

# Sample Long PI Report

Addressee  
Mailing Address  
City, State, Zip Code

Re: Anthony Jones (Fictitious Patient)  
Date of Accident: March 22, 2001  
Date of Release: August 17, 2001

Dear Addressee;

At your request and with the permission of the patient the following report is provided.

## PATIENT DESCRIPTION:

Anthony Jones is a 6'2", 193 lb. Caucasian male of average build. He is 36 years old. He is currently working as a architect with general duties of a light physical nature with some moderate physical activity required when visiting a job site. He is semi-active in sports and home activities. His past occupations include waiter, construction worker, salesman and actor. He currently resides in Tucson but lived in Los Angeles, Denver and Hawaii. Mr. Jones is right handed.

## HISTORY OF INJURY:

The patient states he was a passenger in a vehicular accident on March 22, 2001. Steve Adams was the driver of the 1990 Nissan Maxima sedan and Barbara Adams was another passenger. At the time of the accident the weather was clear and warm without any precipitation. Mr Jones was sitting in the back seat on the passenger side with a lap belt fastened. The car Mr. Jones was in was traveling west on I-10 at about 65 mph. As they proceeded to pass a slower Cadillac and truck the Cadillac to their right pulled into their lane causing a side on collision and causing the car Mr Jones was in to leave the roadway, pass through the median and strike a bridge support head on. The car was totaled.

At the initial collision with the other car Mr. Jones was surprised and unprepared. His right shoulder, arm and side of head struck the car door on his right side. He then was thrown down sideways into the seat. When the car struck the bridge he was still twisted in his seat belt and unsupported. He was violently thrown into the seat in front of him and then rebounded into his final seated position.

Immediately following impact Mr. Jones was disoriented and dazed. He had to have help getting out of the vehicle. Within 5 minutes he was more coherent and able to move but felt weak, shaky, emotional and felt pain in his head, right arm and waist. Within 15 minutes his condition was about the same. Following the ambulance ride to the hospital and a checkup and release he took the pain pills given him by the hospital emergency room staff doctor at Kino Hospital. The pain continued but lessened with the medication. He felt tired and weak and unable to work without strong effort. The next day the pain was essentially the same, but had a generalized achy sensation all over. Over the next few days the pain continued, his vision began to blur and he felt unable to concentrated clearly.

## PAST MEDICAL HISTORY:

Mr. Jones is in good general health. He reports never having any broken bones, surgeries or major illnesses. He is allergic to penicillin. He has had measles and chicken pox and only sought medical care for a sprained ankle in college and minor colds and flus over the years. He is not currently taking any medications. He does not smoke, drinks occasionally and

never uses recreational drugs.

## SUBJECTIVE COMPLAINTS:

Each area of complaint will be discussed separately. They are in particular:

1. Cervical region
2. Right arm and hand
3. Lumbar region

### **1. CERVICAL REGION**

At the time of examination the patient complained of constant headaches, aching in the neck and both shoulders, stiffness, pain on any cervical or shoulder movement, blurring of the vision, inability to concentrate, tiredness, general weakness, and some lapses of memory. Physical examination revealed tight and tender muscles in the superficial and deep muscles of the neck, shoulders, upper back and right subscapular areas. All twelve cranial nerves were tested. CN II - Optic Nerve - showed some visual disturbance to both central and peripheral vision clarity. Cervical Range of Motion tests showed the following results:

Flexion	20° with moderate pain	(60° normal)
Extension	5° with severe pain	(30° normal)
Rt. Lat. Bend	15° with moderate pain	(40° normal)
Lt. Lat. Bend	10° with severe pain	(40° normal)
Rt. Rotation	20° with severe pain	(60° normal)
Lt. Rotation	30° with severe pain	(60° normal)

All cervical movements, active, passive and restricted produced pain. This indicates both muscle and ligamentous damage.

The Cervical Compression and Jackson's Compression Test produced local cervical pain and pain radiating into the right arm to the elbow. This is not specifically positive but does indicate a need for concern and monitoring based on response to treatment.

The Soto Hall Test was negative for pathology but did produce local cervical pain.

Cervical Distraction produced an increase of pain in the cervical region. This indicates probably ligament damage and tends to reduce the probability of cervical disc damage.

Valsalva's Test was negative. This indicates a reduced probably of cervical disc damage.

Shoulder Depression produced local cervical pain bilaterally. This indicates muscle and ligament damage.

Adson's Test and Eden's Costoclavicular Tests were positive on the right. This indicates muscle damage, nerve and arterial involvement in the cervicothoracic/shoulder region.

Biceps, Brachioradialis and Triceps Reflexes were diminished on the right. This indicates nerve involvement or complications based on the mechanism of injury and the damage produced.

Jaymar Dynamometer Tests results were Left: 30, 25, 28 and Right: 15, 15, 10. All test results should be much higher. In addition, the results should be similar bilaterally. The indication is loss of muscle strength possibly due to nerve damage.

The right C<sub>4-7</sub> dermatomes had reduced sensation to pinwheel, vibration and temperature. This generally indicates disc damage or nerve root damage.

The cervical radiological study shows a reversal of the cervical curve, a right lateral list to the neck, and restriction of forward flexion. The Intervertebral Foramen are open and normal. Disk height is within normal limits and there is little evidence of osteoarthritis. A loss or reversal of the cervical curve is abnormal but a common result in cervical injuries of this type.

The general impression and patient image is one of a possible cervical disc herniation with some tests positive but some negative. The initial treatment was based on the probability of no disc damage but monitoring was done to determine the response to treatment in view of revering the patient for more extensive MRI evaluation if expected responses were not made.

The resultant diagnosis for the above described condition is:

1. Cervicobrachial Syndrome (723.3)
2. Acquired Cervical Kyphosis (737.1)
3. Right Thoracic Outlet Syndrome (723.4)
4. Probably Concussion (850.0)

## **2. RIGHT ARM AND HAND**

At the time of the examination the patient complained of constant and varying intensity of pain in the right wrist, palm and forearm. Physical examination revealed tight and tender muscles on the anterior and posterior forearm, pain on palpation of the wrist.

Positive Phalen's, Wartenberg's and Tinel's Tests on the right wrist, weak hand extensors and pain on hand extension, flexion and active and restricted motion of the hand were found. This is specific and indicates Carpel Tunnel Syndrome.

The radiological studies of the hand were normal.

The resultant diagnosis for the above described condition is:

1. Right Carpel Tunnel Syndrome (354.0)
2. Right Wrist Sprain (842.00)

## **3. LUMBAR REGION**

At the time of the examination the patient complained of constant pain in the lumbosacral area and the thoracolumbar area. Any and all movement was painful. The lumbar Range of Motion Test was unable to be done due to the pain. Pain was produced on palpation and percussion of the spinous processes and bilateral paravertebral muscles in the lumbar region. This is expected based on the type of accident and injury. Generally this indicates muscle, ligament and tendon damage. Resultant micro myospasms (Trigger Points) were found.

Knee and Ankle Reflexes were normal bilaterally. No neurological deficit was found to pinwheel, vibration or temperature sensory tests. Babinski's Test was negative. Ober's, Lasegue's, Braggard's, Fajersztajn's Tests were all negative for discogenic pathology. Ober's, Lasegue's, Fajersztajn's and 2-leg Raise Tests produced local posterior lumbar pain. This series of tests indicate no nerve damage but does indicate localized nerve involvement associated with the muscle, ligament and tendon damage found.

The radiological study of the lumbar area showed a left lateral list with spinous process rotation to the left of L<sub>2-4</sub>. The lateral view was normal. An AP Pelvic x-ray was performed with the patient erect and barefooted to assess the possibility of a physiological short leg. The resultant x-ray found an 8 mm shortness on the right side. This is not a result of the accident but does evidence an underlying condition which creates complications and potential delays in healing.

The resultant diagnosis for the above described condition is:

1. Lumbar Segmental Dysfunction (739.3)
2. Lumbar Subluxation (839.20)
3. Lumbar Sprain (847.2)

### PATIENT EFFECT

Due to the injury and subsequent pain the patient has suffered the following alterations in his living pattern:

1. Mr. Jones has had difficulty sleeping through the night. This has put a strain on other facets of his life due to the lack of proper rest.
2. Mr. Jones has had a loss of appetite and desire for eating. Additionally, he has been unable to devote the time necessary to create proper meals. This has affected his nutritional balance, energy levels and immune system making him more susceptible to illnesses.
3. Mr. Jones has been unable to perform his normal work without pain and discomfort.
4. Mr. Jones has been unable to participate in his normal and usual physical and recreational activities. This has generally reduced his strength, stamina and overall performance. To recover his prior condition will take extra effort, time and the discomfort of reconditioning.
5. Mr. Jones has had trouble with general maintenance of living including shopping, car care, repairs and home cleaning and maintenance due to the pain and discomfort.
6. Initially many personal hygiene activities were painful to perform or difficult due to the pain and discomfort. This has been a negative factor in his overall general health and the quality of living.

### CAUSATION

The above described condition is directly attributable to the accident suffered on 3-22-93. The medical probability in this case approaches 100% resultant on the accident. No other extenuating, underlying or concurrent factors were reported by the patient or are evident from any of the tests performed or from any other records obtained by this office.

### RESEARCH COMMENTARY

Below are discussions regarding this patient's injuries including explanations, references and scientific understandings of the specific condition.

### SOFT TISSUE INJURY

The injuries suffered by Mr. Jones were primarily soft tissue in nature. The resultant pain, disability and maladaptation of the affected articular units should be considered secondary. However, without a clear understanding of soft tissue injury and its relationship to the secondary complications an understanding of the healing process cannot be obtained.

Immediately following any injury swelling occurs within the affected tissues. The body's response to this is to isolate or wall off the area to prevent any spread to the surrounding tissues of any possible pathogen. As proper and beneficial as this response is to many

injuries, it is detrimental to aseptic internal soft tissue injuries. It prevents the flow of damaged tissue byproducts from being taken away from the local area. These tissue byproducts become an irritant to the local tissues and affect the nerve receptors in particular.

Also, at the onset of healing, a fibrotic matrix (a patch of fibers) is created in the area to strengthen the damaged tissue. This eventually becomes scar tissue. This benefit, also, creates a disadvantage because this fibrosis is laid down without any particular directional orientation of the fibers as opposed to normal muscle, tendon and ligament tissues that are laid in a pattern to facilitate strength, flexibility and stretchability. This is the reason so much research has found that active mobilization of almost all injured soft tissues speeds and enhances the healing process and a return to normalcy quickly if initiated very soon after the injury. If this process is delayed then the already disoriented fibrotic scar tissue must first be broken down before it can be replaced with properly oriented cellular tissue. This factor greatly lengthens the time and trouble of returning to normalcy. Even with proper initial care, research shows that after 40 weeks only a 70% return to normal cellular fibrosis is to be expected.

Additionally, as the area is originally injured the local nerve endings are easily destroyed. As they attempt to regenerate they are usually replaced by nerve fibers from adjacent non-damaged nerves before the damaged nerves can regenerate. This decreases the specificity of nerve function (both motor and sensory) and increases the sensitivity to any local irritation due to the increased number of adjacent nerves now proliferating into the damaged area.

The overall effect is that the injured body part, unless treated effectively with mobilization, usually "heals" with improper fibrosis, altered nerve control and increased pain sensitivity. This forces a longer and more rigorous level of therapy to return the patient to either an asymptomatic or maximum medical improvement state.

References:<sup>1 2 3 4 5 6 7 8</sup>

## INTERVERTEBRAL DISK DISORDER

An old and outdated belief is that any pain associated with an intervertebral disk (IVD) disorder must be associated with an actual herniation of the nucleus pulposus (NP) through the surrounding annulus fibrosus (AF) because there are no nerves within the disk itself and only its effect on an outside structure like the spinal cord or a nerve could cause pain or neurological symptoms. Through many modern studies it has been found that the outer 1/3 to 1/2 of the disk is innervated and in some cases nerve endings have been found in the NP itself.

The most common and specific type of injuries to an IVD are torsional or twisting injuries to the AF and compression injuries to the disk. It has been found that fewer than 30% (and in some studies fewer than 5%) of pain conditions normally attributable to a herniated NP show any such herniation on any CT, MRI or surgical investigation. Generally more common as the pathology is disk degeneration or irritation. This process is often due to micro or minor trauma over a period of time that leads to small fissures, tears or breakdown of the AF. This in turn leads to a proliferation of more nerve receptors spreading into the damaged area which can then become supersensitive to stimulation and cause pain symptoms without gross pathology. Many studies during and following spinal surgery have found that these degenerated disks cause much of the generalized back pain whereas any irritation or damage to the actual nerve roots such as a herniated NP causes "root pain" which presents differently. It was, also, found that the facet joint irritation was normally much more specific in presentation of pain and rarely a cause of the generalized pain presentation.

The degeneration of the disk, which is not always evident clinically, should be considered a preexisting condition which has been aggravated by the patient's particular accident. It leads to a poorer prognosis and a greater extension of time and effort to bring the patient to an asymptomatic or maximum medical improvement condition. Like many pre-existing conditions if there is no history of pain or

disability from the pre-existing condition at the time of this patient's accident or occurrence then it cannot be considered a cause of the present condition.

References:<sup>9 10 11 12 13</sup>

## PHYSICS OF AN ACCIDENT

Contrary to popular belief the amount of damage to a vehicle and the speed of impact have much less to do with the extent of an injury than previously thought. In many studies with both anthropomorphic test units, live subjects and monkeys it has been found that where there is little damage to a vehicle at a relatively slow speed of 8 MPH or less there is much damage to the vehicle occupant. In fact, at higher speeds the "crunchability" of the vehicle does much to absorb the impact that is transmitted to the occupant.

It is important to understand the forces that are involved. In an 8 MPH rear end collision an initial 2G force of acceleration can result in a 5G acceleration to the occupant's head. This is known as the Magnification of Acceleration. A 3,500 lb car at just 10 MPH will create a force of 25 tons to the occupant's head and neck. This process occurs in less than 2/10ths of a second which is over and done with BEFORE the neck muscles can react and tighten up for protection. It has been found through research that in 8 MPH collisions 50% of the involved occupants actually experienced concussions.

This concussion is not due to striking the head against another object. It is due to the brain moving within the skull itself and causing damage to tissues of the brain as it moves within the skull as a semi-free floating mass inside the cranial cavity. It is important to remember that any structure involved in an acceleration / deceleration accident, whether large or small, inside the car or inside the body will change speed and direction at different moments based on their size, mass and lack of absolute anchoring to the vehicle itself.

A seat belt, unfortunately, does little for the cervical injuries and can sometimes create secondary damage due to the cross body restraint of a shoulder belt leading to twisting of the upper body. Without the shoulder belt much of the force is focused in the mid-body section causing an actual increase in injury to the thoracolumbar area and occasional vertebral fractures.

As in any injury to the spine there are both soft tissue, nerve root and subluxation complications that affect the course of healing, the treatment and the prognosis of the particular case.

One of the clinical problems found in almost all patients experiencing a spinal injury is the disruption of the intraneural venous complex. Within the nerve bundles as they exit the spinal cord they pass through a fairly narrow intervertebral foramen (IVF). There are both circulating arteries coming from the heart with strong blood pressure and weaker veins designed to absorb cellular fluids and return them to the heart within these bundles.

In addition, the dorsal root (sensory portion) of the nerve root is highly vascularized and yet does not have the strong protective connective tissue sheaths that the peripheral nerves have once they exit from the spinal IVFs.

Any damage to these structures creates a condition of swelling within a closed area. This prevents or reduces the ability of the venous complex to remove fluids and cellular damage byproducts. This creates an area of increased repair activity as in any soft tissue injury. Fibrotic matrix (soft tissue fibers) are laid down as scar tissue. Unfortunately, this further prevents absorption of the edema, adds to an increase of fairly inflexible tissue structures in an already cramped space, adhesions of the nerves to surrounding structures and degeneration of the surrounding structures.

This entire process causes a prolongation of the healing process and an increased sensitivity to pain. Like other soft tissue injuries, if treatment with mobilization is initiated quickly, the healing time can be shortened. However, any delay does prolong and interfere with ultimate functional improvement.

References: <sup>14 15 16 17</sup>

## SUBLUXATION

Degeneration of the spinal column can be evidenced by many things - pain, dysfunction, reduced disk height and osteophyte production visible on x-rays, alterations to spinal alignment, and palpable subluxations. This last evidence, a subluxation, is often the first definable and recognizable sign of degeneration. It is not a bone out of place as is a luxation (dislocation). It is a disrelationship of a joint usually producing decreased mobility of the joint in a particular direction which responds to manipulation with increased mobility approaching normalcy.

Often subluxations are the result of some trauma or repeated micro trauma over an extended period of time. They are usually associated with soft tissue injuries and/or other signs of degeneration or injury. Regardless of their cause subluxations can have an effect of additive stress on the body which can affect the bodies ability to repel, repair and rejuvenate itself from injuries, infections, or stress induced conditions.

The correction of a subluxation is more than just moving a bone, releasing a tight joint or creating a popping sound. It is a mobilization of tissues to restructure past and/or present fibrous adhesions to proper function. It is an excitatory stimulus to both spinal and paraspinal nerves to enhance their function. It is a release of tension in surrounding structures to facilitate the relaxation of these structures and tissues to enhance repair and rejuvenation. It goes beyond the normal range of motion which most mobilization therapies go to and gets the full effect of full joint mobility to it's limits. It separates the joint structures to increase interosseous spaces for increased comfort, range of motion, flexibility and use with less irritation.

This patient has been suffering from a subluxation complex. Whatever degeneration has occurred in the past and may or may not be evident now has been aggravated by this present condition. The prognosis for subluxation degeneration is usually guarded to poor based on much medical research into the progression of degeneration. Long term care is usually necessary to at least maintain the current level of wellness and to improve the subluxation complex.

References: <sup>18 19 20 21 22 23 24 25 26 27 28 29</sup>

## PRE-EXISTING CONDITIONS

In the vast majority of spinal trauma cases with pre-existing conditions, the number one type of pre-existing condition is degeneration of the disks and adjacent vertebrae. In all people with increasing age disks undergo desiccation or loss of water content but disk narrowing is not a product of this process. Excessive axial loading, microtrauma and gross trauma lead to the degeneration complex.

With this disk narrowing aspect of degeneration it's physiological affect is a narrowing of the spinal canal and the intervertebral foramen, less compressional loading of the disk, a reduction in compensatory distortion of the disk, less resilience and flexibility of the ligaments and a smaller margin of safety to handle trauma to the area. In essence the area is less healthy and less able to withstand even reduced trauma which leads to an increased susceptibility to injury and a prolonged healing period. The worse the secondary objective findings of reduced motion due to a subluxation, narrowing of the disk space, osteophyte production, abnormality of the spinal curvature and time period from onset of pain or dysfunction the longer proper healing will take.

References:<sup>30 31 32 33 34</sup>

## CHRONIC PAIN

Chronic pain has been mislabeled for many years as pain lasting an extended period of time. There is much more to it than that. Through recent medical research the definition is changing to include the physiological aspect to the condition.

There are three different types of pain. Type One or Nociception is the direct result of an irritation to a nerve bundle (touching a hot object) which is transient and generally produces a protective mobilization of the affected part. Type Two or Algogenic Pain is that next step in which actual damage is done, inflammatory responses are initiated and chemical cellular substances create pain. Type Three or Neuropathic Pain is due to abnormal alterations of nerves leading to supersensitivity to any stimulus whether antagonistic or benign. This Type Three is the basis for chronic pain.

Chronic pain is often lacking in objective evidence. Microscopically evidence can be found of an area of denervation or loss of normal nerve structure where adjacent nerve structures have proliferated to fill the void. This leads to Cannon's Law of Denervation which states, "When in a series of efferent neurons a unit is destroyed, an increased irritability to chemical agents develops in the isolated structure or structures, the effect being maximal in the part directly denervated." This maximal supersensitivity is as much as 1000 times more sensitive to irritation and sensation than normal.

It is important to realize that actual physical interruption of the cell is not necessary to produce denervation and subsequent supersensitivity. Nerves are usually long structures with axons and dendrites extending away from the cell body for up to 30 inches in some cases. In even small nerve cells their length usually surpasses other types of cells. Part of cellular function is the transport of fluids, nutrients and chemicals from one end to the other through the process of axioplasmic flow - a slow internal cellular fluid process. Any irritation to or pressure along it's path can greatly reduce this important process and create denervation beyond that point. This is why minor trauma can lead to an abnormal pain response and prolong need for care.

Common concurrent findings with chronic pain are radiculitis, arachnoiditis, adhesive arachnoiditis, myofascial pain syndrome and sometimes a defect in the fibrinolytic process of cellular repair.

This patient is suffering from chronic pain. There is no easy cure and medications are seldom effective. Prolonged care of 1 to 2 years is often necessary and even then sometimes only a maximum medical improvement is obtained and a maintenance regimen is necessary to keep the patient functional.

References: <sup>35 36 37 38 39 40</sup>

### SHORT LEG SYNDROME

A physiological short leg is measurable only on a standing AP pelvic or lumbar x-ray. By having the patient stand without shoes with the feet 4" to 8" apart a reasonably secure parallelogram of the floor, pelvis and both legs is created. This will correct for any height variation due to body tilt. The measurement is taken from the bottom of the film, which is parallel with the floor, to the top of the femoral heads. Any measurement greater than 5 to 6 mm becomes significant.

Contributing factors to a Short Leg Syndrome or it's complication to other injuries is the muscle tonus of the individual. A strong muscular active person can and usually does compensate for the gravitational effects on the tilted pelvis with muscular support. If this muscular support is compromised or weakened than the pelvic tilt tends to tilt the spinal column. This forces muscles on one side to contract and work more than the other side. The weakened muscles force a greater amount of the weight bearing support to be carried by the lumbosacral ligament structures. This creates a recurring minor sprain condition which does not heal. The ultimate effect is pain upon standing or walking which gets progressively worse but which is relieved by sitting down.

This component of a patient's condition is usually correctable without much time or problem. It is corrected with orthotics prescribed by a DC, DPM or MD with a lift in the short leg side to bring the measurement within 2 to 3 mm.

This patient's condition is affected by a physiological short leg. Proper correction with orthotics is the necessary treatment.

### TREATMENT

The treatment rendered this patient included manipulation, temperature variant (hot or cold) as the condition needed, intersegmental traction, electrical muscle stimulation, ultrasound, specific cervical traction, orthopedic supports, specific home stretch and exercises and specific work restrictions to prevent aggravations in the early period of recovery.

PROGNOSIS

The prognosis at this time is fair. Although the patient is currently without the symptom of pain the damage to the underlying structures will require ongoing work and effort to reach maximum medical improvement. Even at that time, based on the research discussion listed previously, complete recovery and repair is not probably. It is difficult to give a future prediction of health or the cost to maintain it but a fair assessment would be continued biweekly appointments for the next two years. At an average cost of \$60 per office visit this would equate to approximately \$3,120.

COMPARATIVE HOSPITAL COSTS

The following information is furnished by the hospitals in this county and published by the U. S. Federal Government. It's purpose is to analyze Diagnostic Related Groups (DRGs) - similar conditions and severities - and rank the average cost per patient at each facility. It does not include all doctor's costs or outpatient costs. Those costs would have to be included in addition to those listed costs. An example is 243 listed below including patients with a one time visit to an emergency room for a back spasm to a patient with a severe sprain (ligament damage) necessitating a hospital stay of a few weeks but not requiring any surgery or other complicating conditions or procedures.

Not all DRGs are listed below. Non-listed DRGs and updated information can be furnished upon request.

215	Back and Neck Procedures w/o complications	\$7854.
243	Medical Back Problems (non-surgical, Lumbago, Sprain, etc.)	\$4277.
	TOTAL COSTS FOR THE ABOVE CONDITIONS	\$12,131.

The total outpatient care cost provided by our clinic to Mr. Jones was \$4650 which is far below what services could have cost through other methods of care.

If you have any further questions or need information on research articles listed please call me. It is a pleasure to work with you.

To you in good health,

Dr. Kenneth C. Rich

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