# Osteopathy Approach to Patients with Supraspinatus Tendonitis

## Research Paper for National Academy of Osteopathy
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Shoulder pain is a common complaint in the primary care setting. Prevalence studies indicate that 16 to 34 percent of the general population suffers from shoulder pain. Patients with rotator cuff pathology comprise a sizeable portion of this subpopulation

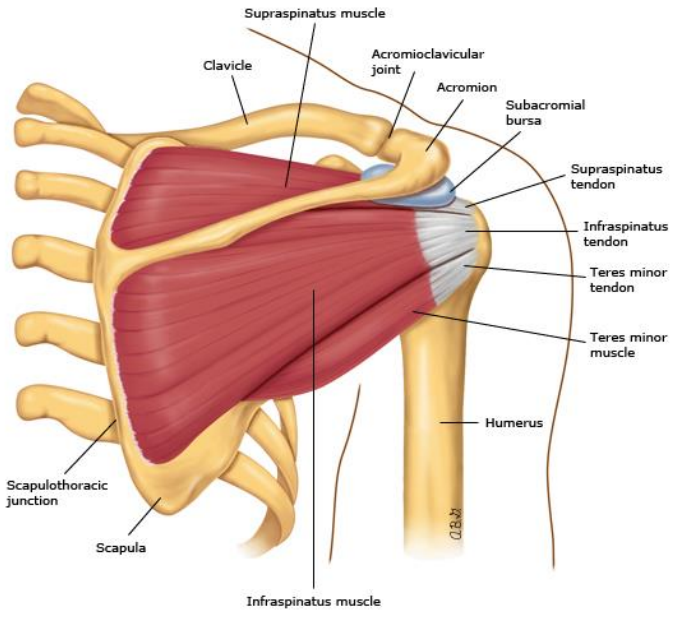
The incidence of shoulder complaints is approximately 11.2 cases per 1000 patients per year. Shoulder pain occurs more often in the elderly, in working populations, the incidence of shoulder-related symptoms may be as high as 14 to 18 percent

Supraspinatus tendonitis is often associated with shoulder impingement syndrome. The common belief is that impingement of the supraspinatus tendon leads to supraspinatus tendonitis (inflammation of the supraspinatus/rotator cuff tendon and/or the contiguous peritendinous soft tissues), which is a known stage of shoulder impingement syndrome (stage II) as described originally by Neer in 1972.

The causes of supraspinatus tendonitis can be broken down into extrinsic and intrinsic factors. Extrinsic factors are further broken down into primary impingement, which is a result of increased subacromial loading, and secondary impingement, which is a result of rotator cuff overload and muscle imbalance. In athletes whose sport involves stressful repetitive overhead motions, a combination of causes may be found.

**Epidemiology:** Frequency

United States: Supraspinatus tendonitis is a common cause of shoulder pain in athletes whose sports involve throwing and overhead motions.

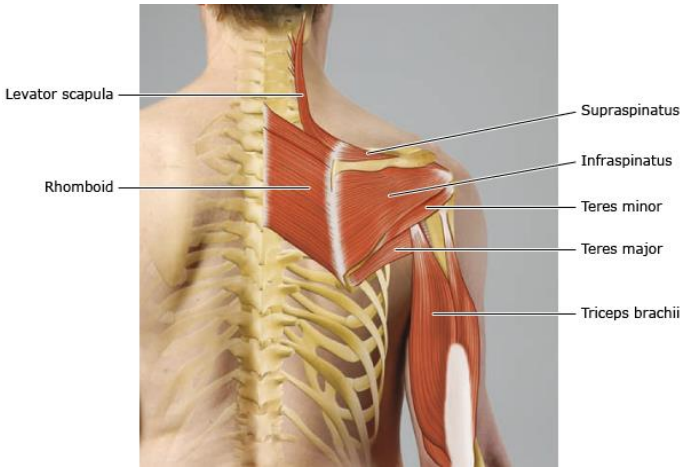



## Functional Anatomy

The shoulder consists of 2 bones (ie, humerus, scapula), 2 joints (ie, glenohumeral, acromioclavicular), and 2 articulations (ie, scapulothoracic, acromiohumeral). Several interconnecting ligaments and layers of muscles join these bones. The relative lack of bony stability in the shoulder permits a wide range of motion. Soft tissue structures are the major glenohumeral stabilizers.

The static stabilizers consist of the articular anatomy, glenoid labrum, joint capsule, glenohumeral ligaments, and inherent negative pressure in the joint. The dynamic stabilizers

include the rotator cuff muscles, long head of the biceps tendon, scapulothoracic motion, and other shoulder girdle muscles such as the pectoralis major, latissimus dorsi, and serratus anterior.




The rotator cuff consists of 4 muscles, which control 3 basic motions: abduction, internal rotation, and external rotation. The supraspinatus muscle is responsible for initiating abduction, the infraspinatus and teres minor for controlling external rotation, and the subscapularis for controlling internal rotation. The rotator cuff muscles provide dynamic stabilization to the humeral head on the glenoid fossa, forming a force couple with the deltoid to allow elevation of the arm. It is responsible for 45% of abduction strength and 90% of external rotation strength.

The supraspinatus outlet is a space formed by the acromion, coracoacromial arch, and acromioclavicular joint on the upper rim and the humeral head and glenoid below. It accommodates passage and excursion of the supraspinatus tendon. Abnormalities of the supraspinatus outlet have been identified as a cause of impingement syndrome and rotator cuff tendonitis.

## Sport-Specific Biomechanics

Overuse or repetitive microtrauma sustained in the overhead position may contribute to impingement and rotator cuff tendonitis. Shoulder pain and rotator cuff tendonitis are common in athletes involved in sports requiring repetitive overhead arm motion (eg, swimming, baseball, tennis).

## Clinical History

Supraspinatus tendonitis is often attributed to impingement, which is seldom mechanical in athletes. Rotator cuff tendonitis in this population may be related to subtle instability and therefore may be secondary to such factors as eccentric overload, muscle imbalance, and glenohumeral instability or labral lesions. This has led to the concept of secondary impingement, which is defined as rotator cuff impingement that occurs secondary to a functional decrease in the supraspinatus outlet space due to underlying instability of the glenohumeral joint.

Secondary impingement may be the most common cause in young athletes who use overhead motions and who frequently place repetitive large stresses on the static and dynamic glenohumeral stabilizers, resulting in microtrauma and attenuation of the glenohumeral ligamentous structures and leading to subclinical glenohumeral instability. Such instability places increased stress on the dynamic stabilizers of the glenohumeral joint, including the rotator cuff tendon. These increased demands may lead to rotator cuff pathology such as partial tearing or tendonitis, and, as the rotator cuff muscles fatigue, the humeral head translates anteriorly and superiorly, impinging on the coracoacromial arch, which leads to rotator cuff inflammation.

## Clinical Presentation and Examination

Patients with Supraspinatus tendonitis complain of shoulder pain with overhead activity. Painful daily activities may include putting on a shirt or brushing hair. Patients may localize the pain to the lateral deltoid and often describe pain at night, especially when lying on the affected shoulder. The history often reveals risk factors

Overhead athletes often complain of pain while performing their sport (eg, pitching, freestyle swimming), weakness, or a decline in performance. Reduced performance generally manifests as diminished speed, accuracy, or endurance.

Palpation – Supraspinatus tendonitis often creates tenderness over the affected musculature (supraspinatus, infraspinatus) or focal subacromial tenderness at the lateral or posterior-lateral border of the acromion.

Strength testing – Supraspinatus strength is evaluated by performing the "empty can" (or Jobe's strength) test. Internal and external rotation strength of the shoulder can be tested with the patient's arms at their sides and the elbows in 90 degrees of flexion. The push-off (or Gerber's lift off) test can be used to assess internal rotation strength

Test of Range of Motion Test the active range of motion if possible; if not, then test passive range of motion.

- Test forward flexion: the average range is 150-180°
- Test abduction: the average range is 150-180°
- Test external rotation: the average range with the arm in adduction is 30-60°, and the average range with the arm in abduction is 70-90°
- Test internal rotation: the average range is measured by how high the patient can reach up his or her back with the ipsilateral thumb (ie, ipsilateral hip, T12, L5). The average range is above T8
- Test adduction: the average range is 45°
- Test extension. The average range is 45°

The supraspinatus may be isolated by having the patient rotate the upper extremity so that the thumbs are away from the floor and resistance is applied with the arms at 30° of forward flexion and 90° of abduction.

## Differential Diagnoses

- Acromioclavicular Joint Injury
- Bicipital Tendonitis
- Brachial Plexus Injury in Sports Medicine
- Cervical Disc Injuries
- Cervical Discogenic Pain Syndrome
- Rotator Cuff Injury
- Shoulder Dislocation
- Shoulder Impingement Syndrome
- Swimmer's Shoulder
- Cervical Radiculopathy
- Cervical Spine Sprain/Strain Injuries
- Clavicle Fractures
- Contusions
- Myofascial Pain in Athletes
- Superior Labrum Lesions
- Suprascapular Neuropathy

## Osteopathy Approach:

### Management of Acute Phase

**The goals** of the acute phase are to relieve pain and inflammation, prevent muscle atrophy without exacerbating the pain, reestablish nonpainful range of motion, and normalize the arthrokinematics of the shoulder complex. This includes a period of active rest, eliminating any activity that may cause an increase in symptoms.

**Range of motion exercises** will help to prevent shoulder stiffness and the complications of adhesive capsulitis. include pendulum exercises and symptom-limited, active-assisted range-of-motion exercises.

Joint mobilization should be included with inferior, anterior, and posterior glides in the scapular plane. Generally, full range of motion should be achieved prior to strengthening exercises.

**Stretching and strengthening** of the muscles of the rotator cuff are basic components of the therapy. Strengthening exercises should be isometric in nature and work on the external rotators, internal rotators, biceps, deltoid, and scapular stabilizers (ie, rhomboids, trapezius, serratus anterior, latissimus dorsi, pectoralis major).

**The combination** of mobilization (ie, not keeping the arm in a sling) and exercise showed greater benefit than exercise alone.

**Eccentric exercise** is the application of a load (ie, muscular contraction) during the lengthening of a muscle. Several studies suggest that eccentric exercise stimulates healing and provides effective rehabilitation of tendinopathy.

**Modalities** that also may be used as an adjunct include cryotherapy, transcutaneous electrical nerve stimulation, high-voltage galvanic stimulation, ultrasound, phonophoresis, or iontophoresis.

**Ultrasound** theoretically stimulates tendon healing via collagen production, thereby increasing tensile strength

**Patient avoidance** of overhead activity, reaching, and lifting is particularly important for this acute phase. The restoration of range of motion, strength, and coordination (ie, kinetic chain restoration) marks completion of a therapy program.

### Management of Recovery Phase

**The initial goals** of this phase are to normalize range of motion and shoulder arthrokinematics, perform symptom-free activities of daily living, and improve neuromuscular control and muscle strength. Range-of-motion exercises are progressed to active exercises in all planes and self-stretches, concentrating on the joint capsule, especially posteriorly.

Strengthening includes **isotonic resistance exercises** with the supraspinatus, internal rotators, external rotators, prone extension, horizontal abduction, forward flexion to 90°, upright abduction to 90°, shoulder shrugs, rows, push-ups, press-ups, and pull-downs to strengthen the scapular stabilizers.

Other important goals include **maintaining joint motion and neuromuscular re-education**. Upper extremity ergometry exercises, trunk exercises, and general cardiovascular conditioning for endurance are also recommended. Therapies may be continued if necessary. Guidelines to advance are full, nonpainful range of motion when manual muscle testing of strength is 70% of the contralateral side.

**The final goal of this phase** is to progress to the point at which the athlete is again throwing and includes improving strength, power, endurance, and sports-specific neuromuscular control. Emphasis is placed on high-speed, high-energy strengthening exercises and eccentric exercises in diagonal patterns. Continue isotonic strengthening with increased resistance in all planes, allowing resistance in the throwing position, 90° of abduction, and 90° of external and internal rotation. Initiate plyometrics, sports-specific exercises, proprioceptive neuromuscular facilitation, and isokinetic exercises.

## Return to Play for Athletes

Return to play is restricted until full, painless range of motion is restored; both rest- and activity-related pain are eliminated; and provocative impingement signs are negative. Isokinetic strength testing must be 90% compared with the contralateral side. Resumption of activities is completed gradually, first during practice, to build up endurance, work on modified technique/mechanics, and simulate a game situation. Patients must be free of symptoms. To prevent recurrence, the patient should continue flexibility and strengthening exercises after returning to sports activities.

## Complications & Prognosis

If rotator Supraspinatus tendonitis is not diagnosed and treated promptly and correctly, it can progress to rotator cuff degeneration and eventual tear.

The prognosis is good for Supraspinatus tendonitis that is promptly and correctly diagnosed and treated. Of patients, 60-90% improve and are free of symptoms with conservative treatment.

## Education

Patient education may improve the outcome because the patient is educated regarding avoidance of provocative activities, pathology, and proper shoulder arthrokinematics. Education should also stress proper warm-up techniques, specific strengthening techniques, and warning signs of early impingement. A proper home exercise program should be formulated and encouraged to prevent recurrence of symptoms.

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