NUCCA

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Co-editor: Dr. Jason Chesney
Co-editor: Dr. Kevin Hallmeyer

This year marks the 60th anniversary of NUCCA, an important milestone in the history of our profession. This issue of the NUCCA Monograph brings together several important aspects of our profession, including updates to our standards, discussions of technique, advances in technology, and reflections on the history and ideas that have helped shape NUCCA.

As our profession continues to evolve, it is important that we keep examining how we practice, how we communicate our methods, and how we preserve the knowledge developed by those who came before us. The Monograph provides a place to share ideas, explore different perspectives, and contribute to the continued development of NUCCA. We hope the material in this issue will be valuable to experienced practitioners and students alike.

I would also like to acknowledge the passing of Dr. Gary Thomson of Kelowna this summer. When I was starting out in practice, Gary was always generous with his business and practice advice, sharing what he had learned through his own experiences. I was always grateful for what he shared with me. Gary was a great man, and he will be truly missed.

Thank you to everyone who has contributed their time, knowledge, and experience to this issue. We hope you find it useful and thought-provoking, and that it encourages continued discussion and collaboration within our profession.

Jason Chesney

Standards Update
A Fifth Element

Dr. Craig Lapenski

The NUCCA spinal corrective procedure is based on measurable and tested procedures that have been developed starting with the work of Dr Ralph R.Gregory and Dr John F. Grostic in their collaboration between 1941 and 1946.

As Dr Gregory founded the NUCCA organization in 1966, he wanted an organization that was founded on tested and proven principles and procedures. The Board of Directors created an organization designed to be tested, advanced and refined. The name of the organization itself (NUCCA instead of The Gregory Technique) is historical evidence of Dr. Gregory's desire not to have the organization and its protocols limited by the knowledge and technology of the time, but to be open for refinement.

Over many decades the Board Certified Doctors, The Standards and Certification Committee, UCRF, Education Committee, and the membership continue to test, make additions, and improvements to the technique as new technology and insights into biomechanical relationships are realized. Clarifications and advancements have been made to optimize film quality, summarize and categorize the basic types, out of pattern types, and create and refine the 8 Phases of the adjustment to name a few.

For Decades it has been commonplace among Board Certified Doctors to alter the Calculated height vector on the Nasium Film to create a more optimal reduction based on clinical observations. This has been especially true with Atypical or Out of Pattern Subluxations (Herein referred to as OP). Many of these concepts have been taught repeatedly throughout our instructors at NUCCA conferences.

The NUCCA RATIONALE is based on the premise that the spinal column, skull, and pelvis deviate from the vertical axis resulting in tractionization to the central nervous system. (NUCCA Standards of Care Practice Guidelines)

The purpose of this paper is not to be exhaustive in the realm of biomechanical rationale, but to bring a commonly taught concept into our protocols. This concept is that the Vertical Axis is an important component to consider in the reduction of the ASC. There have been a multitude of teachers over a number of decades who have shared very similar insights as to how the vertical axis is a component to be considered in height vector selection. The thought put forth in this paper is that there has in effect been taught in intermediate and advanced instruction another Element to the height vector. A Fifth Element if you will. This would be the Vertical Axis consideration.

This concept is not necessarily applicable in all subluxations and all types, but can be part of the consideration for a Basic Type, and most often is in Out of Pattern Types. There have been a number of instructors who will lower the height vector in out of pattern type 1's and 2's for instance. Dr Cripe has suggested measuring how far off the C2 body center is from vertical and subtracting from the Height vector 1/2 inch for each 1/4 inch off of vertical. Drs Dickholtz Sr. has suggested subtracting 2 inches from the height vector in out of pattern type 1's and 2's. Dickholtz Jr, Denton, Yardley, Packer, Flory, have all taught in classes methods for lowering the Height Vector in OP subluxations to aid in better correction of the vertical axis. Some of which have involved zeroing the C/A to aid in the reduction toward normal of the vertical axis.

It is the purpose of this paper that based on decades of insight and biomechanical understanding that there should be a 5th Element included in the height vector. As more understanding occurs there may be need for another element, however based on decades of understanding and application the vertical axis should have consideration in the OP types, and in the basic types.

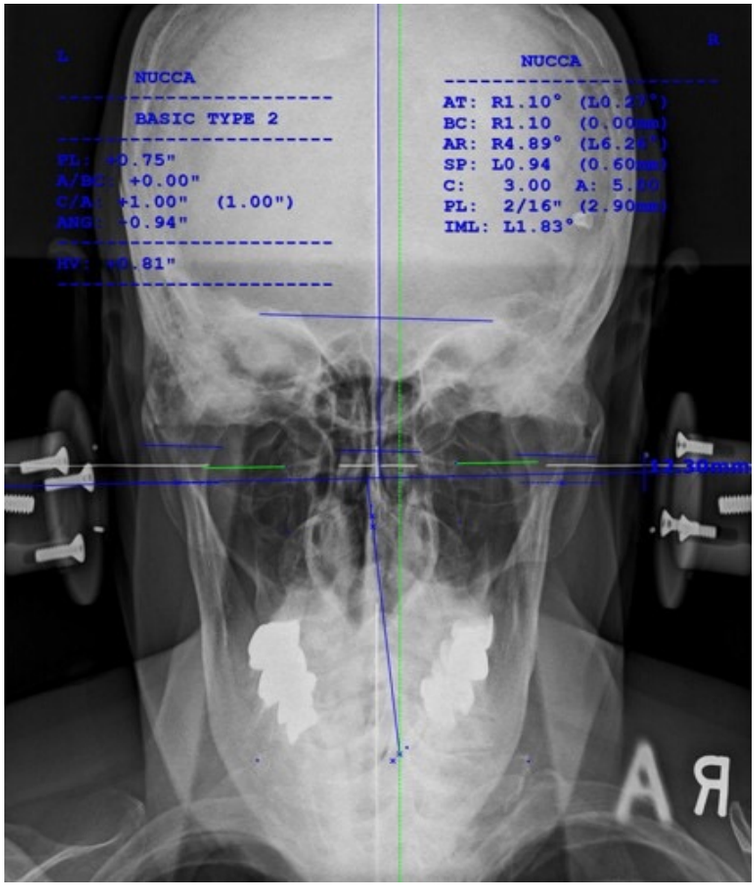
Even though these concepts have been taught for years in Intermediate and Advanced Classes, it is the opinion of the author that it would be beneficial for the Beginner to be taught that the vertical axis(VA) or Fifth Element is a component for consideration. It is also the opinion of the author that this consideration has benefit for practitioners at all skill levels.

My recommendation would be that in OP type 1/2/3 where the neck is leaning into the opposite frontal plane as Atlas laterality, a starting point would be to subtract 1/2 for each degree off the vertical axis to help bring the neck back to the vertical axis. [In a BT 1 and BT 4 this may be considered as well. In other words; if in a BT 1 on the right the neck is leaning into the right frontal plane you may consider adding to the height vector 1/2 in for every degree leaning off of vertical.]

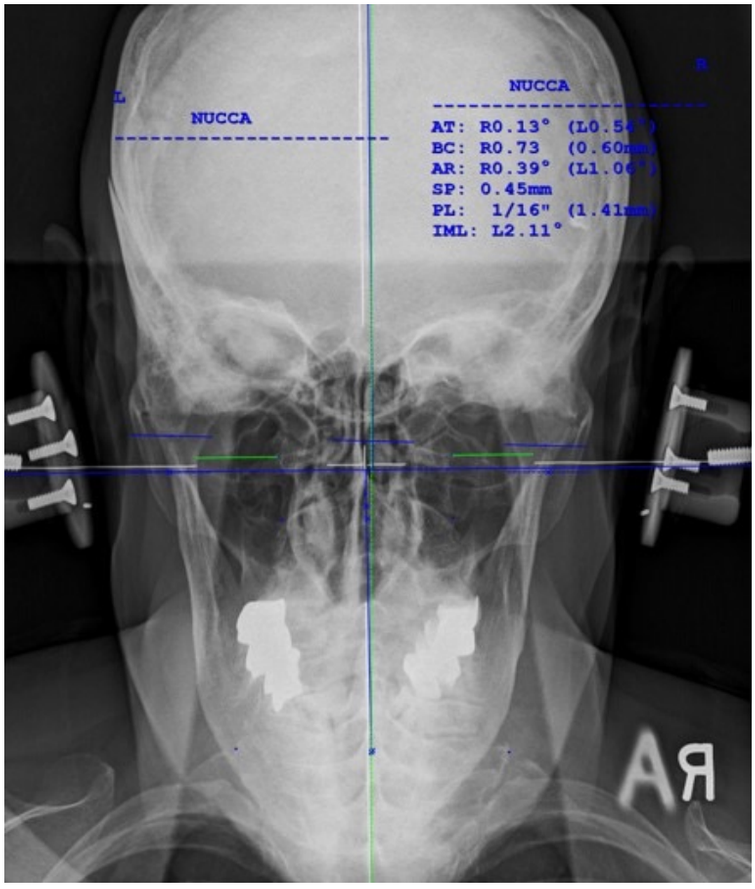
The Standards Committee recruited the help of 5 board certified doctors who helped test the protocol and submit images to verify the procedure. Thank you to Dr. Vince Fitzpatrick, Dr. Jason Chesney, Dr. Jason Granger, Dr. Michael Russamano for submitting images to validate the protocol. Thank you to Dr. Michael Zabelin for compiling all of the images. The Standards Committee unanimously approved the adoption of the new protocol after reviewing all the images verifying the effectiveness of the protocol.

Additional cases in Appendix

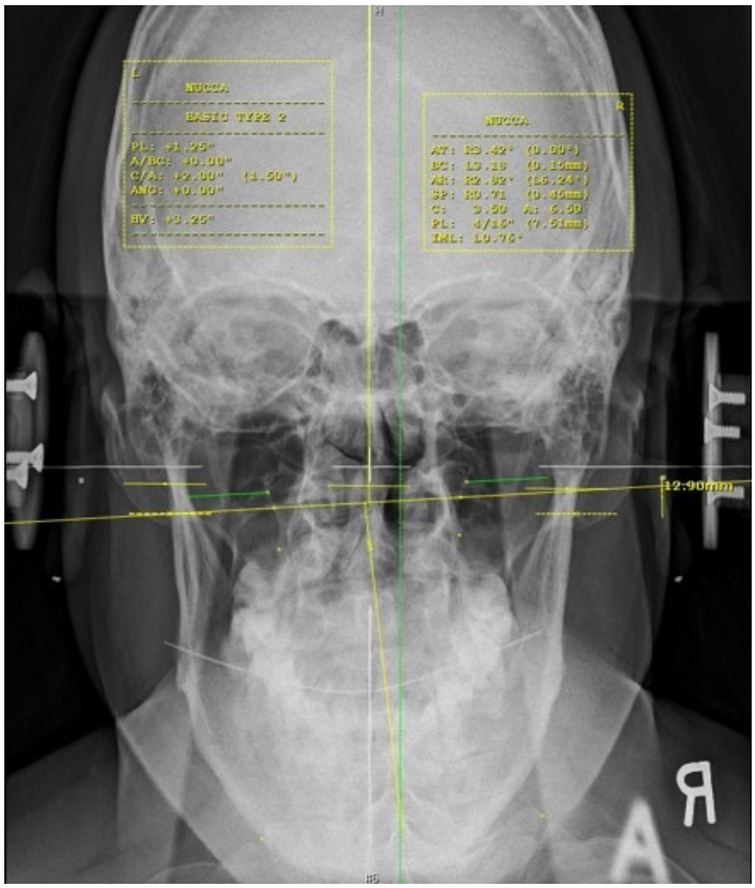
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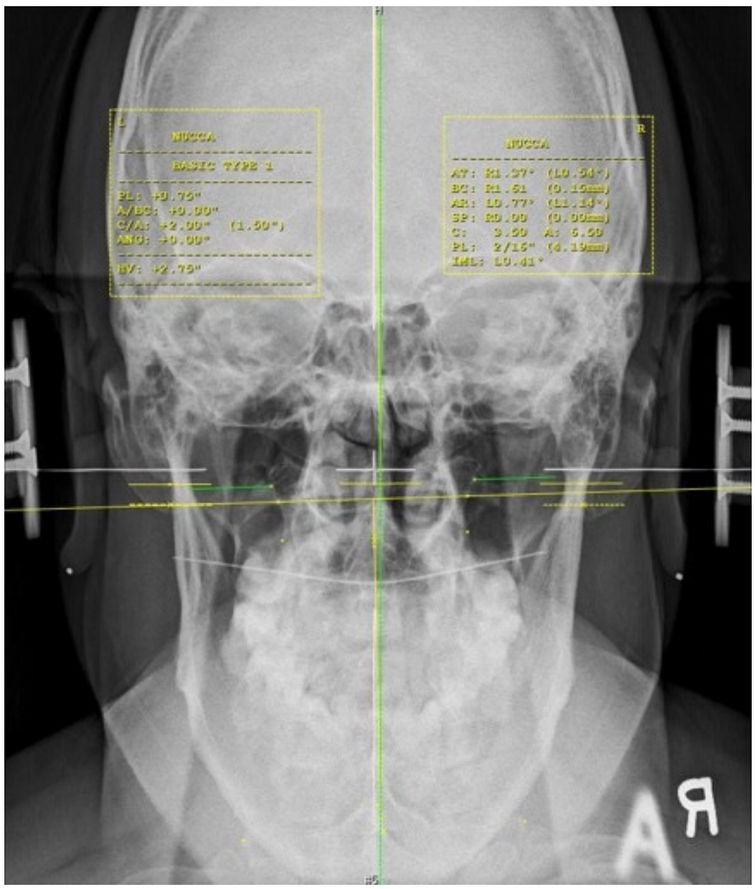
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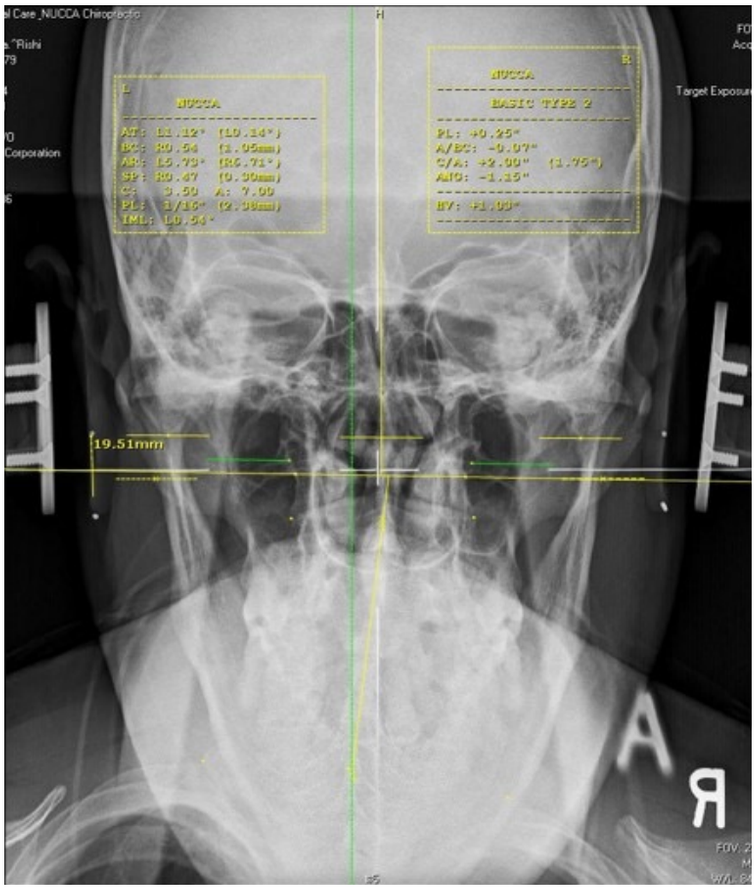
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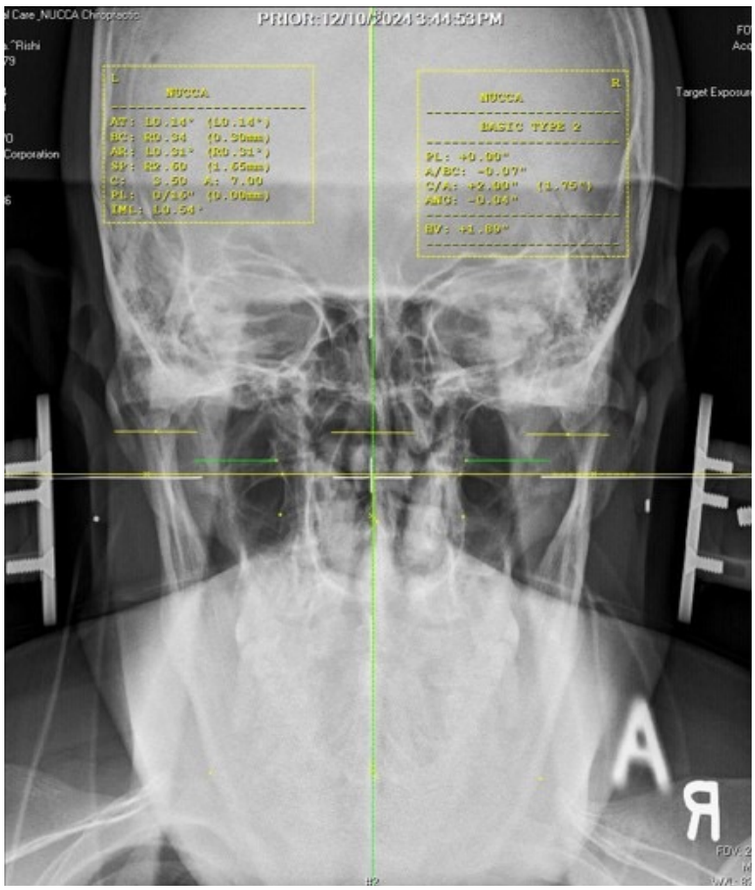
Case 2 Post



Case 3 Pre



Case 3 Post



RESEARCH UPDATE

Case Series & Poster Presentation:

Measuring Posture Changes And Minor C1/C2 Misalignment In Post-Concussion Syndrome: A Small Retrospective Series

Giselle Ghabussi, BS; Shayan Huda, BS; Susan Pannullo, MD; Julia C. Radwanski, DC; Ryan E. Radwanski, MD; Kerry Johnson, DC

This small retrospective case series (n=4) examined the relationship between postural imbalance, the atlas subluxtation complex, and clinical outcomes in patients with diagnosed post-concussion syndrome (PCS).

Patients (ages 11–33) presented with measurable postural distortions, including leg-length inequality and weight-bearing asymmetry, alongside radiographic evidence of C1 lateral displacement (mean 2.63°). Baseline clinical measures reflected typical PCS burden, including elevated scores on the Concussion Grading Scale, Dizziness Handicap Inventory, Neck Disability Index, and pain scales.

Following NUCCA protocol care, there was a substantial reduction in atlas misalignment (mean laterality reduced to 0.80°, ~70% correction). This structural change was accompanied by marked improvement in postural stability indicators and significant reductions in symptom burden, with an ~87% improvement in concussion-related scores at 12-week follow-up.

Clinical Takeaway for NUCCA Practitioners

- Objective postural findings (leg-length inequality, weight differential) may serve as practical indicators of upper cervical misalignment in PCS patients.

- Even minor C1/C2 misalignments appear clinically relevant in this population, potentially impacting proprioceptive integration and postural control.

- Correction and stabilization of the ASC, using NUCCA protocol, may contribute to meaningful improvements in both posture and PCS symptomatology.

Implication

This work supports the clinical observation that subtle upper cervical biomechanical distortions can have significant neurological and functional consequences—particularly in PCS. It provides early data supporting the need for larger, prospective studies.

Measuring Posture Changes And Minor C1/C2 Misalignments In Post-Concussion Syndrome: A Small Retrospective Series

Giselle Ghabussi, BS; Shayan Huda, BS; Susan Pannullo, MD; Julia C. Radwanski, DC; Ryan E. Radwanski, MD; Kerry Johnson, DC

INTRODUCTION

- Post-concussive syndrome (PCS) is a common result of mild traumatic brain injury (mTBI), leading to persistent symptoms like headaches, dizziness, and cognitive impairments. Cervical spine misalignments, especially at C1 and C2, may exacerbate these symptoms by disrupting neural pathways related to proprioception and postural control. The relationship between cervical misalignments and PCS, however, remains underexplored.

OBJECTIVES

- This case series evaluates postural deviations as potential indicators of minor C1 and C2 misalignments in PCS patients.

METHODS

- We retrospectively reviewed PCS patients referred for evaluation of C1/C2 misalignments. Inclusion required an external PCS diagnosis. Data included age, gender, pre-assessment scores, postural measurements, and cervical spine radiographs (3-view X-ray or cone-beam CT). Comparisons were made before and after National Upper Cervical Chiropractic Association (NUCCA) protocol intervention.

RESULTS

- The series (n = 4) included patients aged 11–33 years (mean 21.0 ± 10.3), with three males and one female. Initial assessments showed: Concussion Grading Scale (36.9 ± 12.7), Dizziness Handicap Inventory (20.5 ± 1.73), Neck Disability Index (14.0 ± 4.7), and Visual Analog Pain Scale (19.3 ± 5.3). Postural deviations included leg-length discrepancy (0.53 ± 0.12 inches) and weight differential (5.88 ± 1.67%). Radiographic misalignments (C1 lateral displacement: 2.63 ± 0.95 degrees) were reduced after NUCCA protocol intervention (C1 lateral displacement: 0.80 ± 0.85 degrees, 69.6% reduction). Follow-up at 12 weeks showed significant improvements in clinical scores (e.g., Concussion Grading Scale: 5.25 ± 4.57, 86.9% improvement)

CONCLUSIONS

- This case series suggests postural deviations correlate with minor C1 and C2 misalignments. Correcting these misalignments may improve postural stability and clinical outcomes. Larger studies are needed to confirm the impact of such interventions on PCS recovery.

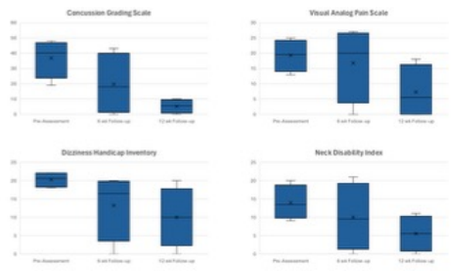


Figure 1. *Concussion Grading Scale, Dizziness Handicap Inventory, Neck Disability Index, and Visual Analog Pain Scale pre-assessment values at pre-assessment, 6-week follow-up, and 12-week follow-up.*

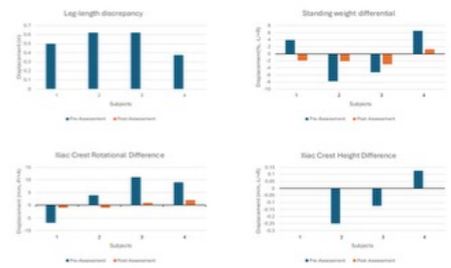


Figure 2. *Postural measurements at baseline, including leg-length discrepancy, standing weight differential, iliac crest rotational difference, and height difference at pre-assessment and post-assessment.*

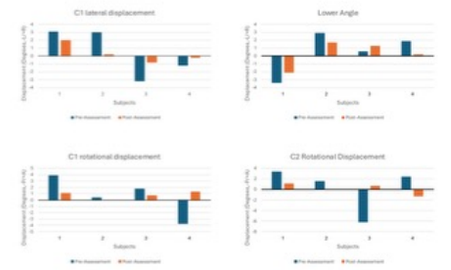


Figure 3. *Initial and post-intervention radiographic measurements of C1 and C2 misalignments, including lateral displacement, lower angle, and rotational displacements.*

A Review of the NUCCA–UCRF Finite Element Modelling Program at the University of Toledo

Precision, Vector Specificity, and the Biomechanics of Upper Cervical Correction

D. Gordon Hasick, DC FPAC NUCCA–UCRF Upper Cervical Monograph • Fall 2026

Abstract

Between 2006 and 2012, the Upper Cervical Research Foundation (UCRF), the National Upper Cervical Chiropractic Association (NUCCA), and the University of Toledo collaborated on a finite element modelling (FEM) program led by Vijay Goel, PhD. The program brought together NUCCA clinical and radiographic expertise with an established spinal biomechanics laboratory to examine how initial spinal configuration, force direction, point of application, and force magnitude influence cervical mechanical response.

A subject-specific skull–T2 model was used to simulate a measured upper cervical misalignment and to test force vectors applied to the atlas transverse process. For the specific misalignment modelled, a coronal-plane vector approximately 14.5° above the transverse plane and a force of 28.3 N simultaneously reduced C1 laterality and cervical spinal angular rotation to zero. Alternative vectors were less effective, required greater force, or produced residual or new misalignment and increased facet loading.

Importantly, the calculated FEM vector closely approximated the vector predicted by the NUCCA radiographic protocol, a method already developed and used clinically. This review places the FEM findings in their historical and clinical context, distinguishes computational findings from clinical evidence, and identifies their relevance to NUCCA standards, laterality, low-force correction, and future research.

Key words: finite element modelling; NUCCA; atlas laterality; cervical biomechanics; force vector; upper cervical spine

Background and Purpose

Between 2006 and 2012, UCRF, NUCCA, and the University of Toledo collaborated on a broader program of cervical spine biomechanical research. Under Dr. Goel's leadership, the work used finite element models to investigate how spinal configuration and controlled loading affect internal spinal mechanics. The goals went beyond a single NUCCA adjustment simulation; the collaboration sought to develop and apply validated computational tools to examine questions that are difficult or impossible to study directly in living subjects, including internal joint loads, ligament strain, disc pressure, injury mechanisms, and the mechanical response to direction-specific corrective forces.

The NUCCA component of the program posed a focused question: if a measurable upper cervical misalignment is reproduced in a validated mechanical model, what happens when

different forces, angles, and planes of application are used to attempt correction? The work therefore provided an engineering test of a clinical principle already central to NUCCA—the use of pre-adjustment radiographic measurements to calculate an individualized corrective vector and post-adjustment imaging to verify the resulting structural change.

What Finite Element Modelling Is

Finite element modelling is a computational engineering method for predicting how a complex structure responds to load. A three-dimensional structure is divided into many small elements, and each component is assigned mechanical properties derived from experimental data. When a known load is applied, the model calculates movement, deformation, stress, strain, joint loading, and other internal responses according to the governing physical relationships.

In practical terms, FEM serves as a virtual laboratory for the spine. Researchers can hold defined conditions constant, vary one variable at a time, and examine mechanical responses that are difficult to measure in vivo. The model does not 'know' the answer in advance; its predictions arise from the geometry, boundary conditions, tissue properties, and applied loads built into the model. The credibility of the conclusions therefore depends on model validation, realistic boundary conditions, and careful interpretation of what the simulation does—and does not—demonstrate.

An Early Published Milestone (2009)

An important early stage of the project was reported in the September 2009 Upper Cervical Monograph under the title Development of a Head-Neck Finite Element Model for the Investigation of Subluxation-Based Upper Cervical Chiropractic Manipulation. The work, involving investigators from the University of Toledo together with Keith Denton, DC, and James Palmer, had been presented earlier that year at the NUCCA seminar in St. Louis and at the ASME Summer Bioengineering Conference. The 2009 model established the feasibility of reproducing a defined upper cervical misalignment computationally and then evaluating how the modeled cervical spine responded to controlled corrective forces applied at the C1 transverse process. This represents an important developmental milestone between the initiation of the collaboration and the more extensive vector analyses reviewed in this paper.

The University of Toledo Modelling Platform

The University of Toledo group had extensive experience developing and validating spinal FE models. The NUCCA work used a detailed skull–T2 model derived from CT imaging and including vertebrae, discs, ligaments, facets, and other relevant structures. A misalignment pattern specific to NUCCA radiographic analysis was introduced into the model. In the 2009 developmental model, asymmetry was intentionally introduced, including an asymmetric relationship at C1-C2 created through modification at the superior surface of C2; the modelled misalignment was therefore a deliberately constructed test condition rather than a

spontaneous feature of the intact model. The correction phase then applied controlled forces at the tip of the C1 transverse process while varying the force direction and magnitude.

This approach allowed the investigators to examine not only whether angular measurements changed but also what occurred internally: facet loading, ligament strain, intradiscal pressure, and the behavior of adjacent cervical segments. It therefore provided a mechanical bridge between the externally applied correction and the internal response of the modelled spine.

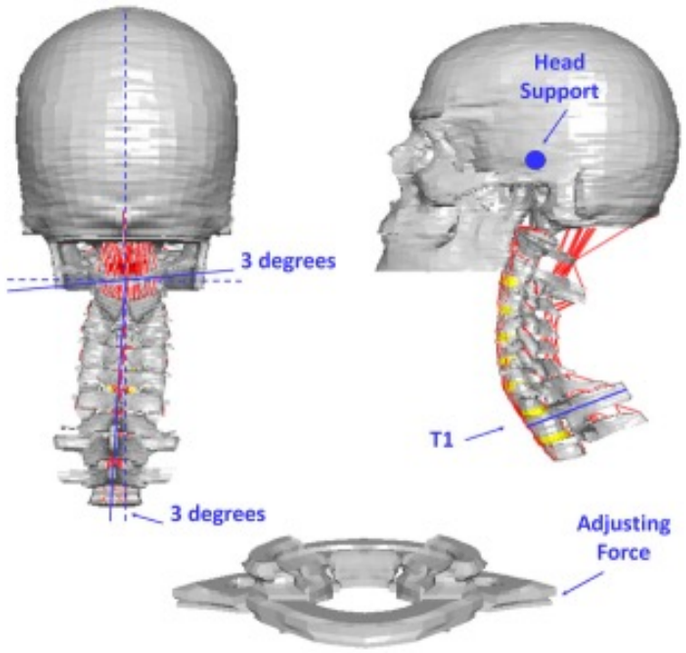


Figure 1: The misaligned FE model and the boundary/loading conditions for simulating NUCCA chiropractic adjustment

Figure 1. Misaligned FE model and boundary/loading conditions used to simulate the NUCCA correction. The modeled configuration includes 3° C1 laterality and 3° cervical spinal angular rotation. Head support and T1 fixation define the correction-phase boundary conditions; the simulated adjusting force is applied at the C1 transverse process along a selected vector.

The Clinical Vector Method Preceded the FEM Study

An important distinction is that the FEM project did not originate NUCCA's concept of a calculated corrective vector. NUCCA had already developed a mathematical radiographic method for determining an individualized vector from pre-adjustment films. Over decades of clinical application, practitioners used these calculated vectors and evaluated structural outcomes using post-adjustment radiographs. Certification review films provided an additional quality-control setting in which the pre-adjustment analysis, the execution of the correction, and the resulting radiographic change could be evaluated against procedural standards.

The clinically important observation was that when the calculated pre-adjustment vector was accurately reproduced during correction, the measured angles were consistently reduced. The FEM project therefore asked a different and particularly valuable question: would an

engineering model, based on anatomical geometry and biomechanical properties rather than from NUCCA clinical assumptions, identify a mechanically effective vector close to the one predicted by the NUCCA analysis?

Clinical–FEM Concordance

For the specific misalignment modelled, the answer was yes. The effective FEM vector closely approximated the vector predicted by the NUCCA radiographic analysis. This should be described as biomechanical concordance rather than as proof that the FEM model independently validates every element of the NUCCA procedure. The importance of the finding is that two different approaches—a clinically derived radiographic calculation and a computational mechanical model—converged on closely related corrective directions for the modelled case.

The vector analysis evolved as the model was refined. The 2009 report tested six frontal-plane angles from 13° to 28° and identified 22° as producing the least residual C1 laterality (-0.05°) among those initial simulations. Subsequent analyses using a broader and more refined series of force directions identified approximately 14.5° above the transverse plane at 28.3 N as the condition in which C1 laterality and cervical spinal angular rotation (CSAR) were simultaneously reduced to zero.

Principal FEM Findings

The most important finding was the strong dependence of the modelled correction on force-vector orientation. In the coronal plane, changing the adjusting angle progressively changed C1 laterality, required force, and C0/C1 facet loading. At approximately 14.5° above the transverse plane, an applied force of 28.3 N reduced both C1 laterality and cervical spinal angular rotation (CSAR) to 0° simultaneously. Angles below or above this point left residual laterality or led to overcorrection. As the vector moved progressively beyond the optimal region, the force required and the left C0/C1 facet load increased.

Tested vector	Post C1 laterality	Minimal CSAR	Force	C0/C1 facet load L/R
Coronal 1°	2.45°	0.00°	22.3 N	0.4 / 2.9 N
Coronal 14.5°	0.00°	0.00°	28.3 N	5.6 / 0.0 N
Coronal 31°	−2.39°	0.00°	34.8 N	14.2 / 0.0 N
Sagittal 40°	−1.12°	0.18°	99.9 N	47.6 / 0 N
Transverse 90°	4.20°	0.11°	63.0 N	41.7 / 22.3 N

Table 1. Selected results illustrating vector dependence. Values are drawn from the FEM dataset reviewed for this monograph; the full simulation table contains the complete tested angle series.

What the Vector Data Mean

For this modelled misalignment, increasing force could not substitute for an inappropriate direction. Posterior-to-anterior/sagittal-plane loading required substantially greater force yet did not reproduce the coordinated correction observed in the coronal plane. Likewise, transverse-plane loading did not simultaneously normalize the principal misalignment parameters.

The finding is therefore more precise than the simple statement that 'direction matters more than force.' The spinal response depends on the interaction among the initial configuration, point of application, force direction, and magnitude. Within this particular modelled configuration, vector direction was decisive because greater force did not compensate for a mechanically inappropriate vector.

Atlas laterality was the most responsive misalignment factor in the simulation. The side of laterality therefore has particular relevance to the modelled corrective approach and supports continued examination of the NUCCA principle that the correction should be delivered from the measured side of laterality rather than from an arbitrary or opposite side.

Low Force and the Clinical Adjustment

The FEM value of 28.3 N represents the force required in the modelled correction condition; it should not be interpreted as a direct measurement of every clinical NUCCA adjustment. In vivo force measurements obtained with pressure-sensing instrumentation during a NUCCA adjustment demonstrated a low-magnitude, time-distributed clinical loading pattern. These measurements are important because they place the computational results in clinical context: the NUCCA correction is intended to use a series of controlled, direction-specific inputs rather than a single indiscriminate high-force thrust.

Together, the computational and in vivo observations support a 'minimally sufficient force' concept: the objective is not to maximize force but to deliver sufficient force accurately along the calculated vector while avoiding unnecessary loading. The FEM simulations also showed that excessive or misdirected loading could produce residual or new alignment changes, reinforcing the importance of precision over magnitude alone. This also highlights the critical importance of the immediate post-X-ray evaluation to determine accurate vector selection and optimal outcome.

Broader UCRF–University of Toledo FEM Work: Whiplash as Context

The collaboration also supported FEM work beyond the NUCCA correction itself. In a UCRF-supported rear-impact study, the Toledo group used an experimentally validated intact skull–pelvis model to compare normal seating with a 25° body-forward-leaning posture. Under the same 4g rear-impact loading, the body-forward-leaning configuration increased C6–C7 intradiscal pressure by approximately 30%, facet stress by 48%, and C7–T1 axial and shear forces from 101 to 212 N and 54.3 to 119.6 N, respectively. At 10g, peak C3–C4 capsular strain reached 0.43 mm/mm, exceeding the 0.35 injury-threshold value cited by those authors.

This whiplash study does not validate the NUCCA corrective vector. Its value to the present review is methodological: it demonstrates the Toledo group's use of an experimentally validated FEM platform to show that changing the starting configuration of the spine changes the internal mechanical response to a known external load. That principle helps frame the NUCCA investigation in mainstream biomechanical terms: spinal response is configuration-dependent as well as vector- and magnitude-dependent.

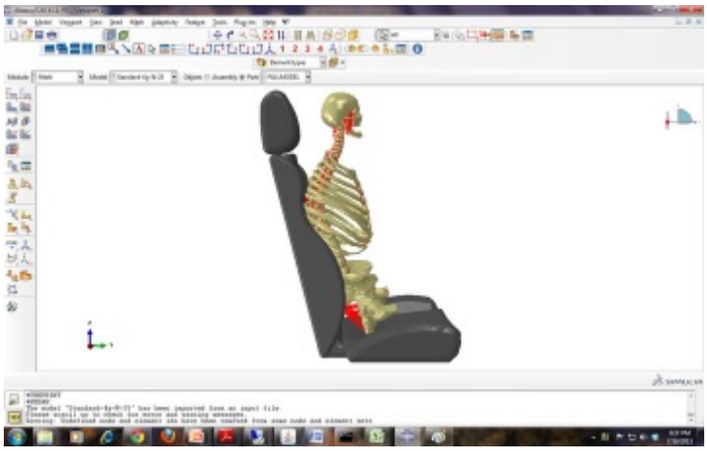


Figure 2. Representative University of Toledo whole-body FE model used in the UCRF-supported whiplash work. The whiplash project provides methodological context for the NUCCA program by illustrating how the same modelling platform can alter initial posture and loading conditions and calculate resulting internal spinal mechanics. Image reproduced from the project material supplied for this review.

Laterality and NUCCA Standards

The FEM review was revisited in part because of current work examining the importance of adjusting on the side of the atlas laterality. The modelling data are relevant because the simulated misalignment was not corrected equally by arbitrary vectors. For the tested case, coronal-plane loading on the measured side of laterality produced a coordinated reduction, whereas alternative planes and vectors did not.

This does not, by itself, establish a universal rule for every possible upper cervical configuration. It does, however, provide a strong biomechanical rationale for treating laterality as a central measured variable and to test the hypothesis that reversing the side of force application changes the corrective response. That question is directly relevant to NUCCA education, certification, and standards because a standardized procedure should preserve the relationship among measured misalignment, calculated vector, contact side, force application, and objective post-correction verification.

The standard should therefore centre on reproducibility: measure the displacement, calculate the intended vector, reproduce that vector as accurately as possible during the correction, and verify the outcome objectively. The FEM work strengthens the rationale for this sequence without replacing the clinical radiographic evidence on which the NUCCA vector method was originally developed.

Persistence of the Measured Misalignment

Clinical observations have long suggested that a measurable upper cervical pattern may remain relatively stable in the absence of intervention. The Bakris et al. randomized, sham-controlled blood-pressure study provides a useful example: the sham group did not demonstrate a meaningful change in atlas alignment over the eight-week observation period, whereas the intervention group maintained the corrected relationship after the targeted atlas procedure. This finding is consistent with, but does not by itself prove, the broader clinical observation that ordinary daily forces do not reliably reproduce the individualized direction and conditions required for correction.

Interpretation: What the FEM Study Supports—and What It Does Not

Supported by the model: For the specific misalignment modelled, the mechanical response was strongly vector-dependent; a tested coronal-plane vector near 14.5° with 28.3 N produced simultaneous reductions in C1 laterality and CSAR; non-optimal vectors produced residual or secondary alignment changes or greater loads; the effective vector was close to the NUCCA clinically calculated vector.

Supported by clinical/radiographic experience: The NUCCA vector calculation preceded the FEM project. Repeated clinical pre/post radiographic observations and certification review experience indicate that accurate execution of calculated vectors is associated with consistent reductions in measured angles.

Not established by this model alone: The FEM study does not prove that every ASC configuration has the same optimal angle, that all clinical outcomes are caused by the modelled structural changes, or that the modelled vector alone establishes neurological or physiological benefit. Those questions require appropriately designed clinical and mechanistic studies.

Implications for Future Research

The original FEM program identified several testable next steps. Future work should model additional measured ASC configurations, quantify sensitivity to small vector errors, incorporate realistic repeated low-force loading, and compare the predicted correction with prospectively collected pre- and post-radiographic data. A renewed model could also evaluate subject-specific anatomy and tissue properties, allowing the clinical vector calculation and the FEM-predicted vector to be compared case by case rather than in a single representative configuration.

A particularly useful research design would prospectively record the pre-adjustment radiographic vector, the delivered force's direction and magnitude, and the post-adjustment radiographic response. This would directly test the relationship among calculated vector accuracy, execution accuracy, and measured correction—the central clinical–biomechanical question raised by the original Toledo work.

Conclusion

The NUCCA–UCRF collaboration with the University of Toledo provided an unusually detailed biomechanical examination of precision upper cervical correction. Its most important contribution is not the claim that force alone corrects a misalignment, but the opposite: the mechanical response depends on the relationship among the starting configuration, point of contact, force direction, and magnitude. For the specific misalignment modelled, a narrowly defined coronal-plane vector produced simultaneous and proportional correction of the principal measured parameters, and that vector closely approximated the direction predicted by the pre-existing NUCCA radiographic protocol.

Greater force did not compensate for an inappropriate vector, and non-optimal loading produced residual or new mechanical distortions and increased joint loading.

Viewed alongside decades of NUCCA pre- and post-radiographic experience, the FEM findings provide an independent biomechanical line of evidence supporting a precision-based sequence: measure the misalignment, calculate the vector, deliver a minimally sufficient force accurately along that vector, and objectively verify the result.

The enduring message of the Toledo work is therefore simple: effective correction is not about applying more force; it is about applying the right force, in the right direction, to the measured mechanical problem.

Historical Note and Acknowledgments

This review reconstructs the FEM program from three unpublished project manuscripts, archived correspondence and reports dating back to approximately 2006, UCRF Board communications, and related University of Toledo FEM materials. Particular acknowledgment is due to Vijay Goel, PhD; the University of Toledo engineering team, including Dr. Liu and colleagues who developed and operated the models; Keith Denton, DC, for clinical and in vivo force contributions; Jim Palmer and other NUCCA/UCRF participants; and UCRF, The TAO Foundation (Calgary), Greg Buchanan and Standard Process for its sustained support of the program. Because several original manuscripts remained unpublished, this review is intended both to preserve the project's scientific history and to distinguish clearly among the computational findings, clinical observations, and hypotheses requiring further study.

Selected References

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TECHNIQUE

Optimal Restoration of the Atlas Subluxation Complex

Why Correction Must Follow Laterality and Not Be Delivered from the Opposite Side

Drs. Gordon Hasick and Glenn Cripe

In NUCCA, correction is not determined by force alone, but by whether that force precisely reverses the direction in which the subluxation was originally produced. Utilizing the correct direction and sequence will thereby restore both structural alignment and neurological balance.

The Atlas Subluxation Complex (ASC) does not occur in isolation; it develops as a result of cumulative forces and stressors acting on the human body over time. These forces may include physical trauma, repetitive micro-loading, postural strain, emotional stress, and environmental factors, all of which add to the mechanical demands on the cervical spine.

From a biomedical engineering perspective, the spine is a dynamic load-bearing structure built to absorb, distribute, and adapt to external forces. However, when the size, direction, or repetition of these forces surpasses the adaptive capacity and structural stability of the spinal system, localized deformation and compensatory changes can occur. In the upper cervical region—where structural tolerances are small and neurological sensitivity is high—these changes may present as the Atlas Subluxation Complex.

Finite element modelling (FEM) uses a computer model to examine and calculate how spinal structures move, deform, and respond to applied forces. Extensive FEM and biomechanical studies of the cervical spine, supported by UCRF and NUCCA, were conducted in collaboration with the University of Toledo under the direction of Vijay Goel, PhD (a world-renowned expert in spinal biomechanics). The FEM findings demonstrate that deviation from the appropriate corrective vector can adversely affect spinal mechanics, increasing joint loading and producing residual or new misalignment rather than the intended correction.

(For additional details of the UCRF–NUCCA research and its findings, see the companion Monograph article, “A Review of the NUCCA–UCRF Finite Element Modelling Program at the University of Toledo.”)

The recently completed review of the UCRF–NUCCA University of Toledo FEM work adds a specific finding relevant to this principle. For the misalignment modelled, a coronal-plane vector approximately 14.5° above the transverse plane, applied with a force of 28.3 N, reduced both C1 laterality and cervical spinal angular rotation to zero. This effective vector closely approximated the vector predicted by the established NUCCA radiographic analysis. Alternative vectors left residual or produced new misalignment and increased joint loading; greater force did not compensate for an inappropriate direction. These model findings reinforce the importance of accurate analysis, precise reproduction of the calculated

corrective vector, and objective post-correction imaging verification. The angle and force reported are findings for that modelled configuration, not universal clinical correction vectors. [1]

These FEM models indicate that the upper cervical spine, due to its distinctive anatomy and mobility, is particularly susceptible to asymmetric loading and rotational forces. When forces are applied while the spine is outside optimal alignment, stress concentrations can develop at the atlanto-occipital and atlanto-axial joints, leading to altered joint mechanics and compensatory postural changes. Over time, repeated or excessive loading beyond normal physiological limits may result in a persistent misalignment pattern associated with the ASC.

The ASC can be understood as the body's reaction to forces it cannot fully adapt to or absorb. Whether from a single injury or repeated smaller stresses over time, the spine constantly works to maintain balance. When those forces exceed the body's capacity to compensate, the upper cervical spine may shift into a pattern that reflects both the direction and the magnitude of those forces. This is why the ASC is not random—it is a structural response to real-world loading conditions.

NUCCA care is built on what Dr. Ralph Gregory called the Restoration Principle: the idea that the correction must restore the structural relationships that were displaced when the Atlas Subluxation Complex was produced. Because the upper cervical region contains the cervicomedullary junction, dense proprioceptive networks, and autonomic regulatory pathways, we must respect its neurological sensitivity and the ASC's impact on these pathways. Even subtle structural distortions in this region can produce disproportionate neurological effects.

There is a central concept of the Atlas Subluxation Complex (ASC) in NUCCA that is sometimes overlooked, or at least not discussed as much as it should be: "Why do we always adjust from the side of laterality?" This question has come up many times in seminars and conferences, and the answer has always been consistent — whether from Dr. Gregory's teachings and writings or from those who trained directly with him. It is not merely about moving bones; it is about how the subluxation was produced and how it must be reduced back to its normal alignment. Because the ASC is both structural and neurological in nature, the correction must be equally disciplined and directional.

The NUCCA procedure teaches that every Atlas Subluxation has a production sequence. Something moved first, something compensated next, and the final measurable subluxation pattern as seen on imaging is the result. When we adjust from the side of laterality, we are not simply moving bones to return them toward the vertical axis. We are introducing corrective forces in the exact opposite direction from the original displacement. This allows the head, atlas, and cervical spine to return toward the vertical axis in the same controlled sequence they left it. That is what creates the predictability and stability in the NUCCA work.

Equally important, this directional precision minimizes unnecessary neurological stress by guiding the atlas back along its restorative pathway rather than imposing new mechanical vectors in the upper cervical spine. This is an effect consistent with findings from the finite element modelling (FEM) studies demonstrating the sensitivity of spinal structures to changes in force direction.

If one were to adjust from the opposite side of the atlas laterality, they would no longer reverse the sequence that produced the subluxation. Instead, by introducing forces unrelated to that sequence, the spine would most likely move along a pathway other than its intended corrective pathway. When that happens, the measurable pattern may change, the patient may not hold the correction, the spine may respond unpredictably, and follow-up analysis can become more difficult. It is as if another accident had occurred to the spine, again affecting the biomechanics and neurology in this region. Symptoms may change or even temporarily improve, but other symptoms and mechanical changes will likely arise later.

From a neurological perspective, an opposite laterality adjustment introduces forces that may subject the brainstem, spinal cord, and related autonomic centres to new mechanical stresses rather than reducing existing distortions. In some cases, the misalignment factors may shift so significantly that, when it subluxates again, the original correction pattern needed to address the ASC is no longer effective, making a stable correction impossible.

This unpredictability is not merely mechanical; it can lead to symptom variation, shifts in autonomic balance, or delayed neurological recovery. In simple terms, the attempted correction becomes less stable and harder to interpret. With optimal NUCCA care, correcting the ASC requires understanding the production and biomechanical reduction sequence, and it requires persistent work to achieve an optimal correction with long-term stability. Switching to the opposite side of laterality can disrupt this predictability, and once predictability is lost, managing the case in the future becomes significantly more challenging.

An example from a biomechanical perspective: in a typical Basic Type I case, the production of the ASC most often begins with the cervical spine moving away from the vertical axis, followed by compensation of the head back toward the vertical axis. When correcting this ASC (and all Basic Types of the ASC), the sequence matters. The neck must move back under the skull before the head can fully correct to vertical. When adjusted from the side of laterality, the atlas first moves on the superior articulating surface of C-2, beginning to restore the cervical spine's vertical relationship. This reverses the direction of ASC production, allowing the subluxation factors to return to normal in a predictable manner. By following this sequence, structural restoration and neurological decompression occur in harmony rather than in conflict.

Through decades of research and clinical practice, Dr. Gregory recognized that the optimal reduction of the subluxation requires a high level of precision, accuracy, and attention to detail. When we remain disciplined in our analysis, biomechanical rationale, and delivery

of corrections, the work behaves as intended. That precision is not merely mechanical discipline; it is also neurological stewardship. When we drift from those principles, the results tend to be far less predictable and favourable.

Conclusion

The NUCCA procedure is based on Dr. Ralph Gregory's Restoration Principle, which holds that a successful correction must restore the structural relationships disrupted during the formation of the atlas subluxation complex.

Because the ASC forms through a specific pattern of force and compensation, effective correction must account for how that pattern developed. The Restoration Principle holds that the correction should not create new abnormal forces but instead reverse the original loading pathway that exceeded the spine's structural limits, thereby restoring both mechanical balance and neurological function.

Misalignment develops through a specific biomechanical sequence. The quality of our work, starting with accurate imaging and analysis, must first determine the direction of laterality and the pathway by which the displacement occurred. The side of atlas laterality, therefore, defines the corrective approach. This ensures that the adjustment reverses the original production sequence rather than introducing new forces.

When the correction follows this restoration pathway, the atlas, skull, and cervical spine are guided back to their optimal vertical relationship in a predictable, stable manner, supporting structural balance and neurological integrity. Post-initial correction imaging is critical because it confirms whether the biomechanical strategy has produced a complete or proportional correction. This information then guides subsequent care, helping refine and maintain the most stable, optimal alignment. In this way, restoration is not merely alignment—it is the careful reduction of mechanical stress within one of the most neurologically sensitive regions of the human body.

Reference for the FEM Addition

Hasick DG. A Review of the NUCCA–UCRF Finite Element Modelling Program at the University of Toledo: Precision, Vector Specificity, and the Biomechanics of Upper Cervical Correction. NUCCA–UCRF Upper Cervical Monograph submission manuscript.

PERSPECTIVE

Technological Advancement

Dr. Craig Lapenski

In recent years the technology available to our group of doctors continues to expand and give us more options on improving patient care and patient outcomes. I can remember as a student spending time in Dr. Dickholtz seniors' basement sitting next to him as he picked points in analyzing images. He would always talk about the importance of a sharp pencil and the critical nature of the points selected when analyzing the images. He would talk about the miraculous changes that would take place in the patients and the link between the study of the images and the outcome they would receive. It was kind of inspiring as a student because of some of the things I saw take place in his patients who suffered with chronic illness and watching them testify to how they don't have those issues anymore.

I remember aligning my first x-ray unit and trying to figure out how to get the best image quality possible. At one point it was green film, then blue film, then different speeds and different brands of fixer and developer in the processor. I remember looking at a bunch of different practitioner's images and deciding who I needed to ask for advice on greater clarity. After closing down the tube port, going from an aluminum grid to a carbon fiber grid, I decided to create new filters to see what might be possible. Talking to Marshall Dickholtz Jr, he recommended that the new Kodak X-sight film and intensifying screens improved his xray quality. So here we go again, new film, cassettes and chemicals. Now working on my third xray unit with new everything, I felt like there was a perpetual search for how to best see the structures I am looking to analyze and understand.

With years spent learning from other's experience and consistently trying new combinations to dial things in, the eventual shift to digital happened, then I felt like I was starting all over again. What panels give the best image quality, do we still use the grid or get rid of it? Wow, my old filters for plain film seem to be creating problems for the processing algorithms of the software that is part of the system. Let's take the films without filters and see how that works. That doesn't seem to be producing what I'm looking for, so it looks like this new technology requires all new filters with much less lead to make the system happy and give a great finished product. What about the analysis? We needed a sharp pencil with plain film, now we need small pixels and thin lines in our annotation options. We need to take all the things we learned previously from plain film and apply it to a new digital medium.

Now the advent of CBCT in the Nucca practice means we don't have to move the patient in different planes and take the images like before, but just take out the appropriate slices from the scan that was taken. Looks like we will probably discover a number of new things pertaining to the relationship between C1 and C2 with the new way we position the patient. No need to have to rotate the patient 2mm and reshoot the nasium, we just rotate the patient on the scan. Technology is awesome. How long will it be before AI technology can analyze our images for us and we don't have to take the time to do so....

What will the next best thing be that replaces Digital imaging and CBCT?

The future is as exciting as ever when it comes to having a greater knowledge, awareness, and understanding of the Atlas Subluxation Complex. I wonder what we will know in 15 more years that will aid us in giving better care to our patients and alleviating the detrimental effects of the ASC?

As much as I have seen the incredible benefits that come with technological advancement, one of the things that seems to come to my mind again and again is that technology doesn't necessarily allow us to develop the skillsets that are needed to maximally reduce the ASC. I have found in the 15 years of being involved with the certification and mentoring program, that even though we have come a long way in our capacity to see structures more clearly and potentially analyze them more accurately, the foundational skills involved in adjusting steps are something that our imaging technology doesn't bring. I find myself going back in to adjust patients and taking repeated posts based upon the fluidity of the mechanics involved in the adjustment steps. The more fluid my steps, the better my weight control, the better my activation of the triceps, and the more complete the contraction of my chest compression, the better things reduce.

A patient of mine is an accomplished Major League Baseball player with a World Series ring, and it's interesting to converse with him about the adjustment. He is a huge proponent of the work and always talks about how amazing it is in how the adjustment works, and how impactful it has been for his health and his family. I will share with him how challenging the work is, then he reminds me that the best baseball players usually have a batting average around .300. In other words they strike out seven out of ten times. I don't think that's necessarily the case for our work, but I do believe that getting consistent large scale reductions of the subluxation is very challenging. Challenging as it may be, it is very doable, as looking over countless submissions has shown me. More often than not when coaching doctors in how to achieve a more maximal reduction, it's usually going back over the basics to see what may be missing. My encouragement is that as we look for advancement we do not gloss over the foundations. They are usually where the breakthrough exists.

My estimation is that forward thinking people in our group of doctors will continue to look for ways that technology will help us expand not just the capacity to image, analyze, and understand, but to also help us develop better adjusters in less time. I am excited to see how modeling, force transducers, spatial awareness technology, and things that are presently unknown can be discovered and adapted to aid in the adjusting skillset development of our organization.

Let's keep creating and advancing!

Settleback Session: Remembering Ralph Gregory – The Man Behind the Work

An edited Q&A from the August 19, 2026 discussion.

Q: What defined Dr. Ralph Gregory's approach to upper cervical chiropractic?

A: Precision and measurable correction. Applying a force was not enough; the purpose was to correct the misalignment. Gregory expressed that distinction clearly: "The word adjustment is synonymous with the word correction."

Q: How did he develop and refine the work?

A: Through testing, observation, and comparison of pre- and post-adjustment radiographs. We used those comparisons to understand what worked, what did not, and what needed to change. "Once they had the ability to take the post X-ray, that's where it developed and where it took leaps and bounds."

Q: Why were post-adjustment radiographs so important to him?

A: Gregory considered them essential feedback for assessing correction and identifying adjusting errors. In his words: "By comparing pre-X-ray analysis against post-X-ray analysis, the errors have been highlighted." The findings gave him a basis for refining the mechanics of the adjustment.

Q: How did he determine whether a patient was holding a correction?

A: His assessment evolved over time. Earlier practice included supine leg checks and spinal temperature recordings, with the Anatometer incorporated later. On the Anatometer, he emphasized frontal-plane balance while recognizing that small transverse-plane differences and individual anatomical asymmetries required interpretation.

Q: What did he teach about the predominant factor?

A: We had to determine which component was most important in the individual misalignment pattern—head tilt, laterality, rotation, or another component—and address it specifically. His instruction was direct: "If you want to help that patient, you better go after that predominant factor and get it out of there."

Q: What was his goal during an adjusting visit?

A: "He was always going for a maximum correction each time he saw somebody. It wasn't, let's get half of it and we'll see you three days later. It was, let's get the whole thing and come back in a week or two."

That could mean working through repeated adjusting attempts rather than stopping after the first few.

Q: What did his adjustment feel like?

A: The contact could feel firm, but the delivery was controlled. One recollection captures it well: "You could feel his hand, but you didn't feel more than the weight of his hand on your neck." It could look effortless, although adjusting required considerable work and concentration.

Q: Did his adjustments produce audibles?

A: Yes. Several of us distinctly remember hearing audibles during his adjustments, sometimes quite pronounced. That was part of our experience receiving care from him.

Q: How did the triceps-pull adjustment develop?

A: We could not identify a single moment when Gregory developed it. What we remember clearly is his concern about excessive depth and his emphasis on controlled contact and coordinated movement. One explanation involved initiating movement through the shoulder girdle before the elbow and wrist: "So you're moving a larger lever first."

Q: Did he continue practicing after becoming highly experienced?

A: "Absolutely. Every day. He would say 20 minutes of practice before he ever saw a patient."

He practiced with a coordinator and used a wall-mounted coordinator to recover the desired triceps action when necessary. Practice remained part of his routine throughout his career.

Q: How was patient care organized in his office?

A: Gregory worked with colleagues who prepared patients, obtained radiographs, and provided instructions, allowing him to concentrate on analysis and adjusting. Initial imaging and the first adjustment were generally separate visits: "He preferred to read the X-rays and have them come back." Exceptions were sometimes made for patients traveling from a distance.

Q: What was he like as a teacher?

A: His teaching was demanding and could be difficult to follow at first. We often understood only a small part of what he presented, but that insight brought us back for more. As one recollection puts it: "It was going completely over our head. But we'd get one bit of insight and it made me realize that I'd never gotten anything like that at school."

Keith Denton later helped organize the material into clearer teaching modules.

Q: Why did certification matter to him?

A: Attendance alone did not demonstrate competence. "He felt that just saying somebody came to a conference didn't really show their skill levels. And that's where certification was born from." He wanted practitioners to demonstrate consistent, documented results.

Q: How did he respond when he did not know an answer?

A: He was willing to acknowledge it. We respected his readiness to say, "I don't know the answer, but I'll try to find it for you." His confidence in the work did not prevent him from recognizing what remained unanswered.

Q: Was he as intimidating personally as he could appear professionally?

A: He could command a room, but he was also generous and encouraging. "If you showed up sincerely wanting to learn and do this work, he met you there with a tremendous amount of kindness and support."

That kindness existed alongside firm expectations: "With his kindness, there was absolutely zero compromise at all in the work."

Q: What do you remember most about his commitment?

A: His complete attention. "When you were with Ralph Gregory, whether it was as a student or a patient, you got all of Ralph Gregory." He answered letters, reviewed difficult cases, and made time for doctors who wanted to learn.

His encouragement could be simple and lasting: "Stay with the work, you're important."

Q: What part of his legacy should continue?

A: Precision, honest evaluation, continued practice, and generosity toward one another. The Saturday classes, correspondence, personal instruction, and hospitality helped create a community around the work. "He gave everything to this work, which is now in our hands."

NUCCA 101 from Ralph Gregory

Correspondence from Dr. Glenn Cripe 1980-1985



I graduated from chiropractic school in 1979 with no prior exposure to upper cervical care. I attended my first NUCCA conference in October of that year, recognizing early on how much I had yet to learn.

From my first interactions with Dr. Gregory, I made every effort to learn from him. Both before and after my certification in May 1985, I routinely sent him radiographs from challenging cases, situations in which I had exhausted my own analysis and was seeking further insight. His responses consistently provided greater clarity, deepened my understanding of the work, and ultimately led to improved corrections.

It is with great respect that I share selected excerpts from Dr. Gregory's correspondence. These letters reflect not only his technical precision, but also his patience and commitment to teaching. They offer a window into how he approached cases that others found difficult and how he was able to see what was not immediately apparent.

It is my hope that these writings will provide additional insight into your own challenging cases, just as they did for me.

The following are selected examples illustrating Dr. Gregory's clinical reasoning and perspective.

The final letter included is more personal in nature and offers a glimpse into his character, his dedication to chiropractic, his willingness to support others, and his deep love for his wife, Ruth.

Dear Dr. Gregory:

First off, I'd like to tell you that you out-did yourself at the seminar! I feel the information was presented clearly and in a way that made me think biomechanically. I still have a lot of thinking to do!

I also learned a great deal from the slides on the adjustment. Again, it required thinking and understanding of the principles behind the adjustment.

Secondly, this case (x-rays enclosed) is giving me problems. I have yet to get her hips to come down all the way and obviously she doesn't hold. Any suggestions would be greatly appreciated. Also, please "let me have it" as far as the quality of the films, etc., is concerned. I want to know how I can improve on any and all aspects of the work.

Lastly, the back has improved to the point of being able to slowly bend over. I have started my own stretching and strengthening program, taking extra care in holding my adjustment, and building up very slowly. I'll let you know how things are going.

Thank you again for a fine seminar and for professional services.

Sincerely,

Glenn

Glenn E. Cripe, D.C.

GEC:m
Enclosures

DEAR GLENN:

RE: DAN ROTH: THE QUESTION IS: DO YOU FIND LATERALITY CHANGED? THE ANSWER IS NO. THE PRE IS NOT A LEFT, IT IS A RIGHT 3/4 OF A DEGREE, MARKED ON FILM. THE POST IS A RIGHT 1 AND 1/2 DEGREES. IN THE SECOND PRE THERE IS A RIGHT 3/4. WHAT THREW YOU WAS THAT JUST ABOVE THE SQUAMOUSAL SUTURE THERE IS A FLATTER AREA, MARKED WITH A "X" ON THE PRE. THE DOUBLE PIVOT SYSTEM OF FILM ANALYSIS WOULD HAVE BROUGHT THIS FACT TO YOUR ATTENTION, MY BOY.

RE: DEBRA YATSKO: LOOKING AT THIS CASE, YOUR ANALYSIS IS SUBSTANTIALLY GOOD, EXCEPT THAT THE SPINOUS IS A RIGHT 3. THE REASON YOU ARE APPARENTLY CONFUSED RE THE SPINOUS IN THIS CASE IS THAT IT APPEARS FAR RIGHT OF THE ODONTOID CENTER. HOWEVER, IF YOU LOOK AT THE ATTACHMENTS OF THE LAMINAE AND THE POSITION OF THE THIRD, FOURTH, ETC. SPINOUSES, IT TELLS YOU THAT THIS AN ANOMALY. CHECKING WITH THE VERTEX SPINOUS CANAL, I VERIFY THIS FACT. ON THE POST, THE ANALYSIS IS O.K. , BUT WE FIND THE PLANE LINE HAS GONE UP 3/4. THIS SUGGESTS INSTABILITY. YOU'VE ADJUSTED IT AS A SECOND BASIC TYPE WHICH IT IS AND DONE SO CORRECTLY BUT CREATED ANOTHER PROBLEM---IN THROWING THE HEAD OVER, THE P.L. HAS RAISED, CREATING ANOTH TYPE.. THE SET-UP NOW LEANS TO THE LEFT, AND WHEN THE RIGHTING INFLUENCES ACTIVATE, IT RETURNS TO THE THIRD BASIC TYPE. WHAT I SUGGEST NOW IS TO TAKE THE CASE AS ORIGINALLY, AND ADJUST IT UNTIL YOU ARE SURE THAT YOU'VE BROUGHT THE PL DOWN LEVEL AND THE SKULL IS TURNED FULLY TO THE VERTICAL AXIS. YOU ARE IN EFFECT EXCHANGING THE TURNING OF THE HEAD AS THE CAUSE OF LATERALITY TO HAVING THE ATLAS TURN ON THE CONDYLES.

GLAD YOU SURVIVED PASADENS, ETC. THANKS FOR MAKING A REPORT TO NUCCA.

REGARDS,
Ralph R. Gregory
R. R. GREGORY, D.C.

DEAR DOCTOR:

RE: M. FERNANDEZ

MY ANALYSIS OF THE PRE AND POST NASIUMS AGREES WITH YOURS. THERE IS A SLIGHT DIFFERENCE ON THE PRE WITH THE C-LINE AT THE BASE OF THE SKULL.

AS YOU KNOW, THIS IS A TYPE 2, MOST OF THE SUBLUXATION IS IN THE TURNING OF THE SKULL INTO THE SUBLUXATION. NOTE THE SHAPE OF THE MASTOIDS. YOU MAY HAVE PUT THE MASTOID-SKULL SUPPORT TOO LOW IN THIS CASE BECAUSE OF THE SHAPE. I RAISED IT A LITTLE. THIS SHOULD GIVE THE HEAD A BETTER CHANCE TO TURN FASTER---WHICH YOU NEED HERE. ALSO DROP THE HEIGHT VECTOR ABOUT 2 INCHES.

THE VERTEX SHOWS ABNORMALITY OF C1 ON THE RIGHT; THIS NO DOUBT CONFUSED THE PROBLEM BECAUSE YOU APPARENTLY MARKED THE WRONG TRANSVERSE OPENING, CONFUSING THE TRANSVERSE FORAMEN ON THE RIGHT WITH ANOTHER FORAMEN. IT IS AN ANTERIOR ATLAS OF 1 AND A QUARTER.

WHY DON'T YOU ADJUST THIS CASE AS A L2A2I3.

BE SEEING YOU SOON,

REGARDS,
Greg
R. R. GREGORY, D.C.

DEAR DOCTOR:

I WOULD NOT TRY TO ADJUST THIS CASE; LOOKS LIKE A COMPRESSION FRACTURE; ONLY LEAD TO TROUBLE.

ANALYSIS O.K. EXCEPT THE SKULL READS ONE-HALF LEFT. THIS IS DOE TO HEAD ROTATION IN TAKING THE FILM. IF HEAD WERE NOT ROTATED IT WOULD BE ABOUT A LEFT ONE, PROBABLY L THREE-QUARTERS.

BEST,

RRG

Dear Dr. Cripe:

Dan and I are happy to hear that you see some improvement in your back. I like the feeling of stability that you report.

The vertex square seems very good also. This type of thing should be of help to everyone using the work. The only suggestion that I can make is that the 3,4, and 5 settings be longer to be of real help. I don't get the idea of their being on the instrument at all unless they are as long as the settings on the relatoscope. If you agree, and need more room, the numerals 3,4, and 5 could be dropped.

I particularly like the way this one "frames" the odontoid in its center. You have done a good job so why don't you continue on and make them. I think they would make nice door prizes at the next NUCCA Convention in 1982. NUCCA should be able to afford to buy them for that purpose. If you have some ready by the September seminar, fine. Perhaps some can be sold then. We'll push them. So far, there are 18 in for the seminar.

The end of October, the University of Toledo will sponsor the Ohio State Chiropractic Association's license-renewal annual meeting. This is the first time to my knowledge that a university has sponsored a chiropractic meeting. The speakers will be Drs. Harriet Williams from South Carolina University (you probably remember her), Dan Seemann, and another Ph.D., a biomechanist from T.U., Dave Drury, nationally known editorialist, and myself. The program will be NUCCA all the way. I have 4 and 1/2 hours on biomechanics and neurology of the Atlas Subluxation Complex.

Ruth is not doing too well. She is not able to be up for very long, is so weak. The diagnosis is carcinoma of the abdomen. She refuses to go on the chemotherapy bit, other than a small start which she has stopped on her own. She believes the adjustment will do her the most good. Strangely, I x-rayed her just prior to this last breakdown, and her neck was really bad; I can't understand it. The surgeon has removed or drained about 20 quarts of fluid so far from her abdomen and 1 quart from her left thorax.

Thank you for your comment on the last monograph. The most recent issue of Chiropractic Economics carried the "Vector Analysis" article.

Regards,

Greg

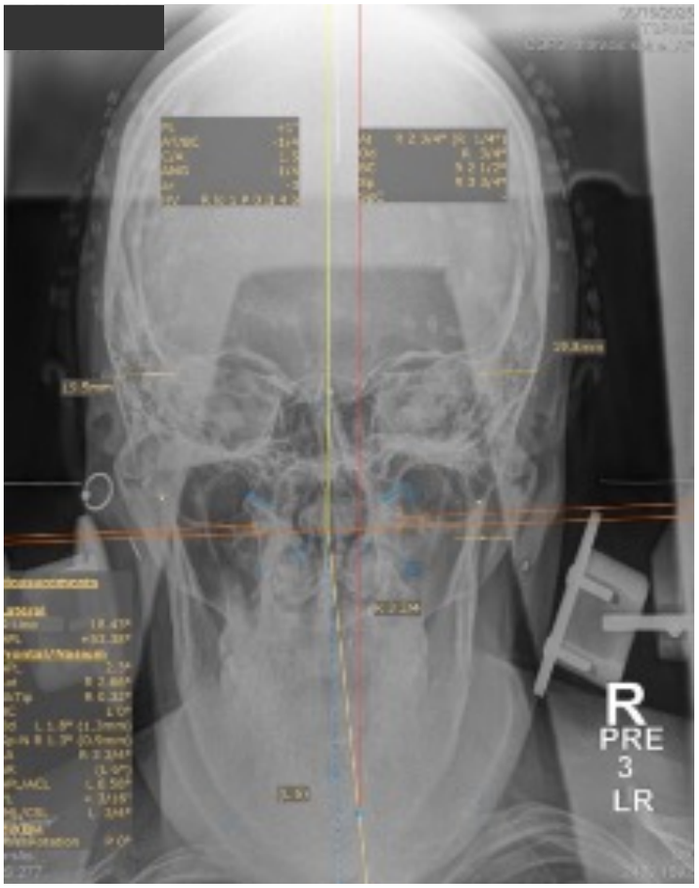
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Appendix

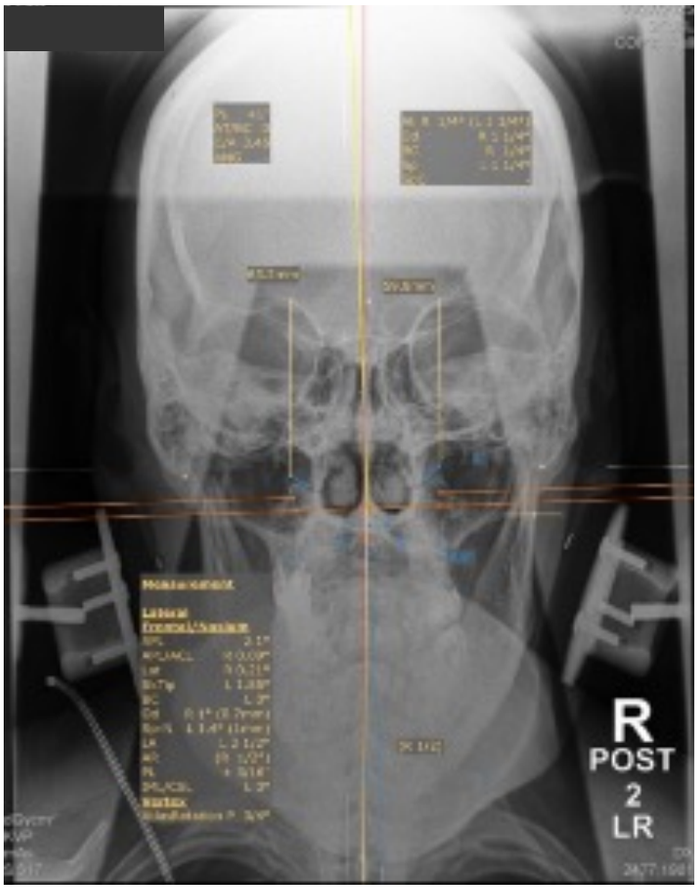
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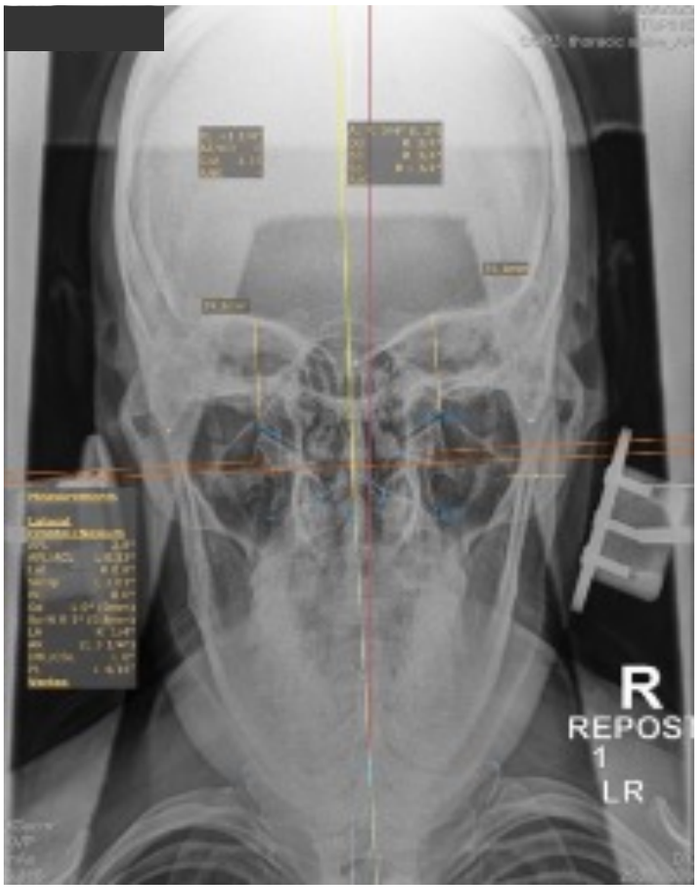
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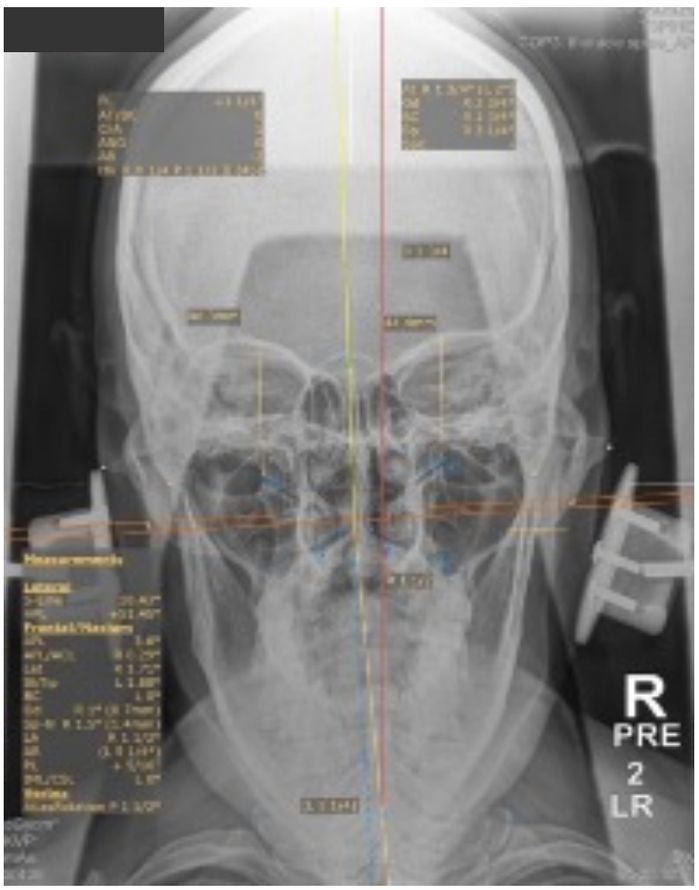
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Case 6 Pre



Case 6 Post



Case 7 Pre



Case 7 Post



Case 8 Pre



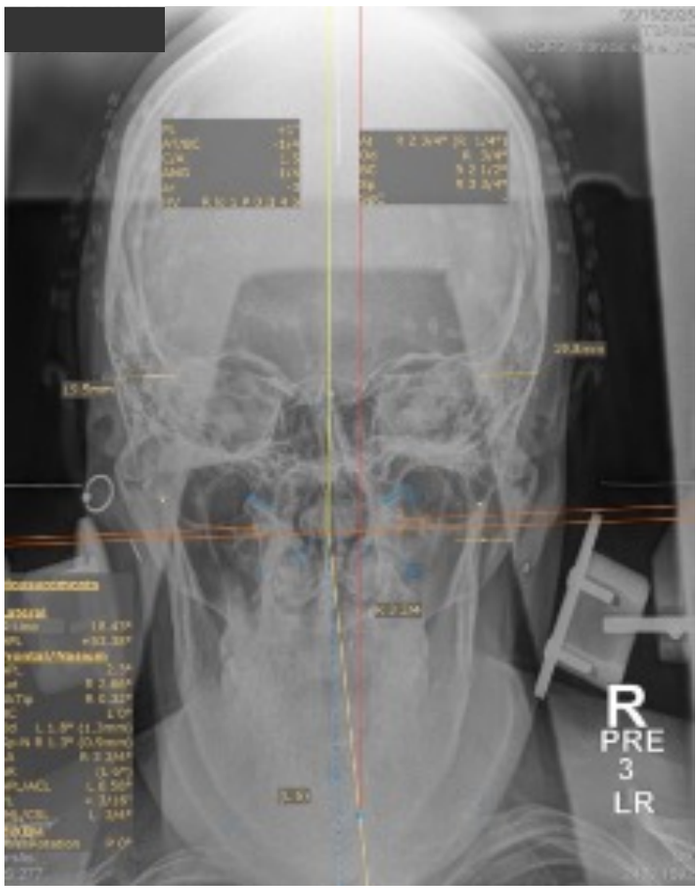
Case 8 Post



Case 9 Pre



Case 9 Post



THE UPPER CERVICAL

Monograph

NUCCA