Case Study

Improved Thyroid Function Following Chiropractic Care to Reduce Vertebral Subluxation: A Case Study & Review of the Literature

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Abstract

Objective: The purpose of this case study is to report on improvement of hypothyroidism in a 50-year-old male patient who decreased his need for synthetic thyroid hormone following chiropractic care.

Clinical Features: A 49-year-old man presented to a private practice for chiropractic care due to neck, back, and shoulder pain. Three years previously, he was diagnosed with hypothyroidism and prescribed Synthroid®.

Interventions and Outcomes: Subluxations-based chiropractic care was delivered using Diversified and Torque Release Techniques™. There were no changes in his lifestyle, diet, or exercise levels. Blood tests revealed his TSH blood levels remained in the normal range and his need for synthetic thyroid hormone decreased. His cervical curve additionally improved.

Conclusion: This paper appears to be the fourth to link the decreased need for synthetic thyroid medication while under chiropractic care. Further study is warranted due to the side effects, drug interactions, and costs associated with the use of synthetic thyroid medications.

Key Words: *Chiropractic, vertebral subluxation, Torque Release Technique™, Diversified technique, adjustment, cervical curve, hypothyroidism, Synthroid.*

Introduction

History

Hypothyroidism is defined as the failure of the thyroid gland to produce sufficient thyroid hormone to meet the metabolic demands of the body.[1] In the 19th century, cretinism and myxedema were attributed to the dysfunction of the thyroid gland and were treated by grafting animal thyroid to human thyroid.[2] This practice was disbanded later in the 19th century when injections replaced surgery, and later still, oral administration of animal extract was determined to be as effective.[2]

20th century studies focused on goiter and iodine deficiency. In 1924, iodized salt was introduced to the US markets and eliminated iodine deficiencies.[3] Advancements in this century started with the development of purified thyroxine crystals, which were quickly replaced by synthetic thyroxine and later liothyronine. Today, levothyroxine is the generic synthetic thyroid in common use and is registered under various names, such as Synthroid, Triosint, and Unithroid.[2]

Function

The thyroid is an endocrine gland that sits at the base of the anterior cervical spine below the larynx and is important for regulating metabolism in the body.[4] It secretes hormones Triiodothyonine (T_3) and Thyroxine (T_4), which are made up of iodine and the derivatives of the amino acid tyrosine. The thyroid hormones are stored in the thyroid gland in macromolecules of the protein thyroglobulin. When the hormones are secreted, they split from thyroglobulin, and release into the blood stream as free hormones. After entering the blood, most of the thyroid hormones combine with plasma proteins, such as thyroxine-binding globulin, which then are slowly released into the needed tissue.[4]

In order to produce proper amounts of thyroid hormones, ingestion of about 50 milligrams of iodine in the form of iodides are required each year along with proper stimulation by the anterior pituitary gland and hypothalamus.[4] The anterior pituitary gland produces thyroid-stimulating hormone (TSH), and the hypothalamus produces thyrotropin-stimulating hormone.[4] Regulation of the release of thyroid hormone is controlled by a negative feedback loop, starting with the hypothalamus. The hypothalamus helps regulate metabolism in the body. When it senses a decrease in metabolism it releases thyrotropin-releasing hormone, signaling the anterior pituitary gland to release TSH, which in turn stimulates the release of thyroid hormone by the thyroid gland.[4]

Epidemiology

The Wickham Study was conducted in 1972-1974 and a follow up was conducted in 1994, published in 1995, to determine general population statistics and the follow up to see if over twenty years the outcomes had changed.[5] On average, incidences of hypothyroidism range from 3.5-5.4 per 1,000 in other countries around the world. A 5% increase in the incidences of hypothyroid was reported in this study. However, studies from other locations in the world did not support their findings. Whether or not there is a local problem has not been determined.[5]

The Colorado Study captured data on over 25 thousand people at a 1995 health fair, revealing issues that relate to this case study.[6]

- Nearly 10% of those tested had not been diagnosed as having hypothyroidism and did not know they had it. Extrapolated nationwide, 13 million people might have undiagnosed thyroid gland failure
- Of those on medication, most were taking dosages that were not in the therapeutic range
- Even modest increases in TSH levels changed lipid and cholesterol levels associated with cardiovascular disease
- Symptoms, which are used to screen for hypothyroidism, were nonspecific and were of limited value. Those without symptoms might still have the disease.

A study done by the National Health and Nutrition Examination Survey (NHANES III) looked at the amount of hypothyroidism in the United States using an upper limit number of TSH at 4.5 mIU/ml. The NHANES III studied over 17 thousand people for whom TSH, T4, and thyroid antibodies data were available.[7] The incidence of hypothyroidism was found to be 4.6% of the U. S. population. They discovered subclinical hypothyroidism was 4.3% and overt hypothyroidism was .3%. The prevalence of subclinical hypothyroidism for women by race was 5.8% white, 1.2% black, and 5.3% Mexican-American. For men it was 3.4% white, 1.8% black, and 2.4% among Mexican-American.[7] The findings documented and supported the Wickham and Colorado studies, but, whereas the Colorado study found those on medication taking dosages that were not in the therapeutic range, this study quantified that to approximately 67% of those on medications were not appropriately treated. It also nearly replicated the number of people not diagnosed as having clinically significant thyroid disease at 9.2% opposed to 10% in the Colorado Study.

After iodize salt was introduced in 1924, the U.S. thyroid failure was attributed to autoimmune deficiencies.[8] In other parts of the world, iodine deficiency remains the primary cause of thyroid dysfunction.[8] The most common cause in the U.S. is autoimmune thyroiditis, also known as Hashimotos Disease.[2] Thyroidectomy, radioiodine therapy, and drug treatments, such as, lithium, interferon and thalidomide, are causes of hypothyroidism.[2]

Congenital hypothyroidism affects about 1 in 4,000 newborns.[3] Hypothyroidism is one of the most common endocrine disorders in the world and has the most prevalence in women and the elderly.[6] There may be as many as 13 million people with undiagnosed hypothyroidism in the United States.[9]

Symptoms

Common symptoms of this disease include fatigue, dry skin, cold sensitivity, muscle cramps, constipation, and voice changes. Other symptoms that are less common but occur with severe hypothyroidism are carpal tunnel syndrome, sleep apnea, pituitary hyperplasia, and hypernatremia.[10] Many rating scales have been used to determine the severity of hypothyroidism and the restoration to a normal thyroid state but have low sensitivity and specificity. They use subjective and objective indicators such as thyroid function tests, cholesterol levels, resting heart rate, anxiety level, disruption menstrual cycle, and sleep patterns.[10] Along with these symptoms and indicators, the diagnosis of hypothyroidism is made by measuring TSH. If an initial measurement of TSH is elevated, a measurement of Free T_4 is made to determine the classification.[10]

Diagnostics

Hypothyroidism is classified as subclinical, central, or overt. Subclinical hypothyroidism occurs when the serum TSH tests above the upper reference limit in combination with a normal free T4. In order for this to be an official reading, thyroid function must be stable for weeks or more, the hypothalamic-pituitary-thyroid axis is normal, and there is no recent or ongoing severe illness. Overt hypothyroidism is characterized

by an elevated TSH, usually above 10 mIU/L, in combination with a lowered free T4.[10] Central hypothyroidism is caused by lowered TSH causing a lack of stimulation to the thyroid gland. The thyroid gland is often normal in this situation and is capable of producing thyroid hormone.[11] The lack of TSH production is due to a problem with the hypothalamus or pituitary gland.[11] Hypothyroidism may be due to primary gland failure of the thyroid, or insufficient stimulation by the hypothalamus or the pituitary gland. Failure of the thyroid to function properly could be caused by a congenital abnormality, iodine deficiency, autoimmune destruction (Hashimotos disease), or another type of disease.[10]

Costs

The figure of 4.3 billion dollars has been quoted as the annual cost of hypothyroidism. The fact is that number is associated with only women's costs.[12] The total cost including men is obviously greater, but there is no data in the available literature to quantify the total cost of hypothyroidism for all those diagnosed with the disease. Ambulatory visits accounted for over half the amount. Of the remainder, about one third were the costs of prescriptions. Private insurance and out-of-pocket expenses were paid by 58% of women, whereas those over 65, the remaining 42%, out-of-pocket expenses were offset by Medicare insurance.[12]

Case Report

Patient History

A 49-year-old male patient presented to a private chiropractic clinic with complaints of neck, back, and shoulder pain of no specific onset or injury, as well as a 4-year history of hypothyroidism. 5 years previously, he started experiencing low energy, fatigue and slurred speech. His general practitioner ordered a TSA panel (see Figure 1), and he was diagnosed with hypothyroidism. The panel showed an increase in TSH, which was measured at 87.45 UIL/ml. The general practitioner prescribed 100mg of Synthroid® per day, which is an artificial thyroid hormone replacement. 5 months after the Synthroid® was prescribed, the general practitioner re-tested TSH and ordered a free T_4 test. The TSH panel and T_4 level returned to normal. His symptoms of low energy, fatigue, and slurred speech resolved with the addition of the Synthroid®. During the beginning of his chiropractic care he was still using the prescribed Synthroid®.

Chiropractic Examination

The chiropractic examination consisted of new patient health history forms, functional rating index, orthopedic and neurologic testing, static and motion palpation, thermography, Torque Release Technique™ (TRT) analysis and plain film radiographic assessment consisting of lateral and anteroposterior views of the cervical, thoracic, lumbar spine and pelvis. The lateral cervical radiograph showed a 9-degree cervical lordosis (see Figure 5) when comparing segments C2 through C5. The normal value for this region is 20.1 degrees.[13] The patient was diagnosed with cervical and lumbar degenerative joint disease. Subluxation was assessed using TRT analysis, which discovered subluxation at levels of C1, C5, T6, L5, sacrum, pelvis, and coccyx/sphenoid.

Torque Release Technique®

TRT is a tonal, neurologically based chiropractic model, which focuses on locating the primary subluxation or alteration of the frequency or tone of the nervous system.[14,15] Primary subluxation is caused by the abnormal tension in the Cranio-Spinal-Meningeal Functional Unit (CSMFU), which in turn can cause alteration in the normal piezoelectric properties and neuropeptide release of the spinal cord.[16] Throughout chiropractic history, both segmental and cord tension subluxations have been described in texts such as the Chiropractic Textbook by Stevenson.[14,17,18,] Cord tension subluxation is most likely caused by the pull of an attachment such as dura, connective tissue, or vertebrae, at a specific level, changing the tension in the entire CSMFU, thus changing the tone of the spinal cord causing global neurologic insult. Most common sites of attachment are at the levels of occiput, C1 (indirect), C2, C5, sacrum, and coccyx/ sphenoid.[14,19.]

The Council on Chiropractic Practice acknowledges in their 2013 updated guide, that the subluxation is a neurologic distortion that can cause pathologic and structural changes.[20] TRT is said to be tonal because tonal techniques use a non-linear, neurological approach to analyze the nervous system and spine as a functional unit in order to locate the primary subluxation.[14,18,21] TRT uses functional measures to determine abnormal tone of the nervous system and apply an adjustive force by the use of the Integrator™, or by hand, at this specific location along the three-dimensional axes to allow for reestablishment of normal tone to the CSMFU, spinal cord and nervous system.[14,21]

TRT was developed out of randomized placebo-controlled research done by Dr. Jay Holder, who is the founder of Holder Research Institute, along with Robert Duncan, PhD, a biostatistician from the University of Miami School of Medicine.[14,22,23] The study observed the benefit of chiropractic care and increased retention rates of addicts suffering from reward deficiency syndrome (RDS).[24] In order for the study to have intra-examiner reproducibility and reliability, Dr. Holder created the Integrator™. It is a toggle recoil adjustment instrument and was the first to be 510k registered by the FDA for the adjustment of subluxation. It holds CE clearances that allow it to be marketed internationally as well as in the US. It fires at 1/10,000th of a second at 64 Hz with the option of clockwise or counterclockwise torque for the three-dimensional listings along with true adjustable force. The Integrator™ works by incorporating a pre-cocking mechanism that fires the instrument only if a predetermined amount of pressure has been reached. The TRT model incorporates 15 indicators of subluxation and includes evaluation of the Functional Leg Length Reflex (FLLR).[14] These indicators come from seven original chiropractic pioneers, Dr. Thomson (Terminal Point), Dr. Van Rumpt (D.N.F.T), Dr. DeJarnette (S.O.T), Dr. Logan (Logan Basic), Dr. Toftness (Toftness Technique), Dr. B.J. Palmer (Palmer Upper Cervical) and Dr. Epstein (Network Spinal Analysis), along with additions from Dr. Holder, to develop a non-linear tonal analysis or model.[14]

By using these indicators along with the FLLR and light pressure test to the specific vertebral levels of direct or indirect dural attachment, this neurological approach views

primary subluxations and differentiates secondary subluxations, which are the compensations to the primary subluxation. There have been many other studies showing how TRT can help improve certain health problems and symptoms such as, infertility, ADHD, depression, and anxiety.[23-26]

Interventions and Outcomes

The patient was put on a care plan of three visits per week for the first six months and two visits per week for the last six months. Adjustments were given by hand at levels of C1 and C5 in the seated position. Adjustments given at T6 were done by hand with the patient in the prone position. The Integrator™ adjusting instrument was used at levels L5, Sacrum, pelvis and coccyx/sphenoid. The patient was also instructed to perform two-way seated cervical traction to help facilitate the adjustment to improve the cervical lordotic curve.[27] The initial functional outcome questionnaire given on the first visit was graded at 5 out of 40 (see Figure 4), with 40 being the most dysfunctional. Retesting occurred after eight months using the questionnaire, resulting in 1.25 out of 40 (see Figure 5). X-rays were also retaken at the eighth-month period of care. The cervical lordotic curve improved from 9 degrees (see Figure 6) to 19 degrees (see Figure 7), a 111% improvement. The patient had blood work 2 months into care and showed normal results (see Figure 2). After 8 months of care the patient reported he no longer needed to take the Synthroid®, which lasted for 8 months. At this time due to personal reasons he needed to reduce his weekly visits to one per week on average. He then noticed the fatigue starting to return. He started back on the Synthroid®, this time only needing one dose per week. Blood work was taken again 14 months into care, which would have been during the time he was not taking the medication and showed normal levels (see Figure 3). The patient has been able to maintain using one dose of Synthroid® per week while being under chiropractic care of one visit per week through the date of this paper being written. He has reported the adjustment giving similar results as the Synthroid®.

Discussion

A literature search of chiropractic care and hypothyroidism revealed three case studies. One case was a pilot study. Three other studies showed pertinence to this case study and the main focus was on hypothyroidism.

Two of the studies were done by Bablis and Pollard; the first in 2003 and the second in 2009.[28,29] Both studies used Neuro Emotional Technique (NET) to improve TSH levels in patients. A third 2015 case study conducted by Bak and Engelhardt used Chiropractic Biophysics to assess chiropractic care on a woman with pain resulting from an auto accident, who had also been diagnosed with hypothyroidism.[30] Using adjustments and traction devices, which helped the patients complaints, and thyroid function returned.[30]

In the 2003 study by Bablis and Pollard, two patients sought chiropractic care for pain, but also complained of tiredness and lethargy.[28] Manual chiropractic treatment resolved all pain complaints, but for the tiredness and lethargy, blood tests were sought revealing one to have hyperthyroidism with an initial TSH result of .07 mIU/L. The second woman's TSH level was 8.1mIU/L. Treatment using the Neuro Emotional Technique resulted in increasing the first woman's TSH to .09 mIU/L, but after six months, a third test revealed her TSH levels had increased to .33 mIU/L, within the normal range, which is .3—5.1 mIU/L. The second woman's level post NET treatment was lowered into the normal range of 3.7 mIU/L and eight months after that result, her level dropped further to 3.0 mIU/L.

The 2009 Bablis and Pollard study also brought TSH levels down in two women who were determined through blood tests to have hypothyroidism.[30] The first patient came in with lower back pain and received manual chiropractic treatment, which made her symptoms disappear, but she complained of tiredness and was tested to have a TSH level of 13.99 mIU/L. After eight weeks of NET treatment, her TSH levels dropped to 5.81mIU/L. A subsequent test revealed her TSH level had dropped to 1.45 mIU/L. The second patient presented to the chiropractic clinic complaining of thyroid problems. Although she had been prescribed Oroxine®, she stopped taking it because her symptoms returned. Her pre-NET test resulted in a 14.8 mIU/L. Post-NET testing revealed her TSH level had dropped to 5.81 mIU/L. A follow up test showed it had dropped to .82 mIU/L, which is in the normal range.[29]

In the third case study by Bak and Engelhardt, a patient presented complaints of upper trapezius and inter-scapular pain from an auto accident.[30] Four years prior, she had been diagnosed with hypothyroidism and put on medication. The second two years, she was switched to Amour Thyroid, a natural porcine-derived thyroid hormone by her endocrinologist. At the chiropractic clinic, she was assessed for her injuries using Chiropractic Biophysics (CBP). Adjustments were made using Mirror-Image® and Post Mirror Image®. TargetForce®, a traction device was used to address a deficient cervical curve. The patient used Denneroll®, an at-home traction device to ensure the correction. After a month of treatment, the patient complained of tremors. The chiropractor referred her to the endocrinologist. Her blood TSH level had dropped to hyperthyroid level (<.3 mIU/L). The endocrinologist dropped the prescribed levels of Amour Thyroid relieving her symptoms. Bak and Engelhardt did not present the patient's TSH levels. They documented the change in her symptoms via chiropractic care and the hypothyroid and hyperthyroid symptoms that occurred during simultaneous treatment.[30]

Treatment

Treatments other than levothyroxine are rarely used although one reference stated a patient was prescribed Armour Thyroid.[8,30] The literature revealed screening and treatment issues of hypothyroidism, but none could recommend changing how patients are screened for hypothyroidism nor found an alternative to synthetic thyroid hormone.

Helfand's "Screening for Subclinical Thyroid Dysfunction in Nonpregnant Adults: A Summary of the Evidence for the U.S. Preventive Services Task Force" purpose was to determine if screening should be done on patients without history or symptoms of thyroid dysfunction.[9] Early detection benefits were to prevent development of atrial fibrillation, osteoporotic fractures, and complicated overt hypothyroidism. Those

benefits were countered by adverse effects of overtreatment and those of L-thyroxine including, nervousness, palpitations, atrial fibrillation, and exacerbation of angina pectoris. Above or below normal levels of TSH are associated with an increase in osteoporosis, which can happen with either a false positive result to screening or untherapeutic levels of L-thyroxine dosage.

In "Treatment for primary hypothyroidism: current approaches and future possibilities," the authors acknowledged that levothyroxine therapy was problematic in that patient symptoms and feeling of wellbeing were not satisfied by the drug.[3] They documented the numerous other prescriptive drugs that could affect the absorption and action of levothyroxine, and discussed three alternative drugs that they recommended for further study.[3]

"Hypothyroidism: An Update" reiterated much of the first article, saying screening of asymptomatic patients was not recommended for the same reasons, but did caution that older people, pregnant women, patients with suspected ischemic heart disease, those being treated for hypothyroidism with persistent symptoms, those diagnosed as subclinical hypothyroid, and those suspected of having myxedema coma were special cases deserving of extra screening.[1] Physicians were cautioned to double-check all medications patients were taking due to drug interaction. This article as well as others stated that hypothyroidism require life-long thyroid hormone therapy.

"Hypothyroid Investigation and Management" gives additional lists of symptoms that should be checked beyond those commonly reported by patients. It cautions that trying to determine the cause of the symptoms is important if case the hypothyroidism is transient due to a temporary drug prescribed or an illness. When symptoms persist, it is recommended that a dosage adjustment should be made.[8]

Correction Mechanism

When the body is stressed beyond what it can withstand, it adapts to each specific stressor in order to continue functioning. These adaptions are changes in the way the body organizes the neurologic system by creating new neuronal pathways. Due to re-organization of these neuronal pathways, they operate at a different frequency or tone than the original normal pathway and are facilitated.[31] Each and every stress on the body is memorized as well as any adaptations that are needed at that instant in time.[32] The adaptation can manifest as a change of signal to postural muscles that connect to specific vertebrae causing subluxation, or a change in signal to any other part of the body.[18,31,33]

The importance of chiropractic care is in the direct affect it has upon the central nervous system (CNS) where the interference manifests. Wherever a bone may have shifted out of place due to the change in signal to the muscle, it is called subluxation and can be located in the spine.[21] Chiropractic techniques may focus on applying a force to the bone-muscle component of subluxation causing the bone to shift into normal alignment. TRT is a technique that acknowledges the neurologic adaptation and attempts to counteract it at a location along the CNS that has connection through the CSMFU, which is where it is best able to accept corrective neurological stimulus for that particular neurologic adaptation.[14,18,33] This location along the CNS as well as the CSMFU is very important in this process due to the cord tension produced, as well as the transfer of neurologic signal by the meninges.[34] In an article explaining new research on meningeal composition and function, it was found that the meninges are a source of important growth factors and can relay neural signals in addition to protecting the CNS.[34] Because the cord tension model of subluxation shows how the tone of the cord can be altered, it will prevent further neurologic signal to the rest of the body. Lack of neurologic signal may produce more subluxations as well as postural distortions and spinal curve changes such as loss of cervical lordotic curve, which have been shown to have negative health consequences.[27,35,13] This cycle will then keep repeating itself causing degeneration and is termed the vertebral subluxation complex.[21]

Research has shown there is a direct connection among the endocrine, immune, and limbic systems through a network of neuropeptides and neurotransmitters and hormones.[16] TRT has been shown to have positive effects on the brain reward cascade, reward deficiency syndrome, and improving wellbeing in patients.[23,24,36] This may be partly due to the limbic system extending into the dorsal horns of the spinal column.[16] If the spinal cord receives tension or pressure from the pull of a dural attachment, this could in turn alter the production of proper neuropeptides necessary for limbic, endocrine, and immune system function.[4,16,37] Pressure has been shown to decrease enzymatic activity, in which the slightest change may alter proper hormone production.[4,37] There are several reasons hypothyroidism may occur. Autoimmune reaction causes T lymphocytes to attack the thyroid gland through the release of lymphokines, which are involved in the feedback loop of the limbic system. TSH uses a secondary messenger system to activate the thyroid cells. The secondary messenger system may be decreased by activation of a specific dopamine gene in the brain reward cascade.[38] The hypothalamic-pituitary-adrenal axis is also incorporated into the brain reward cascade through the hypothalamus and locus coeruleus and is an important factor in hypothyroidism.[39] The hypothalamus is very important to the brain reward cascade due to having receptors for nearly all neuropeptides.[16] If the brain reward cascade improperly stimulates the hypothalamus, it may release improper amounts of corticotropin-releasing hormone, which can decrease thyroid function. By correctly stimulating the CNS at the point of neurologic adaptation, tension is released from the spinal cord and natural tone is returned to the nervous system. Chiropractic adjustments may improve the release of neuropeptides in the limbic system, which may further improve many biological processes in the body such as hypothyroidism.[14,16,18]

Limitations

There are limitations within the study due to patient self-reporting, which is not an objective measure, and frequency of treatment, which also was dependent on the patient. Other environmental and personal factors need to be accounted for to eliminate their possible affect on TSH levels during chiropractic care. Possible factors may include the patient's change in diet, exercise, sleep, other medications, and other

treatment the patient may not have reported. Due to the nature of a case study the data cannot be extrapolated to the general population.

Conclusion

Because synthetic thyroid hormone is now the only current treatment for hypothyroidism, it would be beneficial to have an alternative treatment such as chiropractic care. Those currently receiving synthetic thyroid medication risk its side effects, drug interactions, and associated costs. The Colorado Study showed that about 10% of individuals are undiagnosed supporting a need for chiropractic care as a preventative healthcare model because it may provide incidental relief. This case study as well as the three others demonstrates the possibility of chiropractic adjustments improving thyroid function.[28-30] Further studies are needed such as randomized, controlled trials to investigate possible chiropractic alternatives.

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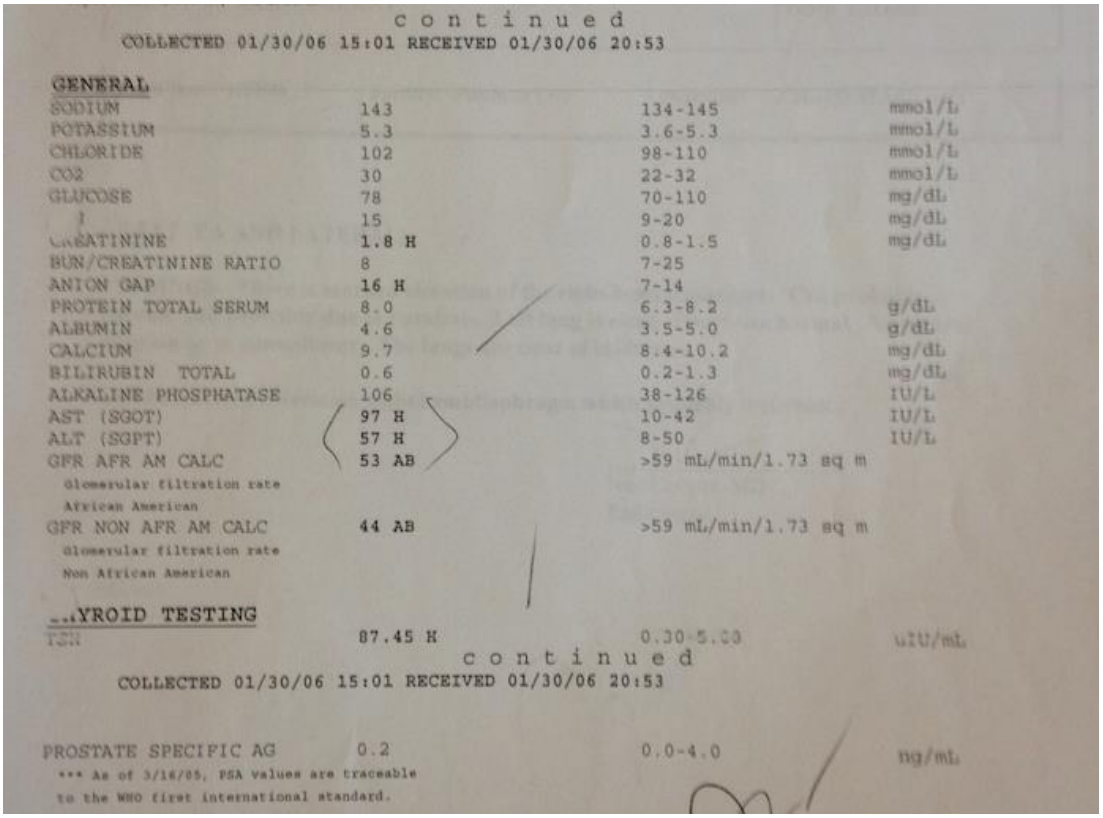

continued

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GENERAL			
SODIUM	143	134-145	mmol/L
POTASSIUM	5.3	3.6-5.3	mmol/L
CHLORIDE	102	98-110	mmol/L
CO2	30	22-32	mmol/L
GLUCOSE	78	70-110	mg/dL
[illegible]	15	9-20	mg/dL
[illegible]ATININE	1.8 H	0.8-1.5	mg/dL
BUN/CREATININE RATIO	8	7-25	
ANION GAP	16 H	7-14	
PROTEIN TOTAL SERUM	8.0	6.3-8.2	g/dL
ALBUMIN	4.6	3.5-5.0	g/dL
CALCIUM	9.7	8.4-10.2	mg/dL
BILIRUBIN TOTAL	0.6	0.2-1.3	mg/dL
ALKALINE PHOSPHATASE	106	38-126	IU/L
AST (SGOT)	97 H	10-42	IU/L
ALT (SGPT)	57 H	8-50	IU/L
GFR AFR AM CALC	53 AB	>59 mL/min/1.73 sq m	
Glomerular filtration rate African American			
GFR NON AFR AM CALC	44 AB	>59 mL/min/1.73 sq m	
Glomerular filtration rate Non African American			
...YROID TESTING			
TSH	87.45 H	0.30-5.00	uIU/mL

continued

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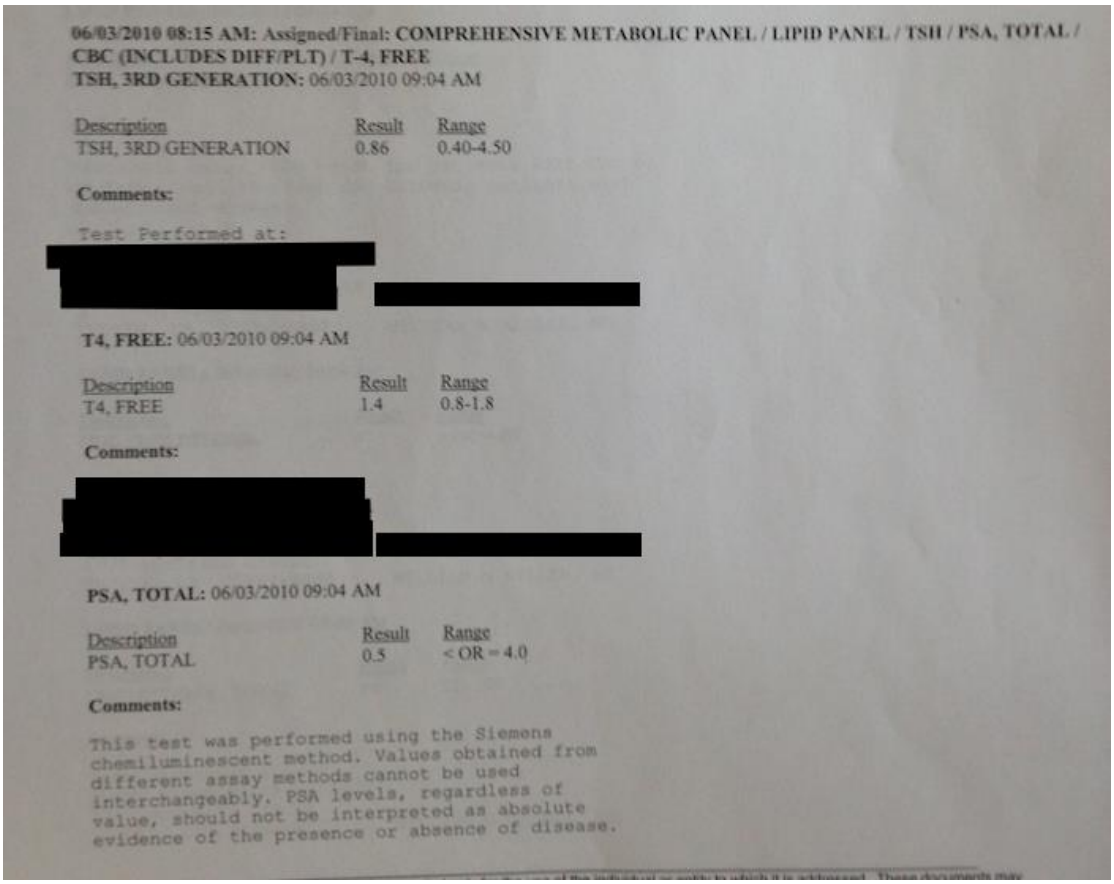
PROSTATE SPECIFIC AG	0.2	0.0-4.0	ng/mL

*** As of 3/16/05, PSA values are traceable to the WHO first international standard.

Figure 1



06/03/2010 08:15 AM: Assigned/Final: COMPREHENSIVE METABOLIC PANEL / LIPID PANEL / TSH / PSA, TOTAL / CBC (INCLUDES DIFF/PLT) / T-4, FREE
TSH, 3RD GENERATION: 06/03/2010 09:04 AM

Description	Result	Range
TSH, 3RD GENERATION	0.86	0.40-4.50

Comments:

Test Performed at:

[redacted]

T4, FREE: 06/03/2010 09:04 AM

Description	Result	Range
T4, FREE	1.4	0.8-1.8

Comments:

[redacted]

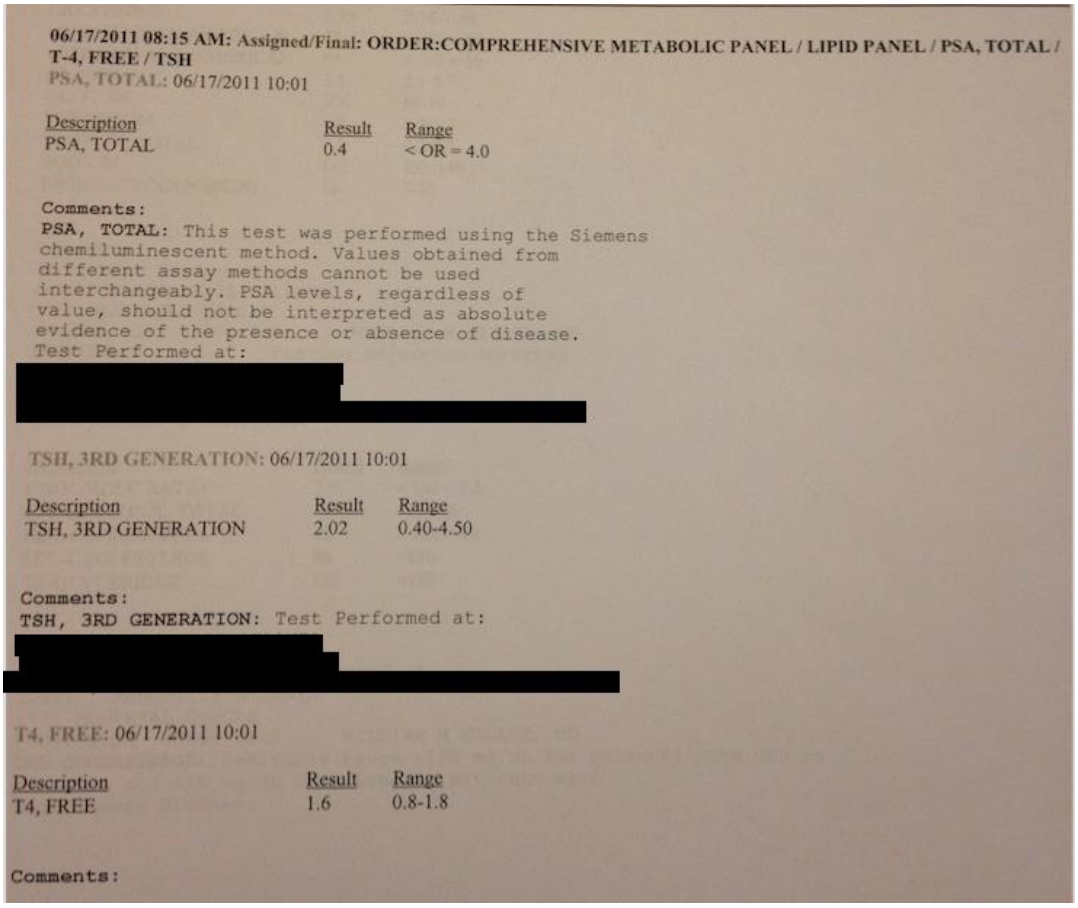
PSA, TOTAL: 06/03/2010 09:04 AM

Description	Result	Range
PSA, TOTAL	0.5	< OR = 4.0

Comments:

This test was performed using the Siemens chemiluminescent method. Values obtained from different assay methods cannot be used interchangeably. PSA levels, regardless of value, should not be interpreted as absolute evidence of the presence or absence of disease.

Figure 2



06/17/2011 08:15 AM: Assigned/Final: ORDER:COMPREHENSIVE METABOLIC PANEL / LIPID PANEL / PSA, TOTAL / T-4, FREE / TSH

PSA, TOTAL: 06/17/2011 10:01

Description	Result	Range
PSA, TOTAL	0.4	< OR = 4.0

Comments:
PSA, TOTAL: This test was performed using the Siemens chemiluminescent method. Values obtained from different assay methods cannot be used interchangeably. PSA levels, regardless of value, should not be interpreted as absolute evidence of the presence or absence of disease.
Test Performed at:
[redacted]

TSH, 3RD GENERATION: 06/17/2011 10:01

Description	Result	Range
TSH, 3RD GENERATION	2.02	0.40-4.50

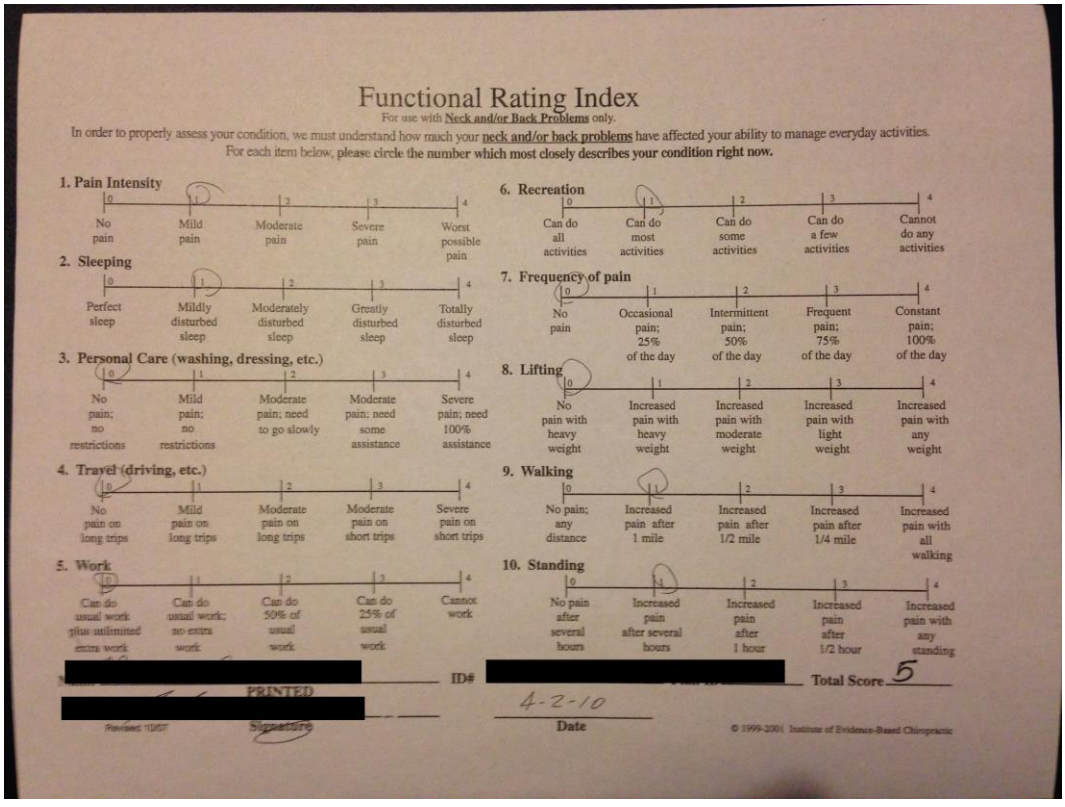
Comments:
TSH, 3RD GENERATION: Test Performed at:
[redacted]

T4, FREE: 06/17/2011 10:01

Description	Result	Range
T4, FREE	1.6	0.8-1.8

Comments:

Figure 3



Functional Rating Index

For use with Neck and/or Back Problems only.

In order to properly assess your condition, we must understand how much your neck and/or back problems have affected your ability to manage everyday activities.
For each item below, please circle the number which most closely describes your condition right now.

1. Pain Intensity: 0 No pain; 1 Mild pain; 2 Moderate pain; 3 Severe pain; 4 Worst possible pain
2. Sleeping: 0 Perfect sleep; 1 Mildly disturbed sleep; 2 Moderately disturbed sleep; 3 Greatly disturbed sleep; 4 Totally disturbed sleep
3. Personal Care (washing, dressing, etc.): 0 No pain; no restrictions; 1 Mild pain; no restrictions; 2 Moderate pain; need to go slowly; 3 Moderate pain; need some assistance; 4 Severe pain; need 100% assistance
4. Travel (driving, etc.): 0 No pain on long trips; 1 Mild pain on long trips; 2 Moderate pain on long trips; 3 Moderate pain on short trips; 4 Severe pain on short trips
5. Work: 0 Can do usual work plus unlimited extra work; 1 Can do usual work; no extra work; 2 Can do 50% of usual work; 3 Can do 25% of usual work; 4 Cannot work
6. Recreation: 0 Can do all activities; 1 Can do most activities; 2 Can do some activities; 3 Can do a few activities; 4 Cannot do any activities
7. Frequency of pain: 0 No pain; 1 Occasional pain; 25% of the day; 2 Intermittent pain; 50% of the day; 3 Frequent pain; 75% of the day; 4 Constant pain; 100% of the day
8. Lifting: 0 No pain with heavy weight; 1 Increased pain with heavy weight; 2 Increased pain with moderate weight; 3 Increased pain with light weight; 4 Increased pain with any weight
9. Walking: 0 No pain; any distance; 1 Increased pain after 1 mile; 2 Increased pain after 1/2 mile; 3 Increased pain after 1/4 mile; 4 Increased pain with all walking
10. Standing: 0 No pain after several hours; 1 Increased pain after several hours; 2 Increased pain after 1 hour; 3 Increased pain after 1/2 hour; 4 Increased pain with any standing

[redacted] ID# [redacted]

PRINTED

Signature

Total Score 5

4-2-10
Date

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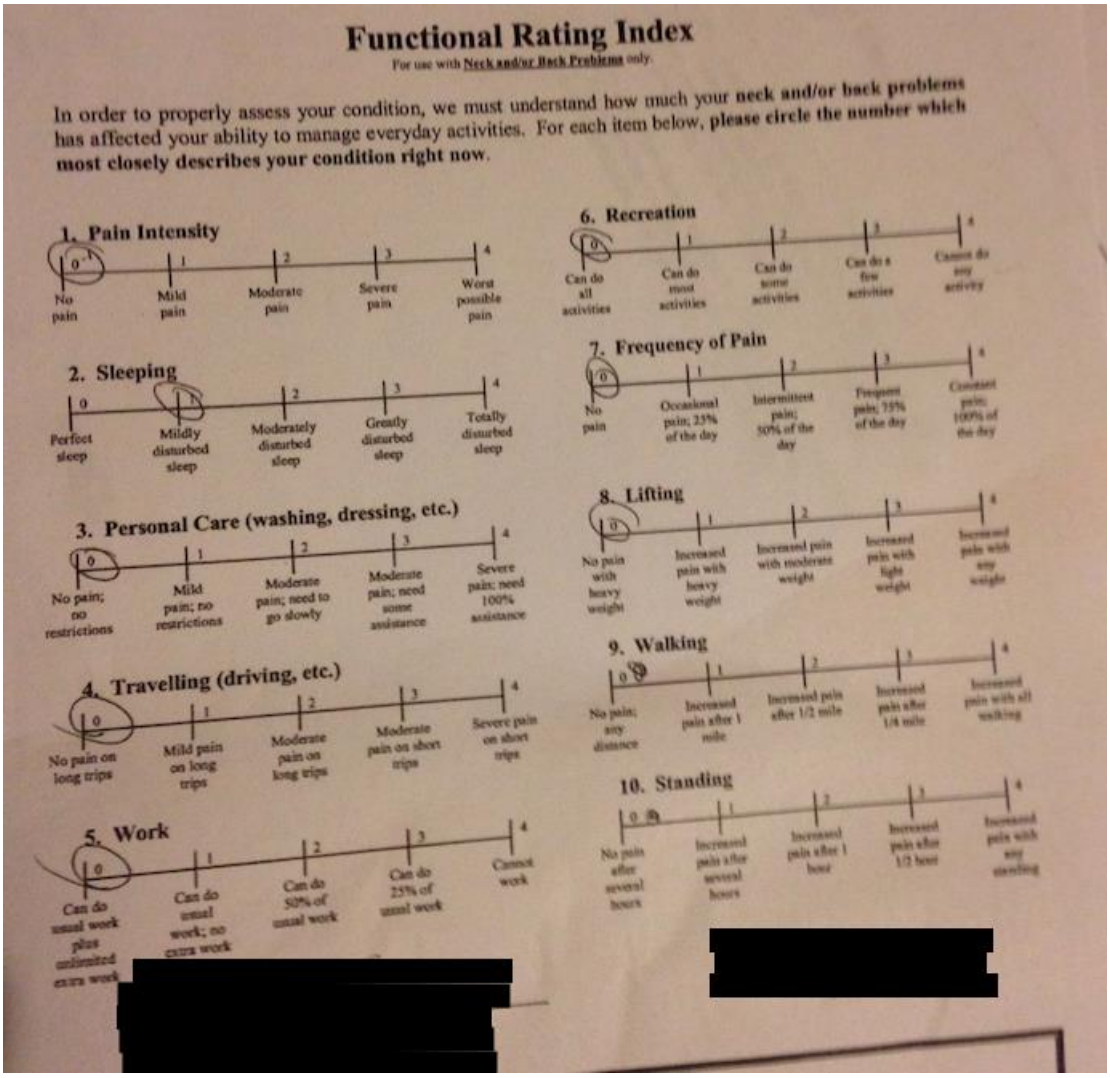
Figure 4



Functional Rating Index

For use with Neck and/or Back Problems only.

In order to properly assess your condition, we must understand how much your **neck and/or back problems** has affected your ability to manage everyday activities. For each item below, **please circle the number which most closely describes your condition right now**.

1. Pain Intensity
0 No pain · 1 Mild pain · 2 Moderate pain · 3 Severe pain · 4 Worst possible pain

2. Sleeping
0 Perfect sleep · 1 Mildly disturbed sleep · 2 Moderately disturbed sleep · 3 Greatly disturbed sleep · 4 Totally disturbed sleep

3. Personal Care (washing, dressing, etc.)
0 No pain; no restrictions · 1 Mild pain; no restrictions · 2 Moderate pain; need to go slowly · 3 Moderate pain; need some assistance · 4 Severe pain; need 100% assistance

4. Travelling (driving, etc.)
0 No pain on long trips · 1 Mild pain on long trips · 2 Moderate pain on long trips · 3 Moderate pain on short trips · 4 Severe pain on short trips

5. Work
0 Can do usual work plus unlimited extra work · 1 Can do usual work; no extra work · 2 Can do 50% of usual work · 3 Can do 25% of usual work · 4 Cannot work

6. Recreation
0 Can do all activities · 1 Can do most activities · 2 Can do some activities · 3 Can do a few activities · 4 Cannot do any activity

7. Frequency of Pain
0 No pain · 1 Occasional pain; 25% of the day · 2 Intermittent pain; 50% of the day · 3 Frequent pain; 75% of the day · 4 Constant pain; 100% of the day

8. Lifting
0 No pain with heavy weight · 1 Increased pain with heavy weight · 2 Increased pain with moderate weight · 3 Increased pain with light weight · 4 Increased pain with any weight

9. Walking
0 No pain; any distance · 1 Increased pain after 1 mile · 2 Increased pain after 1/2 mile · 3 Increased pain after 1/4 mile · 4 Increased pain with all walking

10. Standing
0 No pain after several hours · 1 Increased pain after several hours · 2 Increased pain after 1 hour · 3 Increased pain after 1/2 hour · 4 Increased pain with any standing

[redacted]

Figure 5

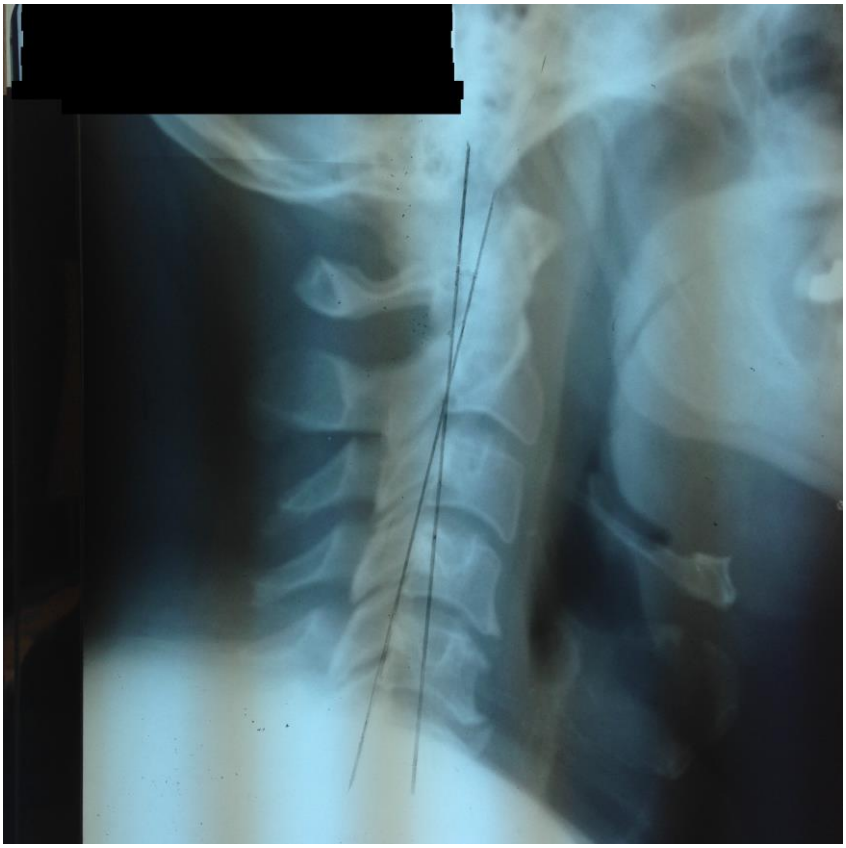


Figure 6 Pre Lateral Cervical Radiograph: 04/02/2010 Cervical Lordosis: 9 degrees

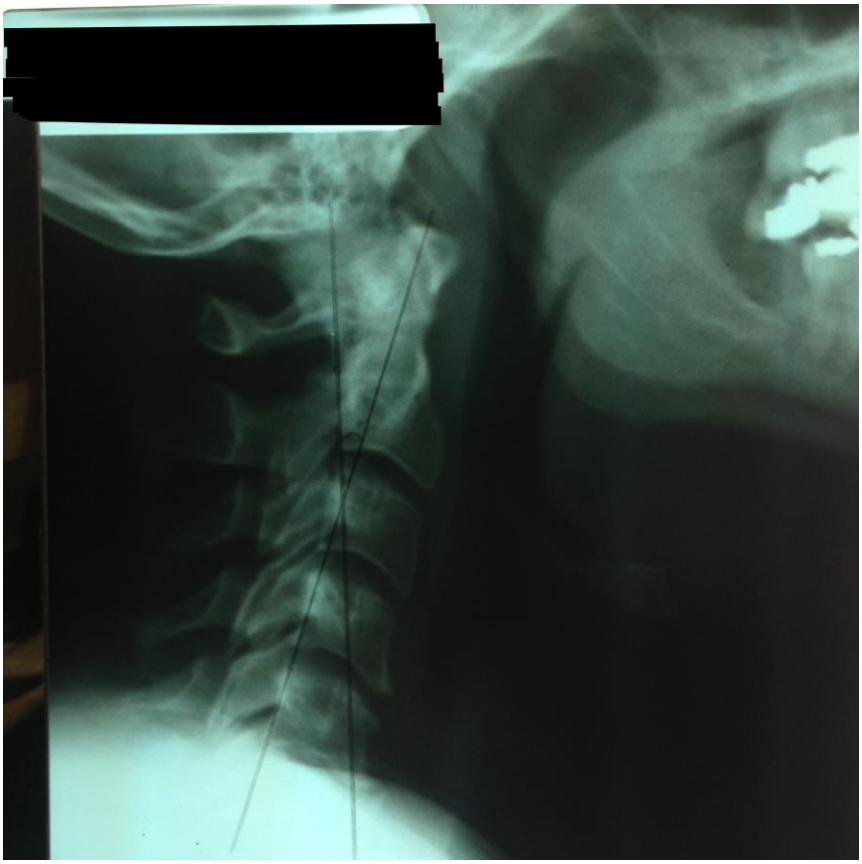


Figure 7 Post Lateral Cervical Radiograph: 01/08/11 Cervical Lordosis: 19 degrees