The Benjamin Advanced Training

Soft Tissue Injury Assessment and Therapeutic Techniques for Experienced Practitioners

The Neck

Revised January, 2007
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Anatomy of Relevant Structures

Vertebrae:
- Spinous & transverse processes
- Vertebral & basilar arteries
- Zygapophyseal (facet) joints & capsules
- Intervertebral discs

Nervous tissue:
- Spinal nerves
- Nerve roots
- Nerve trunks

Ligaments:
- Nuchal (*ligamentum nuchae*)
- Supraspinous
- Interspinous
- Intertransverse

Muscles:
- Sternocleidomastoid
- Trapezius
- Suboccipitals
- Scalenes
- Splenius capitus
- Splenius cervicis
- Levator scapula
Supraspinous ligament (A), interspinous ligament (A1), and intertransverse ligament (B).

Supraspinous ligament (D), vertebral body (E), and intervertebral disc (F).

Intervertebral disc (F), spinal nerve (G), and intervertebral foramen (H).
Before testing the neck:

- Observe the position of the neck and head. Get a sense of the mechanical stresses involved.

Here is the first group of tests for the neck (and what you’re looking for when you execute them); in these tests, you’re evaluating range of motion and pain.

1–2. Active rotation, R and L (pain & limitation)

3–4. Active side flexion, R and L (pain & limitation)

5. Active flexion (pain & limitation)

6. Active extension (pain & limitation)

7–8. Passive rotation, R and L (pain & limitation)


11. Passive flexion (pain & limitation)

12. Passive extension (pain & limitation)
These are the tests you’ll use when you suspect a neurological problem. Because this is a relatively unusual circumstance—and because you’ll have anything that you uncover confirmed by a physician—we’re not going to dwell on the meaning of these tests.

During the resisted tests, you’re checking the relative strength of the right and left sides. With the reflex tests, you’re looking for unusual phenomena (hyper or hypo reflexes that are noted in the test descriptions.

Finally, note that ligament palpation, test #40, isn’t a neurological test, but it’s at the end of the testing procedure.

13–14. Resisted rotation, R and L (weakness)
15–16. Resisted side flexion, R and L (weakness)
17. Resisted flexion (weakness)
18. Resisted extension (weakness)
19. Resisted shoulder raises (weakness)
20. Resisted abduction (weakness)
21. Resisted adduction (weakness)
22. Resisted lateral rotation (weakness)
23. Resisted medial rotation (weakness)
24. Resisted flexion (weakness)
25. Resisted extension (weakness)
26. Resisted wrist extension (weakness)
27. Resisted wrist flexion (weakness)
28. Resisted radial deviation (weakness)
29. Resisted ulnar deviation of the wrist (weakness)
30. Resisted extension of the thumb (weakness)
31. Resisted adduction of the thumb (weakness)
32. Resisted adduction of the 4th and 5th digits (weakness)
33. Brachioradialis jerk (quality of reflex)
34. Biceps jerk (quality of reflex)
35. Triceps jerk (quality of reflex)
36. Knee jerk (quality of reflex)
37. Ankle jerk (quality of reflex)
38. Babinski (nature of reaction)
39. Ankle clonus (presence or absence of “beats”)
40. Knee clonus
41. Ligament palpation (pain)
Neck History

Client Name:  
Address:  
Phone:  
Ref:  
Age: 
(Certain injuries associated with different age groups)  
Occupation: 
(Normally stress on the back, e.g., osteoarthritis)  
Date:  
Diet: Breakfast Lunch Dinner Snacks Coffee Sweets  
Water Intake: ___ Cups daily  
Exercise Regularly:  

HISTORY:  
Why are you here?  
When did it first occur?  
(Specific injuries are associated with different time lines e.g. discs, ligaments, osteoarthritis)  
Was it precipitated by an accident? - Yes No  
Did it come on slowly or suddenly? – suddenly slowly  
Where is your pain exactly?  
Is it there all the time? - Yes No  
(Severity and type of injury)  
Are the pains sharp or achy?  
(Severity)  
What brings it on?  
Sleep, reading, typing, sitting, standing, walking  
What makes it better? - rest  
Is your pain getting better, worse or is it the same?  
(Severity and pattern)  
Does a cough make it worse? - Yes No  
Does a deep breath make it worse? - Yes No  
Does it spread up to your head or down your arm or upper back? - Yes No
(Severity, referred pain or multiple injuries)
Have you had any treatment for your pain? - Yes No

If so, what?

Did it help you? - Yes No

Do you have any numbness or numblike sensations? - Yes  No
(Disc or Ligament)

If so, where?

Do you have any aches and pains anywhere else in your body?

Do you smoke? - Yes No
(General Health)

Are you allergic to anything? - Yes No

Are there any other medical conditions I should be aware of? –

Are you taking any medications? - Yes No
Referred pain sites:

Injuries to the neck can refer pain to the…

- Head (including teeth, jaw, gums)
- Throat
- Shoulders
- Arms
- Hands
- Scapular area
- Upper back
- Upper chest

The “X-ray Mystique”:

As you know, most people believe that whatever is wrong with them will “show up on an X-ray or other radiological test.” In reality, most common injuries will not be detected by radiography; even stress fractures are not usually observable. MRIs can create images of many structures, but their use is still very much limited by the assumptions of those who interpret them. The specific conditions listed below can be observed on an X-ray and other radiological tests.

- Fracture
- Neoplastic erosion (cancer)
- Natural curve or reverse curve
- Alignment of the vertebral joint (even? uneven? stepwise?)
- Osteophytic formation
- Disc erosion—dyes needed to display disc tissue (myelogram)

Scar tissue formation in the neck:

- It’s very common to have post-traumatic adhesions at the occipital attachments and in the ligaments in the neck
**Testing:**

- Major indicators (MI)—the primary assessment tools
  - Movements that create pain
  - Locations of referred pain
  - Weakness
  - Pins and needles
  - Cutaneous analgesia ("numblike")
  - Cutaneous anesthesia (numb; rare in cervical lesions)
  - Reflexes

- Resisted tests, in this part of the body, test *mainly for weakness* and rarely for muscular/tendinous pain

- Passive tests test for pain and limitation in ligaments, joints, disc injuries
General Concepts—Disc & Ligament Injuries

**Terminology:**

*Lesion/Pathology*—general term for an injury or dysfunction in any tissue.

*Ligament lesions*—the patterns of pain and limitation are complex and unpredictable, because many ligaments can be—and usually are—inflicted at once.

*Nerve root lesions*—caused, generally, by pressure from damaged discs. If so, the patterns of pain and limitation that emerge on testing are distinctly asymmetrical, because discs can only bulge one way at a time. So, for example, if active rotation is painful & limited on one side, it shouldn’t be on the other. One-sided pain that *switches sides over time*—this week it hurts on the left, last week it hurt on the right—won’t be from a disc lesion. The accompanying signs of paresis, etc. *(see below)* often won’t appear for some time after the appearance of pain & limitation.

*Neuropathy*—pathology of the nerve.

*Radiculopathy*—pathology of the nerve root, usually caused by compression. *(Radical = root; opathy = pathology.)*

*But don’t forget*—it’s quite possible that if the person you’re examining has a disc lesion, he might have ligament lesions *too*...

*Segmental weakness (ligament laxity)*—makes the joint unstable and more prone to injury. Movement “yanks” the ligament.

*Post-traumatic adhesions (muscle, tendon, ligament)*—these are often at the junction with periosteum.

*Paresis*—clear motor weakness with muscle atrophy.

*Paresthesia*—feeling of pins and needles or tingling; pressure on a nerve trunk or artery. Examples are the feeling of thoracic outlet syndrome and basilar syndrome.

*Cutaneous analgesia*—“numblike” sensation.

*Cutaneous anesthesia*—an actual numbness, i.e., *lack of sensation*. We don’t run into this in the neck very often, but it does happen. When a client reports numbness, confirm it: try touching the ‘numb’ spots to see whether there’s really diminished sensation. Usually, you’ll find that it’s analgesia.
Cervical spondylosis—general term describing 18–20 different conditions arising from disc degeneration; for example,

1. Symptomless osteophytic formation and joint narrowing from disc erosion
2. Osteoarthritis causing neck pain, headache, paresthesia
3. Cervical disc lesion causing neck pain, arm pain, headache, weakness, scapular pain, etc.

Cancer (neoplasm)—neoplastic erosion (hole in bone), pulmonary neoplasm, secondary deposits. Symptoms—extreme bilateral weakness in “too many” nerve roots, arms and legs.

“Facet” syndrome—the zygapophyseal joints, aka facets, are small synovial joints & can suffer inflammation like other synovial joints. Some practitioners take the position that this is an extremely common and important problem; others disagree. We can put our fingers on the ligamentous capsules themselves and treat them; it’s often helpful.

Whiplash—this is a description of a motion, not a clinical finding. A number of different injuries can result from whiplash; ligament lesions are most common.

Predisposing factors:

- Chronic postural patterns, poor alignment
- Stressful experience, emotional factors, tension—the price of compression
- Tense people often get ligament sprains; the ligaments are underused
- Tension during sleep
- Sleeping positions
- Osteoarthritis (remodeling of bone and cartilage) in the neck—brought on by ligament laxity, compression of cartilage
**Nerve root compression vs. ligament strains, part I:**

- *Specific* muscular weakness indicates nerve root compression
- *Generalized* weakness is often confused with weakness from a disc lesion
- Specific muscle *atrophy* indicates nerve root compression
- Severe ligament sprains can also cause numblike sensations, but they tend to *come & go*, unlike those accompanying nerve root lesions

**Nerve root compression vs. ligament strains, part II:**

*Limitation*—when a *disc* lesion is present, limitation of range (in the asymmetrical pattern we’ve discussed before) will be present. This may be caused by either muscle spasm or by displaced disc material actually blocking the joint.

When a *ligament* lesion is present, pain will be felt on active and passive movements, but the range will generally still be available, although uncomfortable to accomplish. If the ligament lesion is especially fresh or severe, full range may be too painful to accomplish.

*Quality of pain*—nerve root lesions tend to cause a ‘hot,’ ‘sharp,’ ‘electric,’ fast-moving kind of pain. Ligament lesions tend to evoke a slower, achier, more diffuse quality of pain. A steady, strong aching (like a toothache) is harder to differentiate, but will often be a root lesion.

*Distal & proximal referred pain*—another difference between disc and ligament lesions has to do with the part of the relevant dermatome to which pain is referred. Disc lesions often create referred pain felt only in the distal part of the dermatome without pain in the proximal part (for instance, pain felt in the hand, but not in the upper arm). Ligament lesions, on the other hand, tend to create referred pain felt in the proximal part of the dermatome but not in the distal part. This is not definitive—the patterns don’t *have* to be like this—but it’s a useful aid in making the disc-versus-ligament distinction.

*Referred pain in dermatomes, other types of referred pain patterns*—for the most part, referred pain coming from nerve root compression follows the dermatome patterns. To a large extent, referred pain from ligament lesions does, too—but there are exceptions. The exceptions documented in your manual are based on clinical experience. A particularly noteworthy one is the pain referred to the medial border of the scapula from a C6–7 intertransverse ligament lesion.

*Sequence of symptoms with nerve root lesions*—with a root lesion, the sensation of light touch (tested with a swab or brush) diminishes before that of pain and sensation of deep touch (tested with a pin); likewise, on recovery, the sensation of deep touch and pain returns before that of light touch.
Evaluation & Treatment—Injury Profiles, Part I:

Ligament Lesions

• **Ligament injuries are the most common.** The most important thing to say here is that ligament injuries in the neck are extremely common. Learning how to recognize them and treat them effectively is one of the most useful things you can do to improve your success with necks.

• **Multiple ligaments are usually injured.** Although it’s useful to have a sense of where the different cervical ligaments refer pain, you’ll generally find many ligaments injured in any given client. Don’t get hung up trying to find ‘the’ injury. Often, as you treat a client with these injuries, the situation will become more and more clear; general neuromuscular dysfunction and low-level ligament lesions will clear up, leaving the more serious ligament injuries ‘highlighted.’

• **Ligament injuries occur along with nerve root compression.** When a client has a nerve root lesion, it’s understandable that the surrounding ligaments will often be irritated or injured. We can help with this problem, but it’s vital to get assessment & help for the root lesion as well.

• **Friction all of the connective tissue.** We’ll talk a lot about the anatomy of the ligaments, but keep this in mind: the spine is basically encrusted with connective tissue. If you find something that looks like a connective tissue injury, it may be one—whether or not there’s a well-known and accepted name for the structure you’re frictioning. Probably the best example of this is the work you’ll find yourself doing around the connective tissue of the zygapophyseal (facet) joint capsules. The moral of the story is that you’ve got to thoroughly explore necks for tenderness.

• **Don’t overtreat.** Although we’ll give you some specific positions & times for ligament frictioning work, bear in mind that it’s very easy to overtreat someone when you’re frictioning the spinal ligaments. The best approach is to be gentle & conservative at first, even if your client is ‘egging you on’ to work harder. Treat a client once to see what his or her reaction is, then use that as a baseline for future treatments. If you make someone very sore after the first treatment, it’ll probably be the last. Make sure that you solicit this post-treatment information; tell your client that he or she might be a little sore for a day or so, but that you don’t want any more soreness than that. You’re relying on your client to give you good information here.
Neck injury referred-pain patterns
Source: *Diagnosis and Injection Techniques in Orthopedic Medicine*, Thomas Dorman and Thomas Ravin (C1-C2 and TP7 below)
This is meant to give you a quick verbal sense of where pain is referred from the different cervical levels. We’ve already said a lot about the differences between root and ligament lesions; location of pain, by itself, isn’t one of the most useful ones. Make sure that you get a good sense of the quality of the pain (page 10).

<table>
<thead>
<tr>
<th>Level</th>
<th>Areas of Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>top of head</td>
</tr>
<tr>
<td>C2</td>
<td>forehead, temples, behind eyes</td>
</tr>
<tr>
<td>C3</td>
<td>temples, side of neck and throat</td>
</tr>
<tr>
<td>C4</td>
<td>neck, top of shoulder, upper chest, upper scapular area</td>
</tr>
<tr>
<td>C5</td>
<td>neck, upper scapular area, lateral aspect of arm to root of thumb</td>
</tr>
<tr>
<td>C6</td>
<td>neck, upper scapular area, lateral, anterior aspects of arm, radial aspect of hand to thumb and index finger</td>
</tr>
<tr>
<td>C7</td>
<td>neck, scapular area, pectoral area, posterior arm to middle three fingers</td>
</tr>
<tr>
<td>C8</td>
<td>lower scapula, posterior and inner upper arm, inner forearm, ulnar aspect of hand, last three fingers</td>
</tr>
</tbody>
</table>
The intertransverse ligaments cause some unique referred pain patterns, so we’re listing them separately.

<table>
<thead>
<tr>
<th>Ligament</th>
<th>Pain Patterns</th>
</tr>
</thead>
</table>
| C2–3, C3–4   | - Side of neck  
              - Upper deltoid  
              - Top of shoulder  
              - Temporal area  
              - Sternocleidomastoid |
| C4–5         | - Upper arm  
              - Lower arm to root of thumb |
| C5–6         | - Upper arm  
              - Lower arm to thumb and index finger |
| C6–7         | - Chest  
              - Lateral upper arm  
              - Medial border of scapula |
| C7–T1        | - Medial border of scapula  
              - Posterior scapula |
| Nuchal/supraspinous ligament | - Upper back (bilateral) in the shape of a coat hanger |
| Thoracic ligaments | - T1 and T2 injuries may cause pain in arm and scapular area  
                      - T3–T8 may also cause scapular area pain  
                      - Pain down the arm with neck rotation |
Table of Root Lesion Symptoms

Here’s a condensed table of the essential symptoms of root lesions, level by level. Clinical reality, as always, is complicated by communication problems, chronic postural distortions, neuromuscular dysfunction, associated ligament lesions—you know the story. Nevertheless, this information will clarify a lot of situations.

<table>
<thead>
<tr>
<th>Root</th>
<th>Weakness</th>
<th>Reflex Changes (lessened or absent)</th>
<th>Diminished Sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Neck Rotation (very rare)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>C2</td>
<td>Neck Rotation (very rare)</td>
<td>NA</td>
<td>Mid-neck</td>
</tr>
<tr>
<td>C3</td>
<td>Shoulder Shrug/traps (very rare)</td>
<td>NA</td>
<td>Cheek</td>
</tr>
<tr>
<td>C4</td>
<td>Shoulder shrug</td>
<td>NA</td>
<td>Point of shoulder</td>
</tr>
<tr>
<td>C5</td>
<td>Biceps, Infraspinatus, Deltoid, Brachioradialis</td>
<td>Biceps</td>
<td>Upper arm</td>
</tr>
<tr>
<td>C6</td>
<td>Biceps Extensor Carpi Radialis</td>
<td>Brachioradialis Biceps</td>
<td>Forearm, thumb, 1st two fingers</td>
</tr>
<tr>
<td>C7</td>
<td>Triceps, Flexor Carpi Radialis</td>
<td>Triceps</td>
<td>Mid three fingers</td>
</tr>
<tr>
<td>C8</td>
<td>Flexor Digitorum, Extensor Pollicis, Adductor Pollicis Flexor Carpi Ulnaris Extensor Carpi Ulnaris</td>
<td>NA</td>
<td>last three fingers</td>
</tr>
<tr>
<td>T1</td>
<td>4-5th Interosseus</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Numerous studies have been done to determine root innervation to each muscle. Many charts will differ. The most recent studies have emphasized the great variability in humans. Take the above with a grain of salt.

Upper roots go to the upper arm, lower roots to the lower arm.
Differentiating Ligament Injury from a Disc/Nerve Root Compression

<table>
<thead>
<tr>
<th>Ligament Injury</th>
<th>Disc/Nerve Root Compression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Pain</td>
</tr>
<tr>
<td>Proximal pain</td>
<td>Distal pain</td>
</tr>
<tr>
<td>Pain that switches sides</td>
<td>Pain on one side only</td>
</tr>
<tr>
<td>Pain on right and/or left</td>
<td>Constant pain</td>
</tr>
<tr>
<td>Pain that comes and goes</td>
<td></td>
</tr>
<tr>
<td>Numb-like sensations</td>
<td>Confirmed numbness</td>
</tr>
<tr>
<td>Tingling sensations</td>
<td>Pins and needles sensations</td>
</tr>
<tr>
<td>No loss of sensation</td>
<td>Diminished or loss of sensation</td>
</tr>
<tr>
<td>No specific weakness</td>
<td>Weakness in one segment</td>
</tr>
<tr>
<td>Normal reflexes</td>
<td>Diminished or absent reflexes</td>
</tr>
<tr>
<td>Limitation of movement caused by pain</td>
<td>Asymmetrical limitation of movement caused by muscle spasm in reaction to pain</td>
</tr>
</tbody>
</table>

Nerve root lesions are the cause of less than 5% of neck injuries. The overwhelming majority of neck injuries are related to ligament lesions.
Osteophytic root pain

MI—Increasing weakness, usually at one level
MI—Usually over 50

The bone grows and slowly presses on the nerve. Neck pain is usually slight, but not always. The arm rarely hurts. The main complaint is increasing weakness.

Bone cancer (malignancy, secondary deposits) at C1, 2, 3

When cancer attacks the upper three cervical vertebrae, the signs are not as clear as in the lower vertebrae, because there is no nerve root involvement that can be easily seen.

MI—Rapidly increasing stiffness and pain coming on over a few months
MI—Gross limitation of active movements in every direction
MI—Spasms of the neck muscles when attempting passive testing
MI—Pain and weakness on resisted neck tests

Bone cancer (malignancy, secondary deposits) at C4, 5, 6, 7

MI—Rapid onset as above
MI—Active, passive and resisted tests as above
MI—Two or three nerve roots affected at once
MI—Gross bilateral (arm) weakness

Cervical rib

This is an abnormally long transverse process at C7.

Characteristic signs include numbness and pins & needles; having a cervical rib, however, does not guarantee having these symptoms. An X-ray will definitively establish the presence of a cervical rib.
**Basilar syndrome**

The basilar artery supplies the brain with blood. The two vertebral arteries join to form the basilar artery, which then makes a right angle before it goes up to the brain. When the head is rotated, two-thirds of the blood to the opposite side is cut off in a normal person. If a cervical abnormality increases, trouble with kinking arises.

MI—Vertigo (dizziness) when the neck is in extension
MI—Dizziness when bending or standing suddenly
MI—Pins and needles in the face (sometimes)

The cause is that osteophytes are compressing the vertebral arteries. Some authorities assert that the syndrome can also come about from subluxation.

Special test—Ask the client to hold his hands horizontally out in front of his body with the eyes closed and the head held in active rotation for one minute. If the injury is present, arms become weak and will waver or drop.

Treatment—Drill out the osteophyte or correct subluxation

**Headache from neck injuries**

Types of headaches:

- Ligament injury headache (*not simply related to stress*)—for example, C3–4 can refer pain to temples; C2 can refer pain to top of head. To discriminate, it’s helpful to see whether friction to sprained ligaments refers pain to areas where headaches have occurred.

- Tension/migraine headaches. Largely related to stress & compensation for neck ligament injuries. Can involve many different head & neck muscles, particularly suboccipitals.
**Spinal cord pressure and paralysis**

- Paraplegia
- Quadriplegia
- Gross muscle weakness & atrophy
- Clonis at the ankle or knee—three beats or more
  *(one or two is OK—no need to worry)*
- Positive Babinski test
- Hyporeflexia—early symptom
- Hyperreflexia—more severe pressure
- Sudden onset (from cord trauma)—generally, severe pain, weakness and tingling in upper arms or all four limbs

**Tinnitus (constant ringing in the ears)**

Tinnitus and dizziness often occur after a whiplash injury. Sometimes it appears for a while, then ceases. Manipulation sometimes helps. Tinnitus can also occur with a slow onset; a reasonable assumption is that disturbances of neck structures can occur slowly as well as in an accident, and in both instances cause ringing. It is not usually helped by treatment.

Treatment—A manipulation-and-injection procedure (done by Ongley, *et al.*) helps more often than anything else Ben knows of
Torticollis (neck fixed in rotated or flexed position)

Some are painful and some are not...

Spasmodic torticollis—the head rotates involuntarily to one side. The head can be brought back with the client’s or therapist’s hand, but then an overpowering involuntary force turns the head slowly to the same side again. The cause is unknown; it’s probably something in the brain or nervous system.

Congenital (from birth)—painless permanent contracture of the sternocleidomastoid muscle. The head is fixed in side flexion toward the affected side and in rotation away from the affected side.

Acute in children (5-10 years old)—usually from a swollen gland beneath the SCM. It should resolve in two weeks.

Acute torticollis in adults and adolescents—the head is fixed in side flexion without the rotational element. The pain and restriction are usually felt when sitting up after a night’s sleep.

MI—Pain is on only one side only

MI—Rotation to one side is painful and limited

MI—Side flexion to one side is limited and painful

The cause is that the client has slept with the head flexed to one side throughout the night. One theory is that part of the nucleus pulposus has oozed out during that time. More likely however, a C6–7 intertransverse ligament strain is causing the pain.

The problem usually resolves in 7–14 days; with treatment the problem should resolve in 3–5 days.
Subtle Signs and Tests

• Neck or scapula pain on resisted abduction or other resistive tests—stress to neck

• Side flexion—make sure that you get clear about stretch vs. pain in exam

• Pain on rotation—this pattern that emerges level by level:
  o C1 through C3: rotation in flexion
  o C4: rotation in erect anatomical position
  o C5 through C8: rotation in extension

• Weakness at most or all levels is just disuse/general dysfunction

• If you see fear during the exam, be very careful

• Midback pain on flexion—thoracic ligament injury

• Shooting pain in the back of the eye (C2)

• Pain in the teeth (C5; muscular reference, too)

• Dizziness and altered vision (intervertebral artery compression)

• Extreme pain in flexion/extension—look out for cord pressure or C6–7 intertransverse ligament injury

• General principles for testing the neck:
  o Ask the client to do movements by himself first (active tests)
  o Watch the client’s face
  o Be careful when testing in extension
  o Take up the slack and jerk lightly
  o Go gently at first…
  o Then, if no pain, go harder
  o Questions to ask: Does it hurt? Where?

• Tension in the neck—its effect on healing

• Poor alignment—a cause of injury and slow or limited recovery
Neck Tests—Detailed Descriptions

Remember—when you do the resisted tests, you are checking for weakness.

**Tests 1–2. Active rotations**
Ask the client to rotate their head as far as possible to the right, and then to the left. After each test, ask if there is pain. Note whether there is limitation of movement; normal range is 90 degrees in each direction.

![Image of active rotation]

**Tests 3–4. Active side flexion**
Ask the client to tilt their ear toward their shoulder (while not raising the shoulder). Note any limitation and ask whether there is pain.

![Image of active side flexion]

**Test 5. Active flexion**
Ask the client to drop their chin gently toward their chest, looking down toward the floor and touching chin to chest if possible. (In addition to any pain, note whether the client’s chin touched the chest; this is normal range.)

![Image of active flexion]

**Test 6. Active extension**
Ask the client to look up at the ceiling, tilting the head as far back as possible without pain. A full range of motion is a 90-degree tilt, ending with the face parallel to the ceiling. (Note that many people tend to look up at the ceiling by moving only their eyes. If your client does this, ask them to try to look up further, stopping only if there is pain or discomfort.)

![Image of active extension]

**Tests 7 & 8: Passive rotation**
Stand at the person’s right side and ask the client to turn their head to the right. Place your left forearm on the left scapula to stabilize the upper body, and place left your palm on the side of the head, with your fingers around the ear but not covering it. Then place your right hand on the client’s left cheek and gently rotate the neck to the end of range, taking up all the slack. Stop if there is any pain of discomfort. If there is absolutely no discomfort, give a very gentle jerk/overpressure (a slight motion, moving through less than a half-inch of space). Note any limitation of movement and the location of any pain. Now repeat the test on the other side.

![Image of passive rotation]

**Tests 9 & 10: Passive side flexion**
Stand behind the client and ask them to tilt their head to the right, trying to bring the ear to the shoulder. Place your left hand on the left shoulder and your right hand on the left side of the head above the ear. Stretch to the end of range. If there is no pain, give a slight jerk. Note whether there is limitation, and note the location of any pain. Now repeat on the other side. If there is only a slight stretching sensation and it is the same on both sides, the test result is negative.

![Image of passive side flexion]
**Test 11: Passive flexion**
Ask the client to lower the chin toward the chest, with the weight of the head hanging down. If there is no pain, place your middle and index fingers on the back of the head and gently stretch it further. If there is still no pain, give a very slight jerk, using only two fingers to ensure that you do it gently. In most individuals under 40, the chin should reach the chest.

**Test 12: Passive extension**
Ask the client to look up at the ceiling, extending the neck as far as possible by him- or herself. If there is no pain, place one or two fingers on the forehead and the other hand on the upper back for support. Gently press the head into further extension, and if there is still no pain, give an added gentle jerk. Take note of any pain or limitation.

**Tests 13–14: Resisted rotations (C1 and C2)**
Stand behind the client and place one hand on each side of the head, just above the ears at the temples. Hold your hands firmly in place and ask the client to try to turn the head forcefully to the right, while you prevent it from moving. If the person is quite strong, you may have to slide your right hand slightly forward for better leverage. Repeat the test with the client turning to the left.

**Tests 15 & 16: Resisted side flexion**
Place your right hand on the client’s right shoulder to stabilize the upper body, and place your left hand on the left side of the head, just above the ear. Then ask the client to bring the head toward the left shoulder as you resist the movement isometrically. Repeat on the other side.

**Test 17: Resisted flexion**
Place one hand on the client’s upper back for stabilization, and place your other hand on the forehead. Now ask the client to forcefully try to lower the head toward the chest. As the client presses the head down, offer resistance with your hand to make sure it doesn’t move.

**Test 18: Resisted extension**
Standing at the client’s side, place one hand on the upper chest and the other hand on the back of the head. Now ask the client to push the head backward into your hand as you offer resistance, preventing any movement.

**Test 19: Resisted shoulder raise (C2, C3, C4)**
Stand behind the client. Ask her to raise the shoulders and hold them steady. Place one hand on top of each shoulder and try to force the shoulders down as the client tries to keep her shoulders up.
Test 20: Resisted abduction (C5)
Place one hand on the outside of the client’s elbow and the other hand around the waist on the opposite side of the body to stabilize the trunk. Now, ask the client to press out forcefully as you hold the arm near her side.

Test 21: Resisted adduction (C7)
Hold one of the client’s arms by the wrist about one foot away from the side of her torso, with the elbow straight. Place your other hand or fist on the client’s nearest hip bone to stabilize her. Now, ask her to pull the arm in toward the body.

Test 22: Resisted lateral rotation (C5)
Place one hand on the client’s upper arm just above the elbow and press the upper arm into the body to stabilize it. With the client’s forearm bent at a right angle and extending forward from the trunk, place your other hand on the outside of her wrist. Now, ask her to push outward toward you while you resist the push. This test is done at 90° (the angle of the arm and the trunk, not the angle of the elbow) first, but may also be done at 30° and 135° for more precise testing.

Test 23: Resisted medial rotation (C5)
Starting from the same position as in the previous test, place your fingers on the inner portion of the wrist with the client’s arm bent at a 90° angle and in front of her. Now, ask the client to pull the wrist toward the stomach while you pull outward. Be sure to keep her upper arm against her body to stabilize the shoulder.

Test 24: Resisted flexion (C5 and C6)
There is less need to stabilize in this test and the following test. Starting from the same position as in the last two tests, place one or both hands above the wrist and ask the subject to push up while you push down.

Test 25: Resisted extension (C7)
Place one or both of your hands under the client’s wrist as she holds the arm in the same position as in the last three tests. Now, ask her to push down forcefully as you resist.

Test 26: Resisted wrist extension (C6)
Ask the client to hold her arm out in front of her, extending the hand as if she were a traffic cop saying “Stop.” Place one of your hands under the client’s wrist to support it and wrap the fingers of your other hand around the back of her hand just below the fingers. Now, ask the client to hold the hand position while you try to pull the hand forward.
Test 27: Resisted wrist flexion (C7)
Ask the client to hold the arm out in front of her, making a fist and flexing the hand downward. Place one of your hands over her wrist to support it and wrap the fingers of your other hand under her fist. Now, ask the client to hold the hand position while you try to pull the hand forward.

Test 28: Resisted radial deviation (C7)
Ask the client to hold the arm out in front of her, radially deviate the wrist with the palm down, and hold it there. Now, grasp the lateral part of her forearm with your lateral hand and grasp the thumb side of her hand with your other hand. Try to forcefully move her hand laterally as she resists you.

Test 29: Resisted ulnar deviation of the wrist (C8)
Stand in front of the client and ask her to hold her hand in front of her, palm down. Now, grasp the medial part of her forearm with one hand to stabilize the arm and grasp the lateral portion of her hand with your other hand. Ask her to evert her wrist (ulnar deviation) and hold it there. Now, forcefully try to bring her wrist medially as she resists you.

Test 30: Resisted extension of the thumb (C8)
Ask the client to extend her hand as if she were going to shake your hand. Now, ask her to her thumb up as you grasp it with your thumb and try to press it down. Wrap your thumb around the most distal joint; don’t press down at the tip of the thumb.

Test 31: Resisted adduction of the thumb (C8)
Ask the client to hold her hand in front of her, palm down, with the fingers and thumb together. Now, grasp her thumb between your thumb and index fingers and hold the lateral part of her hand with your other hand to stabilize it as you try to pull her thumb away from her index finger.

Test 32: Resisted adduction of the 4th and 5th digits (T1)
Ask the client to hold her hand in front of her, and place one of your fingers between her 4th and 5th digits. Now ask her to squeeze your finger by drawing her fingers together, with the palm still facing the floor.

Test 33: Brachioradialis jerk (C6)
Stand facing the client and cradle her left forearm with your left hand, supporting the client’s elbow with your left hand, supporting the client’s elbow with the palm of your left hand. Now, holding a reflex hammer in your right hand, hit the brachioradialis muscle to test the reflex.
**Test 34: Biceps jerk (C5 and C6)**
Stand facing the client and cradle her left forearm with your left hand, supporting the client’s elbow with the palm of your left hand. Now, place your left thumb on the client’s biceps tendon as it crosses the elbow joint. Holding the reflex hammer in your right hand, hit your own thumb between your 1st and 2nd thumb joints and look for the reflex.

**Test 35: Triceps jerk (C7)**
Stand facing the client and cradle her left forearm with your left hand, supporting the client’s elbow with the palm of your left hand. Now, place your left thumb on the client’s biceps tendon as it crosses the elbow joint. Holding the reflex hammer in your right hand, hit the triceps muscle a few inches above the elbow and look for the reflex.

**Test 36: Knee jerk**
With the client lying on the table and you standing at his right side, place your left hand under the left knee and bend the leg about 30 degrees. Make sure he’s relaxed. Holding the reflex hammer in your right hand, strike the patella tendon below the kneecap and watch for the reflex. Now, reach across to the other knee and repeat, remaining on the same side of the table. If you’re left-handed, do the entire test from the other side of the table.

**Test 37: Ankle jerk**
With the client lying supine on the table, stand at the foot of the table and gently place her foot in passive dorsiflexion (be sure she’s not holding her foot in that position). With the reflex hammer in your free hand, strike the Achilles tendon forcefully and watch for the reflex. Repeat on the other side; you can use the same hand position if you position yourself slightly differently.

**Test 38: Babinski**
With the client lying on his back, place one hand over the ankle to hold it in place. Now, place the handle end of your reflex hammer or a fingernail on the bottom of the foot, just in front of the heel. Now, with moderate force, scrape the sole of the foot and watch for the big toe to turn down. If the test is positive, you’ll see the big toe curl into dorsiflexion; this indicates cord pressure.

**Test 39: Ankle clonus**
Stand at the side of the client’s feet. Place one hand above the ankle and press it gently into the table. Now, place your other hand on the ball of her foot and forcefully push it into dorsiflexion. Count the number of involuntary beats. One or two are fine; three means spinal cord pressure. Repeat on the other ankle.

**Test 40: Knee clonus**
**Test 39: Ligament palpation**

With the client lying on her back and you sitting at the head of the table, run the tip of your finger across each ligament in succession (nuchal, then intertransverse) to check for tenderness.

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**Friction Techniques for the Neck**

1. **Supraspinous/nuchal ligament**—Sit at the head of the table with the client lying supine and place your hands under the client’s neck. Using your middle or index finger, palpate the spinous processes. Feel their shape, depth, and alignment. Start at the bottom and press the tip of your index finger in at the space between C6 and C7. Friction in one direction, pulling your finger across the ligament. You can switch hands; this will get the opposite side more firmly. You will feel a ‘snap’ as you go over the ligament structure. Work your way down one by one to each ligament, stopping at the tender ligaments, frictioning for 1 or 2 minutes in each spot at first.

2. **Nuchal ligament with tilted head**—Tilt the head into side flexion to the left to friction the lateral edges of the nuchal ligament on the right side. This is done most effectively with your left hand reaching under the neck to the right side; switch hands for the opposite side. Again, work your way down the vertebrae one by one.

3. **Scalene press**—Tilt the head into side flexion away from the side you’re working on. Using the tip of your thumb, carefully press into the lateral posterior portion of a transverse process and hold it there for 20–30 seconds. Now, press into the transverse process again and friction horizontally.

4. **Intertransverse attachment & zygapophyseal (facet) capsule friction with the thumb tip**—With the head in side flexion as above, place the tip of your thumb between two of the transverse processes and friction in an anterior-to-posterior direction. Then, repeat the same technique on the opposite side. This may also be done with the middle or index finger reaching under the neck to the opposite side. This works better for some practitioners, and is a good alternate technique to rest the hand. Work on each structure that is tender for 1–2 minutes, depending on the client’s tolerance and how many structures are injured. To access zygapophyseal capsules work posterior to transverse processes.

5. **TP7 friction**—Supporting the thumb with the index finger curled beneath it, push the trapezius back out of the way and place the thumb tip on the 7th transverse process (TP). Work your way to the back of the process and friction in an anterior-to-posterior direction. Press slightly toward the midline while doing this. Move up one vertebra and do the same at TP6; it will often cause the same pain patterns. You need to aim slightly more into the neck for TP6.
6. **TP7 friction, prone**—Ask the client to lie on the stomach with the face down or turned away from the painful side. Now, place your middle finger over the trapezius and press your finger onto the posterior portion of TP7. On very muscular people, you have to pull the trapezius back; on thin people it’s not necessary. Friction in an anterior-to-posterior direction. This position is easier for some practitioners.
**Neck Ligament Exercise**

Lie supine with the neck supported by a pillow and slowly rotate the head so that the cheek moves towards the shoulder. Be sure to rotate the neck slowly without force. Twenty-five rotations should be performed, right and left, two to three times a day. This movement is a combination of rotation, flexion and side bending. These combine to stretch the lower cervical intertransverse ligaments, tearing unwanted scar tissue and preventing it from forming adhesions. If there is pain while doing the exercise, it should be discontinued until recovery is sufficient to do it without pain. If a slight pulling sensation is felt, that’s OK.
Neck Tests—Illustrations

1–2. Active rotations

3–3. Active side flexion

5. Active flexion

6. Active extension

7–8. Passive rotations

9–10. Passive side flexions
11. Passive flexion

12. Passive extension

13–14. Resisted rotations

15–16. Resisted side flexions

17. Resisted flexion

18. Resisted extension
19. Resisted shoulder raise

20. Resisted abduction

21. Resisted adduction

22. Resisted lateral rotation

23. Resisted medial rotation

24. Resisted flexion
25. Resisted extension

26. Resisted wrist extension

27. Resisted wrist flexion

28. Resisted radial deviation

29. Resisted ulnar deviation of the wrist

30. Resisted extension of the thumb
31. Resisted adduction of the thumb

32. Resisted adduction of the 4th and 5th digits

33. Brachioradialis jerk

34. Biceps jerk

35. Triceps jerk

36. Knee jerk
37. Ankle jerk

38. Babinski

39. Ankle Clonus

40. Knee Clonus

40. Ligament palpation
Neck Tests

Name:

Date:

1-2. Active rotations

3-4. Active side flexions

5-6. Active flexion/extension

7-8. Passive rotations

9-10. Passive side flexions

11-12. Passive flexion/extension

13-14. Resisted rotations

15-16. Resisted side flexions

17-18. Resisted flexion/extension

19. Resisted shoulder raises (C2,3,4)

20. Resisted adduction (C7)

21. Resisted abduction (C5)

22. Resisted lateral rotation (C5)

23. Resisted medial rotation (C5)

24. Resisted flexion (C5,6; brachialis C6)

25. Resisted extension (C7)

26. Resisted wrist extension (C6)

27. Resisted wrist flexion (C7)
Neck tests (continued)

28. Resisted radial deviation (C7)
29. Resisted ulnar deviation/wrist (C8)
30. Resisted extension/thumb (C8)
31. Resisted adduction/thumb (C8)
32. Resisted adduction of 4th & 5th digits (T1)
33. Brachioradialis jerk (C6)
34. Biceps jerk (C5,6)
35. Triceps jerk (C7)
36. Knee jerk
37. Ankle jerk
38. Babinski
39. Ankle clonis
40. Ligament palpation

<table>
<thead>
<tr>
<th>Nuchal:</th>
<th>Intertransverse (left and right):</th>
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<tbody>
<tr>
<td>Occiput–C2</td>
<td>C1–2</td>
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<tr>
<td>C2–3</td>
<td>C2–3</td>
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<tr>
<td>C7–T1</td>
<td>C7–T1</td>
</tr>
</tbody>
</table>
Neck History

Client Name: 
Address: 
Phone: 
Ref: 
Age: 
Occupation: 

Date: 

Diet: Breakfast Lunch Dinner Snacks Coffee Sweets 
Water Intake: ___ Cups daily 
Exercise Regularly: 

HISTORY: 
Why are you here?

When did it first occur?

Was it precipitated by an accident? - Yes No

Did it come on slowly or suddenly? – suddenly slowly

Where is your pain exactly?

Is it there all the time? - Yes No

Are the pains sharp or achy?

What brings it on? 
Sleep, reading, typing, sitting, standing, walking

What makes it better? - rest

Is your pain getting better, worse or is it the same?

Does a cough make it worse? - Yes No

Does a deep breath make it worse? - Yes No

Does it spread up to your head or down your arm or upper back? - Yes No

Have you had any treatment for your pain? - Yes No

If so, what?
Did it help you? - Yes No

Do you have any numbness or
numblike sensations? - Yes No

If so, where?

Do you have any aches and pains anywhere else in your body?

Do you smoke? - Yes No

Are you allergic to anything? - Yes No

Are there any other medical conditions I should be aware of? –

Are you taking any medications? - Yes No
I understand that this course on the assessment and treatment of injuries is for qualified professionals and is part of the Benjamin Advanced Training Program.

I further understand that this course contains trade secrets, copyright materials, specially designed course materials gathered over years of work that are for my use as a student only and in no event shall these written or video taped materials be used or shared with any individual or company for any commercial means.

I also understand that this course does not qualify me to teach similar courses in the assessment and treatment of injuries and I will not attempt to do so.

I also understand that only those who have successfully completed the Benjamin Advanced Training Teacher Training Program will be certified to teach this material.

I further agree that in addition to all rights and remedies accruing to Ben E. Benjamin, Ph.D. in the event that I breach this Agreement in whole or in part, this Agreement will be enforceable by injunction in courts of law.

This agreement is signed as a sealed instrument.

DATE ________________ SIGNATURE
________________________

PRINTED
NAME________________________
1. Whiplash describes a specific injury to the neck.  
   True or False? ______

2. The ligamentum nuchae is posterior to the interspinous ligaments at the cervical level.  
   True or False? ______

3. Neck ligament injuries never cause specific muscle weakness in the arm.  
   True or False? ______

4. Which ligament causes pain down the front of the chest and also slightly down the arm? _____________________________________________________________

5. Which is the most common level at which the nuchal ligament in the neck becomes sprained? ______________________________________________

6. Neck ligament injuries are a major cause of tension headaches. True or False? ______

7. Hyperreflexia is a sign of__________________________________________

8. Weakness in resisted extension of the elbow means there is possibly a disc injury at the level of _________________________________________________________

9. A great deal of weakness in several resisted motions of the neck is an indicator of ______________________________________________

10. A client’s head is fixed in rotation to the right and cannot be held straight. This condition is referred to as ______________________________________________