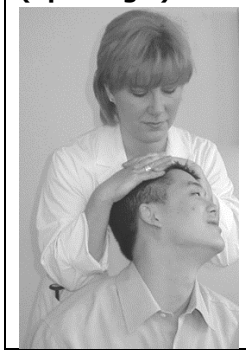
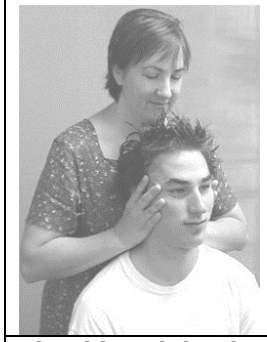
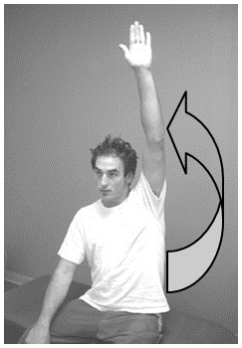
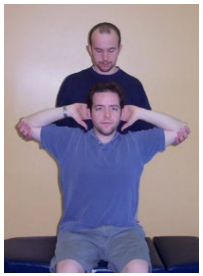
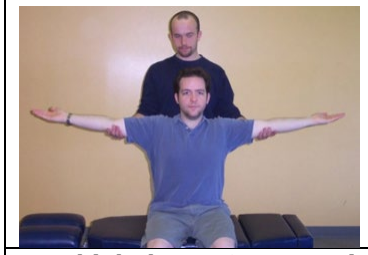
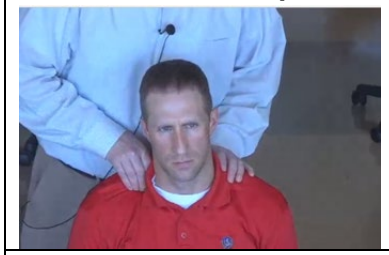
Orthopedic Tests for a Patient Presenting with Neck Pain and Arm Symptoms

A systematic review suggested that a combination of a positive Spurling's test (Maximum Cervical Compression), axial traction (Cervical Distraction) test, and the Arm Squeeze test may be used to increase the likelihood of a cervical radiculopathy, whereas a negative outcome of combined Upper Limb Neural Tension tests (ULNTT's) and the Arm Squeeze test may be used to decrease the likelihood. (Thoomes 2018)

Previous studies have suggested an optimal cluster of tests should include Spurling test, the shoulder abduction test, Valsalva maneuver, Cervical Distraction, and upper limb neural tension test. (Wainner 2000, Wainner 2003, Rubinstein 2007)

Test	Description	Interpretation	Reliability and Validity
Arm Squeeze Test 	The examiner squeezes the middle third of the patient's arm (fingers over biceps and thumb over triceps) with approximately 6 to 8 kg of force. For comparison, pressure of the same force is also applied to the acromioclavicular and anterolateral-subacromial area. The patient is asked to rate their pain with each squeeze.	Squeezing the middle third of the upper arm is more likely to elicit a reaction of local pain in patients with cervical nerve root irritation from C5 to T1. If it is more painful than the comparative squeezes, it is more likely that the shoulder pain is due to a nerve root lesion rather than a shoulder lesion. The test is considered positive when the patient rates the pain at least 3 points higher with the arm squeeze than with other squeezes.	A study by Gumina (2013) found a specificity of 96% with a +LR of 24 and a sensitivity of 95% with a -LR of 0.05. Interexaminer reliability was reported as *k*=0.81 and intraexaminer reliability as *k*=0.87.
Maximum Cervical Compression (Spurling's) 	Examiner stands behind a seated patient. Patient's cervical spine is brought into lateral flexion, extension, and rotation to the same side. Gradually increasing pressure is applied axially down through the neck.	Creation or reproduction of upper extremity pain, paresthesia or numbness is suggestive of a radicular syndrome. Aggravation or production of neck pain only, suggests a local cervical spine lesion.	The several studies on reliability of the various versions of cervical compression have found inter-examiner reliability to be moderate to fair. (Cleland 2011). Various studies have evaluated the diagnostic accuracy of cervical compression, but all performed slightly different movements before adding d axial compression. Regardless of head position, cervical compression appears to have a high specificity and moderate sensitivity for diagnosing radicular syndromes. (Thoomes 2018)

Test	Description	Interpretation	Reliability and Validity
Cervical Distraction 	The patient is seated in a neutral posture. The examiner places thumbs under the patient's occiput, thenar eminences under mastoid processes. The examiner gradually adds force superiorly up to about 5 to 30 pounds of lifting pressure.	A decrease in or centralization of arm symptoms suggests a radicular syndrome. An increase in local pain with distraction may suggest a soft tissue injury.	Specificity has been reported as high as 100% (Viikari-Juntura, 1987, 1989), although independent analysis of the data from these studies appears insufficient to support such a strong claim. A negative test has sensitivity ranged from 26-43% (Viikari-Juntura 1989). Relief of symptoms with up to 14 kg of traction) was useful in supporting a C6-C7 radicular diagnosis (90% specificity and LR+ 4.4), but not in ruling out the condition (44% sensitivity). (Wainner 2003)
Shoulder Abduction Test 	The patient is asked to actively raise (abduct) the symptomatic arm until it is near the head and to report if there are any changes in arm symptoms.	If shoulder abduction relieves the patient's arm pain, this suggests there is a radicular syndrome of the lower nerve roots. Patients may present in this posture to relieve radicular arm pain (Bakody's sign).	One study showed that when radicular symptoms decreased or disappeared when the patient lifted the affected hand above the head, there was moderate sensitivity and high specificity of this test (Viikari-Juntura 1989).
Shoulder Depression 	Standing behind a seated patient, the examiner first instructs patient to laterally bend the neck away from the side to be tested. Then while maintaining the head in that amount of lateral flexion with one hand, the other hand is placed on top of the patient's shoulder and applies gradually increasing pressure toward shoulder depression.	Reproduction or exacerbation of arm symptoms on the side being tested suggests Irritation/inflammation of the nerve root, spinal nerve or brachial plexus. Reproduction of arm symptoms may also be myofascial pain referral from stretching (e.g., anterior scaleni). Neck pain produced on either side may suggest a local cervical lesion.	Unknown

Test	Description	Interpretation	Reliability and Validity
Brachial Plexus Tension Test  	This test would only be performed if the patient reports arm symptoms with shoulder abduction. A seated patient is instructed to abduct the arms with elbows extended until the onset of arm symptoms. The patient then repositions the arms just short of symptoms. With examiner support under the elbows, the patient then flexes the elbows such that the hands are positioned behind the head.	Reproduction of arm symptoms with elbow flexion suggests an ulnar nerve lesion or C8 or T1 radiculopathy. Lack of symptom reproduction with elbow flexion suggests the painful abduction is more likely from a shoulder lesion.	Interexaminer reliability regarding nerve tension tests has been shown to be quite good. Cadaveric studies have confirmed that the positions utilized do, in fact, increase tension along the course of the nerve. Nerve tension tests have been shown to result in a large number of false positives, so interpretation of findings must be conservative.
Brachial Plexus Compression 	Standing behind a seated patient, the examiner creates firm compression over the brachial plexus with the thumb or fingers (just above the clavicle and posterior to the SCM).	Pain radiating between the shoulder blades or into the arm suggests cervical or brachial plexus neurological involvement. Local pain produced at the site of compression is a normal finding and not considered a positive finding.	The test had a sensitivity of 74% in patients with mechanical lesions around the nerve root and 69% in patients with lesions of the cervical cord. Specificity ranged between 79% and 83%. (Uchihara 1994)
Tinel Sign (Cervical Spine) 	Standing behind a seated patient, the examiner firmly taps over the posterior triangle, just posterior to the SCM, along the nerve trunks as the patient slightly laterally bends their neck away.	No response suggests that, if there is neurological injury, it is in the root rather than elsewhere in the cervical or brachial plexus. A pure tingling sensation (no pain) in the distribution of the nerve trunk suggests damage in the brachial plexus or root. Roots C5 and C6 are the most superficial and are most likely to respond	Unknown

Orthopedic Tests for Suspected Cervical Spine Lesions

Test	Description	Interpretation	Reliability and Validity
Cervical Flexion Rotation Test 	With the patient supine, the examiner sits or stands at the head of the patient and fully flexes the patient's cervical spine. While holding the flexed position, the examiner then rotates the patient's head to end range of both left and right rotation.	Decreased rotational range of motion may indicate hypomobility of the C1-C2 segment. In patients presenting with headache, loss of ≥ 10° of motion or recreation of the patient's headache pattern increases the likelihood that the headache is cervicogenic.	Two small studies have assessed the validity of this test for diagnosing cervicogenic headache. One found a specificity of 100 and sensitivity of 86 (Hall 2004). The other found a specificity of 90 with +LR of .91 and a sensitivity of 91 with a -LR of 0.1(Ogince 2007) One study on the inter-examiner reliability of this test showed K= .50 (Hall 2010).
Soto-Hall Test 	With the patient supine, one hand is placed on the patient's sternum to prevent lumbar and thoracic regions from flexing; the other hand is under the patient's occiput. The neck is then passively flexed towards the chest while maintaining gentle pressure on the sternum.	Localized pain suggests a possible joint or bone injury or pathology (but not lower than the T7 level).	Unknown
Deep Neck Flexor Endurance Test 	In the supine position, the patient is directed to maximally retract the chin and, while maintaining the retraction, lift the head about one inch off the table. The examiner places a hand on the table under the patient's head and observes for the skin folds in the neck created by chin retraction. The test is terminated when the patient's head touches the examiner's hand or separation of the skin folds occurs.	If the patient is unable to maintain the beginning position a loss of the skin folds, chin jutting, or shaking is observed this would be considered a failed test. The examiner may also place their hand under the patient's head to be able to feel when the patient's head lowers. Under normal circumstances the position should be able to be held for about 39 seconds. (Magee 2014) A failed test would indicate a potential need for improving strength and endurance of the involved muscles.	Various studies have shown this test to have moderate to high inter-examiner reliability (Cleland 2011) Validity is unknown

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