

THE LNC NEWSLETTER

PRESENTED BY:

Medical-Legal Interface

SOFT TISSUE INJURIES

Sarah McLain RN, CLNC, CLCP

August 2004
Volume 3, Issue 11

Inside this issue:
Special Edition
MVA-Related
Articles

Work-Related MVAs Extract a High Price	2
MVA Related Brain Injury	3
Serum Alcohol Level and Blood Alcohol Concentration: What's the Difference?	5

Soft tissue injuries are the major complaint in most motor vehicle accidents, and seem to have the most varied theories to treat them. Below are the most widely accepted methods to treat these injuries.

Soft tissue injuries are those injuries (excluding fractures) affecting the joints and muscles of the limbs. Sprains, strains and dislocations are considered soft tissue injuries, with some authorities also including bruising.

The treatment of soft tissue injuries is based on resting the injured part, applying ice packs to limit swelling and reduce pain, the application of a firm compression bandage as support, and elevation of the limb. This treatment is known as 'RICE'. RICE = Rest, Ice, Compression and Elevation

Ice packs should be placed on for a maximum of 10 minutes and can be re-applied when the damaged area becomes warm again. Never apply ice directly onto the skin, as this may cause tissue damage. Always use a barrier, such as cloth, between the ice pack and the skin to help protect tissue.

SPRAINS

Sprains involve the over-extension of a joint, usually with partial rupture of the ligaments. There may also be blood vessel, nerve and tendon damage. An injury with severe ligament damage may require subsequent immobilization in a plaster cast.

SIGNS AND SYMPTOMS

Sudden pain in the joint
Loss of power and ability to bear weight
Bruising
Swelling

Site becomes tender, painful to palpate

CARE AND TREATMENT

RICE
Seek medical aid for assessment of ligament damage

STRAINS

Strains involve over-stretching of the major muscles of the limb. Muscles are attached to bones by tendons, which tear if a muscle is forced to stretch excessively. This injury is usually less severe than a sprain, but can still have complications

Cont on p 3

Pregnant Women and Motor Vehicle Accidents

Jan Aken RN IBCLC

INTRODUCTION

Motor vehicle crashes are the leading cause of death for women in the puberty to premenopausal age. Women in their reproductive years are active independent women. I would wager a bet and say today's moms spend more time driving kids to activities than they do making meals for the family. And they are not only driving the kids, they are driving dads. It is not uncommon to see a man in the passenger seat and the woman driving the car. So yes "we've have come a long way baby" as the old cigarette commercial said.

So lets see, we have more women driving cars, the national birth rates increased from 1985 – 1993, so more of the women driving are pregnant so bingo! It is not surprising then that in this reproductive age group, the chance of dying from a motor vehicle accident is ten times greater than from any other injury device.

INITIAL ASSESSMENT

The team assessing the female trauma victim should always assume the female victim is pregnant until proven otherwise, if she is in the 14 – 44 age range. Thus many a female trauma victim presents with double whammy problems. Consequently if this trauma victim is pregnant the trauma team must deal with two lives and both must be treated simultaneously.

QUESTIONS RELATED TO THE CAR CRASH

- Was the pregnant woman the driver? The steering wheel could

have caused major trauma to the fetus.

- If she was a passenger where was she seated? Middle back seat is the safest place in the car.
- Was she wearing a seat belt? Unrestrained occupants may strike the steering wheel or other areas in the car interior or worse yet they may be ejected from the car. If the woman was wearing a lap type seat belt it should be fastened secure and low across the pelvic bone structure.
- Was it just a lower belt or was it a shoulder harness type belt? Shoulder harness provides the greater security. But seat belts may cause injury to the lower abdominal wall and yes that is where the gravid uterus is located.
- Was the car equipped with airbags and did they deploy? The airbags may well cause damage if the woman is of short stature and has the moved the front seat close to the steering wheel.
- Did the vehicle strike a road side object within 40 feet of the highway? Fatal accidents occur when the vehicle strikes an object within 40 feet of the highway.
- What was the make and model of the car? The vehicle size and design can change the injury pattern.
- Was the vehicle going at a high rate of speed? However even at low speed an accident can be fatal to the fetus.
- Take for instance a pregnant mother who was not buckled in as she drove down her neighborhood street at 25 mph. As a neighbor child dashed into the street,

Cont on p. 3

Work-Related MVAs Extract a High Price

Robert Morrison, RN BSN

Regardless of their cause, the costs of work-related motor vehicle accidents (MVA's) are an ever-present burden on the Worker's Compensation system. The National Institute of Occupational Safety & Health (NIOSH), the statistical and research support for OSHA, and the Bureau of Labor Statistics (BLS) put the toll at approximately two thousand deaths per year. This comprises more than 30% of all fatal occupational injuries, according to BLS. These figures more than 30% of all fatal occupational injuries, according to BLS. These figures include driver and passenger deaths in highway crashes, farm equipment accidents, industrial accidents, and pedestrian deaths. According to Appalachian State University, speeding is a factor in about one-third of these accidents, and approximately 90% of all crashes are due, at least in part, by unsafe driver practices. While these last two figures are disputed by different sources, there is no contesting the fact that a single MVA can cost the employer- not to mention the employee- a great deal of money, time, loss of function and productivity, and permanently alter more lives than the people involved in the crash.

We will, in a future issue, look at the differences in compensation and coverage for work-related MVA's vs. non-occupational accidents. At the moment, we look at the basic needs of the parties involved in the work-related accident, as they apply to the medical issues. For the attorney, whether plaintiff or defense, there are 3 basic things to be established with the medicals in these cases. First is identification of the claimant's baseline physiological status prior to the crash. This needs to be compared to the medical findings following the accident to establish the specific changes to that status and the severity of those changes. Second is the issue of causation. This item requires that the first issue be fully explored and resolved. Third is the issue of permanency of the damages. The medical records of the claimant become a focus of the litigation during this phase of preparation. For the injured worker, this is often uncomfortable, and can easily make them feel as if their personal privacy has

been permanently violated by legal counsel on both sides of the case.

In order to establish what damages are the result of the MVA the claimant's post-accident medical status must be fully documented. This is then compared to their pre-accident baseline data in order to show what changes have occurred. While simple in theory, this is a most difficult and subjective process. The baseline data is often incomplete, or completely non-existent. Since we usually only seek medical attention when we have a problem, most of us don't have MRI scans, x-rays, blood tests results, and physical capacity evaluations on-record (certainly not immediately before the MVA). On the other hand, all of this information is usually in the record during the time following the MVA, and is thus the data that needs to have a benchmark. We normally ask our clients (plaintiff or defense) to obtain the medical records for several years prior to the accident. This allows us to assess for prior complaints or diagnoses similar to those following the accident. As is often the case, we play a game of "significant in it's absence." If there have been no such symptoms or diagnoses made in the years prior to the accident it has to be assumed that the problem wasn't there. If there are such problems identified the issue becomes thorny, as different states have different rules about the admissibility of evidence of pre-existing conditions. For the defense counsel, this may be a significant argument against the claim. The plaintiff's attorney also needs to know this information in order to be prepared for motions and requests from the defense.

The post-accident records need to be completely explored, including all handwritten, typed, filmed, and electronic data. The findings of each attending physician need to be compared to the others to make sure there are no discrepancies. If there are, they need to be documented and presented to the attorney's testifying expert for evaluation. If the claimant is still in treatment, the attending doctors need to be made aware of any such differences in order to make sure all the medical issues are fully addressed. Not all injuries are symptomatic immediately after the

accident. Inter-vertebral disks, for example, may take days or weeks before a herniation becomes severe enough to compromise the spinal canal and cause symptoms. Soft tissue strains may also not be symptomatic until the swelling reaches a significant degree. It is important to examine the records from all attending physicians, not just the ER records. Attorneys on both sides of the issue need to be able to argue the pros and cons of each finding and its relationship to the accident.

We also need to include the need for proper identification of the attending providers, and the establishment of their credentials. In the event there is a difference of opinion, the attorney needs to know the providers experience, certifications and licensure, and current practice area in order to argue for or against the credibility of the expert. This documentation may also highlight records that are not included in the current file. All of the records need to be obtained and assessed. The opposing counsel may very well have done so, and found significant information.

Now comes the fun part- relating the problem list to the specific accident. Since the plaintiff's attorney has the claimant at their disposal, a thorough interview and history-taking is a necessity. This may point out pre-existing problems that the gathered records don't mention, identify providers not previously known, and either identify or rule out other significant intervening events. Were they involved in any accidents prior to the current crash that didn't show up on the gathered records? Were they involved in any accidents since the crash that is being litigated? If the answer is yes to either, all of the above information from these events needs to be gathered and assessed. This has implications for relating the occurrence or severity of claimed injuries, as well as proving the permanent impairments that resulted from the accident. It may also hinder the plaintiff in proving their damages by submitting to defense medical exams, since the findings of the DME will be skewed by these intervening events.

Now the LNC consulting expert has done their primary
Cont on p. 4

SOFT TISSUE INJURIES

Continued from page 1

if not managed correctly.

SIGNS AND SYMPTOMS

Pain, increasing on movement

An audible ‘crack’ may be heard as the tendon parts from the bone

May have a discernible gap between muscle and bone

Tenderness, discomfort when weight bearing

Swelling if near joint

CARE AND TREATMENT

RICE

Avoid stretching the injured limb

Avoid massaging the injured limb

If pain persists, seek medical aid

DISLOCATIONS

Dislocations involve the displacement of bone from a joint. These injuries are often underestimated, and can have serious consequences in the form of damage to nerves and blood vessels. Many people have joints which dislocate easily due to either a congenital condition, or to weak ligaments, stretched by previous repeated dislocations.

SIGNS AND SYMPTOMS

Sudden pain in the affected joint

Loss of power and movement

Deformity and swelling of the joint

Tenderness

May have some temporary paralysis of the injured limb

CARE AND TREATMENT

RICE

Support limb in position of comfort

Seek medical aid

Any attempt to reduce a dislocation is only to be made by a doctor

BRUISING

Bruising, or more correctly, ‘contusion’, is bleeding by damaged blood vessels beneath the surface of the skin. This is invariably caused by blunt trauma, the application of force to the injured site.

A common injury, especially in contact sports, is ‘corked thigh’, a heavy blow to the muscle mass of the thigh, which involves damage to blood vessels as well as injury to the thigh muscle tissue. Although not a serious injury, it is very painful and prompt first aid assists in a rapid recovery.

SIGNS AND SYMPTOMS

History of a blow to the thigh

Pain and tenderness

Swelling and discoloration

CARE AND TREATMENT

RICE

after four hours, gentle exercise of limb

In reviewing medical records of claimants with soft tissue injuries, it is important to consider the practitioner’s methods as well as the cost involved. An Independent Medical Examination can determine if your claimant is actually reached Maximum Medical Improvement and is continuing treatment because of an unethical practitioner, or if the claimant requires a different therapy. Therapy can be the most expensive part of a motor vehicle accident claim and can draw the case out for years if not closely monitored by your legal nurse consultant. Overuse of therapy will be easily argued by Defense and not easily won by Plaintiff. To prevent elevated medical bills and lengthy treatment plans, have your MVA case evaluated by your legal nurse consultant for recommendations as soon as it comes into your office.

Pregnant Women and Motor Vehicle Accidents

Continued from page 1

- the mother applied her brakes, stopping quickly and as she related she “bumped her abdomen against the steering wheel”. She was transported to a local hospital where she was informed that bump to her abdomen killed her fetus. The mother had neither a cut nor a scratch but her fetus was dead.

PROBABLE EFFECTS OF TRAUMA ON PREGNANCY

- The gestational age of the fetus must be determined. If this is any early pregnancy the uterus is protected by the boney pelvis. If greater than 12 weeks or when the uterus is out of the pelvis there is a greater chance of injury to the fetus.
- Placenta abruption is a real risk with trauma of greater than twelve weeks. I will use the analogy of a rubber ball and an egg. The uterus muscle is like the rubber ball in that it can be squeezed and it will recover, however the placenta is akin to the egg in that it will break or tear if pressure is applied.
- Increased maternal blood reserve may

give a false sense of security in treating the pregnant client.

- The decision to incision must be made within four minutes if CPR is ineffective and we have a viable fetus.
- Thus an emergency cesarean section under non sterile conditions should be performed for the benefit of the mother and fetus.
- During resuscitation it is import to remember the ABC’s always remain the priority.
- Fetal monitoring should be done at least four hours depending on the severity of the injuries and uterine activity with one caveat; a 16 week fetus is not viable so yes it is important to monitor for a baseline but in such cases the monitoring would not have to be continuous.
- CT scans and other diagnostic procedures should be performed and this should not interfere with the fact that the client is pregnant client.

In summary it must be noted that caring for the pregnant trauma patient is a unique and challenging experience and involves teamwork from a variety of specialist.

MVA Related Brain Injury

Pattie Patterson RN, LNCC

In the United States traumatic brain injuries (TBI) are the leading cause of death for persons under the age of 45. A TBI occurs every 15 seconds. Approximately 52,000 US deaths per year result from TBI. Local factors in the United States may influence this mortality rate; it is lowest in the Midwest and Northeast and is highest in the South. The mortality rate for deaths outside the hospital is approximately 17 per 100,000 people; it is approximately 6 per 100,000 people for patients who are hospitalized. The initial GCS (Glasgow Coma Score) score and, therefore, the severity of the TBI help to predict likelihood of death from the injury. The mortality rate is high in severe TBI and low for moderate TBI. In a TCDB study, the mortality rate in severe TBI was about 33% and, in another study in Central Virginia, the mortality rate in moderate TBI was found to be 2.5%.

The leading

Cont on p. 4

Work-Related MVAs Extract a High Price

Continued from page 2

task. All of the information has been gathered, organized, and highlighted for the testifying expert (TE), often as a physician. The TE has to take all of the medical information discussed above, create a picture of the claimant's health status before and since the accident, and then show why the established changes in status were (or were not) caused by the accident being litigated. Even without pre-existing conditions, differences of medical opinion, or intervening events this process is tenuous to say the least. The toughest part of it all is often the point made earlier in this article. The "baseline" that is serving as the benchmark is often the fact that these symptoms or diagnoses were not mentioned in the records prior to the accident. Ask a philosophy professor to prove a negative (better yet, disprove a negative), and you will spark a long and interesting debate. Can you state that a problem not addressed in the prior record did not exist? On the other hand, can you discount it because you can't prove it did? The TE is working on the information

gathered and analyzed by the consulting LNC. The testimony will have to include a knowledgeable discussion of the mechanism of injury, the physics of the collision, and the detailed symptoms found after the accident. If the LNC has done their job, the TE has enough scientific data to make such a discussion.

The third issue, that of permanency, is also difficult to establish at times. Here it is often conflicting medical opinions that cause the most headaches. Multiple physicians and therapists may be involved, and they don't always agree whether the patient has reached a point of maximum improvement. Some are ready to stop treatment while others are determined to keep going. Here the LNC looks for documented improvement in function (or lack thereof), charting the progress. When progress appears to have ended for a significant time, the patient may, indeed, have reached MMI. The TE will also have to make sure that there hasn't

been a missed diagnosis that may be causing this lack of progress. If the LNC has documented all the attending providers, then their credentials can also be examined in order to determine who is in the best position to declare MMI.

MVAs are costly and time-consuming whether work-related or not. It is important that the LNC and the attorney work closely to gather and evaluate all of the relevant data. Since it is not always easy to know where to find that data the team has to be able to support each other in their search. Both plaintiff and defense counsel need to make sure that there are no unknowns out there. After all, the other side may very well have found them.

[The third issue, establishing permanency, will be discussed in more detail in future articles. This issue is common to many occupational injury cases, is also the basis for monetary claims. We will look at the process for properly establishing, or refuting, claims of permanent medical impairment.]

MVA Related Brain Injury

Continued from page 3

causes of TBIs are motor vehicle accidents, with MVAs being the leading agent in both fatal and mild brain injuries. Men are twice as likely to sustain a TBI from a MVA as women and are three times as likely to die from them as women. From 40 to 60% of all mild brain injuries are caused by motor vehicle accidents with the most common diagnosis given being concussion. Many of these MVA-related injuries are a result of blunt head injury which describes contact with some object without penetration of the skull. An example would be striking the windshield or the steering wheel.

The "whiplash" movement seems to be particularly damaging to the brain. The brain is soft and vulnerable with a consistency of firm pudding. When the head is jerked backward and forward, the brain collides with the skull, causing a coup and countercoup injury, that is, the primary contact with a surface is the coup, causing the brain to strike the front of the skull, and the secondary injury is when the head jerks

backwards causing the brain to hit the back of the skull. This type of injury is much like the "shaken baby syndrome". Coup countercoup injuries can also be seen in blunt trauma injuries, such as in a MVA, when the head strikes the windshield, or steering wheel, and the impact with the object the car strikes causes the head to be jerked backwards after impact.

Diffuse Axonal Injuries

The brain consists of billions of nerve cells located in the gray matter which communicate with distant nerve cells through long nerve fibers called axons, composing the white matter. Severe sudden twisting or torquing of the brain, as occurs in sudden acceleration/deceleration-whiplash-accident that can stretch, twist and damage these delicate axonal fibers. Under the microscope the axonal damage is called diffuse axonal injury (DAI). Although diffuse axonal injury generally results from a severe whiplash injury that renders the person comatose, recent studies have shown that diffuse axonal

injury can also occur, but to a lesser degree, when there has only been brief loss of consciousness (LOC). Because diffuse axonal injury causes microscopic damage, it cannot be visualized on a CT or MRI scan.

Direct Trauma versus Indirect Trauma

Direct trauma to the brain is when the skull actually hits or is hit by another object, such as in the case of striking the windshield or steering wheel. These can be in the form of a closed injury, as when the skull is not actually penetrated, or an open injury, where there is an actual "break" or indentation to the skull bone.

Conversely, indirect trauma is when the skull doesn't actually come into contact with any type of object, such as in a whiplash injury or in the shaken baby syndrome. The brain, in injuries such as these, actually bounces back and forth within the skull, causing injury to itself to the front to back of the brain, or from side to side, depending how the head is positioned to the

Cont on p 5

Serum Alcohol Level and Blood Alcohol Concentration: What's the Difference?

Maggie Driscoll BSN RN CCRN CLNC

The medical records have arrived on a new personal injury claim: Mr. Jones' motor vehicle collision. Your paralegal notes that an alcohol level was drawn at the hospital approximately one hour from the time of the accident. The level is recorded at "50 H" with a normal value of less than 10mg/dl. What does this mean for your client and his case?

Blood Alcohol Concentration vs. Serum Alcohol Level

BAC stands for blood alcohol concentration. Concentration is described in percent which is defined as weight per volume. Therefore, BAC measures the percentage of alcohol in a person's blood. In the United States the typical measure is grams of ethanol in 100 milliliters of blood or in 210 liters of breath.

A breathalyzer test result is an estimate of the percentage of alcohol in whole blood. Hospitals typically measure blood alcohol levels in the serum of the blood and not the whole blood. Whole blood contains blood cells, lipids (fats), and proteins, and has a water content of approximately 86%.

When a blood sample is drawn at the hospital through venipuncture, the lab spins the sample in a centrifuge, leaving a clot of red blood cells and most of the white blood cells at the bottom and the clear fluid, the serum, remaining at the top. The alcohol level is tested from the serum of the blood. The alcohol in serum is "more concentrated" than in whole blood because the red blood cells have been removed. Therefore, a serum alcohol level will yield a slightly higher result than a whole blood test.

Why Convert?

Because legal statutes in most states base alcohol concentration on whole blood and not serum levels, the serum value should be converted to the BAC in whole blood. Analyses conducted on serum must be reduced by 16-18% in order to convert the serum value to "whole blood".

If the serum level is not corrected for the difference in concentration, it could appear that the client's alcohol was higher than the legal limit may allow. For example, let us return to Mr. Jones' case:

Serum alcohol level: 50 H

("H" signifies a "high" result or a result higher than would expected)

1. Move the decimal place over three places to the left, .05,
2. Divide by 1.16 for a blood alcohol concentration comparable to the breath test
3. .05 divided by 1.16 = .043 or .04

Calculating the BAC

The formula for estimating the blood alcohol concentration is based on the following:

- body weight
- amount of consumed (number of drinks)
- concentration of alcohol in beverage consumed
- time period
- male or female

To determine the concentration of alcohol consumed obtain the percent or proof of alcohol in the drink and multiply that percent by the volume of the beverage in the drink.

Beer for example is 4.2% alcohol by volume. A can of beer is 12 oz. $0.042 \times 12 \text{ oz.} = 0.50 \text{ oz.}$ of pure ethanol per can of beer.

More information on the effect of alcohol on driving skills and a blood alcohol calculator can be found online at <http://www.ou.edu/oupd/bac.htm>.

Factors that influence Blood Alcohol levels:

- water as a percent of total body weight (total body water)
- metabolism rate
- percent of water in blood
- drinking history

When calculating the BAC, a person's metabolism is the most variable factor. **On average a person experiences a .017 per hour decline in BAC.** The range varies from .04 on the high side to .01 on the low side. Conservatively, one would use .012 per hour decline in BAC. Above average decline in BAC is .020 per hour.

Heavy drinkers metabolize alcohol faster. This group would experience an above average (or .02 per hour) decline in BAC.

Mr. Jones' level was .043 one hour after the accident. Reportedly, he is not a heavy drinker. On average, he his level at the time of the accident would have been estimated at .06, still below the legal limit

for intoxication.

References:

1. Drunk Driving Defense.com
<http://www.drunkdrivingdefense.com/ho-we-process-alcohol.htm>
2. Drunk Driving on Trial: Fact Sheet:
http://www.iupui.edu/~iutox/Impaired_Driving/General%20Info.htm
3. LastCall.org:
<http://www.lastcall.org/topics/bac.htm>

MVA Related Brain Injury

Continued from page 4

repetitive motion of the head.

Secondary injuries to the brain

In addition to the direct injury to the brain, there are secondary issues that can be caused by a TBI.

Increased intracranial pressure (ICP): Severity of injury tends to increase due to heightened ICP, especially if pressure exceeds 40 mm Hg. Increased pressure also can lead to cerebral hypoxia, cerebral ischemia, cerebral edema, hydrocephalus, and brain herniation.

Cerebral edema: Edema may be caused by increased ICP. Disruption of the blood brain barrier, with impairment of vasomotor autoregulation leading to dilatation of cerebral blood vessels, also contributes.

Brain herniation: Supratentorial herniation is attributable to direct mechanical compression by an accumulating mass or to increased intracranial pressure.

Hematoma: Hematoma is a collection of blood due to blood leaking into the skull cavity. This can occur days after the initial head trauma. This is why it is so critical for the emergency department to do a CT scan after a TBI, as the CT scans are very effective in picking up these bleeds in the brain. These bleeds are known as subdural, epidural or sub-arachnoid hematoma, depending on its location within the brain.

Cerebellar herniation: This injury is marked by an infratentorial herniation in which the tonsil of the cerebellum is pushed through the foramen magnum and compresses the medulla, leading to bradycardia and respiratory arrest.

Cont on back page

MVA Related Brain Injury

Continued from page 5

Hydrocephalus: finally, hydrocephalus-is a collection of fluid in and around the brain. The communicating type of hydrocephalus is more common in TBI than the noncommunicating type, which frequently is due to the presence of blood products causing obstruction to flow of the cerebral spinal fluid (CSF) in the subarachnoid space and absorption of CSF through the arachnoid villi. The noncommunicating type of hydrocephalus often is caused by blood clot obstruction of blood flow at the interventricular foramen, third ventricle, cerebral aqueduct, or fourth ventricle. There is normally fluids bathing the brain and going in and out of the ventricles and the subdural space. If, for some reason the normal flow of this fluid is blocked, the fluid can build up in these spaces, causing pressure on the brain and thus causing damage to the brain. In each of these 3 scenarios, of the pressure is not relieved, death can occur.

Medical-Legal Interface

Pattie Patterson RN, LNCC
Legal Nurse Consultant-Certified
Life Care Planner
6501 Galaxie Road
Richmond, Va. 23228

Phone: 804-262-2991

Fax: 804-266-5701

Email: leglnurs@bellatlantic.net

“We get to the heart of your case.”

