

Concord Sport & Spine Newsletter



Interesting Case History: Massage resulting in long thoracic nerve injury

'Lara' is a 24-year-old healthy dance instructor. Following a gradual build-up of generalized muscle tension around her left shoulder and upper back, she decided to have a massage. She had not had any recent symptoms or dysfunction related to the right shoulder. She reported that the massage therapist worked in the region of her neck, upper back and both shoulders. This included techniques into the supraclavicular fossa, and lateral rib/scapular region. At one point, while the therapist was performing a very rigorous technique around her right lateral scapula, with her right arm abducted, she noticed severe pain and asked him to stop. She immediately felt "like something was out of place", and was unable to elevate her right arm. She consulted me the same day.

Examination:

The main findings were:

- On attempted shoulder flexion she was unable to elevate above 70 degrees, and even this was achieved with a lot of scapular hitching. There was associated medial scapular winging.
- A 'wall push-up' test revealed significant medial scapular winging, particularly when this was done with fingers and elbows pointing down.
- On manual stabilization of the scapula she was able to elevate the arm fully.

The clinical diagnosis was a *long thoracic nerve palsy*. While I have seen several cases over the years, I have never heard of one arising acutely after massage. I undertook a literature-search and found two similar cases.

Discussion:

The long thoracic nerve arises from the anterior rami

of the 5th to 7th cervical levels. It consists of an upper trunk, from C5 and C6, which courses through the scalenus medius muscle. The lower trunk, from C7, courses anterior to scalenus medius, and then blends with the upper trunk to form the common long thoracic nerve trunk. The nerve then travels below the brachial plexus, over the first rib, and down the lateral chest wall. It is a purely motor nerve and the only nerve that supplies serratus anterior⁵. It is reported to be thin and with sparse connective tissue compared to its length, and this is proposed to be the reason why it is susceptible to injury. It may be most susceptible to traction or compression where it exits from scalenus medius, or as it courses over the upper ribs^{2,3,5}. Cadaveric studies suggest that the nerve is particularly vulnerable when the ipsilateral arm is abducted overhead, and the cervical spine is rotated to the opposite side⁵.

The serratus anterior muscle arises from the anterolateral 1st to 8th (or 9th) ribs, and inserts along the medial scapular border, from the superior to the inferior angle. It functions to protract, anteriorly tilt, externally rotate, and elevate the scapula⁴. It is an essential scapular stabilizer, and importantly keeps the medial scapula approximated to the rib cage. Paralysis leads to winging of the medial scapular border.

There are many reported long thoracic nerve injury mechanisms. It is frequently associated with sports or occupations that involve repetitive abduction or heavy loading of the arm. Sports include weightlifting, swimming, tennis, golf, gymnastics, throwing-related sports, basketball, and archery^{3,4,5}. Iatrogenic causes include surgery in the region of the

lateral neck or axilla^{3,5}, and thoracotomy⁵. In a 2007 study of 50 patients, two cases were reported to have arisen after deep tissue massage³. In both cases the massage was to the supraclavicular region, and pain and paraesthesia were felt during the massage. There is one report of injury due to chiropractic manipulation⁶. Idiopathic cases are also reported and include *Parsonage Turner Syndrome*, and after viral infection.

Another cause of scapular winging is trapezius muscle paralysis, due to spinal accessory nerve palsy. The clinical appearance of this condition is different, with the scapula moving laterally and often rotating downward as it wings. Winging may also occur due to scoliosis, deltoid contracture, Sprengel's deformity, post-shoulder dislocation, and due to infraspinatus atrophy⁴. Rare causes are rhomboid paralysis², and after scapular muscle avulsion⁴.

After long thoracic nerve injury, the patient's symptoms may include pain in the region of the scapula, upper trapezius, anterior chest, and sometimes into the arm. A feeling of weakness is common. Many patients describe a burning sensation in the region of the inferior scapular angle². Symptoms may be vague initially, and become more troublesome several weeks after the initiating event⁵.

On examination, the patient will be unable to elevate the arm above 90° to 120°. Scapular winging will usually be observed during this movement. Further clarification can be gained by having the patient perform a wall push-up, particularly an 'underhand' push-up.

Further investigation may include electromyography or nerve conduction testing. However, electrodiagnostic studies are said to be unreliable^{2,3}. Sub-acutely, the patient may develop other problems due to muscular compensations and imbalances. These could include tendinopathies, adhesive capsulitis, subacromial impingement, and brachial plexus radiculitis³.

Approximately 75% of cases resolve spontaneously², with resolution taking anywhere from 1 to 24 months^{2,3}. The average recovery was said to be 9 months⁵. However, in some cases symptomatic resolution occurred, but a degree of scapular

winging remained². Physiotherapy is the mainstay of conservative management. Exercises include range of motion and stretching to avoid contracture^{1,2,5}. However, serratus anterior stretching is avoided. Scapular stabilization exercises are undertaken, as are exercises to strengthen the periscapular muscles. Manual therapy and massage help to reduce discomfort in areas of tension secondary to compensatory action. Orthotic devices and strapping have equivocal results^{2,5}. Once recovery is underway, more vigorous exercises can be undertaken.

Surgery has been advocated for patients who remain symptomatic beyond two years. Procedures which have been described include:

- Scapular fusion^{2,3,5}. This radical approach, not surprisingly, is associated with complications including restricted shoulder range, pulmonary compromise, and pseudoarthrosis².
- Sternal head of pectoralis major tendon transfer to the inferior angle of the scapula^{2,3}.
- Nerve decompression and neurolysis³.

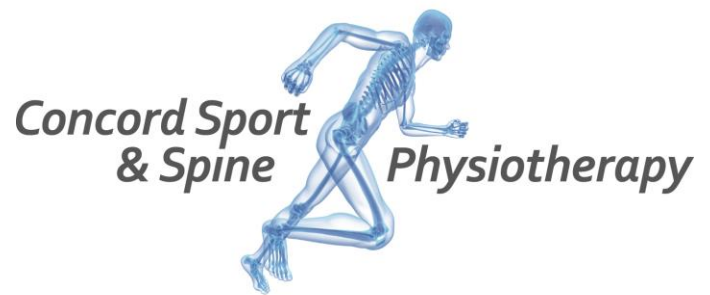
In the two cases of injury due to massage in the literature, both occurred with deep massage into the supraclavicular fossa. However, 'Lara' is adamant that her injury occurred while the therapist was working into her lateral scapular/rib region, while the arm was abducted overhead. Conceivably, this could have adversely tractioned the nerve, as it has been shown to be most vulnerable during shoulder abduction⁵. 'Lara' is undertaking an early stage exercise programme, and has been referred to her GP for confirmation of the diagnosis and possible further investigation. An informal letter has been sent to the involved massage clinic, with an explanation and recommendations of caution with particular techniques that may compromise the long thoracic nerve.

References:

1. Berthold, J et al (2017). Long thoracic nerve injury caused by overhead weightlifting leading to scapular dyskinesis and medial scapular winging. Journal of the American Osteopathic Association, 117, 133-137.
2. Martin, R & Fish, D (2008). Scapular winging:

anatomical review, diagnosis, and treatment. Current Reviews in Musculoskeletal Medicine, 1, 1-11.

3. Nath, R et al (2007). Microneurolysis and decompression of long thoracic nerve injury are effective in reversing scapular winging: long-term results in 50 cases. BMC Musculoskeletal Disorders. 8: 25.
4. Nawa, S (2015). Scapular winging secondary to apparent long thoracic nerve palsy in a young female swimmer. Journal of Brachial Plexus Peripheral Nerve Injury, 10, e57-e61.
5. Oakes, M & Sherwood, D (2004). An isolated long thoracic nerve injury in a navy airman. Military Medicine, 9: 713.
6. Oware, A et al (1995). Long thoracic nerve palsy following cervical chiropractic manipulation. Muscle & Nerve, 18, 11, 1351.



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