



Standard of Care: Cervical Radiculopathy

ICD 9 Codes: 723.4 (cervical radiculitis); 723.1 (neck pain)

Case Type / Diagnosis:

Cervical radiculopathy (CR) is defined as a disease of the cervical spine nerves caused by cervical disc herniation or a space occupying lesion, typically an osteophyte encroachment with cervical spondylosis¹. The above will impinge the cervical nerve root, cause inflammation and therefore cause radicular symptoms. The patient may report symptoms of sharp pain, tingling, or burning sensation². CR usually occurs spontaneously and is non traumatic in origin¹. The incidence of CR is significantly higher in patients who have spondylitic changes, rather than a cervical herniated disc¹. The incidence of CR peaks in the 4th and 5th decade of life⁷. The prevalence is 3.3 cases per 1000 people⁷.

Radicular symptoms will commonly follow dermatomal and myotomal patterns depending on the level affected. The most common involvements are the C6 and C7 nerve roots secondary to lesions at C5-C6 and C6-C7 cervical segments^{1,10}.

C3 nerve root from C2-C3: This type of radiculopathy is more unusual in clinical presentation. Patient may report pain into the back of the ear. Motor deficits cannot be detected².

C4 nerve root from C3-C4: Patient may report more of an unexplained neck and shoulder pain. There may be numbness from neck to superior aspect of the shoulder. Motor deficits may present in paradoxical respiration due to involvement of the diaphragm².

C5 nerve root from C4-C5: Patient may report numbness on the superior aspect of the shoulder which may travel laterally to mid arm. There may be profound weakness of deltoid and impaired biceps reflex².

C6 nerve root from C5-C6: Patient may report pain into the lateral aspect of the biceps and forearm and the dorsal aspect of the thumb and index finger. There may be motor deficits in wrist extension, elbow flexion and supination of the forearm. There may be impaired brachioradialis and biceps reflex. Sensory symptoms may mimic carpal tunnel².

C7 nerve root from C6-C7: This is commonly the more frequently involved nerve root. Patient may report pain into the back of the shoulder/ scapular area region, triceps and dorsum of the forearm and long finger. There may be motor weakness of triceps, wrist flexion and finger extension. There may be impaired triceps reflex².

Standard of Care: Cervical Radiculopathy

C8 nerve root from C7-T1: Patient may report numbness of the medial aspect of the arm, medial border of the hand and dorsal and volar aspect of the ulnar 2 digits. There may be motor weakness of the flexor digitorum profundus in the index and long finger and flexor pollicis longus FPL of the thumb. Patient may report difficulty using the hand for ADLs².

Indications for Treatment:

1. Pain into the cervical spine
2. Paresthesias into the upper extremity
3. UE weakness
4. Limited cervical AROM
5. Limited function due to neck pain: concentration, sitting or driving tolerance, computer use, cervical rotations, disturbed sleep

Contraindications / Precautions for Treatment:

1. Vertebral artery insufficiency
2. Osteoporosis/ osteopenia
3. Hoffman's sign/CNS involvement: flexion and adduction of the thumb with the examiner flexes terminal phalanx of the long finger⁶
4. History of cancer: Red flags
5. Prolonged history of steroid use

Evaluation:

Medical History: History of major illness, surgery, accidents, allergies; Family history¹¹.

History of Present Illness: Age; Describe what is bothering the patient; Was there trauma; Slow or sudden onset; Where are the symptoms; What increases or decreases the pain; How long has the problem existed; Has this happened before; Describe the type and duration of the pain; Experiencing any numbness or tingling into the arms or legs; Any changes in bowel or bladder function¹¹.

Any imaging performed:

Plain film: To rule out other insidious disease process; To visualize osteophytes¹; Gold standard for assessing bone- ABC's: bony Alignment, Bone quality, Cartilage and Soft tissue

MRI: To visualize soft tissue changes in disc, spinal cord, nerve root¹

EMG: The hallmark diagnostic test for lumbar and cervical radiculopathy; Moderate sensitivity and high specificity for cervical radiculopathy and peripheral nerve entrapment⁵

Myelography: To assess the effect of a space occupying lesion on the dural sac, nerve root and spinal cord¹

CT Scan with contrast: To enhance myelography in order to detect space occupying lesion with good resolution¹

CT scan : To enhance bony margins¹

Standard of Care: Cervical Radiculopathy

Social History: Work activity; Sports and leisure activity; Stress; Sleep patterns¹¹

Medications: Taking any medications for this problem¹¹; Taking any prednisone or steroids (currently or history of)- this is important to know secondary to its negative effects of mechanical properties of collagen resulting in a decrease in tensile strength

Examination:

Pain: Inquire regarding location, nature and intensity of pain

Palpation: Locate the tissue at fault and then palpate for tenderness to determine the extent of the injury within that tissue; Note differences in tissue tension and texture, differences in tissue thickness, abnormalities, tenderness, temperature variation, pulses, tremors and fasciculations, abnormal sensation, pathological state of tissues, moisture of the tissue¹¹

ROM: Before taking any ROM, first try to assume neutral position of the joint⁵. Cervical flexion, extension, BL sidebend can be measured with an inclinometer⁵. Cervical rotation can be measured with a goniometer⁵. Also consider thoracic ROM, TMJ, shoulder, elbow and wrist and hand to rule out involvement¹¹.

Strength:

Scapulothoracic strength³
Deep Neck Flexors strength³

Myotomes⁵:

C5: Deltoid
C6: Biceps Brachii, Extensor Carpi Radialis
C7: Triceps, Flexor Carpi Radialis
C8: Abductor Pollicis Brevis
T1: Dorsal Interossei

Sensation: Dermatomes testing with light touch or pin prick¹¹

C5: Deltoid area, anterior aspect of entire arm to base of thumb
C6: Anterior arm, radial side of hand to thumb and index finger
C7: Lateral arm and forearm to index, long, and ring fingers
C8: Medial arm and forearm to long, ring, and little finger
T1: Medial side of forearm to base of little finger

Posture/alignment: Patient may assume a posture of holding arm overhead to relieve symptoms (shoulder abduction sign); May also tilt head to contralateral side to relieve symptoms². Observe sitting posture from frontal and sagittal view.

Standard of Care: Cervical Radiculopathy

Reflexes:

C5-C6: Biceps, Brachioradialis⁵

C7: Triceps⁵

Functional Outcomes:

Neck Pain Disability Index (NPDI): This is used to measure a patient's level of pain. Patient asked to rate best and worst pain over the past 24 hours. There is 11 point scale from 0= no pain to 10= worst pain. The average of 3 ratings is used for a patient's pain over the last 24 hours⁹.

Neck Disability Index (NDI): This is a 10 item questionnaire with 7 questions related to ADLs, 2 questions related to pain and 1 question related to concentration. Each question is scored from 0-5 points. The total score is a percentage, with a higher score equaling greater disability. This test has moderate test-retest reliability. The NDI has also been shown to be a valid health outcome measure for population of people with cervical radiculopathy⁹.

Patient Specific Functional Scale (PSFS): The patient lists 3 activities that are difficult to perform secondary to their symptoms, injury or disorder. These 3 activities are rated on a scale from 0= unable to perform the activity to 10 =able to perform the activity as well as they could before experiencing the symptoms. The PSFS final score is an average of the 3 activity scores. This test has been shown to have high test-retest reliability and high validity for people with cervical radiculopathy⁹.

Provocative Tests:

Spurling's Test Part A: The patient is seated, the neck is passively side bent towards the symptomatic side and overpressure is applied to the head. Positive test= symptom reproduced⁵.

Shoulder Abduction Test: Patient is seated and asked to place the hand of the arm that has symptoms on their head. Positive test= symptom reduced or eliminated⁵.

Valsalva Maneuver: Patient is seated and asked to take a deep breath and hold it while attempting to exhale for 2-3 seconds. Positive test= symptoms reproduced⁵

Neck Distraction: Patient is supine and PT places their hands and chin and occiput. The patients head is put into a position of flexion to comfort and a distraction force is applied up to about 14 kg. Positive test= symptom reduced or eliminated⁵

Standard of Care: Cervical Radiculopathy

Upper Limb Tension Test Part A: Patient is supine and PT passively places the patient's symptomatic upper extremity in the following order:

- 1) scapular depression
- 2) shoulder abduction
- 3) forearm supination, wrist/finger extension
- 4) shoulder external rotation
- 5) elbow extension
- 6) contralateral then ipsilateral cervical side bend.

A Positive test = symptom reproduction, side to side differences (>10 deg) in elbow extension, symptomatic limb side: contralateral neck side bending increases symptoms or ipsilateral side bending decreases symptoms⁵

A study performed by Wainner et.al. concluded that the following 4 positive findings could help to diagnose cervical radiculopathy with a + Likelihood ratio of 30.3: 1) cervical rotation < 60° to symptomatic side 2) + Spurling's test 3) + ULTT Part A 4) + Cervical Distraction⁵.

Special Tests:

Tests for Upper Motor Neuron Lesions (Cervical Myelopathy):

- Romberg¹¹
- Lhermitte's Sign: sensation of electrical shock radiating down the spine, initiated with cervical flexion^{6,11}

Test for vascular signs:

- Vertebral Artery Test¹¹

Test for cervical instability:

- Sharp-Purser Test
- Transverse Ligament Stress Test¹¹
- Alar ligament Stress test¹¹

Differential Diagnosis:

1. Rotator cuff pathology¹
2. Shoulder adhesive capsulitis¹
3. Neurological disorders to be ruled out¹
 - a. Myelopathy: findings include: hyperreflexia, hypertonia, pathological reflexes⁶
 - b. Upper limb mononeuropathies of medial, ulnar or radial nerves
 - c. Brachial neuritis
 - d. Intracranial tumor
 - e. Axillary Tumor
 - f. Epidural varicose veins
 - g. Glenoid cyst
 - h. Vertebral artery dissection
 - i. Osteochondroma of upper cervical spine
4. Pancoast syndrome⁶ : presentation of paresthesia weakness in C8-T1 region

Standard of Care: Cervical Radiculopathy

5. Thoracic outlet syndrome⁶ : intermittent paresthesia and presentation of weakness in C8-T1 region
6. Carpal Tunnel Syndrome or other peripheral nerve entrapment⁶
7. Herpes Zoster⁶ : neuropathic pain in dermatomal distribution

Assessment:

Establish underlying reason for cervical pain and radicular symptoms and need for skilled physical therapy services

Problem List:

- 1) Pain into cervical spine, shoulder or upper extremity
- 2) Decreased cervical or UE ROM
- 3) Decreased strength into neck flexors, myotomes, back extensors, periscapular strength
- 4) Decreased sensation into myotomes
- 5) Decreased function
- 6) Impaired posture

Prognosis/ Expected Outcomes:

An article by Cleland et.al. looked to identify whether variables from the baseline examination or physical therapy interventions received could predict clinical outcomes for people with cervical radiculopathy. In order to be considered for this study, a diagnosis of cervical radiculopathy or arm and neck pain was necessary. As a result of this study, 8 predictor variables that were likely to predict short term success were found in patients with cervical radiculopathy. They are as follows⁹:

From the subjective history:

1. Age <54 years old
2. Dominant arm is not affected
3. Looking down does not worsen symptoms

From the clinical examination:

4. >30° cervical flexion

From the interventions:

5. Mechanical traction
6. Thoracic spine thrust manipulation
7. Not receiving soft tissue mobilization
8. Multimodal approach: manual therapy, cervical traction, deep neck flexor muscle strengthening

A logistic regression identified that these predictor variables would maximize the ability to identify a patient to experience successful outcomes: 1) age < 54 years old 2) dominant arm is not affected 3) looking down does not worsen symptoms 4) multimodal treatment for at least 50% of the visits including: manual therapy, cervical traction, deep neck flexor muscle strengthening. If 3 of the 4 variables are present, it was found that the physical therapist could

Standard of Care: Cervical Radiculopathy

Patient / family education

Education on posture: standing, sitting, sitting at computer or TV
Education on the nature of their symptoms, activities to avoid
How to listen to the symptoms
Be aware if they experience symptoms of loss of bowel or bladder control

Recommendations and referrals to other providers.

Ergonomics evaluation of work stations for posture

Re-evaluation

Standard Time Frame- 30 days or less as appropriate

Other Possible Triggers- A significant change in signs and symptoms, identify appropriate possibilities that happen in the case type

Discharge Planning**Commonly expected outcomes at discharge:**

Degree of functional recovery³
Resolution of impairments and functional limitations³
Meeting stated goals³
Meaningful change in the Functional outcomes measure
A change of 2-7 points is considered a minimally clinically meaningful for
NDI and for PSFS³
A change of 2 points is considered a minimally clinically meaningful for
NPRS³

Patient's discharge instructions

Continue with HEP

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Standard of Care: Cervical Radiculopathy

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Standard of Care: Cervical Radiculopathy

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