

Back To Chiropractic Continuing Education Seminars
History & Exam Neurology of Trauma ~ 4 Hours
Presented by Steven C Eggleston, DC, Esq.

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Marcus Strutz, DC

Back To Chiropractic CE Seminars

History & Exam – The Neurology of Trauma – 4 Hours
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Objectives

Participants will be taught common neurological injuries that occur in trauma cases. They should learn to ask important questions during the history-taking process so they can order the correct tests and their examination will lead to the correct diagnosis more frequently.

Hour 1

The common neurological symptoms of trauma patients is presented. Injuries are broken down into those afflicting the central nervous system and the peripheral nervous system. They are taught the four areas that cause fingers to tingle between the spinal cord and the fingers that are actually tingling.

Hour 2

Participants are taught to inquire during the history-taking process whether the patient's numbness/tingling is constant or occasional and why this question is so important. They are taught that different tests need to be ordered depending on whether the patient's symptoms are occasional or constant. They will be taught the most common causes of constant numbness/tingling and why an MRI test is likely to discover the patient's exact injury. They will also be taught the most common cause of occasional numbness/tingling and why stress X-rays is the test most likely to correctly diagnosis the patient's injuries.

Hour 3

Participants will be taught the three testable parts of nerves, how to test for "drift" in the upper and lower extremities in order to screen for subtle motor dysfunction or weakness in the extremities. They will be taught about Spinal Pain Mapping and how to make an appropriate referral to have this done. They will learn about double crush nerve injuries.

Hour 4

Participants will learn why torn ligaments cause neurological symptoms and how to carefully take a history in order to distinguish between various neurological symptoms that are quite similar in presentation but vastly different in causation. They will be taught which X-ray views are most likely to find the source of a patient's neurological symptoms in a trauma case. They will be taught how to differentiate between True Vestibular Syndrome (inner ears) versus torn upper neck ligaments versus brain concussion when the patient has dizziness, vertigo, headaches and balance problems.

Nothing that chiropractors do in practice is more closely scrutinized than neurological symptoms of trauma patients. In a personal injury or workers compensation case, attorneys and claim adjusters on both sides look at your chart notes as evidence to be used to fight the case. What you write on paper is crucial to the outcome of your patient's case. You can win it for them or lose it for them depending on how well you know and write the neurology of traumatic injuries.

We will look at neurology in this course from a practical, easy to understand perspective and not delve into the deep functions of the nervous system. After all, the people reading your chart and looking for evidence do not have the education to understand the deep functions anyway. You will learn the “buzz words” that need to be used in a legal setting to accurately and thoroughly write down enough evidence for the attorneys and claim adjusters to fight over.

Why Do Fingers or Toes Tingle?

Nerve injuries are very serious. One of my professors in Chiropractic College once said, “A nerve injury is an ominous injury that can go downhill fast.” If you have a nerve injury, you may have a lifetime of pain, disability, and suffering. Nerve injuries are most emphatically *not* “just soft tissue injuries.”

Central Nervous System vs. Peripheral Nervous System

Central means the nerves that are in the brain and spinal cord. *Peripheral* means all the rest of the nerves outside the brain and spine.

The central nerves are those that are enclosed inside of bones. The brain is so delicate and important that it is inside the very hard bones of your skull for protection. The spinal cord is also completely enclosed inside the bones of the spine for protection. These nerves are so important to the health and the function of the body that nature enclosed them inside some of the hardest bones in your body (the skull and vertebra.)

However, once a nerve leaves the protection of the bones of your skull and spine, they are called peripheral nerves. Doctors understand this term to mean two things: (1) The peripheral nerve lacks the protection of being inside of a bone; and (2) the word *peripheral* literally means the outer region or part (as opposed to the inner region or center.)

The most common injury to the central nervous system in a motor vehicle accident is brain concussion (also known as MTBI.) These delicate brain nerves in the central nervous system can be severely injured simply by *shaking* your head back and forth during the car accident. Another injury to the spinal cord portion of the central nervous system can cause paraplegia (being in a wheelchair because there is no nerve supply going to your legs) or quadriplegia (neither your arms nor your legs function anymore.)

However, the peripheral nervous system is completely different. Injuries to peripheral nerves are so medically different that they have the opposite effect on your reflexes as compared to central nerve injuries. Doctors judge a normal amount of jerking and measure it as +2. When the injury is to the *central* nervous system, the patient’s knee jerks *more* than normal (graded +3 or +4). This is the opposite reaction you have when the patient has a *peripheral* nerve injury because that causes your knee to jerk *less* than normal (graded +1 or 0.)

What Causes Finger Numbness or Tingling?

It is fairly common to have numbness and/or tingling in your arms, hands, fingers, legs, feet, or toes after a car accident. This can come from many different injuries and it is the doctor's job to figure out what is causing the nerve to be numb or to tingle.

For example, the fingers on your right hand can tingle because of either a central nerve injury or a peripheral nerve injury. Doctors sometimes use a very general term for this variety of nerve symptoms and simply call them *altered sensation*.

Where Does Nerve Pressure Cause Altered Sensation?

The four most common places that you can have a “short” in the nerve traveling between your spinal cord and your fingertips are: (1) The nerve root; (2) the brachial plexus; (3) the elbow; and/or (4) the wrist.

The Nerve Root: As the nerve root passes through the small opening, there are many things that can put pressure on that nerve and cause a “short” or altered sensation in the other end of that nerve (fingers.) The four things that can cause altered sensation because of nerve root irritation are:

- Disc herniation
- AOMSI (from torn ligament(s) in the spine)
- Bone spurs (aka degenerative arthritis)
- Inflammation and chemical changes

Disc Herniation: When the disc *herniates*, disc material leaks out and it commonly flows into the foramen that the nerve root is passing through. When this happens, there are two things trying to occupy the same space. The disc takes up some of the space which puts pressure on the nerve root that results in the short-circuiting of that nerve. The patient may feel numbness (nothing) or tingling (partial or altered sensation) in the fingers.

Constant numbness or tingling in the fingers after a motor vehicle collision is very commonly caused by a disc herniation. You will do certain orthopedic and neurological tests such as the cervical compression test and the cervical distraction test which isolates the nerve root as being the area (of the four most common areas) where there is pressure on the nerve.

When the patient has constant numbness or tingling in fingers or toes after a car accident or any trauma, you should order an MRI test. Magnetic Resonance Imaging (MRI) is currently the best medical test to see discs and to see whether the disc is herniated. REMEMBER that you should order the MRI when the patient has CONSTANT numbness or tingling that lasts all waking hours because that is most likely caused by a herniated disk pressing constantly on the nerve.

This article in *Spine* states that a disk “bulge” is an age-related phenomenon of old age and is NOT an injury to a disk. A “bulge” is defined as **more than 50%** of the circumference of the disk is beyond the margin of the vertebral body. A “herniation” is, by definition, where “**less than 50%** of the circumference of the disc” is beyond the margin. Thus, if the radiologist incorrectly uses the word “bulge” to describe a disk injury in a patient under fifty years of age, you should contact the radiologist, send him or her a copy of the *Spine* article and ask for an addendum to the MRI report retracting the word “bulge” and, instead, use the correct words to describe the patient’s injury. Otherwise, the insurance adjuster will offer exactly zero dollars for any patient whose MRI report uses the word “bulge” to describe an injury.

AOMSI - Vertebral Translation Caused By Torn Ligaments

When the bones in the spine (vertebrae) are translating or sliding with excessive motion from a partial tear of the ligaments, they *occasionally* squeeze and pinch the nerve root by partially closing the foramen during some spine movements. It is like hitting the nerve in your elbow (“funny bone”) and it causes your fingers to tingle for a few seconds or minutes. Each time the patient moves his/her neck into a certain position, the bone bumps the peripheral nerve root and it causes the fingers (or toes in the case of lumbar AOMSI) to tingle for a short time.

When the patient describes *occasional* numbness or tingling in your fingers, that is a very strong sign that the cause of the altered sensation is **not a disc herniation**, but rather a ligament tear that is causing a vertebral segment to have **Alteration Of Motion Segment Integrity (AOMSI)** because of torn ligament(s) in the spine. When a ligament tear is causing occasional numbness and tingling, the MRI test will usually be negative and a waste of time and money. **IF YOU DO NOT UNDERSTAND THIS BASIC AND MOST IMPORTANT DIFFERENCE BETWEEN CONSTANT AND OCCASIONAL TINGLING, YOU WILL ORDER THE WRONG TEST, IT WILL BE “NEGATIVE” AND YOU HAVE SERIOUSLY DAMAGED THE PATIENT’S LEGAL CASE.**

The **most likely cause of occasional finger numbness or tingling** with certain neck movements is translation instability (aka ligament laxity, ligament instability, ligament tear, AOMSI etc.) Any ligament laxity seen on the plain x-ray films is an indication to order a digital motion x-ray (DMX) or video fluoroscopy study to evaluate all twenty-two neck ligaments. One of the most common mistakes I see when I review my clients’ medical records is that the patient told the doctor she had numb or tingling fingers, the doctor never asked whether it is constant or occasional, the doctor orders the wrong test (MRI), and the MRI test is “negative”. The insurance company says, “See, there’s nothing wrong with your client.” The rule of thumb for analyzing numbness and tingling is:

Constant numbness or tingling

Consider disk herniation

Do MRI test

Occasional numbness or tingling

Consider torn ligament(s)

Do stress x-rays and/or fluoroscopy

Bone Spurs: Wherever bone spurs are seen on spine x-rays, that joint was injured more than seven years ago (probably a ligament partial tear.) DJD is most definitely the body's self-healing mechanism for torn spine ligaments. The bigger the bone spurs, the longer it has been since that joint was injured.

It is common for a patient to have bone spurs with no numbness or tingling. I have seen it thousands of times in my own patients. It is also common for a person who already has bone spurs (but no numbness or tingling) to be in a car accident and then their fingers start tingling within a few days or weeks. The additional injury from the accident is the cause of the altered sensation following an accident.

Bone spurs take years to grow and take a long, long time to get large enough to press on a nerve. When your patient suddenly has altered sensation right after a whiplash, it is not because the bony spurs suddenly grew 10,000,000 times faster and suddenly are so big they press on the nerves.

The bone spurs have been growing slowly and partially fill the small opening where the nerve root passes through. The IVF is a fixed diameter, approximately five millimeters. If the patient has a one millimeter spur that has made the IVF only four millimeters wide, the nerve still has plenty of room to get through without any pressure on it. If the patient then has a car accident that causes torn vertebrae ligaments, the result can be that the four millimeters of the the IVF (that is already slightly compromised by bone spurs) can be compressed in certain spine movements from the sliding vertebra. In certain positions, the nerve tunnel is only one or two millimeters. Each time this happens (with spine movements) the bones crush the nerve and cause numbness and/or tingling for a minute or two.

A whiplash also causes swelling in the injured area. Just like the ankle swells up after a sprain, the spine also swells up after a whiplash. This swelling can fill up the space inside the nerve tunnel. Swelling in the nerve tunnel in addition to the bone spurs can, when added together, make the IVF so small that the nerve cannot pass through without pressure on that nerve. Pressure on the nerve causes altered sensation.

Assume the patient's spine has a bony spur from a previously torn ligament 7 or more years ago and then has a whiplash. The clinical sign is occasional numbness or tingling. The first thing you should think of is spine ligaments and the best first test is stress plain film x-rays (flexion and extension views.)

On the other hand, suppose the patient has constant numbness and tingling. You must assume there is something inside the IVF constantly putting pressure on that nerve. That can be EITHER a herniated disk OR swelling of the tissues. It takes three or four weeks for acute swelling to go down so if the patient STILL has constant numbness and tingling after 30 days, order the MRI and look for a disk herniation. It is possible that the constant numbness/tingling will go away in less than 30 days and a good assumption on your part is that it was caused by swelling in the spine from the whiplash.

In other words, pre-existing arthritis in your spine is not the *cause* of the peripheral nerve symptoms, but it magnifies a smaller disk herniation or swelling in the spine so the patient can have altered sensation from an accident when you would not expect such a severe and significant symptoms (constant numbness/tingling). Take your history carefully AND get the patient's prior medical records to see if he/she has ever had numbness/tingling before. If the patient has truly NEVER had altered peripheral sensation symptoms but has spine DJD, your records should explain in detail what YOU BELIEVE is causing the numbness/tingling symptom. **Looking smart on paper is always a good idea.**

Inflammation and Chemical Changes: Injured joints in the neck can become inflamed (which is a type of chemical change in the tissues around the joint.) These inflamed joints swell up and can press on or even entrap nerves which results in pain. There are many layers of protective tissue surrounding nerves. When these protective layers become inflamed with chemical irritants, the inflammation can spread to the nerve cells themselves. If this inflammation is not treated, the ongoing inflammation can also lead to the progressive destruction of connective tissue that normally protects your nerve. Unprotected, nerve fibers are more vulnerable to compression injuries.

The National Institutes of Health states that car accidents are a common cause of nerve injury. There are many processes that can injure nerves after an accident including disc herniations, ligament tears, and inflammation that causes chemical irritation of nerves. These injuries can even be exaggerated if the patient already had some bone spurs in their spine vertebra.

Diabetes and Nerve Injuries

Diabetic patients that are involved in car accidents have a weakened nerve system even before the accident. It is common for blood sugar to become out of control following a car accident. This is believed to be caused by a minor brain concussion that affects the area of the brain that controls hormone levels in your body. When the hormone system is affected by an accident, the normal quantity of insulin taken each day may not control blood sugar like it did before the accident.

ADVISE diabetic patient that have been in a trauma to check their blood sugar more carefully and tell you if readings are higher since the accident. They may need to adjust their medications and/or insulin intake. Advise your patient to inform their medical doctor of this fact and get medical advice for their new blood sugar readings.

The Brachial Plexus

The Brachial Plexus is a group of peripheral nerves that you must consider is causing the patient's arm/hand/finger altered sensation. If the nerve root is not causing it, test the brachial plexus. It may be the site of the injured nerve(s) causing altered sensation.

The Elbow

The third area vulnerable to nerve pressure, injury, or short circuits that can cause finger numbness, tingling, or weakness is the elbow. The ulnar nerve passes your elbow on the side of your pinkie finger. Hitting your “funny bone” is really striking the ulnar nerve and the symptom is 15 seconds up to a couple of minutes of numbness or tingling in the 4th and 5th digits. This is similar to the sensation when the C8 nerve root is struck by the vertebra bone when AOMSI is present after spine ligaments have been torn.

If the patient complains of pinkie finger numbness or tingling, your job as the doctor is to figure out whether it is a C8 dermatome alteration of sensation caused by a nerve root injury (or pressure) or whether the source of nerve irritation is the brachial plexus, the elbow or the wrist. Take a few moments to write your thoughts in your chart about WHY you think the patient’s altered sensation is coming from a certain area.

Nerves near the elbow can be injured by holding on to the steering wheel as the patient’s body is thrown around violently. They can also be injured by hitting the elbow on the window, door, or center console of your car while their body is flying around. The patient may not remember hitting his/her elbow on something so you should take a moment to explain the mechanism of injury to the patient. Notes in a doctor chart like the following help all the attorneys and claim adjusters settle a case: “This patient hit his left elbow on the door and that cause his altered sensation. Evidence of this conclusion is visible by the subtle swelling and discoloration on his left elbow.”

The Wrist

Carpal Tunnel Syndrome occurs at the wrist and is very common. There are actually *two* major tunnels in your wrist through which major nerves pass. One is on the thumb side of the wrist (called the Carpal Tunnel.) The other is on the pinkie side of the wrist (called the Ulnar Tunnel or sometimes called the Tunnel of Guyon.)

The Median Nerve passes through the Carpal Tunnel (along with arteries, veins, and other important parts.) When this nerve tunnel is damaged, the patient may experience symptoms such as altered sensation or weakness in the thumb or index finger. The Ulnar Nerve passes through the other tunnel in the wrist and when it is damaged the patient may feel these nerve symptoms in your pinkie or ring finger.

You must locate the exact area of nerve pressure in order to avoid delivering the wrong treatment. If nerve pressure is at the wrist from steering wheel trauma and you assume it is coming from the neck, no amount of treatment to the neck will cure the altered sensation caused by a nerve injury in the wrist (or elbow or brachial plexus.) The patient’s hand will continue to tingle.

Sensory Nerve Testing

There are three testable parts of nerves. The first is *sensation* which is the ability to feel sharp vs. dull objects, hot vs. cold objects, vibration, etc. The most common symptom of

nerve injury is altered sensation. The doctor may test this with a sharp object such as a pin and ask the patient if it is sharp.

Some doctors make the mistake of only testing the symptoms reported by the patient. You can avoid this mistake by having your receptionist say to patients, “The more thoroughly you fill out these forms, the better the doctor can help you.”

Nerve Deep Tendon Reflexes

Deep Tendon Reflexes (DTRs) is a method of testing yet another part of the nerve. There are DTRs in your knee, ankle, elbow, wrist, and many other parts of your body. An abnormal DTR is very strong objective evidence that the patient’s nerve was injured.

Nerve Motor Testing

The third major testable part of your nerve is called the motor function. The best and most simple screening test for motor dysfunction I have ever used is to ask the patient to close their eyes and hold their hands palms up in front of their body with elbows straight. Ask the patient to hold that position for 30 seconds. If there are no subtle motor weaknesses in the upper extremities (out of the 46 muscles), they will hold that position and the hand or fingers will not “drift” away from this position. The doctor can then write, “No evidence of drift in the upper extremities.”

For the lumbar spine nerves, place the patient face down on the chiropractic table (this effectively closes their eyes), bend their knees to 90 degrees and hold their ankles 6 inches apart. Ask them to hold this position for 30 seconds. If no drift is present, that is a good sign there are no motor dysfunctions. If you do see a hand or foot drifting slowly away from the original position, a referral to a neurologist is a very good idea with a note such as, “I observed drift in the left upper extremity. Please evaluate.”

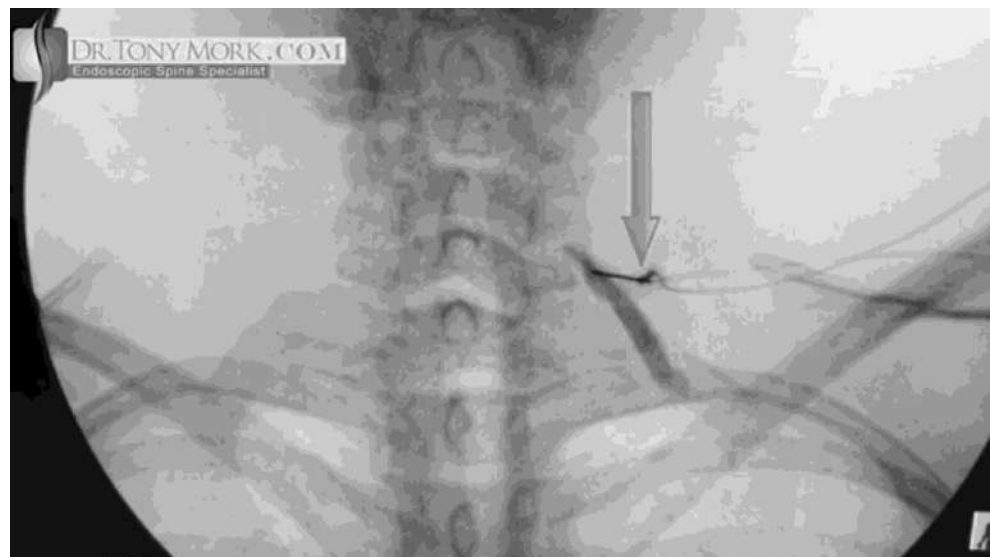
Spinal Pain Mapping & Endoscopic Surgery

Many spine surgeons in the United States still use fusion surgery to treat altered sensation. There is another technique that is successful in about 90% of my own patients and clients without having to surgically fuse two or more vertebrae. Spinal pain mapping is a technique to identify exactly which nerve root is the true cause of the patient’s radiating pain. This can be done in the neck or the low back in order to test radiating pain into the arms or legs, respectively.

The patient is taken into an operating room and a needle is placed adjacent to the most highly suspected nerve root based on the clinical symptoms and the MRI films. It is a special needle with many functions that the surgeon uses to zoom in on the exact source of the altered sensation or pain.



This is a special needle that has two separate leads to it. One is an electrode hooked up to a generator which can stimulate the nerve to twitch a little to make sure the needle is in the right place. Once that twitching occurs, the other lead is a tube capable of injecting a small amount of dye into the nerve itself. Video fluoroscopy is then used to make absolutely certain that the dye shows that the needle is, indeed, in the correct nerve area.

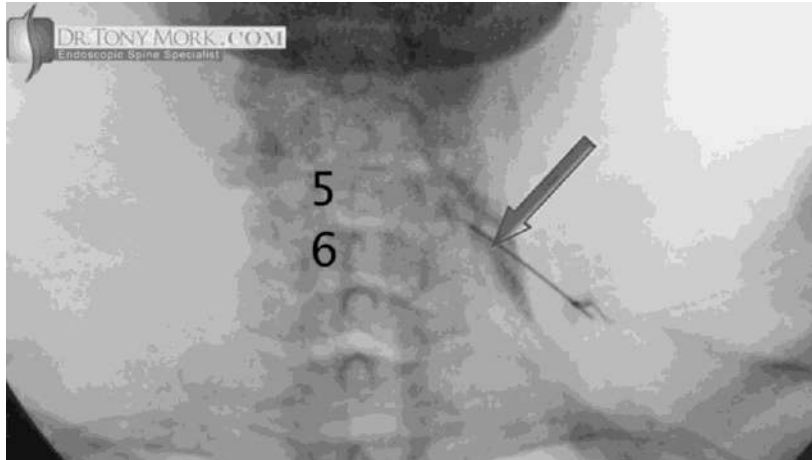


Pain Mapping Figure 1 Needle and dye show proper placement in C7 root

Lidocaine, a local, short acting anesthetic, is injected into the nerve and the patient is awakened. The patient can subjectively tell the surgeon whether their pain is gone. If yes, the test is over and a surgery is scheduled a few days or weeks later to decompress that nerve using endoscopic surgery (like arthroscopic surgery on a knee) which is minimally invasive and does not fuse any of the patient's vertebrae.

If the first nerve injected with lidocaine does not resolve the patient's pain, the patient is put back to sleep and the process is repeated on the second most suspected nerve root. In the case with these pictures, a 32-year-old woman was having neck pain radiating into her arm from a car accident almost eighteen months before. The first test (Pain Mapping Figure 1) on the C7 nerve root failed to stop her pain. Figure 2 shows the pain mapping

procedure being repeated on the C-6 nerve root. This time the patient reported that 85% of her pain was gone when she was awakened.



Pain Mapping Figure 2 Needle and dye show proper placement in C6 root

This technique helps to identify exactly the cause of pain. Each time the patient is awakened following the lidocaine injection and asked if the pain is gone. Once the lidocaine demonstrates that the patient's pain is resolved, the surgeon knows exactly which nerve is the source of the pain and endoscopic surgery is scheduled to decompress only that nerve root. Needless to say, the success rate for surgery is very high when this pain mapping technique is done first.

In the MRI scan shown, the C-6 nerve root appears to be the most compressed nerve on the MRI even though the clinical testing indicated that it was the C-7 nerve root causing the patient's pain. After pain mapping, the surgeon knew that the MRI results corresponded more closely than the clinical neurological testing and a small and not terribly invasive surgery cured the patient.



Pain Mapping Figure 3

MRI Correlates Exactly With Pain Mapping

We now know that symptoms are not always caused by the nerve that “looks” the worse on an MRI or even looks like the worst one when the surgeon opens up the patient’s neck and looks with his or her own eyes. One endoscopic surgeon I know told me that when he is looking at the actual spine during surgery, there are often vertebrae and IVF openings that look much worse than the one he is operating on. Without pain mapping, the patient would get surgery in places that are not even causing any symptoms.

What Is Double Crush Nerve Injury?

I have described four areas where there can be nerve pressure between the spinal nerve and the fingertips. What happens when there is pressure on the nerve at two or more places, not just one of the four?

Double Crush is the term to describe a nerve that has pressure (crushing) on it in two or more places along the nerve’s pathway between the spine and the fingers. You should examine thoroughly and completely all possible areas of nerve crush in all four areas between the spine and fingertips in order to accurately and correctly diagnose your patient’s injuries. For example, the nerve could be crushed at the nerve *root* in the IVF and *also* be crushed inside the Carpal Tunnel where it passes through the wrist. The patient may have two separate injured body areas (neck and wrist), two separate areas where the nerve is crushed, and yet the doctor may only diagnose one of them. Treatment may be directed at the one that the doctor diagnosed and the other injury is ignored and may not get better. Your patient may not get the proper treatment for both injuries and that would be your fault.

It is common to have only **mild pressure at two different areas** along the nerve pathway. Either one of the injuries is not bad enough to cause symptoms. However, taken together, a little bit of pressure at two different areas along the same nerve can combine their effects to cause symptoms.

The proper and accurate examination of a patient with altered sensation in the hand after trauma is to examine *all four areas*. You should be able to explain this **IN WRITING** in the patient’s chart so you look smart on paper.

The legal system looks at the facts. If facts are missing, the legal system cannot function properly. If lawyers and claim adjusters are not given all the facts, the patient’s claim cannot be settled correctly. **THE DOCTOR IS THE SOURCE OF THE FACTS THAT LAWYERS FIGHT OVER IN PERSONAL INJURY AND WORKERS COMPENSATION CASES.** If you do not give **ALL** facts or **ACCURATE** facts, the lawyers and claim adjusters are arguing over things that are not really wrong with your patient. Poor legal settlements are mostly caused by poor doctor records.

Peripheral Nerve Injuries in the Legs

All the nerves in the low back, hips, legs, and feet are also peripheral nerves. Take the same care to take a detailed history of your patient's lower extremity nerve symptoms and keep examining until you can explain the injury ON PAPER and you have explained exactly which nerve is injured and why.

Permanent Impairments And Ligament Partial Tears

The American Medical Association (AMA) publishes the most sophisticated and widely used book on the subject of permanent impairments. In it, they address how much *impairment* should be given (in percentages of your whole body) for injured ligaments.

Impairment is a close cousin of *disability* but there is a significant difference. Disability means you are unable to do *your* job. Impairment means you may be unable to do *all* jobs. Impairment rating is the preferred method of evaluating your residual pain and injuries after an accident. It is a more accurate comparison of injuries among people who work very different jobs.

For example, if you are a right-handed math teacher and you accidentally cut off all the fingertips on your left hand, you are not disabled at all from being a math teacher. You can still teach math without fingertips on your left hand since you can write on the blackboard and grade papers with your right hand. However, if you are a right-handed *concert violinist* who loses your left fingertips, you are 100% disabled from that job. The concert violinist uses the fingers of the left hand to play the strings to make beautiful music. It would be nearly impossible to play to the level of a concert violinist if you are missing all four fingertips of your left hand. Both the math teacher and the violinist have the exact same injury and would have the exact same impairment rating. However, their disability is much different. Impairment ratings measure the severity of your injury without accounting for how it affects your particular job.

Torn spine ligaments typically have high impairment ratings because doctors and other scientists know they are severe injuries. For example, if any two vertebrae in your neck translate more than 3.5 millimeters or more than 20% back and forth when you move your neck, your impairment rating will be between 25% and 28%. Likewise, somebody who has had neck surgery also will have an impairment rating of 25% to 28%. Ligament injuries are serious. Impairment ratings for partially torn neck ligaments are as high as if the patient already had the surgery. The AMA knows that the likelihood of future surgery is high and the impairment ratings are identical for these two injuries.

How Translation Instability Causes a Lifetime of Pain

AOMSI is an acronym for Alteration of Motion Segment Integrity. This is the most modern term for spine joints with partially torn ligaments. Doctors use many different words to describe this injury to your ligaments such as Translation Instability, Ligament Laxity, Joint Hypermobility, Loose Joint, Torn Ligament and many others.

As you now know, ligaments *never* heal. Ligaments are not like a muscle “strain” which will heal in a few months. Muscle injuries are like breaking a fingernail because it will heal and grow back to be as normal as it was before the injury. Even *breaking* your leg has a better outcome (prognosis) than a ligament injury because a broken bone will heal in a few months and be normal again.

Since a ligament injury never heals, the patient will suffer from the pain of the torn ligament, the referred pain “triggered” in another area of your body, secondary muscle spasms and degenerative arthritis in the joint that is permanent and gets worse over time. This patient is NOT going to get better with chiropractic adjustments. The truth is that forceful adjustments on torn spine ligaments probably makes them worse and I know from interviewing thousands of personal injury clients that chiropractors are INFLICTING UNNECESSARY PAIN by adjusting patients with torn spine ligaments.

Symptoms of Neck Ligament Injuries

- Pain that increases with neck movement
- Secondary muscle spasms
- Degenerative Arthritis
- Posterior neck pain (pain at the back of your neck)
- Headaches
- Dizziness
- Vertigo
- Balance problems
- Vague ache in neck, shoulder, upper back
- *Occasional* numbness, tingling, pins & needles in arm, hand, or fingers

Treatments For Torn Ligaments

Treatments for ligament partial tear injuries currently include three choices: (1) Surgery to fuse the joint; (2) Prolotherapy/PRP injections; or (3) lifetime pain management. All of these treatments involve pain and suffering to the patient. Remember all those patients that never heal after a whiplash and they keep coming to you for many years because they still hurt? THOSE are the torn ligament patients. If you will diagnose them early and get them some Prolotherapy, PRP or stem cell injections they will have a better life. You can still adjust those patients after their Prolo, PRP or stem cell injections. You will find they hold their adjustments better and have less pain between treatments. The key is to make the referral for these three very natural treatments EARLY before the nerve itself is permanently damaged by the bones hitting it all the time with certain spine movements.

What Causes Secondary Muscle Spasms?

Doctors use the word *secondary* to mean a symptom that is an *indirect* result of the injury. They use the word *primary* to mean the normal symptoms expected from the injury. For example, if you cut your finger, two primary symptoms would be pain and bleeding. Most of the time you put a bandage on the cut and it heals normally and forms a scar. However, if the cut becomes infected, red, and swollen, those are the *secondary*

symptoms of the cut. The secondary symptom often has to be treated separately from the primary symptoms. Treatment for this secondary symptom (infection) will require an antibiotic ointment or antibiotic in pill form.

The most common secondary symptom of ligament injury is muscle spasms. Just like a cut on your finger, your body has internal healing methods to deal with injured ligaments. Your body can sense the extra movement of the joint and tenses up your muscles to try to prevent this unacceptable movement. **The two terms to describe this phenomenon, muscle *guarding* and muscle *splinting*.**

Consider that your patient has torn neck ligaments. His/her body slowly and steadily tenses up his/her muscles over a two to four week period to try to “splint” the neck and stop the looseness in the damaged joints. Thus, muscle spasms are secondary to (or "caused by") the hypermobile joint and the hypermobile joint is caused by torn spine ligaments.

The muscle spasms themselves are painful. Muscle spasms hurt (even if they are indirectly caused by another injury.) When you treat the patient’s muscle spasms instead of their PRIMARY injury (torn spine ligaments) you are no smarter than the medical doctor that prescribes muscle relaxants and ibuprofen. After your treatment relaxes the spasm in the muscles, the next joint becomes hypermobile again.

Then, sensing hypermobility, the muscle spasms just keep coming back within a few weeks because they are secondary symptoms to the unstable joint. You are treating the smoke, not the fire. The cycle will repeat itself about every two to four weeks and the chiropractor just keeps delivering massage, stretching, electric muscle stimulation or other treatments that treat the muscle spasms but NOT THE CAUSE.

Since spine ligaments never heal, the only relief the patient will eventually get is when their joints develop enough DJD to stop the hypermobility. The neck gets stiff but the secondary muscle spasms finally stop.

You can see the see-saw battle going on in your patient’s body. The car accident tears the ligaments. The partially torn ligaments cause loose joints. Their body senses the extra movement in the joint and tightens up tightens up the muscles to try to prevent the extra movement. The secondary muscle spasms are, by themselves, painful. You treat your patient’s tight muscles to relieve the pain from the spasms and then the patient is right back where they started with hypermobile joints. It is a vicious cycle that keeps repeating itself every two to four weeks until arthritis permanently stiffens up their joints. A far better method is to make a referral for some Prolotherapy, PRP or stem cell injections to treat that actual injury. Once the ligaments heal, the secondary muscle spasms will stop.

Headaches, Dizziness, Vertigo and Balance Problems

A patient of mine was in a car accident fifteen years ago. She had immediate headaches, dizziness, vertigo and balance problems. Although conservative treatments helped her significantly, the relief was only temporary and she was unable to travel in airplanes at all

or even a car for more than thirty minutes or so without experiencing severe vertigo. I sent her to several other doctors but nobody seemed to be able to help her get any real relief. After she had suffered for seven or eight years, I looked at some new research about the ligaments in the neck and decided to take another look at the ligaments in her upper neck. I took stress x-rays of her C1-C2 joints (APOM view in left and right lateral flexion) These were unconventional and non-standard views at that time which I have come to call APOM stress views. They revealed the cause of her symptoms.

Severe ligament partial tears existed in her accessory and alar ligaments. These two ligaments stabilize the first two vertebrae that are located at the top of the neck. She had six millimeters of translation instability at these two joints. The vertebral arteries pass through small holes in both of these vertebrae on their way to supplying blood and oxygen to the brain. The severe translation instability was causing the vertebral arteries to be pinched when she moved her neck into certain positions. I knew that she could have surgery to fuse her neck. I knew that doctors could install a lot of hardware in her spine and that would stop her vertigo. I spent months looking for another less invasive way to treat this.

My research led me to a treatment option I had never heard of called Prolotherapy. She had twelve Prolotherapy treatments over the course of a year. She was then able to fly to Japan with her family and had no vertigo, dizziness, or balance problems on the long flight over or back. It has been a miracle treatment for her. Since the only other option was surgery to implant metal hardware into her spine to stabilize it, the Prolotherapy was relatively inexpensive and had far fewer risks than delicate spine surgery. Since then, hundreds of my patients and clients have been very happy with the results from Prolotherapy.

A newer technique is to inject Platelet Rich Plasma instead of dextrose solution. They take about six vials of blood, centrifuge it and re-inject it into the patient's damaged joint. The patient's own plasma acts on the injured joint (ligament, tendon, meniscus) to actually heal it.

The latest technique (and I believe the future of modern medical care) is stem cell injections. They can extract mesenchyme cells from the patient's ilium (or purchase them from someone else) and inject the stem cells into the patient's injured joint. These truly heal the patients injured tendon, ligament or meniscus in the cases I have handled. This is a very promising treatment for joint injuries and may eventually put a lot of orthopedic surgeons out of business. The most important thing is that the sooner these treatments are started after the injury, the better the outcome. Make the referral when you diagnose torn ligament to get the best results for your patient.

Vestibular Deficits Caused by Whiplash

Dizziness and vertigo occur in approximately 25% to 50% of whiplash cases. Torn neck ligaments are not the only reason for dizziness, vertigo and balance problems after a car accident. Whiplash can damage the delicate parts of the inner ear which are responsible for letting your brain know the position of your head in relation to gravity. Whiplash can

also damage the brain stem where the lowest part of your brain exits the skull and enters the spinal canal.

Dizziness is a term generally understood but vertigo is a specific type of dizziness in which you feel a spinning sensation when he/she is not moving at all. People with vertigo also experience balance problems and these spinning sensations can cause nausea, upset stomach and even vomiting.

There are two specific tests that can be done by ENTs to diagnose dizziness. Brainstem Auditory Evoked Potential (BAEP) records the electrical activity of the brain stem. Electronystagmography (ENG) tests voluntary and involuntary eye movements. Since three of the cranial nerves control eye movements, ENG is an important test to find out whether your brain stem may have been injured during whiplash. Get to know a good ENT so you can make referrals of your whiplash patients with vertigo and get good data to explain your patient's injuries. Looking smart on paper is always a good idea.

Brain stem injury can cause a myriad of very debilitating symptoms. Dizziness can last months or years. Tinnitus (ringing in the ears) and even hearing loss in both ears have been found as long as five years after whiplash.

There is some cross-over that occurs with dizziness and vertigo symptoms. They can be caused by damage to the vestibular system, torn upper cervical ligaments, brain concussion AND chiropractic subluxations. Since you are a chiropractor the best first place to start is to look at stress X-rays to make sure the patient has no torn alar or accessory ligaments. THEN you can safely adjust the patient's neck and see if it cures their dizziness or vertigo. If it does not after some adjustments, it is best to assume that you better test the patient for brain concussion and/or make a referral to an ENT to have the patient's vestibular system and brain stem evaluated.

True Vestibular Syndrome

Symptoms of true vestibular damage include:

- Dizziness along with vision problems that seem to be made worse when you are moving your head
- Poor spacial relationships when reading where you skip words or letters while reading or you have a disorganized writing style
- Nystagmus (involuntary rapid eye movements)
- Difficulty navigating in the dark
- Hearing loss or ringing in the ears
- Motion sickness or sensitivity and/or nausea
- Unsteady gait, clumsiness, tendency to fall
- Ear pressure
- Headaches associated with nausea and/or dizziness

Notice that some of these symptoms are present in a brain concussion: (1) Dizziness; (2) blurry vision; (3) hearing loss; (4) nausea; and (5) headaches. The hearing loss in

concussions tends to be more the kind of not understanding what people say whereas with true vestibular injury it tends to be more associated with tinnitus (ringing in the ears.) Concussion also manifests with dizziness and blurry vision but they tend to be there even when you are not moving or turning your head. Concussions also cause reading problems but it tends to be caused by the inability to concentrate (re-reading things) rather than skipping words and/or letters and a disorganized writing style.

With this overlap of symptoms, there are good reasons for you to refer your patient to both an ENT and a neuropsychologist to be tested thoroughly to determine which injury is causing these symptoms. Keep in mind that Whiplash Syndrome can include both a concussion and vestibular injuries so accurate, professional testing may reveal that the patient may have some degree of injury to both.

Ligaments Hold Your Upper Neck Joints Together

There are twenty-two major ligaments in the neck. When the ligaments in the upper one-third of the neck are torn, the patient may experience symptoms such as headaches, dizziness, vertigo, and balance problems. The first test that should be done for a patient with these symptoms is a set of *stress x-rays* of the upper neck. This should include both lateral flexion and extension as well as APOM stress views with the head tilted to the left and right to look for alar and accessory ligament partial tears. **BE SURE TO PUT A LEFT OR RIGHT MARKER ON THE FILM.**

The most frustrated patients after car accidents are those whose doctors can't seem to figure out what is wrong with them. Also, the insurance companies will say, "It's just soft tissue injuries that should have healed in three to six weeks. You must be faking these symptoms just to scam the system and get money from us." That is very difficult to hear when the patient has a legitimate injury, disabling symptoms, and their doctors don't know how to diagnose it correctly or get them the correct treatment.

Torn Ligaments in Arms, Legs, Hips, Shoulders, Elbows, Knees, Hands & Feet

There are *completely* torn ligaments as well as *partially* torn ligaments that can occur in all the joints of the extremities after trauma. I offer you the same advice as for torn spine ligaments. If the patient does not respond to your extremity adjustments, get them some Prolotherapy, PRP or stem cell injections in their extremity joints. They will thank you for it.

Arthritis: Natural Progression of Torn Spine Ligaments with AOMSI Injuries

I was rear-ended in a car accident in 1985. At the time, my doctors did not know how to read my x-ray films and see the ligament damage at the joint between the 3rd and 4th vertebra in my neck. Over the years I had to get regular adjustments from my chiropractor to keep the pain and stiffness to a minimum. I have several sets of x-ray films taken over the years and each set shows a constant progression of degenerative arthritis between the 3rd and 4th neck vertebra. Neck x-rays in 2011 showed that those two bones have almost completely fused together on their own (without surgery.) Neck

x-rays taken after my 2012 car accident showed those two vertebra bones were 100% completely fused.

We have known scientifically since the 1980s that there is a 66% likelihood that you will get arthritis in your neck within seven years after getting in a rear-end car accident. Based on my research into ligament laxity cases, I now believe that doctors can predict to almost 100% accuracy exactly which joints will get arthritis after a car accident.

My anterior longitudinal ligament was torn in a minor rear end collision in 1985. This x-ray was taken in 2011. It took twenty-six years for the C3-4 vertebrae to fuse all by themselves naturally. I took x-ray films in my chiropractic office about every four to five years and the natural progression of fusion is obvious on that series of films



Natural Fusion of C3-4

The anterior longitudinal ligament was torn in a minor car accident twenty-six years before this x-ray film was taken.

Degenerative Arthritis is the process of joints with torn ligaments forming scar tissue and bone spurs in an attempt to stabilize the excessively mobile joint. It takes approximately seven years for arthritis to get bad enough to see on a plain film X-ray. However, the process of forming arthritis begins shortly after the injury and is full blown within two or three years and can be seen on CT or MRI films.

Treatment Options for Ligament Injuries

There are many treatment options that can help a patient after a whiplash injury. Many people go to a chiropractor because we are so good at providing quick relief. Even if the patient has torn spine ligaments, your chiropractic care can treat and cure all of the patient's OTHER injuries even if you refer the patient out for Prolotherapy, PRP or stem cell injections. Finding a torn ligament does not mean dismissing the patient. It means don't forcefully adjust that spinal segment until Prolotherapy, PRP or stem cell therapy has healed the ligament and stress X-rays demonstrate LESS translation movement.

The Golden Rule is to do unto others as you would have them do unto you. If YOU have torn ligaments in your neck after a whiplash, how would you like a really hard neck adjustment?

Another, good rule is that if 30 adjustments doesn't fix a patient, 30 more are unlikely to fix that patient. If your patient still has symptoms after 3-4 months under your care, figure out what you missed. It is likely you missed the torn spine ligament(s) or disk herniation. When the patient is making no measureable progress under your care, you have an obligation under California Board Rule 317(w) to make a referral. Do your best to cure the patient but WORK WITH OTHERS to help your patient get the best outcome.

When you get chiropractic treatment, you frequently feel improvement even before you walk out of the office. That is what makes chiropractors so popular in society. However, if you still have neck pain more than four months after a car accident, you almost certainly have torn ligaments in your neck.

From my perspective as a personal injury attorney it is harmful to your patient's personal injury legal case to just keep going to the chiropractor for six, ten, or twenty months without seeing any other specialists. The time line to follow is to get up to four months of conservative, non-invasive treatment from the chiropractor. Physical therapists are also considered conservative. After four months, it is time to try something else and increase the level of "invasiveness." That does NOT mean you have to dismiss the patient. It means you need to CO-TREAT the patient with others.

One last thought, as a personal injury attorney, I have found it EXTREMELY helpful to get the best settlements for my clients to get video of any scary-looking or painful treatment. I like to take video of my clients getting Prolotherapy, PRP or stem cell injections. The needed looks really scary in high definition on a big screen in front of a jury. Claim adjusters know that and will offer MUCH larger settlements when I have video of a needle or scalpel because that is the "pain and suffering" the patient went through.

Likewise, when your patient needs neurological testing such as Nerve Conduction Velocity (NCV) or other nerve tests, I find that video shows how much the patient "suffered" not just from the injuries but also from the treatments. The neurology of trauma often means the patient has an injury that may need treatments from specialist in addition to the chiropractor. It also means more "pain and suffering" to get these tests and make sure the patient gets video of the tests or treatments.

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