Cervical Radiculopathy – The Diagnosis and Management of Neck and Arm Pain

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What is Cervical Radiculopathy?

Cervical radiculopathy (CR) basically means “something wrong with a nerve root”. From a clinical standpoint, it is important to understand the mechanisms for cervical radiculopathy is it relates to what causes pain and what causes neurologic deficit.

It has been commonly believed that radicular pain resulted from compression of a nerve root.

How common is CR?

Surprisingly, there are few epidemiological studies that have examined incidence and prevalence of CR. Radhakrishnan, et al\(^1\), estimated the average annual age-adjusted incidence in Rochester, Minnesota to be 83.2 per 100,000 population. It is not clear whether there is an increased incidence by gender. The levels most commonly effected are C6 and C7 and there is conflicting evidence as to which of these levels is more common.\(^2\)

The most common causes of CR, in order of prevalence, are:
1. Lateral canal stenosis
2. Disc protrusion
3. Post surgical scar
4. Other space occupying lesions

Lateral canal stenosis is a condition in which, as a result of the degenerative process, osteophytes form on the zygapophyseal joints and the vertebral body and the ligamentum flavum hypertrophies. This can cause encroachment on the nerve root.
With disc protrusion, a piece of the nucleus pulposis herniates through the annulus fibrosus and encroaches on the nerve root.

In addition, other entities can occupy the space taken up by the nerve root, including tumor or infection.
T1 weighted post-contrast coronal MRI demonstrating adhesions around the right (viewer’s left) descending S1 nerve root. This is note the ring of high intensity (white) around the nerve root. Note also the absence of a lamina on that side. This person had undergone a right sided hemilaminectomy and had radiating leg pain attributed to post surgical adhesions. When ordering an MRI is a patient who has had previous surgery to the area of the spine being imaged, always order it with contrast.

Finally, other space occupying lesions, such as tumor or infection, can occur.

**What is the pathophysiology of CR?**

What actually causes the pain in CR depends on the anatomical process that is involved. In other words, the pathophysiology of nerve root pain in the case of lateral canal stenosis is different from that of disc protrusion. First, it must be realized that pressure on a nerve root, in and of itself, does not produce pain. If one were to apply direct pressure to the ulnar nerve at the elbow (the most accessible peripheral nerve site), one would not develop radiating arm or hand pain. Rather, one would develop paraesthesia, followed by numbness, follow by (if the pressure was maintained long enough) motor weakness. So in order to produce nerve root pain, something other than just pressure alone. Something else must be happening in order for the patient to experience pain.

In the case of lateral canal stenosis, very little is known about the actual mechanism of pain. However, there is evidence that vascular congestion occurs within the nerve root as a result of chronic compression and/or irritation to the nerve root. This leads to the development of intraneural adhesions. Further, it is thought that chronic irritation of the nerve root also produces adhesions between the nerve root and the osteophytes.
These adhesions can interfere with the normal mechanics of the nerve root. Normally, movements of the upper extremities cause the peripheral nerves, and thus the nerve roots, to move back and forth within the foramen. If there are significant adhesions present, these movements can cause tractioning of the nerve root, leading to the development of pain.

In the case of disc protrusion, the cause of the pain differs depending on the situation. In the acute stage, the pain is largely chemical in nature. The presence of certain chemicals from the nucleus pulposus, specifically glycoprotein, immunoglobulin G, phospholipase A₂, stromelysin, prostaglandin E₂, and cytokines⁵, causes inflammation of the nerve root, leading to pain. In addition, pain from the disc itself can produce pain in the cervical spine as well as referred pain in the upper extremity and scapula.

Once this inflammatory response resolves, there are often residual adhesions remaining⁶. So with chronic radicular pain related to disc protrusion, acute inflammation is not involved in pain generation, and the pain is likely related to the same tractioning of the nerve root with movement that discussed above in the case of lateral canal stenosis.

**How can cervical radiculopathy be diagnosed?**

There are several different disorders that can produced neck and arm pain. So the diagnosis of cervical radiculopathy must be made in the light of these other disorders. History, examination and, at times, imaging findings are all useful in establishing a diagnosis.

The diagnosis in any patient with spine related pain can be very challenging. This is primarily for 2 reasons. First, most cases of spine related pain are multifactorial. That is, there are usually several factors that are of importance in contributing to the clinical picture. The general approach to diagnosis in any patient with spine related pain can be based on what I refer to as a Diagnosis-Based Clinical Decision Rule⁷,⁸. This approach considers 3 questions, the answers to which will provide a working diagnosis:

1. Are the symptoms with which the patient is presenting reflective of a visceral disorder, or a serious or potentially life-threatening disease?
2. What specific tissue(s) is (are) the primary source(s) of this patient’s pain?
3. What has gone wrong with this person as a whole that would cause the pain experience to develop and persist?

A full examination of this clinical decision rule is beyond the scope of this course, but specifically with regard to the neck/ arm pain patient, it is important to rule out ominous disorders such as tumor, infection and fracture. In answering the first question of diagnosis, there are particular historical and examination factors to watch for:
### Red Flags for Potentially Serious Conditions in Neck/Arm Pain Patients:

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Detected by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>Previous history of CA, no position of relief, fever, constitutional symptoms, weight loss</td>
</tr>
<tr>
<td>Benign tumor</td>
<td>Localized severe pain, no position of relief, dramatic relief with NSAID, pain on percussion</td>
</tr>
<tr>
<td>Infection</td>
<td>History of fever and/or chills, fever on examination, pinpoint tenderness, redness or heat</td>
</tr>
<tr>
<td>Fracture</td>
<td>History of trauma, history of osteoporosis, pain on percussion</td>
</tr>
<tr>
<td>Seronegative spondyloarthropathy</td>
<td>Hx of iritis, AM stiffness, improvement with exercise, family Hx</td>
</tr>
<tr>
<td>GI disease</td>
<td>GI complaints, relation of pain to certain foods, abdominal examination</td>
</tr>
<tr>
<td>GU disease</td>
<td>GU complaints, bleeding, spotting, unusual discharge, GU examination</td>
</tr>
<tr>
<td>Myelopathy</td>
<td>Gait difficulties, bowel/ bladder dysfunction, UMN signs, spasticity, sensory level</td>
</tr>
<tr>
<td>Cauda equina syndrome</td>
<td>Bowel/ bladder difficulties, saddle anesthesia, decreased anal sphincter tone</td>
</tr>
</tbody>
</table>

### History

**Finding**
- Age >50 or <20
- Hx of CA
- Constitutional symptoms
- Recent infection
- No mechanical factors
- Symptoms in UE and LE
- Venous symptoms

**Suggestive of**
- Tumor or infection
- Mets
- Infection or tumor
- Infection
- Infection or tumor
- Myelopathy
- Subclavian Venous Thrombosis
### Exam

<table>
<thead>
<tr>
<th>Finding</th>
<th>Suggestive of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinpt tender spinous</td>
<td>Fracture or infection</td>
</tr>
<tr>
<td>Fever</td>
<td>Infection</td>
</tr>
<tr>
<td>Hyperreflexia w/ upgoing toes</td>
<td>Myelopathy</td>
</tr>
<tr>
<td>Palpable mass</td>
<td>Infection or neoplasm</td>
</tr>
<tr>
<td>Horner’s syndrome</td>
<td>Tumor</td>
</tr>
<tr>
<td>UE edema</td>
<td>Subclavian venous thrombosis</td>
</tr>
<tr>
<td>Palpatory cord in the axilla</td>
<td>Subclavian venous thrombosis</td>
</tr>
</tbody>
</table>

### Primary CA That Has Predilection for Bone

- Breast
- Lung
- Prostate
- Thyroid
- Kidney
- Bladder
- Endometrium
- Cervix
- Melanoma
In answering question #2, there are 4 clinical entities that are most important:

- Centralization signs – suggestive of disc pain
- Segmental pain provocation signs – suggestive of zygapophyseal joint pain
- Neurodynamic signs – suggestive of radiculopathy or some other source of neural pain
- Myofascial signs – suggestive of myofascial trigger points

In the patient with neck/ arm pain, any of these pain generators can be present, and some patients will have more than one. So meticulous examination must be carried out to determine the most relevant pain generator(s).
Centralization signs – Centralization is believed to occur in the presence of disc derangement, a condition in which a piece of the nucleus pulposus has shifted within an intact annulus. This can cause neck pain, but can also cause pain to refer into the scapula or arm. It is detected by the McKenzie protocols, in which the mechanical and symptomatic response to end range loading maneuvers is detected. If a characteristic pattern of centralization and peripheralization is found, disc derangement can be strongly suspected. Detailed examination of the McKenzie protocols is beyond the scope of this course.

Neurodynamic signs – this is the primary topic of discussion in this course. Radiculopathy can be detected by a combination of history, pain provocation tests and neurologic exam.

### Pain and neurologic dysfunction related to C5 radiculopathy.

<table>
<thead>
<tr>
<th></th>
<th>Pain</th>
<th>Sensory Disturbance</th>
<th>Reflex Disturbance</th>
<th>Motor Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typically</td>
<td>Neck, shoulder, medial border of the scapula, upper arm</td>
<td>Deltoid area, radial aspect of the upper arm</td>
<td>Biceps</td>
<td>Deltoid, biceps, supra- and infraspinatus</td>
</tr>
<tr>
<td>Occasionally</td>
<td>Radial aspect of the forearm</td>
<td>Entire upper arm and radial aspect of the forearm</td>
<td>Brachioradialis</td>
<td>Brachioradialis</td>
</tr>
</tbody>
</table>

### Pain and neurologic dysfunction related to C6 radiculopathy.

<table>
<thead>
<tr>
<th></th>
<th>Pain</th>
<th>Sensory Disturbance</th>
<th>Reflex Disturbance</th>
<th>Motor Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typically</td>
<td>Neck, shoulder, medial border of the scapula, radial upper- and forearm, thumb and index fingers</td>
<td>Thumb and index fingers, radial aspect of hand and forearm</td>
<td>Biceps, brachioradialis</td>
<td>Biceps, brachioradialis, wrist extensors</td>
</tr>
<tr>
<td>Occasionally</td>
<td>Ring finger, all fingers at once</td>
<td></td>
<td>Triceps</td>
<td>Forearm pronators, triceps, deltoid</td>
</tr>
</tbody>
</table>

### Pain and neurologic dysfunction related to C7 radiculopathy.

<table>
<thead>
<tr>
<th></th>
<th>Pain</th>
<th>Sensory Disturbance</th>
<th>Reflex Disturbance</th>
<th>Motor Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typically</td>
<td>Neck, dorsal and palmer surfaces of the forearm, medial border of the scapula</td>
<td>Middle finger</td>
<td>Triceps</td>
<td>Triceps, wrist flexors, finger extensors</td>
</tr>
<tr>
<td>Occasionally</td>
<td>Lateral epicondyle area, index finger, ring finger, all fingers</td>
<td>Index finger, index- and middle fingers, thumb, index- and middle fingers</td>
<td>Brachioradialis</td>
<td>Biceps, interossei, wrist extensors</td>
</tr>
</tbody>
</table>
Pain and neurologic dysfunction related to C8 radiculopathy.

<table>
<thead>
<tr>
<th></th>
<th>Pain</th>
<th>Sensory Disturbance</th>
<th>Reflex Disturbance</th>
<th>Motor Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typically</td>
<td>Neck, scapula, ulnar aspect of the upper arm and forearm, ring and little fingers</td>
<td>Ring and little fingers, medial forearm</td>
<td>None</td>
<td>Finger flexors, abductor pollicis brevis</td>
</tr>
<tr>
<td>Occasionally</td>
<td>All fingers, middle and ring fingers</td>
<td>Middle, ring and little fingers, ulnar side of the middle finger</td>
<td>Triceps</td>
<td>Triceps</td>
</tr>
</tbody>
</table>

*It is important to note that while textbooks commonly state that the pain from radiculopathy typically follows a specific dermatome, research has shown that this is not the case¹⁰⁻¹². So do not expect nerve root pain to be dermatome-specific! But, as can be seen in the above charts, scapular pain is common in patients with cervical radiculopathy, especially if it involves herniated disc.

Nerve roots that can be affected by HNP at each disc level.

<table>
<thead>
<tr>
<th>Disc Level</th>
<th>Nerve Root Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-3</td>
<td>C3</td>
</tr>
<tr>
<td>C3-4</td>
<td>C4</td>
</tr>
<tr>
<td>C4-5</td>
<td>C5</td>
</tr>
<tr>
<td>C5-6</td>
<td>C6</td>
</tr>
<tr>
<td>C6-7</td>
<td>C7</td>
</tr>
<tr>
<td>C7-T1</td>
<td>C8</td>
</tr>
</tbody>
</table>
Pain provocation maneuvers are useful. There are a number of orthopedic tests that are supposedly specific for the detection of cervical radiculopathy, but most of them have no known reliability or validity. However, Wainner, et al \(^\text{13}\) determined which examination procedures were best in making the diagnosis of cervical radiculopathy. They found that there were a number of reliable and valid tests, but the best cluster of tests were:

- The Brachial Plexus Tension Test – this is also known as the Upper Limb Tension test. This is analogous to the straight leg raise test for lumbar radiculopathy. With this test, maneuvers are applied to the brachial plexus that place a stretch on the peripheral nerves, the plexus and the nerve roots, and the degree of resistance to stretch is assessed, as is the production of pain. The most common form of the test that is of relevance to patients with cervical radiculopathy is performed like this:
  ⇒ The patient is supine and the shoulder is abducted to 90 degrees.
  ⇒ The wrist and fingers are extended
  ⇒ The forearm is supinated
  ⇒ The shoulder is externally rotated
  ⇒ The elbow is extended

The patient should be asked if the maneuver is painful and, more specifically, if the maneuver reproduces the patient’s pain. However, if it is does, one does not know for sure if the pain is arising from neural tension. So qualifying maneuvers can be used to make the test more specific to neural pain. If the head is laterally flexed away from the site being examined, this puts additional stretch on the brachial plexus along with its nerve roots and peripheral nerves. If this increases the pain, the pain is likely of neural origin. Also, if the downward pressure on the shoulder is released, tension is taken off the neural structures. If this reduces the pain, then the pain was likely neural in origin.
- Cervical Rotation limited to < 60 degrees due to pain
- Cervical Distraction test causes relief of pain
- Spurling’s test reproduces pain it should be noted that what these authors referred to as “Spurling’s test” was described as lateral flexion of the head toward the side of pain with slight extension, then pushing down on the top of the head. This is commonly known as the Maximum Cervical Compression or Jackson’s Cervical Compression test rather than Spurling’s test.

They found that if 3 of the 4 tests were positive, there was a 65% probability of the presence of cervical radiculopathy. If all four were positive, there was a 90% probability of the presence of cervical radiculopathy.

Myofascial signs - Trigger points are believed to be small areas of congestion that build up in an individual fascicle of muscle fibers. It detection is done via palpation. Palpation of trigger points has been shown to have good reliability in the cervical spine but the validity is unknown due to the lack of a Gold Standard.

In patients with neck and arm pain, the most important muscles to examine are the scalenes, as they can cause referred pain into the chest, scapula and arm.


Need to rule out myelopathy!
In any patient with confirmed or suspected cervical radiculopathy, it is essential that cervical spondylotic myelopathy, or some other spinal cord process, be ruled out. This is because spinal stenosis or disc protrusion can cause cord compression, if it is central in location.


So a good neuro exam is essential. This should include, at a minimum, sensory, motor and reflex examination of the upper and lower extremities, assessment of Rhomberg’s position with eyes closed, heel, toe and tandem walking and plantar response.

Should there be signs suggestive of upper motor neuron (UMN) lesion, it is important to then attempt to localize the lesion, so that the appropriate area can be imaged. That is, if the patient has, say, upgoing toes, he or she may have cervical myelopathy, but the UMN lesion can be anywhere in the CNS, and the physician will need to localize the lesion in order to decide what part of the spine to image, or if the brain is the appropriate area to image.

Clinical examination can be very helpful in this localization. It is carried out by moving up the neuraxis and assessing the upper motor neuron function as well as sensory function, along the way:

1. Umbilical reflexes – if these are absent, the lesion is at least at the level of the mid thoracic cord.
2. Hoffman’s or Tromner’s reflex – if these are present, it places the lesion at least at the level of the mid cervical cord. It is important to remember, however, that these reflexes are not pathological, they are signs of hyper-reflexia. So their presence does not, in and of itself, indicate the presence of an UMN lesion. However, in the presence of upgoing toes, they can help to localize the lesion.
3. Scapulohumeral reflex – this is performed by tapping the acromion with the reflex hammer. Elevation of the shoulder in response to this places the lesion at least at the upper cervical cord. As with Hoffman’s or Tromner’s reflex, however, this is not a pathological reflex, only a sign of hyper-reflexia.

4. Jaw jerk reflex – this places the lesion at least at the brainstem.

5. Sensory level – this is done by touching the patient with a pin on the rank, gradually moving upward to the cervical spine. The patient is asked if there is a point at which the pinprick suddenly becomes more pronounced. This helps to localize the level of sensory deficit.

If neuro exam localizes the lesion to the cervical spine (i.e., all of the above are positive except jaw jerk), MRI of the cervical spine should be ordered. The most common cause of cervical myelopathy is cervical spondylosis, but there are other less common causes of which the physician needs to be aware.

Cervical myelopathy caused by tuberculosis.
In seeking an answer to question #3 of the 3 questions of diagnosis, we look for those factors that are serving to perpetuate the problem, i.e., if the problem has become chronic, we seek to find those factors that have allowed this chronic state to occur.

There are several factors that contribute to the development of chronicity in spinal pain patients. There are varying degrees of evidence in support of these factors, and research is ongoing to determine what these factors are and how we can detect them clinically.

The factors that are believed to be most important in the perpetuation of cervical radiculopathy are:

- Dynamic instability
- Central pain hypersensitivity
- Fear
- Catastrophizing
- Passive coping
- Depression

1. Dynamic instability is believed to arise from a disruption in the normal motor control mechanism by which the cervical spine protects itself during everyday movements. Not a great deal is known about these mechanisms at present, but it is believed the in patients with chronic cervical pain syndromes, there develops an imbalance in muscle activity in which the deep cervical flexors and lower cervical and upper thoracic extensors become inhibited.

The inhibition of the deep cervical flexors can be detected with the craniocervical flexion test \(^{17}\), in which the patient lies supine and a modified blood pressure cuff is placed under the cervical spine.

The patient is instructed to gently nod the head, restricting the movement to the upper cervical spine, until the pressure cuff reaches 22 mmHg, i.e. just one mark on the pressure dial. The doctors sees if they can hold the position steadily. If successful at that pressure, the patient relaxes and repeats to each 24 mm Hg, 26 mm Hg and 28 mm Hg to a maximum of 30 mm Hg. Pressures higher than 30mmHg are not relevant.

The pressure that the patient can hold steady is the one at which endurance capacity is measured. The patient performs 10 repetitions of 10 sec holds.

A normal test would be the patient being able to target to at least 26 mmHg in a slow controlled manner. This is a minimum requirement for a satisfactory performance. 28mm Hg and 30 mm Hg are the ideal targets and should be the targets in a rehabilitation process. Also, the patient should be able to hold a steady contraction at their target level for 10 repetitions of 10 seconds each.

A test that is simpler and easier to perform, but is not quantifiable and, as of yet, unvalidated, it the Cervical Stability test.

**Cervical Stability Test**

This test allows the assessment of the deep cervical flexors and the ability of these muscles to maintain stability of the cervical spine. The deep cervical flexors, when acting as stabilizers, must have both a short reaction time (brought about by the Type II fibers) and a long endurance
capacity (brought about by the type I fibers). This procedure tests both functions as well as the balance between the deep cervical flexors and the sternocleidomastoid (SCM) muscle.

The patient is supine and the doctor passively prepositions the head in the neutral position with the chin slightly tucked. The clinician tells the patient that he or she is going to let go of the head and that he or she should continue to hold it in this exact position. The clinician then lets go of the head and observes

Normal Pattern: Maintenance of head position without excessive shaking.

Faulty Pattern: Any of the following responses, listed in order of commonness:
- The chin pokes
- The head shakes excessively
- The entire cervical spine flexes
- The head drops into extension

Indicative of: Inhibition of the deep cervical flexors and/or hypertonicity of the SCM’s, thus producing dynamic instability of the cervical spine. The presence of shaking suggests that transformation of type I to type II fibers has taken place in the deep cervical flexors.
1. Central pain hypersensitivity is a condition in which the nociceptive system has undergone a change whereby incoming nociceptive information is amplified on its way to the cerebral cortex and non-nociceptive information is transmitted as if it was nociceptive. This creates a heightened and exaggerated pain state in which the patient’s experience of pain is out of proportion to the degree of tissue pathology. There are no definitive diagnostic test that can identify the presence of central pain hypersensitivity, but clinical findings can help the clinician to at least suspect its presence. This will be discussed below.

2. Fear and catastrophizing are important factors in the perpetuation of spinal pain that are poorly appreciated by most chiropractors and other physicians who are trained in a purely somatic approach. In some cases, these may be the most important factors.

There are a number of simple questionnaires that are available that are useful in detecting the degree to which fear beliefs are playing a role in the perpetuation of pain. Probably the 2 best are the Fear Avoidance Beliefs Questionnaire $^{18, 19}$ and the Tampa Scale for Kinesiophobia.
FABQ

Here are some of the things which other patients have told us about their pain. For each statement please circle any number from 0 to 6 to say how much physical activities such as bending, lifting, walking or driving affect or would affect your back pain.

<table>
<thead>
<tr>
<th></th>
<th>Completely disagree</th>
<th>Unsure</th>
<th>Completely agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My pain was caused by physical activity .......................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>2. Physical activity makes my pain worse ..........................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>3. Physical activity might harm my back ............................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>4. I should not do physical activities which (might) make my pain worse ........................................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>5. I cannot do physical activities which (might) make my pain worse ...............................................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
</tbody>
</table>

The following statements are about how your normal work affects or would affect your back pain.

<table>
<thead>
<tr>
<th></th>
<th>Completely disagree</th>
<th>Unsure</th>
<th>Completely agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. My pain was caused by my work or by an accident at work .................................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>7. My work aggravated my pain ..........................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>8. I have a claim for compensation for my pain ..........................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>9. My work is too heavy for me ..........................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>10. My work makes or would make my pain worse .........................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>11. My work might harm my back ........................................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>12. I should not do my normal work with my present pain ..........................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>13. I cannot do my normal work with my present pain ..........................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>14. I cannot do my normal work till my pain is treated ..................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>15. I do not think that I will be back to my normal work within 3 months ..................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>16. I do not think that I will ever be able to go back to that work ..........................</td>
<td>0</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
</tbody>
</table>

Name ____________________________

Date ________________
The Tampa Scale

Name: ________________________                     Date:

In these days of high-tech medicine, one of the most important sources of information about you is often missing from your medical records; your own feelings or intuitions about what is happening with your body. We hope that the following information will help to fill that gap.

Please answer the following questions according to the scale on the right. Please answer according to your true feelings, not according to what others think you should believe. This is not a test of medical knowledge; we want to know how you see it. Circle the number next to each question that best corresponds to how you feel.

Please turn the page and answer these questions by yourself.

We want to know how you feel, not someone else.
The Tampa Scale

Read each question and circle the number that best corresponds to how you feel.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

<table>
<thead>
<tr>
<th>Question</th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I’m afraid that I might injure myself if I exercise</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. If I were to try to overcome it, my pain would increase</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. My body is telling me I have something dangerously wrong</td>
<td></td>
<td>2</td>
<td>3</td>
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<tr>
<td>4. My pain would probably be relieved if I were to exercise</td>
<td></td>
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<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. People aren’t taking my medical condition seriously enough</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. My pain problem has put my body at risk for the rest of my life</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. Pain always means I have injured my body</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. Just because something aggravates my pain does not mean it is danger</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. I am afraid that I might injure myself accidentally</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. Simply being careful that I do not make any unnecessary movements</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. I wouldn’t have this much pain if there weren’t something potentially dangerous going on in my body</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
12. Although my condition is painful, I would be better off if I were physically active……………………………………………1 2 3 4

13. Pain lets me know when to stop exercising so that I don’t injure myself……………………………………………………… 1 2 3 4

14. It’s really not safe for a person with a condition like mine to be physically active………………………………………………1 2 3 4

15. I can’t do all the things normal people do because it’s too easy for me to get injured…………………………………………1 2 3 4

16. Even though something is causing me a lot of pain, I don’t think it’s actually dangerous………………………………………1 2 3 4

17. No one should have to exercise when she/he is in pain…… 1 2 3 4

Thank you for taking the time to answer these questions about you!
It appears that there is a close relationship between central pain hypersensitivity and psychological factors.

The clinical test that shows promise in detecting central pain hypersensitivity, and perhaps fear and catastrophizing, in low back pain patients is the examination for nonorganic signs. It is unknown whether these are as useful in the cervical spine, but there is evidence that this examination has validity in cervical patients\(^\text{20}\).

A group nonorganic signs, based on those of Waddell, have recently been developed and shown to be reliability. Their validity and full clinical usefulness has yet to be established, but they have potential in the detection of a significant illness behavioral component to patients with chronic cervical related pain.
**Cervical Nonorganic Signs**

<table>
<thead>
<tr>
<th>Sign</th>
<th>Test Site</th>
<th>Criteria for Positive Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Palpation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Superficial tenderness</td>
<td>Palpation of the cervical and upper thoracic region</td>
<td>Pt complains of pain with light touch or light pinching of the skin</td>
</tr>
<tr>
<td>b. Nonanatomic tenderness</td>
<td>Deep palpation of the cervical, thoracic, lumbar and brachial regions</td>
<td>Pt complains of widespread tenderness, i.e., outside the cervical and upper thoracic regions</td>
</tr>
<tr>
<td>2. Simulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation of the head, shoulder, trunk pain with rotation and pelvis while standing</td>
<td>Examiner rotates the pt’s head, shoulders, trunk and pelvis</td>
<td>Pt complains of pain</td>
</tr>
<tr>
<td>3. Cervical Range of Motion</td>
<td>Pt rotates head as far as possible to the right and left</td>
<td>Rotation is less than 50% normal in each direction</td>
</tr>
<tr>
<td>4. Regional disturbance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Sensory loss</td>
<td>Light touch or pinprick</td>
<td>Pt reports diminished sensation in a pattern that does not correspond to a specific dermatome or peripheral nerve</td>
</tr>
<tr>
<td>b. Motor loss</td>
<td>Manual muscle testing</td>
<td>Weakness is detected in a nonanatomic pattern, particularly “breakaway” weakness. Also positive if the patient appears to have normal strength with activity but weakness on exam</td>
</tr>
<tr>
<td>5. Overreaction</td>
<td>Observation</td>
<td>Examiner feels the pt is “overreacting” during history or exam. This includes: 1. Moderate to extremely stiff, rigid or slow movements 2. Rubbing the affected area for more than 3 sec 3. Clutching, grasping, or squeezing the area for more than 3 sec. 4. Grimacing due to pain 5. Sighing</td>
</tr>
</tbody>
</table>
What are the best forms of treatment for CR?

Assuming that the answer to question #1 is no, i.e., there are no significant factors that suggest a non-mechanical etiology, we can formulate a management strategy based on the answers to questions #2 and 3. That is, we can utilize treatments that address the most important pain generators and the most important perpetuating factors.

By definition, the patient with cervical radiculopathy has nerve root pain as at least one of the primary pain generators. But they may have one or more additional pain generators that need to be addressed. The approaches that are recommended for each of the known pain generators are as follows:

Disc derangement is treated with end range loading in the direction of centralization. That is, the patient is taught maneuvers, and the practitioner applies maneuvers, that repeated move the cervical spine in the direction that the examination procedure determined was the directional preference.

Joint dysfunction is best treated with manipulation. Manipulation in the cervical spine has a significant track record both clinically and in the literature. However, few studies have evaluated the effectiveness of manipulation in the presence of radiculopathy. But, as has been the focus in this whole course, it is suggested that manipulation would not be used for radiculopathy per se, but, rather, is a treatment for painful joint dysfunction.

Myofascial trigger points are treated with ischemic compression or muscle lengthening procedures.

Neural tension or irritation, which includes nerve root pain, is treated according to the level of chronicity. In acute nerve root pain, which usually arises from disc protrusion, the pain is chemical, resulting from inflammation that arises from the chemical presence of nuclear material. Thus, it requires an anti-inflammatory approach. This may include non-steroidal anti-inflammatory medications, oral steroids, or epidural steroid injections. Ice applications are also helpful. These have only a short-term effect, but short term relief is all that it need to decrease patient suffering quickly and allow the physician to move on to more active treatments. There is no evidence that electrical modalities such as interferential or galvanic current, or ultrasound are useful for this purpose.

If the radicular pain is chronic, it likely arises from intra- or extra-radicular fibrosis. The best treatment for this is neural mobilization in which maneuvers are applied that gently mobilize the involved nerve root, theoretically freeing it from the entrapment.

In response to question #3, we can come up with methods by which we may address the one or more perpetuating factors involved. In the case of dynamic instability, cervical stabilization training can be applied. This consists of a system of exercises designed to train the co-contraction of the muscles that provide stability to the spine. Because the deep cervical flexors and lower cervical and upper thoracic extensors are the muscles that tend to become inhibited in patients with chronic neck pain, cervical stabilization training begins with training co-contraction of these muscles. This is accomplished by an exercise
Once appropriate co-contraction is attained, strength, coordination and endurance training can be instituted.

A full description of the process of cervical stabilization training is beyond the scope of this course, but details can be found in 27.

Also, convenient patient handout booklets which the physician can provide to the patient are available at http://optp.com/index.cfm/pageid/251/productid/8722. These contain full descriptions and photos of the various exercises to save the physician time in teaching the exercises to the patient. They can be provided at a relatively low cost to the patient.

Central pain hypersensitivity and fear and/or catastrophizing usually occur hand in hand to varying extents. These can all be addressed by, first, treating those peripheral pain generators that do exist, then using a graded activity approach by which we, though the use of exercise and activity of daily living, we introduce movements and activities which provoke pain and fear, but to a level that the patient can handle. We then allow them to adapt to this activity. Once the patient has adapted, we increase the intensity of the activity to a level that again provokes pain and fear, but that again the patient can handle. We continue this process to gradually desensitize both the nociceptive system and the fear and catastrophizing.

This graded activity approach, however, must be done in an environment of education as to the nature of chronic pain, focusing on the message that 1) those pain signals that are arising from the periphery are being amplified by the nociceptive system and 2) some non-pain signals (i.e., signals related to joint movement or muscle activity) are being transmitted as if they are pain signals. Thus, the experience that the patient is having of severe tissue damage is inaccurate. Because there is no real tissue damage, only dysfunction, it is safe to resume activities under guidance, to gradually desensitize the nociceptive system and train it to stop amplifying the signals from the periphery.

**How do we decide when to recommend surgical consult in patients with CR?**

Decision for surgical referral should be based on the following criteria:

- Progressive neurologic deficit that does not improve with an *adequate* trial of nonsurgical care
- Intractable pain that does not improve with an *adequate* trial of nonsurgical care
- Severe motor loss, even of recent onset
- Signs of myelopathy

Cervical radiculopathy is a disorder that is fairly common and well within the chiropractor’s ability to effectively manage. This management requires a firm understanding of the
pathophysiology, clinical features, differential diagnosis and treatment strategies that are unique to the CR patient.

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REFERENCES


7. Murphy DR, Hurwitz EL. A theoretical model for the development of a diagnosis-based clinical decision rule for the management of patients with spinal pain. BMC Musculoskeletal Disord. 2007;8:75.


