glenoid fossa. This tendon runs down the front of the glenohumeral joint and provides added stability to the glenohumeral joint.
There are muscles that stabilize the scapula and others that help move the arm. The rhomboid muscles, trapezius muscle and serratus anterior muscle are a few of the scapular stabilizing muscles. The pectoralis major muscle, the deltoid muscle and the muscles of the rotator cuff are some of the muscles that move the arm at the glenohumeral joint. The upper part of the trapezius muscle also helps "shrug" the shoulder. All of the muscles that are part of the shoulder complex work together in order to move the arm through its many possible ranges of movement.

Finally, a bursa (pl. bursae) is a fluid filled sac that decreases the friction between two tissues. Bursae also protect tissues from bony structures. In the shoulder, the subacromial bursa (also called the subdeltoid bursa) covers the rotator cuff tendons and protects them from the overlying acromion process. Normally, this bursa has very little fluid in it but if it becomes irritated it can fill with fluid, become painful and also irritate the surrounding rotator cuff tendons.

**What is rotator cuff tendonitis and bursitis?**

Rotator cuff tendonitis is an inflammation of the tendons of the rotator cuff. Initially, microscopic tears form in the tendons. These tears trigger an inflammatory response, which causes pain. The supraspinatus tendon is the tendon that is most commonly affected. When the rotator cuff tendons become inflamed, the subacromial bursa may also become irritated and inflamed.

**What causes rotator cuff tendonitis and the associated bursitis?**

Rotator cuff tendonitis often occurs as a result of overuse, mechanical impingement on the tendons of the rotator cuff (see the impingement syndrome below), from age related degeneration of the rotator cuff or from all of the above. Rotator cuff tendonitis is often due to excessive overhead motions such as throwing or swimming.

**What is the "impingement syndrome"?**

Impingement syndrome is the term used to describe the pinching (impingement) of the rotator cuff tendons and the subacromial bursa between the head of the humerus and the acromion process of the scapula. This causes irritation and inflammation of the rotator cuff and the bursa. The rotator cuff and subacromial bursa are most likely to become pinched during overhead activities.

Impingement of the rotator cuff and the bursa occurs to some degree in everyone’s shoulder. Everyday activities that involve reaching above shoulder level cause some impingement. Continuously working with the arms raised overhead, repeated throwing activities, or other repetitive actions of the shoulder can also cause
Impingement. Impingement only becomes a problem when it causes irritation or damage to the rotator cuff tendons.

Usually, there is enough room between the acromion and the rotator cuff so that the tendons slide easily underneath the acromion as the arm is raised. But each time the arm is raised, there is a bit of rubbing or pinching on the tendons and the bursa. Raising the arm tends to force the humerus against the edge of the acromion process. With overuse, this can cause irritation and swelling of the bursa. If any other condition decreases the amount of space between the acromion process and the rotator cuff tendons, the impingement process may get worse.

**What does rotator cuff tendonitis and bursitis feel like?**

Pain related to rotator cuff tendonitis and bursitis usually occurs over the top and side (anterolateral) aspect of the shoulder, often with some radiation to, but not usually beyond, the elbow. Typically, the pain is aggravated by overhead activity and is worse at night. Patients often report a clicking or popping sensation in the affected shoulder. Biceps tendonitis frequently occurs in conjunction with rotator cuff tendonitis and bursitis.

In the early stages, rotator cuff tendonitis and bursitis causes a generalized shoulder ache. There may also be pain when raising the arm out to the side or in front of the body (the painful arc). Some people complain that the pain makes it difficult for them to sleep, especially when they roll onto the affected shoulder. As the condition worsens, the discomfort increases. The joint may become stiffer. Sometimes a "catching" sensation is felt when the arm is raised or lowered. Weakness and inability to raise the arm may indicate that the rotator cuff tendons are actually torn.

**Can rotator cuff tendonitis be detected on X-rays?**

The diagnosis of rotator cuff tendonitis is usually made on the basis of the medical history and physical examination. Your surgeon will order an X-ray to look for a curved or hooked acromion process or bone spurs around the AC joint. An MRI scan may be performed to rule out a tear of the rotator cuff. An MRI scan is a special imaging test that uses magnetic waves to create pictures that show the tissues of the shoulder in slices. The MRI scan shows tendons as well as bones. A MRI arthrogram involves injecting dye into the glenohumeral joint. If the dye leaks out of the glenohumeral joint, it suggests that there is a tear in the rotator cuff tendons. Injecting dye greatly increases the accuracy of the MRI allowing your physician to better treat shoulder pain.
What is the treatment for rotator cuff tendonitis?

Rotator cuff tendonitis is usually treated non-operatively. Treatment may include stretches, strengthening exercises, anti-inflammatory medications, rest or activity modification, and/or heat/cold therapy. In some cases a cortisone injection may be required to help decrease the pain and inflammation. Finally, people who do not improve with non-operative measures may benefit from surgery.

Adapted with permission from Santa Monica Orthopaedic Group Tom Knapp, M.D.