Scapular winging can markedly hinder the function of the upper extremity. Nerve damage represents the most common cause, most often to the long thoracic nerve, spinal accessory nerve, or, less commonly, the dorsal scapular nerve. This injury results in an abnormal scapulohumeral interaction during kinetic motion known as scapular dyskinesis. In this case report, the patient presented with scapular dyskinesis and medial scapular winging caused by overhead weight-lifting exercises, and a long thoracic nerve injury was diagnosed. Physicians are encouraged to consider long thoracic nerve damage in a patient with a history of repetitive overhead movements who presents with scapular dyskinesis and the corresponding restriction of overhead arm motions. Potential mechanisms of injury and treatment options are also discussed.

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Scapular winging refers to any alteration of the typical kinematics of the scapula during scapulohumeral movements. Nerve damage represents one of the many causes of this condition. Scapular dyskinesis seems to be most prevalent in athletes who routinely perform overhead motions, such as volleyball players and baseball players. The current patient presented with scapular dyskinesis and medial scapular winging caused by overhead weight-lifting exercises.
The leading differential diagnosis was mononeuropathy of the long thoracic nerve secondary to overhead weight lifting. The expanded differential diagnosis included rotator cuff tear, SICK scapula, glenohumeral instability, SLAP (superior labral from anterior to posterior) tear, acromioclavicular disease, biceps tendonitis, Parsonage Turner syndrome (brachial neuritis, neuralgic amyotrophy), and scapular osteochondroma. Right upper extremity electromyography (EMG) and a nerve conduction study (NCS) were ordered to assess the long thoracic nerve and periscapular musculature, and standard radiographic imaging of the shoulder and scapula were ordered to rule out osseous abnormality.

The EMG found evidence of a right long thoracic nerve injury by increased insertional activity with positive sharp waves and fibrillations in the serratus anterior on the right, which indicated active denervation. The remainder of muscles tested demonstrated normal insertional activity and motor unit action potential configuration. Results of motor NCSs of the right long thoracic, median, and ulnar nerves as well as the left long thoracic nerve were normal. No electrodiagnostic evidence of cervical radiculopathy, brachial plexopathy, or peripheral neuropathy was found in the right upper extremity. The shoulder/scapular radiographs revealed no remarkable findings. The results confirmed the diagnosis of long thoracic nerve injury resulting in scapular dyskinesis.

A conservative treatment plan was initiated and included an active scapular physical therapy program focusing on strengthening the serratus anterior, lower-middle trapezius, and rhomboid muscles, with a focus on functional tasks with proper scapular positioning and integration of closed kinetic chain exercises. The program also included stretching of the anterior chain,
specifically the pectoralis minor muscle, education on home exercises, and rib mobilization. A follow-up appointment was scheduled at 6 weeks.

**Discussion**

In athletes, damage to the long thoracic nerve commonly occurs when there is traction on the arm in the overhead position with the neck turned to the contralateral direction. Actions such as throwing a baseball or taking a breath during freestyle swimming may increase the risk of damage to the long thoracic nerve. The current patient’s weight-lifting program included repetitive military presses and leverage incline chest presses. Military presses require an overhead lift of weight, and it can be varied to incorporate both arms simultaneously or 1 at a time. Depending on the height of the incline, the leverage incline press can also incorporate a press movement greater than 90° from the trunk of the body. Both actions can injure the long thoracic nerve. The type of nerve injury in the current patient was classified as axonotmesis because denervation potentials were found on needle examination. However, some motor axons were still intact, indicated by a compound motor action potential found during the NCS. This finding led us to believe that the patient had a good prognosis, owing to the intact perineurium and epineurium. A good prognosis is implied with an axonotmesis nerve injury as long as the distance between the lesion site and end organ is not too long.

A few key factors explain how we arrived at the diagnosis of long thoracic nerve injury despite the normal results on motor NCS. The EMG showed increased insertional activity with positive sharp waves and fibrillation potentials in the serratus anterior muscle. These findings are indicative of active denervation. During the NCS, the long thoracic nerve was assessed by stimulating the Erb point and recording over the serratus anterior with surface electrodes. The serratus anterior is a large muscle spanning multiple intercostal levels; therefore, it is possible that the electrodes were placed over intact endplate zones and not directly over an area of denervation. We determined that the data collected
Rehabilitation, as in the current case, should focus on alleviating the scapular dyskinesis with proper strengthening exercises for the muscles that stabilize the scapula. Patients should also be encouraged to undergo osteopathic manipulative treatment, including correction of somatic dysfunction in the cervical, thoracic, rib, and upper extremity regions. Rib motion should be assessed with suspected exhalation dysfunction of ribs 6 to 9 (normal bucket handle motion), which could result from the impaired activation of the serratus anterior. Additional techniques include inhibition of myofascial tenderpoints along the right medial scapular border and scapular mobilization, supine pectoral traction, and thoracic mobilization to facilitate correction of postural derangement.

Consistent follow-up with patients who have long thoracic nerve injury is necessary during the therapeutic process to maximize the potential for functional recovery.

Conclusion
Although it is a rare phenomenon, an injury to the long thoracic nerve should be included in the differential diagnosis for a patient with scapular dyskinesis and medial scapular winging. If the patient also has a history of participating in activities that require repetitive motions of the arm in the overhead position, the likelihood of damage to the long thoracic nerve is greater.

References


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