

## **SCAPULAR WINGING**

Scapular winging is a rare disorder often caused by neuromuscular imbalance in the scapulothoracic stabilizer muscles.

Lesions of the long thoracic nerve and spinal accessory nerves are the most common cause.

Patients report diffuse neck, shoulder girdle, and upper back pain, which may be debilitating, associated with abduction and overhead activities.

Accurate diagnosis and detection depend on appreciation on comprehensive physical examination.

Although most cases resolve nonsurgically, surgical treatment of scapular winging has been met with success.

True incidence is largely unknown because of under diagnosis.

Most commonly it is categorized anatomically as medial or lateral shift of the inferior angle of the scapula.

Primary winging occurs when muscular weakness disrupts the normal balance of the scapulothoracic complex.

Secondary winging occurs when pathology of the shoulder joint pathology.

Delay in diagnosis may lead to traction brachial plexopathy, periscapular muscle spasm, frozen shoulder, subacromial impingement, and thoracic outlet syndrome.

### **Anatomy and Biomechanics**

Scapula is rotated 30° anterior on the chest wall; 20° forward in the sagittal plane; the inferior angle is tilted 3° upward.

It serves as the attachment site for 17 muscles.

The trapezius muscle accomplishes elevation of the scapula in the cranio-caudal axis

and upward rotation. The serratus anterior and pectoralis major and minor muscles produce anterior and lateral motion, described as scapular protraction.

Normal Scapulothoracic abduction:

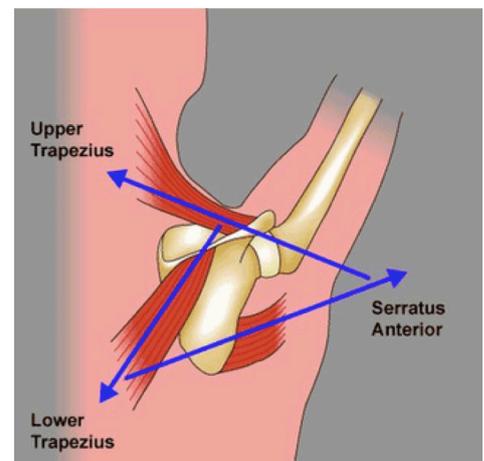
As the limb is elevated, the effect is an upward and lateral rotation of the inferior pole of scapula. Periscapular weakness resulting from overuse may manifest as scapular dysfunction (ie, winging).

### **Serratus Anterior Muscle**

Origin From the first 9 ribs  
Insert The medial border of the scapula.

The upper portion originates from the first and second ribs and inserts onto the supero-medial aspect of the scapula. This portion facilitates lateral rotation of the inferior scapular angle.

Nerve supply: Long thoracic nerve C5,6,7,



### **Trapezius Muscle**

Origin The external occipital protuberance, the medial one third of the nuchal line (ie, the ligamentum nuchae), and the spines of the 7 cervical and 12 thoracic vertebrae.

Insertion The superior fibers insert onto the posterior clavicle.  
The medial fibers insert onto the medial aspect of the acromion.  
The inferior component: onto the spine of the scapula.

Nerve supply Cranial nerve XI, the spinal accessory nerve.

### **Rhomboid Muscles**

Deep to the trapezius, the rhomboid minor muscle originates from the ligamentum nuchae and the spinous processes of C7 and T1. Inferior to this muscle lies the rhomboid major, which originates from the spinous processes of T2 through T5. The rhomboid minor muscle inserts at the level of the scapular spine, whereas the rhomboid major inserts distally on the medial scapula to the inferior angle. Both muscles serve to retract and elevate the scapula while rotating the inferior angle medially. The dorsal scapular nerve

innervates the rhomboid muscles, which derive mainly from the C5 nerve root.

### **Levator Scapulae**

The C5 nerve root via the dorsal also innervates the levator scapulae scapular nerve. These muscles originate from the first four cervical vertebrae and insert onto the medial borders of the scapulae. The levator scapulae elevate the scapula and assist in rotating the glenoid inferiorly.

### **Etiology of Winging**

#### **Serratus Anterior Muscle Palsy**

The most common cause of primary scapular winging

1. Compression, traction, and laceration of the nerve
2. The most common injury is neurapraxia after blunt or stretch injury:

Repetitive activities with the head tilted away from the nerve and the arm overhead—as occurs in baseball pitchers, javelin throwers, and tennis servers—may place the long thoracic nerve on stretch. Similarly, upper extremity overuse in industrial laborers and homemakers may also contribute to serratus anterior muscle palsy.

Atraumatic: Paralysis of the serratus anterior muscle has been associated with C7 radiculopathy, Transient brachial neuritis, Guillain-Barré syndrome,

#### **Trapezius Muscle Palsy**

Blunt trauma, such as assault or a direct blow from a football tackle or a lacrosse or hockey stick, may be associated with spinal accessory nerve palsy. Similarly, penetrating gunshot wounds, stabbings, and bite injuries have been implicated.

The most common cause of trapezius palsy is iatrogenic injury to the spinal accessory nerve during cervical lymph node biopsy.

#### **Rhomboid Muscle Palsy**

Avulsion of the C5 nerve root may occur with heavy lifting and motor vehicle accidents.

#### **Fascioscapulothoracic Dystrophy**

Fascioscapulothoracic dystrophy (FSHD) is an autosomal dominant genetic

neuromuscular dystrophy linked to chromosome 4q35 that predominantly affects the face, shoulder girdle, and upper limb muscles. Weakness in the trapezius, levator scapulae, and rhomboids relative to preserved strength in the deltoid and rotator cuff muscles leads to severe scapular winging.

### **Secondary Causes**

Painful intra-articular conditions of the glenohumeral joint cause patients to compensate for lost motion with the scapulothoracic articulation. Scapular stabilizers, such as the serratus anterior and trapezius muscles, quickly fatigue under the increased demands, producing winging. Common causes include subacromial bursitis, adhesive capsulitis, rotator cuff tears, and shoulder instability.

### **Patient Evaluation**

1. Fatigue, or muscle weakness, especially with elevation
2. Difficulty with ADL
3. Feel discomfort while sitting against hard surfaces



Serratus Anterior



Trapezius winging

4. Atrophy of the periscapular muscles
5. Paralysis of the serratus anterior muscle causes medial winging.

6. Paralysis of the trapezius muscle causes the inferior angle is rotated laterally
7. A palpable clunk with abduction may be a sign of an underlying osteochondroma.
8. If winging produced with forward elevation is eliminated with glenohumeral external rotation, then posterior instability is confirmed. Persistent winging with this maneuver suggests a complete serratus anterior muscle paralysis.

9. MCR Trapezius muscle function: a resisted shoulder shrug.

Rhomboid and levator scapulae: evaluated by having the patient place his or her hands on the hips and pushing the elbows posterior against resistance.

Serratus anterior muscle can be easily appreciated with the shoulder flexed to 90° while the patient performs push-ups or push against the wall.

### **Investigations**

1. CT may help to better characterize osteochondromas.
2. MRI: cervical disk disease, shoulder instability, or rotator cuff tears.
3. NCV and EMG are valuable adjuncts to confirm neuromuscular causes

### **Management**

1. For neurapraxia, observation of 6 to 12 months is undertaken. Physio exercises.
2. Acute transections are best managed with repair and nerve grafting, when necessary.
3. For recalcitrant neurapraxia, surgical muscle transfer is recommended.

Patients with serratus anterior muscle palsy are treated with pectoralis major muscle transfer augmented with autogenous hamstring graft.

5. In patients with recalcitrant trapezius palsy who require a muscle transfer, a modified Eden-Lange procedure is used. Originally described in 1924, the procedure involves lateralization of the rhomboid major, rhomboid minor, and levator scapulae insertions on the scapula, thereby allowing them to act synergistically for the three components of the trapezium