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The Mechanics of the Shoulder Compression

By Lloyd C. Pond, D.C./Lonnie L. Pond, D.C.

Much has been said and written concerning the shoulder girdle and its function in relation to the adjustment, yet, it can be difficult for the adjustor to feel the necessary muscular feedback in order to accomplish a consistent action of the controlled shoulder compression used in the adjustment. Doctor Gregory stated "the required force is **generated** and **maintained** in the adjustor's shoulder girdle until the force is sufficient to overcome the subluxation resistance. The adjustor must pull back toward the shoulder with the contact arm and maintain a steady pressure against the anatomic fossa of the contact wrist with the roll-in arm. **Both arms** execute a function that is reverse of extension, i.e., functional reversibility, which action forces the heads of the humeri into the glenoid fossae."[1]

The above quote stimulates some specific mechanical thoughts! I have found that if the shoulders are allowed to move too far to the posterior the compression action is diminished and the potential energy is not directed down the adjustic pathway but rather is dispersed and lost behind the adjustor. The entire shoulder complex does not move backward in an exaggerated manner. The ball of the humerus is merely drawn back in a firm, snug position, similar to taking the slack out of the trigger of a firearm prior to completing compression to fire. The triceps will be in a slight state of contraction at this point. The adjustor's concentration must be maintained on the triceps pull and glenohumeral joint and not on the excessive movement of the scapula. The movement of the scapula is minute compared to the overall compression of the shoulder girdle and should not be exaggerated. The mind of the adjustor should concentrate on equalized shoulder compression being directed toward the anterior of the spine or even toward the episternal notch. Needless to say, the roll-in as well as all other phases must be correct.

The ball of each humeri should be in the posterior aspect of the glenoid fossa. As I remember, at one time it was said that the fossa would allow a three position placement of the ball. These placements include:

1. Anterior to center of the fossa, as in an extended reaching action;
2. Medial in the center of the fossa, as in standing erect and raising the arm from a neutral position out in front;
3. Posterior in the fossa, as is accomplished when drawing the roll-in arm back at 90° to the radial bone of contact arm during step one of the roll-in and also when drawing the contact arm back from below the transverse to take contact. (see Figure 1)

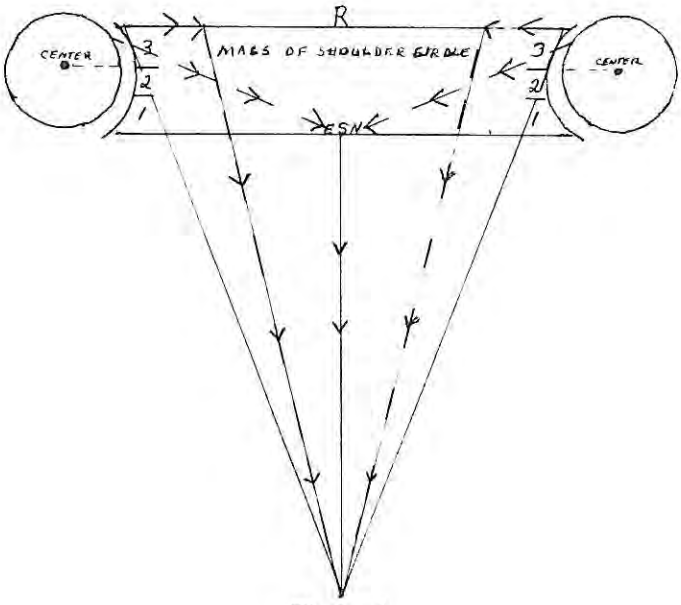


Figure 1

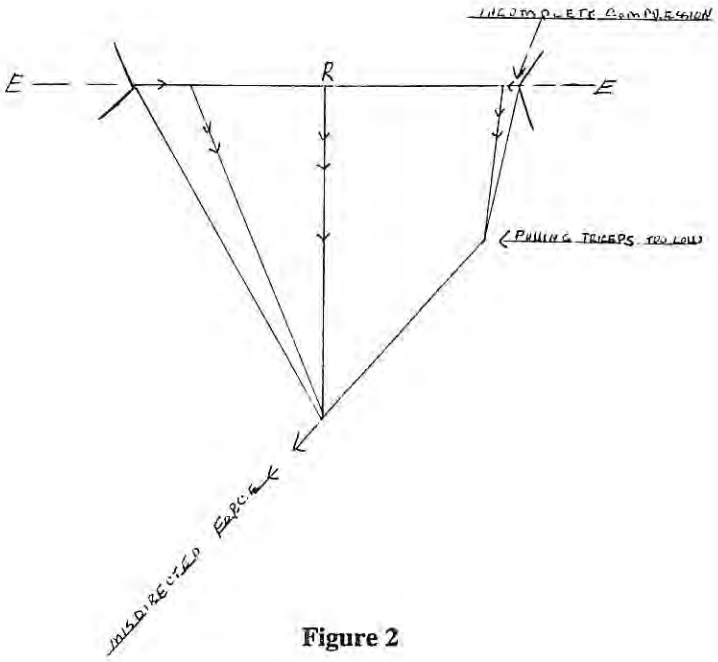


Figure 2

Positions (1) and (2) will not accomplish compression of the shoulder mass toward the reduction pathway as well as position (3).

Just prior to beginning the triceps pull and shoulder compression, one must check carefully to be certain the ball of each humerus is properly positioned in the posterior aspect of each glenoid fossa, position (3) in the diagram. (see Figure 1) I must mention at this point, that it does require more effort on the adjustor's part to properly position the roll-in humerus ball due to the position of the roll-in wrist on the contact wrist. If this is done properly, it will also assist in reducing the so often observed excessive elbow bend in the roll-in arm. Otherwise, the force will be misdirected or lessened to a great degree. (see Figure 2)

It is of primary importance that as much elbow bend be removed as possible, especially in the roll-in arm. This will facilitate the correct positioning of the ball in the fossa. Failure to remove the excess elbow bend will result in loss of control of the adjustic force down the reduction pathway, as well as misdirect it. A one arm adjustment would be the result. (see Figure 2)

Prior to initiating the triceps pull and shoulder compression, the adjustor must relax the roll-in hand, arm and shoulder muscles a slight amount, but not enough to lose their correct positioning. A more efficient and complete triceps pull and shoulder compression will result if the action is initiated from a relaxed or passive position.

1. "At less than 50% of rest length the muscle cannot develop contractile tension."
2. "At normal (intact) rest length the muscle is already in slight passive elastic tension. At this length the muscle produces its greatest developed tension."
3. "When contraction is initiated at a length longer than rest length, although total tension is greater than at rest length, developed tension has already diminished and declines progressively at all greater lengths.[2]

As the adjustor is pulling back with the contact arm and holding a steady pressure with the roll-in arm, he must not increase the downward pressure of contact hand on the patient. As a smooth, continuous shoulder compression is completed, the pressure on the patient remains the same. The completion might be described as a pressing effect, only enough to overcome the resistance of the subluxation. The first action that should be felt by the adjustor when beginning the shoulder compression (other than a tightening of the roll-in hand around contact wrist) is a slight backward movement of each shoulder. This is followed by complete shoulder compression all in one smooth motion from beginning to end. The adjustor should be looking intently at the contact point during the complete compression phase, as if he were aiming a gun at a target and pressing the trigger in a smooth continuous action.

The overcoming of the resistance of the subluxation should be a surprise to the adjustor. In the field of firearms training, it is called a surprise compression break as the trigger is compressed and the hammer is released which fires the gun. Any anticipation on the part of the shooter or the adjustor will result in a push or jerk, the shooter will miss the target, the adjustor will miss or lock up the subluxation. Both lose the battle! Establishing proper feedback control of shoulder compression while maintaining consistent pressure with the contact hand can be difficult to develop. An exercise to facilitate consistent accomplishment of these maneuvers can be performed in the sitting position by placing the pisiform of the contact hand on the knee or leg. Maintaining the humeri in position (3) will enhance control of both direction and depth and give a consistent feedback to the adjustor, as well as prevent a too low pull of the triceps.

The N.U.C.C.A. work is a specialized procedure, not a general manipulation. Many health practitioners, such as M.D.'s and physiotherapists, are incorporating manipulation into their practices. Those of us who practice the N.U.C.C.A. procedure exclusively, are giving the patient a corrective procedure, not a therapy or manipulation. Correct the subluxation and you will correct the neuromuscular problem, and in time, maximum body distortion. The patient then has the potential for response. The anatometer has verified reduction of body distortion for many years.

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2. Gowitzke and Milner - Understanding the Scientific Basis of Human Movement, 2nd Edition, Pg. 97.

The NUCCA Manual Adjustment

Anatomical and Physiological Considerations

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Understanding the muscular function of shoulder and arm movements requires definition of these movements. The arm, or upper extremity, extends from the shoulder to the elbow, and the forearm from the elbow to the wrist which then attaches to the hand, completing the limb.

Flexion of the arm is the forward movement from the side of the body forward and upward toward the side of the head. The movement is between the humerus and the shoulder joint.

Extension of the arm is the reverse of flexion wherein the arm is returned back to the side of the body.

Abduction of the arm begins at the side of the body (anatomical position). The arm is moved away from the side of the body and to the side of the head. Abduct means "to lead away from" the body's midline.

Adduction, or movement toward the body's midline, is the opposite movement, the reverse of abduction, i.e., bringing the arm toward the side of the body.

Two kinds of arm **rotation** take place. Turning the arm toward the body's midline is called **medial rotation**, away from the body is termed **lateral rotation**. The first movement, medial or inward rotation is also called **pronation**: Outward movement or lateral rotation is called **supination**.

Raising or lifting of the shoulder as in shrugging is referred to as **elevation**. **Depression** is the opposite direction of elevation.

The movement of the shoulder forward is known as **protrusion**; a backward movement is **retraction**.

Movements of the forearm are **flexion** wherein the elbow is bent from the anatomical position. **Extension** is the return of the forearm to the anatomical position — straightening the elbow.

Supination is turning the palm of the hand upward; in **pronation** the hand palm is facing the floor.

What do you think about when you think of the adjustment?

THE SHOULDER GIRDLE

The clavicles, or collarbones, and the scapulae, or shoulder blades make up the bony part of the shoulder girdle. The clavicle is a rather flattened bone that articulates with the sternum or breast bone at its medial end, and the acromial process of the scapula at its lateral end. The humerus attaches to the glenoid fossa.

On the posterior surface of the scapula is the scapular spine which separates two shallow depressions, or fossae: the supraspinatus fossa and the infraspinatus fossa which give rise to muscles of the same name. The supraspinatus fills the supraspinatus fossa completely, and its tendon passes over the superior part of the fibrous capsule of the shoulder joint inserting into the greater tubercle of the humerus. It is an abductor of the humerus, starting the abduction and supplementing the deltoideus which pulls directly upward.

The infraspinatus has its origin from the infraspinous fossa of the scapula. It closely associates along the lateral or axillary border of the fossa with the small teres minor and inserts with the teres minor on the greater tubercle of the humerus, the infraspinatus being just superior to the teres minor. Both these muscles rotate the humerus outward or laterally.

The teres major arises from the inferior angle and lower part of the axillary border of the scapula and inserts on the crest of the lesser tubercle of the humerus slightly behind the insertion of the latissimus dorsi with which it functions to adduct, extend, and rotate the humerus inward or medially.

The subscapularis arising from many origins in the subscapularis fossa converges laterally into a broad tendon which passes over the front of the fibrous capsule of the shoulder joint and inserts on the lesser tubercle of the humerus. Its upper fibers weakly abduct the humerus and its lower fibers adduct the humerus.

The coracobrachialis attaches to the tip of the coracoid process of the scapula in conjunction with the short head of the biceps brachii, and attaches to the medial surface of the humerus opposite the deltoid tuberosity. The coracobrachialis flexes and adducts the humerus.

The deltoid, a large thick triangular muscle, has three parts. Its first part is attached at the anterior border of the outer third of the clavicle, and its posterior part at the lower margin of the spine of the scapula. The deltoid inserts into the lateral aspect of the humerus, about midpoint.

Each part of the deltoid is capable of separate functions. As a whole the muscle is an abductor of the humerus. The anterior fibers of the deltoid flex and rotate the humerus inward; the posterior fibers extend and rotate it laterally or outward. The anterior portion of the deltoid also aids in all forward movements of the arm.

The triceps brachii is a large muscle covering the entire posterior surface of the humerus. It consists of three heads: the long head, lateral, and medial.

The long head arises from the infraglenoid tuberosity of the scapula; the lateral head from the posterolateral surface of the proximal end of the humerus, and the medial head from the lower two-thirds of the posteromedial surface. Insertion of the three-headed muscle is by a common tendon into the olecranon process of the ulna. The function of the triceps brachii is to extend the forearm.

The above muscles are those used chiefly in the triceps adjustment permitting abduction, adduction, flexion, rotation of the humerus, shoulder retraction and depression.

The kinetic phase of the C1 adjustment is initiated by contracting the triceps muscle of the contact arm along the muscle's line of pull. The line of pull is a straight line between the insertion of the triceps on the olecranon process of the ulnar bone and the muscle's origin of its long head on the infraglenoid tuberosity of the scapula. The direction of the line of pull

is upward toward the glenoid fossa. When the roll-in hand is inserted into the contact wrist fossa to provide the holding action of the adjustment, i.e., against the upward pull of the contact arm, the triceps muscle of the roll-in arm must pull toward the glenoid fossa on the roll-in arm side if the shoulder joint is to compress.

The function of the triceps is to adduct the arm and to extend the forearm. Muscles are capable of pulling from their origins to their insertions or vice versa. This principle is known as functional reversibility.

In the triceps pull adjustment, the triceps pull from their insertions at the olecranon fossae, and the pull is initiated from just below the adjustor's shoulder joints. The contact arm is kept straight at the elbow to insure accuracy, and the roll-in arm through triceps pull action is locked at its pisiform bone into the anatomic fossa of the wrist of contact arm. The effort of the muscular action is to compress the adjustor's shoulder girdle which constitutes the resistance of a first class lever in which the muscles are the effort, the shoulder joints the fulcrum, and the shoulder girdle the resistance.

Because each C1 subluxation has a different resistance, a separate and exact adjustic force is required for its correction. For example, a subluxation requiring 10 lbs. of force would not correct with 8 lbs. or 12 or 14 lbs. It could be damaged biomechanically or neurologically from over correction. The amount of needed adjustic force cannot be predetermined from the x-ray analysis. These resistances are determined by bone structure sizes and position, tendons, ligaments, and muscles. The distances that vertebrae have moved from normal position does not seem to be a resistance factor. A five degree laterality of C1 can present less resistance than a one degree lateral movement, same with rotation. Therefore, each adjustic force must be built up in the adjustor's shoulder girdle until it reaches the point where it is sufficient to overcome the subluxation's resistance. In so doing, the exact required force for each C1 subluxation is assured.

Better understanding of the adjustment is obtained if the adjustor can visualize the mechanics of shoulder girdle action in the adjustment. A triceps muscle possesses the pulley action of a biaxial or two joint muscle. That is, it acts over both the shoulder and elbow joints, but it is too short to permit complete movement of both joints at the same time. By pulling the triceps brachii along its line of pull from a point slightly below the glenohumeral joint, this joint is activated before the elbow joint. This is important in overcoming the resistance of the shoulder joint, and setting the adjustic chain in action.

Kinesiologists compare the pectoral or shoulder girdle to a three-link chain. Movements at the glenohumeral joint are always accompanied by accommodating movements of associated structures. If accommodation did not occur, the primary movement would be inhibited.

The primary movement of the C1 adjustment is the upward and inward motion of the humeri, initiated by the triceps brachii contraction. It is the accommodating movements medialward of the adjustor's clavicles and scapulae that permit full and uninhibited tricep brachii contraction.

A timing sequence in the adjustic act is essential between the triceps brachii contraction and the accommodating movements of clavicles and scapulae. If the adjustor's clavicles and scapulae move even slightly ahead of the triceps brachii contraction, the result is a loss of the effort of lever and a loss of control. When the timing of the triceps brachii contraction is coordinated exactly with the movement of the adjustor's clavicles and scapulae, momentum is transferred to the adjustor's body mass.

In overcoming the resistance of the shoulder lever by completely contracting the triceps brachii, the adjustor moves the body lever first that possesses the greatest inertia. This concept is very important in the sequence of movement, because efficient movement in a motor skill necessitates that levers of the greatest mass must move first as they possess the greatest inertia. Smaller levers, such as the elbow, should move after the shoulder lever, or later in the sequence of movement. If the adjustor violates this principle and initiates his adjustment from the elbows, she or he transfers little momentum to the body mass. Follow through is lost and usually compensated for by a so-called body-drop which reduces the length of the notch-transverse resultant, thereby reducing the height and rotation vectors, resulting in an incomplete vertebral reduction.

Kinesiologists explain that efficiency in performing any motor skill depends on the relationship between the amount of work accomplished and the force or energy expended. This relationship is vital in adjusting C1 subluxations. The system incorporating the force of the triceps brachii in overcoming the adjustor's shoulder lever recognizes and practices the work-force principle. If ten pounds of force is required to correct a given C1 subluxation the vertebra will normalize at the same instant that the adjustor's triceps brachii have exerted ten pounds of force against her or his shoulder lever. Thus, a built-in mechanism operates that controls force and protects the patient.

We can realize from all this data that the term "light force" in adjusting has no meaning. An adjustic force in the nature of a "thrust" can be dangerous and any adjustic force that moves from the adjustor to the patient straight downward is questionable. Using the same amount of force for every subluxation is harmful and impractical. Each subluxation has its own resistance so each subluxation has its individual adjustment.

Expression of force in giving an adjustment is vital. The term force is from the Latin and means strength. While in the popular sense it is referred to as a push or pull, its technical meaning (from Newton's Laws of Motion) is "that which can impose a change of velocity on a material body." Force is that quality that has both size and direction and which initiates changes or arrests motion. Force is power made operative against resistance.

If we know the strength of the force and the direction in which it is acting, we have the essential information re that force. In adjusting vertebral segments, we are delivering force over several inches, the strength of which is building with each inch. Do we need this continuing and building adjustic force to move a bone less than 1/4 of an inch? Or should we retain that force until the instant that it equals the unknown and unfathomable resistance of the subluxation? If we accept the former concept, no wonder we say displaced vertebrae

cannot be restored. The adjustic force must be delivered in that fraction of a second that it meets the resistance of the subluxation.

I would like to comment on the sound of cracking noises when adjustments are given. A joint capsule is a sleeve-like extension of the periosteum. Lining the joint capsule is a fine membrane which secretes a lubricant called synovial fluid. It resembles egg white. It oils the joint and contains cells that remove microorganisms and debris.

In addition to lubricating joints, synovial fluid eases friction between tendons, ligaments and bones. The fluid is in small sacs called bursae. It is this synovial fluid that causes the "cracking" noise when pressure is placed on the joint. When the gas bubbles burst in the synovial fluid under pressure to the joint, they emit the sound of cracking. Because the joint is stretched, the pressure on the fluid is reduced causing bubbles to form and then explode, releasing their energy as noise. Cracking noises do not mean a good adjustment, a correct adjustment, or even that the vertebral joint has been anything other than stretched.

Triceps adjustment — first class lever:

1. Define and draw a first class lever.
2. Relate lever to the adjustment (fulcra-shoulder joints, resistance—shoulders; force-triceps).
3. Setting the fulcra: (raising arms from shoulders) effect: increases resistance factor.
4. Triceps, or effort, must be pulled high — opposite fulcra — to more effectuate fulcra.
5. Resistance results from proper fulcra position, effort action, acting directly on shoulder girdle.
6. If all these factors are not performed in proper sequence, it results in loss of control, greater depth, and poor timing.
7. Resistance is not in the vertebra in the adjustment but in the shoulders. Vertebral resistance is separate and secondary.
8. Movements at the glenohumeral joint are always accompanied by accommodating movements of associated structures, i.e., a movement at the shoulder joint involves movement of the scapulae and the humerus. The timing of the adjustment must be perfect if the adjustment is to be efficiently performed.
9. Size of laterality does not require greater force but correction of the lower angle, down and around the axial circle in a type 1. Type 2, 3, & 4 require vector changes, and up and around the axial circle in types 2 & 3 to accommodate head turning. Head placement is an essential in all types.

Roll-In Phase
(Placement of the Pisiform)

By Lloyd C. Pond, D.C.

Draw the roll-in shoulder back until the ball of the humerus is situated in the posterior aspect of the glenoid fossa position, then place the roll-in hand at a 90° angle to the radial bone of contact arm so that the pisiform is just at the proximal end of the anatomic snuffbox of contact wrist and at the base of the styloid process of the radial bone.[1] (Figure 1) While pulling back at the shoulder with the contact hand, press down firmly with the pisiform of roll-in wrist. There will be a slight bend in the elbow of the roll-in arm to facilitate maintaining the knuckles of roll-in hand parallel to the radial bone of contact arm. (Figure 2) While pressing down firmly, pronate the roll-in forearm and hand forcing the tissue of contact wrist toward the dorsum of contact hand. (Figures 3 and 4) The center of motion as well as the concentration at this moment should be on seating the pisiform securely between the extensor pollicus longus and the extensor pollicus brevis, which form the boundaries of the anatomic snuffbox.[2] (Figure 5) If the adjustor has maintained a proper arch and radial deviation,

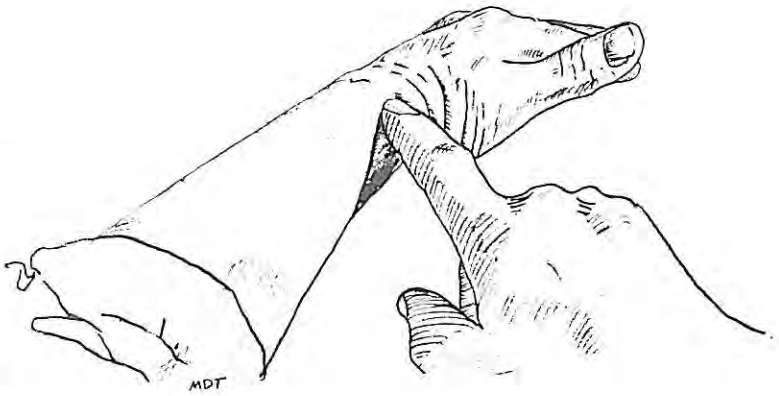


Figure 1

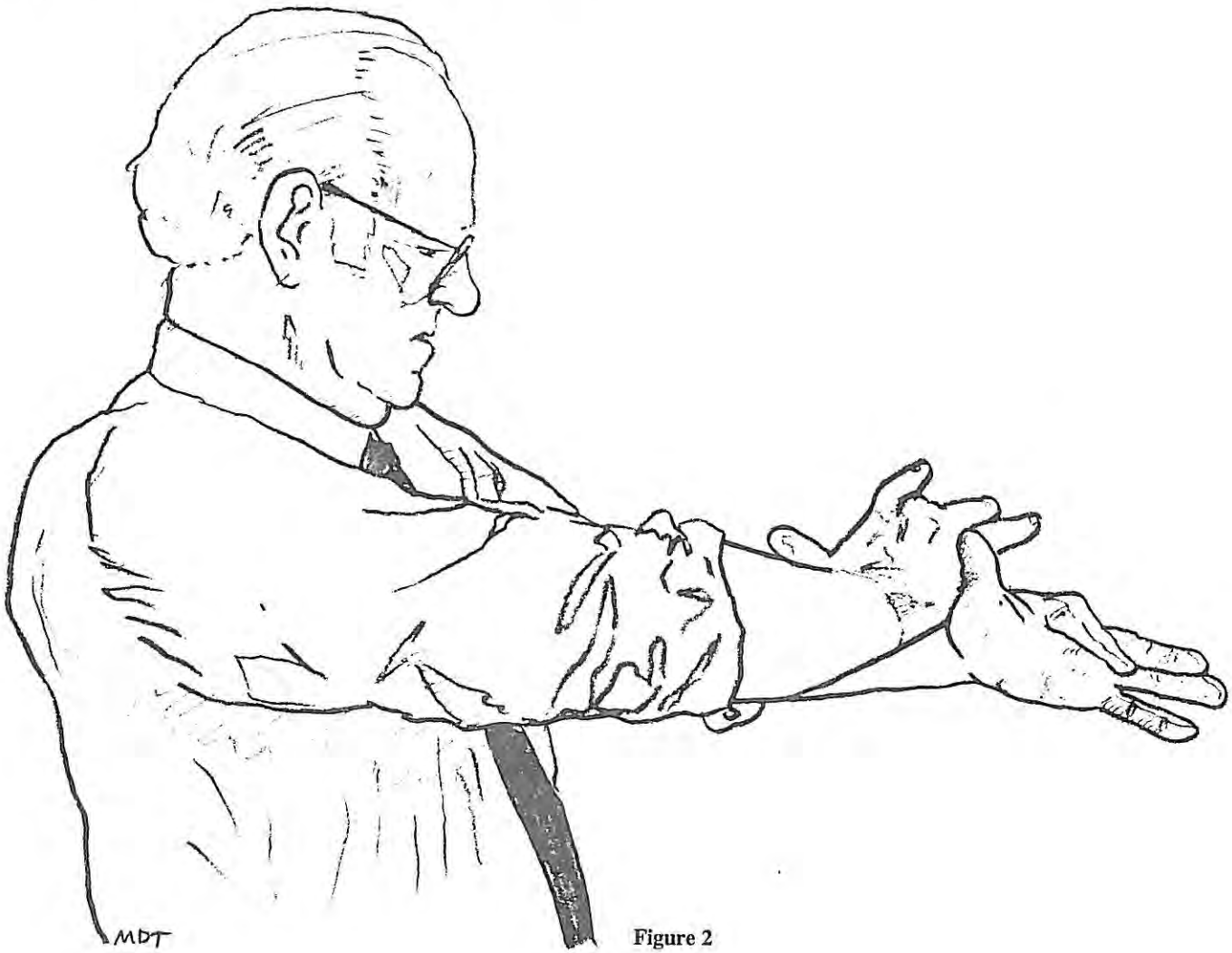


Figure 2

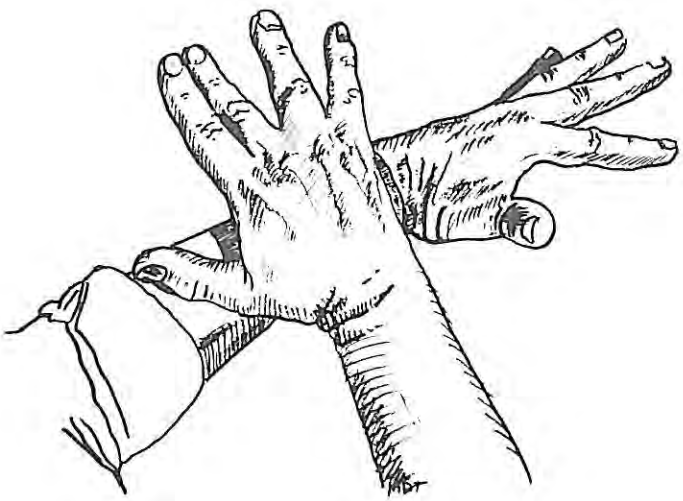


Figure 3

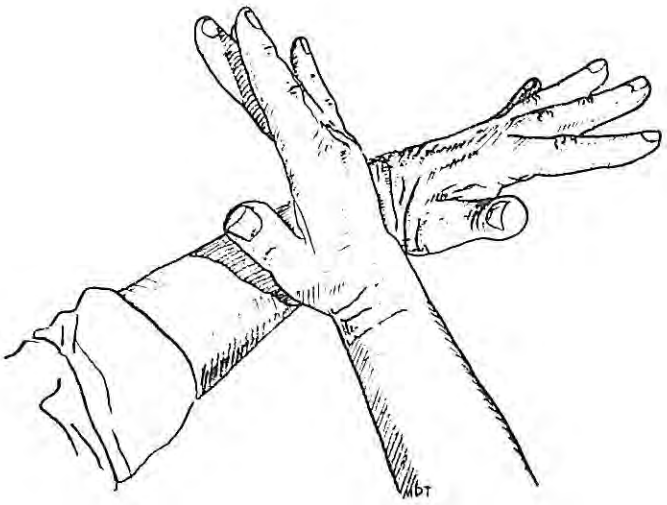


Figure 4

the sensation should feel as if the pisiform is hooked, or stabilized against the extensor pollicus longus and solidly positioned against the base of the thumb. This sensation must be maintained as the center of motion moves to the ball of the humerus in the glenoid fossa forcing the thumb of the roll-in hand down and around. Concentration must be maintained in order to keep the pisiform correctly positioned during all succeeding steps of the roll-in. Failure to maintain a proper arch and radial deviation of the contact hand will result in loss of the proper position of the roll-in pisiform and allow divergence of the adjustment force resulting in little or no reduction of the subluxation.

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2. Lockhart, Hamilton, Fyfe — *Anatomy of The Human Body,* 2nd Edition, 1969 - Pg. 227, Figure 352.

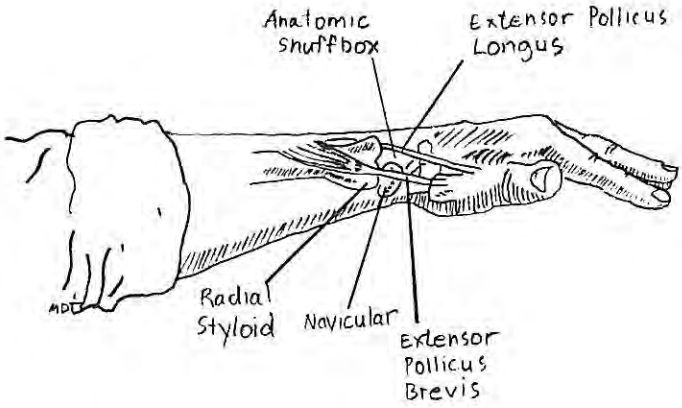


Figure 5

Biomechanical Problem

By Albert Berti, D.C.

Out of Pattern Basic Type Two Subluxation: (Figure 1)

This misalignment is classified as an out of pattern Type 2 subluxation because it does not follow the majority of the features of a typical Type 2 subluxation. The typical second basic type exhibits angular rotation opposite to the side of laterality present in this out of pattern case; also typically the skull drops down on the side of laterality and the turning of the skull contributes to the amount of laterality. This is not present in this out of pattern case. The plane of C1 in a typical Type 2 is generally horizontal or slightly low on the side of laterality — this also is not evident in the out of pattern case since the plane of C1 is quite high on the occipital condyle. In a typical Type 2 subluxation the greater weight of the skull is on the side of laterality, and the skull center of gravity has dropped lower and toward the side of C1 laterality. Again this is not present in this out of pattern case.

Because the greater skull weight is on the side of C1 laterality, the axis of motion for C1 rotation is nearer the occipital condyle on that side and usually produces an anterior rotation. In this case the greater weight of the skull is slightly on the opposite side of laterality. The rotation could be posterior or anterior. The analysis demonstrates an anterior rotation of two and one-quarter degrees.

Resistances to the adjustment encountered in a typical second basic type are the skull on the side of laterality and the superior articulating surfaces of C2. In this case there is no resistance of the skull on the side of laterality but the resistance does remain on the opposite superior articulating surface of C2 because C2 must be brought back toward the vertical axis and toward laterality.

Problem evaluation:

In this case the adjustic force must be directed up and around the axial circle so that the angular rotation is brought back toward the vertical axis. Since there is a considerable amount of angular rotation away from the vertical axis, a lower line of drive than computed must be considered. However, because the skull is not turned in or tilted on the side of laterality and the laterality is produced by C1 moving superior on the condyle, the adjusting force cannot be too low. The only other variable in this case is the mastoid positioning on the mastoid support. Consideration must be given to positioning the mastoid on the support so as to prevent the skull from turning toward the vertical axis or turning further away from the vertical axis.

Problem solving:

A Type 2 subluxation presents two variables, the adjustic force direction or line of drive and the mastoid positioning on the mastoid support. The mastoid process positioning on the mastoid support acts as a fulcrum but also presents two other factors involving the skull: the direction the skull will move and the speed in which the skull will move.

In this particular case the skull should not be moved since it is positioned one-half a degree away from the vertical axis or away from the laterality. The small amount of degree deviation in relation to the vertical axis is not significant in this case. A square mastoid support should be used and the area of the mastoid used in a Type 4 subluxation should be placed on the center position of the mastoid support. The angle of the headpiece would be the same angle used for a Type 4 subluxation.

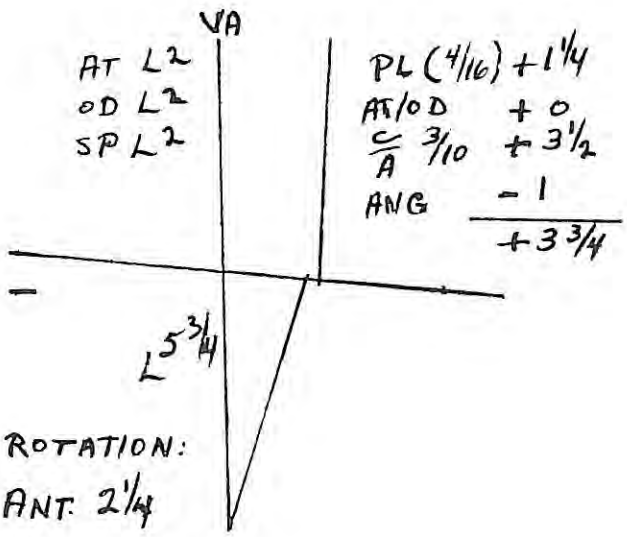


Figure 1

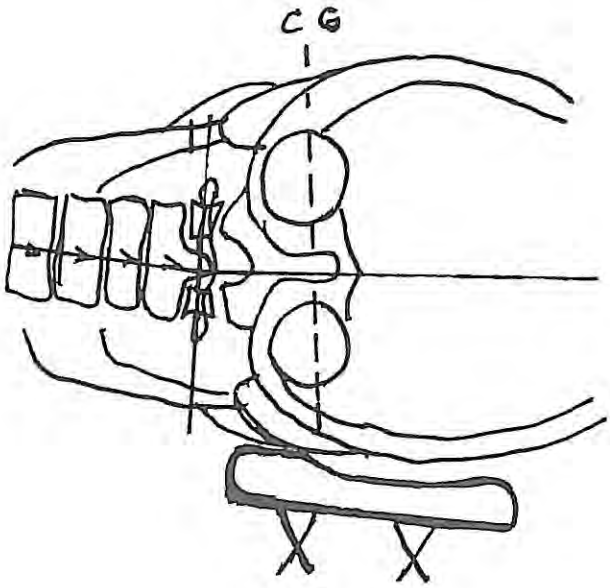


Figure 2

In computing the adjustic force direction the condylar-axial relationship must be considered. In this case the condylar circle is a three and the axial circle is a ten, computing a force vector of plus or high three and one-half inches. With a line of drive of three and one-half, fifty percent of the force would be directed up and around the skull to the opposite side (right) of the axial circle and fifty percent of the force would be directed down and around the left side of the axial circle resulting in no movement of the vertebral structures and no reduction of the subluxation. Since we have set the mastoid and the mastoid support to prevent the skull from turning in or out, a line of drive lower than a high three and one-half is considered. More force is required to be directed up and around the skull to the right side of the axial circle in order to return the angular rotation to the vertical axis. With the angular rotation of five and three-quarters I decided approximately two thirds more force computed from the condylar-axial factor should be directed up and around the skull. Therefore a line of drive of plus one and one-quarter or a high one and one-quarter would be the line of drive used in the first adjustment and then evaluated following analysis of the post x-ray. If the line of drive is accurate, the angular rotation would return to the vertical axis and the cervical vertebrae would be under the skull permitting C1 to return to a more horizontal plane.

The post x-ray verified the accuracy of the line of drive and also the position of the mastoid process on the mastoid support. (Figure 3)

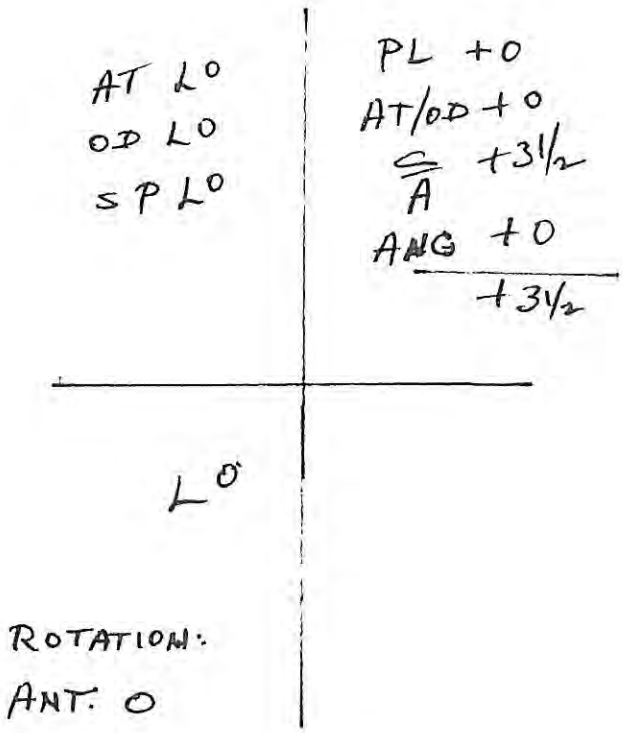


Figure 3

Biomechanical Principles

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An adjusting rule to keep in mind: move the atlas about the resistance offered by the axis (superior articulating surfaces) and the subluxation must reduce — move toward normal — if the **direction** of the adjustic force is correct. (By correct direction is meant that the adjustic force must be collinear with the notch-transverse resultant established from an accurate analysis.) The axis body is the base of support for the atlas and the skull (load).

The adjustment is the activation of a mechanical lever. The atlas is the lever, the transverse process is the effort, and the superior articulating surfaces of C2 are the resistance. The circular pathway also constitutes part of the resistance. The atlas-lever is not activated until the resistance is overcome. Thus an adjustment is not given until resistances are overcome. The purpose of a force vector is to gain mechanical advantage.

What are the factors that facilitate an easy and effective adjustment?

(1) Placing the patient's head on the headpiece so that it is supported according to the basic type subluxation.

(2) Placing the patient so that his fixed point lies on the same plane as the center of his skull.

(3) Adjusting the headpiece to accommodate the shape of the patient's skull: round or elongated.

(4) Pre-setting the circular pathway according to the type of subluxation, e.g., pulling the patient's lower shoulder toward his hip.

When adjusting a C1 subluxation, the adjustor's parallel forces must be exactly coplanar with the notch-transverse resultant.

When laterality of C1 is the predominant factor, spastic contracture is contralateral. Therefore, the contractured leg is opposite the side of laterality.

Instructing the patient to turn his head while in the supine position may accentuate the degree of leg shortness, depending upon whether it increases or decreases the size of the foramen magnum as the dura mater becomes involved.

All forces generated by the adjustment must be directed medialward in the adjustor's body if the adjustment is to be effective. This is the meaning of giving a "light" adjustment.

The only purpose of the triceps pull is to activate the adjustor's body; to overcome the inertia of the adjustor's body; to convert potential energy into kinetic energy.

An adjustic force that **exceeds** the resistance to the subluxation causes trauma to the patient.

The predominant factor of any given C1 subluxation is that single misalignment chiefly responsible for causing spastic contracture.

The adjustic phase most responsible for reducing rotation of C1 into the transverse plane, and high lines of drive, is the conversion phase.

In the first basic type subluxation, restoration of the C2 spinous process to normal (vertical axis) requires a properly computed height vector, plus torque.

Whenever the adjustor permits his body to drop before completing his triceps pull, he shortens the notch-transverse resultant. This destroys the effectiveness of his adjustment because in effect it changes the analysis.

In into-the-kink type cases, or the second basic type case, it may be necessary to lower the height vector. In such cases, the torque should be increased if the spinous process of C2 is on the side of laterality.

The smaller the size of C1 laterality, the more that the height vector can be lowered in basic types two and three. Conversely, the larger the degree of C1 laterality, the less the height vector should be lowered.

Whenever the spinous rotation of C2 is responsible for rotation of the cervicals subjacent to it, torque is vitally essential to their restoration.

The degree of abnormal bone structure, e.g., short condyle, can be accurately measured only on the post x-ray film that shows correction of the skull to the vertical axis.

As a rule of thumb, a laterality that exceeds seven degrees is indicative of abnormal bone structure.

When computing force vectors, add the amount of the abnormality on the vertex into the adjusting listing.

Equilibrium, the restoration of all vertebral segments and the pelvis to the vertical axis, and the balance of forces both as to magnitude and as to direction, is essential to a C1 correction (adjustment) and its capacity to hold.

Leg Length Inequality in the Chiropractic and Medical Literature

Michael D. Thomas, D.C.

ABSTRACT

This paper is a brief examination of the chiropractic and medical literature on leg length inequality and the so-called "short leg", as it may apply to the doctor practicing the NUCCA procedure. Prevalence studies relating to leg length inequality are compared and a possible methodological problem in radiographic measurement of leg length inequality is discussed. A potential neurological rationale for functional leg length inequality is reviewed along with treatment. Degenerative effects of leg length inequality are also briefly noted.

Key Words: leg length inequality, anisomelia, postural distortion, pelvic obliquity, occipito-atlanto-axial joint complex, spastic contracture, chiropractic.

An abbreviated but intensive study was done on the subject of leg length inequality using the CD-ROM files at Palmer College of Chiropractic; the search covered data from 1987 through April 1991. Of the 240 articles reviewed, 58 abstracts were printed. A few of these will be cited in this paper when pertinent. Papers prior to 1987 came from other sources and are listed in the reference section at the end of this paper.

For NUCCA doctors, the importance of the "short leg" is its specific use within the NUCCA procedure as a clinical indicator of the presence or absence of the Atlas Subluxation Complex Syndrome. The term, Atlas Subluxation Complex Syndrome, was originated and defined by Gregory as the observable and measurable (meaning objective) signs of an Atlas Subluxation Complex. These signs include misalignment factors as shown on x-ray, distortion of the pelvic girdle, displacement of the body's center of gravity, contractured leg and deviation of the spinal segments from the vertical axis of the body.[1,2]

The Contractured Leg

The supine leg check is, aside from roentgenological examination, the major indicator used by NUCCA practitioners to detect the presence of the Atlas Subluxation Complex Syndrome (ASC Syndrome). Any reliable indicator that can be clinically obtained without additional radiation exposure is of tremendous value to the patient.

In the 1970's, Gregory and Seemann developed the Anatometer which became a more exact means of objective measurement. The Anatometer allows a qualitative picture of the postural distortion and subsequent adaptation accompanying the ASC Syndrome to be visualized, and in addition a discrete quantitative measurement of each component. These measurements include pelvic obliquity in the frontal plane, pelvic turning in the transverse plane, movement of the fixed point into one of the frontal planes, and movement of the center of gravity into one of the frontal planes.[3]

Postural changes associated with misalignment of the occipito-atlanto-axial joint complex have long been noted by Grostic, Gregory and others. Gregory described a "reciprocal relationship" that exists between the ASC and postural distortions.[4] Seemann, in his 1978 study of 355 patients, found 100% correlation between reduction of atlas laterality and decrease in frontal plane pelvic obliquity.[5] Although direct relationships between misalignment factors and specific postural changes have been difficult to correlate, some statistical relationships have been developed which may one day lead to a more complete development of the "predominant factor" theory. The basic premise of this theory states that the "predominant factor" is the single misalignment factor of the Atlas Subluxation Complex (ASC) that can be singled out to be the most important causative factor responsible for the ipsilaterality or contralaterality of spastic contracture.[6]

Some NUCCA doctors have been able to develop a high degree of correlation between a specific upper cervical misalignment pattern in a patient and that patient's subsequent pattern of postural distortion. Utilization of the leg check and Anatometer enables doctors using the NUCCA procedure to monitor the response to adjustive care and to also determine a change in the misalignment factors of the ASC. Use of these two procedures results in a sophisticated methodology for maintaining optimum correction without resorting to repeated x-ray exposure.

Within the chiropractic and medical professions, the significance of the leg check remains controversial with regard to definition, mechanisms, accuracy of measurement, significance, prevalence and treatment. The NUCCA supine leg check is not designed to measure true (anatomic) leg length inequality. The measurement taken is one of relative difference in the supine position. It is not possible at this time to make direct correlations between the numeric value from the leg check and the results of true leg length difference measurement. It is inferred after fifty years of clinical study that the NUCCA leg check is reliable as an indicator of functional leg length inequality secondary to spastic contracture. The supine leg check originated in the early 1940's with Gregory and Grostic. They found a functional "short leg" always correlated with misalignment of the occipito-atlanto-axial joint complex.[5]

Verified anatomical leg length differences have not been found to correct on supine leg length measurement nor on Anatometer pelvic frontal plane findings. Several NUCCA doctors have informally reported that the functional difference is resolved after upper cervical correction, leaving only the anatomical disparity. A doctor using the Anatometer can verify this after corrective adjustment and spinal stabilization of a patient suspected of having an anatomical inequality by raising the foot pedal on the short leg side until the pelvic calipers are level in the frontal plane. If the transverse rotation of the pelvis is also resolved then a shoe lift may be appropriate.

The following is a pertinent review of the examined research and a sample of various viewpoints regarding leg length inequality.

Definition

The term "leg length inequality" (LLI) is used in the various literature with both functional and anatomical meanings. Due to the assorted methods of measuring "leg length inequality", the differences between the two meanings are not always clear.

Gonstead, DeJarnette, Walther, Pierce, Fuhr and Gregory have all described the functional "short leg". Gregory preferred the term "contractured leg", which he defined as:

> "An apparent difference in the leg length of a C1 subluxated individual when measured in the supine position, and resulting from spastic contracture of the extensor musculature of the spinal column."[2,6]

Mechanisms

Structural leg length inequality (anisomelia) is recognized to result from pathological changes in the long bone epiphysis secondary to trauma (including fracture and vascular complications), infection (septic arthritis, osteomyelitis), tumor, radiation, Perthe's disease, or paralysis of associated muscle groups. Leg length inequality (LLI) may be congenital in nature (phocomelia, dysgenetic syndromes), and/or secondary to neurogenic (poliomyelitis, infantile paralysis, traumatic, iatrogenic), orthopedic, vascular (A/V fistula, aneurysm, hemangioma), or developmental anomalies (hemihypertrophy, hemihypotrophy, dysplasia, Ollier's disease). Most commonly, Rock notes, there is no apparent cause.[7]

The functional "short leg" is associated with several mechanisms. DeJarnette looked to the pelvis as the causative factor.[8] Walther[9] and Thomson [10] attributed the "short leg" to pelvic imbalance as well as upper cervical subluxation. Pierce[11] looked to the cervical spine, Gregory[12] to the upper cervical subluxation.

The inability to adjust the cervical region and equalize the observed LLI has led many chiropractic researchers to look elsewhere for a cause. Most have centered on the pelvis, sacrum and lower lumbar spine due to the observable changes found in these structures.

By 1942-43, Gregory and Grostic had found that when the atlas was properly adjusted (laterality and rotation returned to normal) the subjacent vertebrae also returned to normal (i.e. the vertical axis) position as determined by their system of post x-ray analysis. As research continued, Gregory realized that pelvic unleveling (obliquity) and functional LLI also resolved with upper cervical correction.[12]

Kandel states that modulation of segmental stretch reflexes and muscle tone by the medullary and pontine reticulospinal tracts is influenced by the reticular formation. The antagonistic activity of these two tracts is vital to maintain normal muscle tone.[13]

It is the historical position of NUCCA that upper cervical misalignment causes a tractionization of the brainstem. This tractionization results in inhibition of the inhibitory center (medullary reticulospinal tract) that together with the facilitory center (pontine reticulospinal tract) modulate tone of the extensor or "antigravity" muscles. The loss of balance between these two centers results in over-facilitation to the extensor muscles or, as Gregory termed it, unilateral spastic contracture. Spasticity or the exaggeration of myotatic reflexes, has long been known to follow injury to the suppressor systems in the brain. This inequality of muscle tonus results in pelvic unleveling, LLI and movement of the entire spine away from the vertical axis. White and Panjabi[14] refer to this movement of the spine away from the vertical axis as altering the instantaneous axis of rotation for each of the individual segments. This results in progressive degeneration in segments under the greatest stress.

Accuracy of Measurement

The medical literature has offered several, often technically sophisticated methods for quantifying leg length inequality. Radiographic methods range from orthoroentgenography (radiograph of entire limb taken in three sections, all perpendicular to ankle, knee and hip in the supine position), and slit scanography (also supine, entire leg is scanned by moving x-ray beam emitted through a slit at right angles to the leg), to use of flying spot digital imaging device and computerized axial tomographic equipment.

The most popular method used to determine leg length disparity in a population is the teleroentgenographic technique of Goften and Trueman[15] with certain modifications. This technique amounts to measurements taken from a 14 X 17 radiograph of the pelvis and proximal femurs. The FFD is greater than 1.5 meters. Care is taken to establish a true horizontal and to place the feet properly, i.e., approximately 19 cm apart. The x-ray tube is placed at the approximate femoral head height. The height of each femur is then measured from the bottom of the film or from a true horizontal line if the film isn't oriented properly. (To examine results of several studies using this method, see table in Prevalence section.)

It should be clear that neither the supine leg check nor the prone Derifield-Thompson leg check measure actual leg length disparity.[16] The supine leg check measures a relative difference, one heel to the other. It is this relative measurement that has been correlated with the upper cervical misalignment. Since equalization of leg length after adjustment usually correlates with leveling of the pelvis in the frontal plane on the Anatometer, this indicates that the relative measurement of the leg check is a sign of functional imbalance. Though the initial Anatometer reading may show pelvic obliquity, this does not necessarily infer the presence of anisomelia to the NUCCA doctor. Further studies are required to definitively differentiate anisomelia from the contractured leg.

Significance

Whether LLI is functional or anatomical or both, the biomechanical effects are demonstratively deleterious. Giles and Taylor[17] showed that pelvic unleveling and LLI are usually compenstated by postural scoliosis which results in asymmetric concavities in the endplates of th lumbar vertebral bodies, "wedging" of L-5 in the A-P view, lateral traction spurs, and osteophyte formation. They also found excessive wear on the convex side of the curvatue consisting of thickened subchondral bone and thinning of articular cartilage. Rock[7] attributes this to asymmetrical load bearing on the convex and concave sides of the curvature. Friberg[18] mentioned that with postural scoliosis compensating for LLI there was a tendency for the intervertebral disc to bulge toward the nerve root on the long leg side. Goften and Trueman[15,19] found that pelvic unleveling causes a decrease in acetabular roofing and an increase in hip stress on the long leg side in a study on osteoarthritis of the hip.

A study by Bolz and Davis[20] found that in subjects with LLI, the "short leg" is consistently weaker as measured by

electromyography and that LLI may be associated with asymmetric paraspinal muscle activity. Triano[21] found asymmetry of bilateral paraspinal muscle behavior in patients with LLI and low back pain.

Of interest is a study by Friberg[22] of 62 top level athletic jumpers in which he found that 81.4% invariably used the longer leg for takeoff.

Several studies have been done that show deleterious effects of LLI on the knee, ankle and foot.

Giles and Taylor[17] and most medical researchers found that low back pain was more prevalent if the LLI is 10 mm or greater. Seemann[12] noted that most upper cervical chiropractors think 3.25 mm or more is enough to cause low back pain. He also remarked that in those with LLI who did not complain of low back pain, many had complaints of the cervical and brachial regions. Several medical studies have shown no correlation in prediction of low back pain in the presence of LLI, however, the Biering-Sorenson study[23] found significance in retrospect. In other words while those with LLI may not have been experiencing low back pain at the time of the initial study, re-examination at a later date found much better correlation between LLI and low back pain.

For NUCCA, the significance of the LLI lies in it's use as an indicator of spastic contracture. Spastic contracture in turn, indicates imbalance in reticular regulation of muscle reflexes. Much more difficult to quantify are the effects on the other principal functions of the reticular formation: behavioral arousal, coordination of autonomic functions (breathing movements and cardiac function) and modulation of pain sensation.

Upper cervical doctors have long noticed the far-flung effects of the upper cervical correction in their patients. Proving that the adjustment can normalize neural flow through the brainstem is difficult to explain and has not been adequately accomplished. Rebalancing neuromodulation of the extrapyramidal system (sympathetic and para-sympathetic) could however, begin to explain the widespread effects and cessation of symptoms that patients have described over the years after receiving and maintaining upper cervical correction.

Prevalence

Giles and Taylor[17], after examining the amassed literature on prevalence of LLI concluded that approximately seven percent of the adult population without history of low back pain and 13-22 percent of patients who have sought treatment for low back pain have an LLI of greater than 9 mm. Again, the supposition is that this is structural leg length disparity (anisomelia). In their own study, they found 18.3 percent of 1186 patients with low back pain had an LLI of greater than 9 mm, versus 8 percent of the control population. Friberg[18] found that 92 percent of the population with low back pain in his study had LLI greater than 9 mm.

Radiographic methods to determine anisomelia

	number of patients with LBP	control	LLI (mm)	incidence with LBP (%)	incidence contol (%)
Rush and Steiner 1946 *[24]	1000	100	≥11	15	4
Stoddard 1959[25]	100	50	≥12.5	17	8
Henrard et al. 1974[26]	-	50	≥10	-	8
Fisk and Bailgent 1975[27]	206	-	≥12.5	6	-
Giles 1979[28]	300	-	≥10	13	-
Giles and Taylor 1981[17] TOTAL)	1309	50	≥ 9	20.7	8
chronic LBP	1186	-	≥ 9	18.3	-
acute LBP	123	-	≥ 9	21.9	-
Friberg 1983**[18]	653	354	≥ 9	30.1	15.6
Hellsing 1988[29]	600	-	5-15	32	-
			>15	4	-

*Rush and Steiner found 71% of population with some measure of leg length inequality.

**Friberg found 92% of population with some measure of leg length inequality.

The above studies have found structural LLI in as much as 92 percent of the population. Considering the less than two percent figure informally offered by Gregory[30] and other NUCCA doctors, there exists a tremendous discrepancy.

The explanation may lie in the radiographic methods used. The attempt to place the tube perpendicular to the femurs cannot be done successfully if the pelvis has rotated in the transverse plane. This will cause the femurs to be seen obliquely. Even placing the pelvis against the bucky would not correct this problem with measurement of a projection.

In addition, the inability of any method to resolve the LLI and level the pelvis, perhaps because it does not resolve the spastic contracture, could lead many to believe the deficiency is anatomical. One study is currently being done utilizing the NUCCA procedure which may shed some light on this subject.

No population study has been published by NUCCA in the areas of LLI and postural distortion until now. Results of a preliminary study will be examined in another paper.

In comments regarding prevalence of the contractured leg, Gregory had this to say:

> "Just how prevalent is the short leg? One needs only to observe the signs that indicate the presence of the short leg in any gathering of people to see that it is wide-spread. Watch people as they walk, observe the angle of the foot, the twist of the pelvis, the unequal action of the pelvic girdle—more to one side than to the opposite side—one side of the body shorter than the other between the crest of the pelvis and the shoulder—the dropped shoulder girdle on one side—the shorter stride on the side of the short leg—the pivoting action of the foot—all signs of the short leg. Incidence is high at chiropractic conventions."[30]

Treatment

Treatment of the "short leg" is, considering the numerous definitions, highly variable. A study by Grill, et al.,[31] reviewed the medical/surgical approaches. Discrepancies up to 2-3 cm

are treated conservatively by shoe lift. For deficiencies of 3-5 cm, epiphysiodesis or shortening osteotomy is often performed. Discrepancies between 5 and 15 cm are treated in the main by lengthening operations such as corticotomy, callus distraction, and various external fixation procedures. In cases greater than 15 cm, a combination of lengthening and shortening procedures are often performed.

It is clear that better definition of the "short leg" is required. Appropriate treatment can only follow correct diagnosis. It has been previously mentioned that structural and functional leg length deficiencies often coexist. Gregory commented on this twenty-two years ago:

> "The increasing interest in the short leg among members of the healing arts and the expanding use of shoe-lifts, traction, non-specific manipulation and surgical intervention gives emphasis and concern to the problem of rational treatment which, of course, must be based upon determination of cause. Because multiple causes may exist, the problem can become complicated. It is palpably apparent that the role of the A.S.C. should be fully determined in all cases because of the high incidence of its involvement both as a contributing and as a single cause."[2]

Triano,[21] and Giles and Taylor[17] recommend shoe lifts in cases of "short leg" within certain guidelines depending on vertebral body rotation, curve convexity, and pelvic and sacral unleveling. Triano even writes of success in "balancing" paraspinal muscle activity with appropriate shoe lift therapy. Of 35 subjects tested by Triano with demonstrated asymmetry of bilateral paraspinal muscle balance, LLI and low back pain, 20 percent showed no alteration in muscle asymmetry when unilaterally fitted with heel lifts or ishial supports. 51 percent demonstrated electromyographic balancing of paraspinal muscle activity with heel lift and all 80 percent were balanced by ishial support. No long term data was offered.

The NUCCA approach to chiropractic, with it's focus on the imbalance in neurologic control systems secondary to osseous misalignment of the occipito-atlanto-axial joint complex, represents the framework for a widespread and virtually unknown (within the medical community) pathological syndrome, as well as its correction. The A.S.C. syndrome manifests symptomatically with an incredible array of findings. Considering the pivotal nature of the reticular formation, this may not be surprising. The efforts of Gregory and NUCCRA have been able to correlate objective findings of LLI and postural distortion with the A.S.C. Equalization of leg length then becomes a consequence of rebalancing reticular function.

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A Comparison of Weight Differential Between a Group That Had a History of Spinal Problems or Had Been Under Care and a Group That Had Neither a History of Spinal Problems Nor Been Under Care

By D. Seemann, Ph.D.

Abstract

This research compared a group who had a history of spinal problems or had been under care and a group who had neither a history of spinal problems nor been under care. The Anatometer II was used to measure weight differential between the two groups. The group who had no prior history of spinal problems or had been under care had the smaller weight differential. Comparisons were also made between ipsilateral and contralateral WD and frontal plane displacement.

Key Words: Anatometer II, leg length insufficiency (LLI), and Weight Differential (WD).

Background

Incorporation of transducers in the foot plates of the Anatometer II, makes it possible to measure not only pelvic distortion in two planes, and body tilt at C-7, but also weight differential in each leg. Weight differential (WD) is thought to be caused by leg length insufficiency (LLI).

Thomas (1991), Lawrence (1985), and Rock (1988) have reviewed the literature about (LLI) and the general conclusion is there is little agreement in chiropractic and medicine about measurement, the causes of short leg or what biomechanics are involved.

But some investigators (Lawrence, 1984, Vernon and Grice, 1985) found the study of weight differential (WD) improved the understanding about the LLI syndrome. Lawrence reported that subjects with small leg shortness had a tendency to bear the heaviest weight on the ipsi-side of the short leg, while subjects who had greater leg shortness bore more weight on the opposite side of the short leg. Lawrence felt the gluteous medius levels the pelvis which causes a weight shift to the opposite leg. Vernon and Grice were interested in how the body weight was distributed to the four quadrants in the frontal and sagittal planes. They felt that after time, body weight would shift to the opposite side of the short leg. They called this adaptation, the "trochanteric shift" which occurs between the pelvis and the lower limbs.

There is also agreement as to the percentage of body distortion (LLI) found in the population. Friberg (1983) reported 92%, Lawrence (1984), 80%, and Sherwood (1989), 92%. The current study found a more conservative number with 71%. See Figure 1. Of the 71% who had LLI only 36% were under some form of care. What then makes a person a candidate for spinal problems while others are not?

The purpose of this paper was to explore weight differential (WD) between a group who had a history of spinal problems or been under care and a group who had neither a history of spinal problems nor been under care.

Table 1

Percentage considered distortion free (0°) or near distortion free. (Absence of short leg or LLI. N=123)

Distortion	N	Percent
0 degrees	8	6
<1 degree	28	22
Total	36	29

Note: 70% of sample have LLI, yet only 36% were under some form of care.

Methodology

Methods. One hundred twenty-three subjects were obtained at a business expo in Monroe, Michigan, over a two day period in March of 1991. Although a sign in the booth indicated that a postural evaluation study was being conducted, most subjects initially stopped to inquire about what the "machine" (Anatometer) did. The subjects, all of whom were volunteers, were informed about how the Anatometer worked and how it is used. Information on age, gender, and history of spinal problems and care for spinal problems was obtained from the subjects and recorded along with Anatometer measurements.

Subjects were given instructions on how to position themselves on the Anatometer; measurements were taken by a doctor of chiropractic trained in the use of the instrument.

The Anatometer was used to measure (1) angular displacements in the frontal and transverse planes, and the fixed point relative to a gravital line, and (2) bilateral weight distribution, all measures of postural distortion.

The subjects' measurements were recorded on an Anatometer pamphlet which was presented and explained to the subject by the doctor.

Subjects concerned about their measurements received a brief explanation from the doctor about the nature of the follow-up process to correct the postural distortion.

Results

The means and SD's between the group who had a history of spinal problems or had been under care and the group who had not are found in Table 2. Although there is a (WD) of about three pounds, statistically, the difference is not significant but close.

Table 3 shows the ratio of the subjects weight to total body weight. Ideally, the WD should be zero, (Vernon and Grice), but realistically it may not be possible. A 10 lbs. WD would

Table 2

Means and SD's of the weight differential between a group who has had a history of spinal problems or been under care and a group who has not. N=119

Group	Mean	SD	N
Yes	12.51 lbs.	10.31	52
No	9.32 lbs.	8.27	67

Note: p>.05=NS

Table 3

Means and SD's of the weight ratio differential between a group who has had a history of spinal problems or been under care and a group who has not. N=113

Group	Mean	SD	N
Yes	6.92	5.68	52
No	5.52	4.09	61

Note: It would take an index of 4.8 to make a difference between the Yes and No groups.

Table 4

Percentage of weight differential to body weight (Ratio)

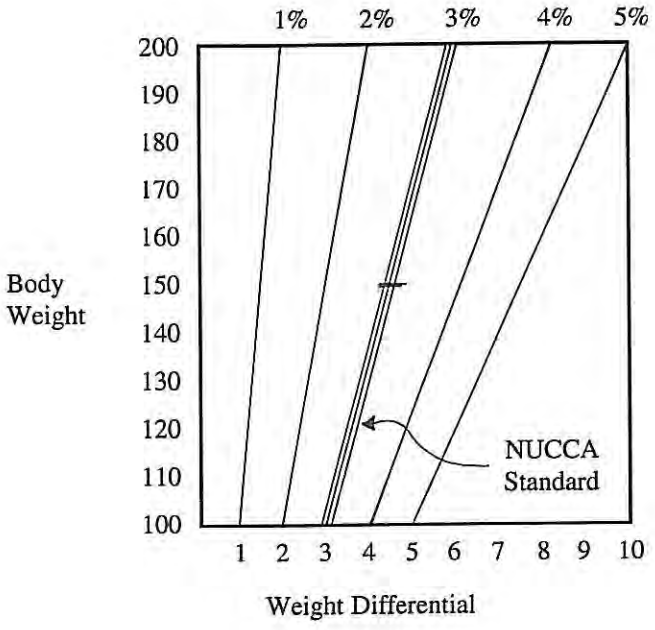


Table 5

Means and SD's of the weight differential between a group who bears weight on the ipsilateral side and a group who bears weight on the contralateral side. N=107

Side	Mean	SD	N
Ipsi	12.96 lbs.	10.60	56
Contra	10.92 lbs.	7.60	51

Note: p>.05=NS

Table 6

Means and SD's of the frontal plane distortion (in degrees) comparing those who have ipsilateral WD and those who have contralateral WD. N=107

Side	Mean	SD	N
Ipsi	1.88 deg.	1.11	58
Contra	1.66 deg.	.94	49

Note: p>.05=NS

Table 7

Percentage of time if in pattern WD will be ipsilateral and percentage of time if out of pattern WD will be contralateral.

Pattern	Ipsilateral	Contralat.
In	87%	13%
Out	11.4%	91%

Note: In pattern and out of pattern WD are usually predictable.

be statistically significant according to Vernon and Grice. The ratio percentage may be more meaningful for the adjustor than just knowing the WD, because of the weight range of patients. For an example, a 10 lbs. WD for a 200 lbs. man would represent 5% of total body weight whereas, a 10 lbs. WD for a 100 lbs. woman would be 10% of body weight. See Table 4. The diagonal lines indicate a standard of 1-5% WD. To be significant, the ratio would need to be 4.8. NUCCA practitioners who use WD feel the post adjustment standard should be between 3% and 4% WD.

The mean weight for the subjects who had ipsi-side WD was greater than for subjects who had contralateral side WD. See Table 5. An analysis of the LLI distortion, using the frontal plane as the standard, showed a greater LLI on the ipsi-side. See Table 6.

And finally, Table 7 shows that it is possible to predict (in most cases) which leg will bear the most weight using the "in pattern," "out pattern" paradigm. When using the Anatometer, if rotation of the pelvis is posterior, and the fixed point (at C-7) is ipsilateral, the WD will fall on the side of the short leg. This is called "in pattern". If rotation of the pelvis is anterior and the fixed point (at C-7) is contralateral, the WD will fall on the opposite side of the short leg. This would be called "out of pattern". Approximately 10% of the cases defy explanation at this point. Some in pattern cases were found to have the WD on the side opposite the short leg, while some out of pattern cases had the WD on the same side as the short leg. Obviously, further refinements are needed to understand these anomalies.

Discussion

The development of the Anatometer II and its predecessor Anatometer I (Seemann, 1979) has been helpful in understanding the lateralization of weight differential. There are more questions than answers—although it was found that people with a prior history of spinal problems and who were under care usually had a higher WD than those who never had a history or been under care. How does this help the patient? Why do some patients have "in pattern" LLI and some patients have "out of pattern" LLI? Again, with those who have LLI, why do some have spinal problems and some do not?

The research with Anatometer I showed that with a successful reduction of the atlas the spinal distortion in both planes of the pelvis: the frontal and transverse planes, and also at C-7, the distortion in these planes would reduce to zero almost immediately. The reliability and objectivity coefficients were acceptable on three measurements, but lower than expected. (Seemann, 1984) With Anatometer II, the concern over the coefficients are minimized because the crucial measurement becomes the WD. The WD summarizes or interprets the LLI of the three body measurements. The objectivity and reliability of taking the one WD measurement should be quite high. The subject merely has to be placed correctly on the foot plates. The error that might occur by taking measurements in degrees improves when measuring in pounds (to 1/100th of a pound). If the post adjustment WD approaches zero, the adjustor should feel confident the reduction was successful. A future article will investigate pre and post adjustment weight differential.

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Radiology Case Report

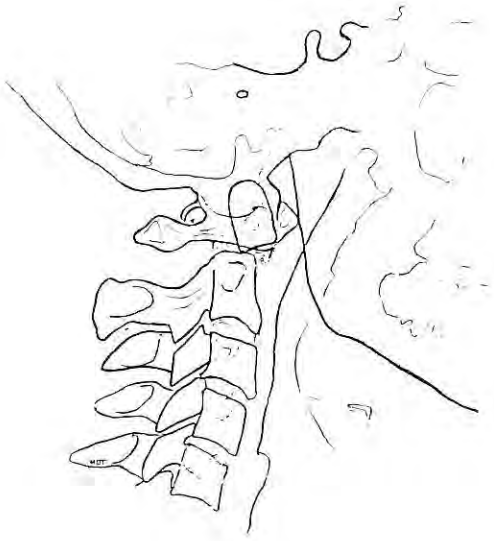
Michael D. Thomas, D.C.

History

Eighteen-year-old female with non-radiating cervicalgia.

Clinical History

The patient presented on March 29, 1991 with the complaint of non-radiating cervicalgia, worse with motion, since a December 1989 automobile accident in which the patient, while wearing her seat belt and shoulder harness, was hit broadside on her driver's side. Her head shattered the driver's side window. The patient experienced loss of consciousness for approximately 15 minutes. She was evaluated at a local hospital emergency room at which time cervical films were taken. No positive findings were noted and she was released that day. Over a period of time, due to continued cervical pain, the patient was prescribed a variety of medications, went through physical therapy, traction, exercise and consulted a local chiropractor who evidently performed cervical manipulation.





Radiographic Findings

Lateral cervical, vertex and A-P open mouth radiographic films were taken at our office. The lateral film revealed evidence of an unstable, anteriorly displayed odontoid fracture with anterior subluxation of C1 on C2. The patient was referred for medical evaluation.

Flexion - extension studies done by the neurosurgeon revealed a step fracture widening on sagittal range of motion to more than half the width of the odontoid itself. Posterior interspinous ligament did not appear ruptured.

Incidental findings included cervical hypolordosis and ponticulus posticus.

Diagnosis

Anteriorly displaced type II odontoid fracture with anterior subluxation of C1 on C2.

Discussion

A type II odontoid fracture is a fracture at the junction of the odontoid process and the axis body. It is the most common type of odontoid fracture and the most frequent type for nonunion. This fracture can be mimicked by the Mach effect in the A-P view, though an acute type II fracture of the odontoid will have an associated increase in the prevertebral soft tissue space secondary to hemorrhage. Since the patient was seen in this office approximately 16 months after the traumatic injury, the soft tissue injuries had resolved.

Yochum and Rowe [1] state that the odontoid fracture is best seen on A-P open mouth radiographs as an irregular radiolucent line. Occasionally side tilt of the odontoid will indicate the underlying fracture. In this case the A-P open mouth film appeared negative, possibly due to the anterior displacement. Some spinal cord pressure occurs with anterior displacement of the odontoid and atlas. If the transverse ligament ruptures with an intact odontoid, there will be a "guillotine" effect on the cord.

Os Odontoideum must also be differentiated from an odontoid fracture. Os Odontoideum occurs when the odontoid peg fails to unite with the body of the axis. This is a developmental anomaly occurring around the age of 12-14 years. Radiographically, the Os Odontoideum appears as a large radiolucent gap between the odontoid peg and the axis body, usually too large to be a fracture. The margins of the base of Os Odontoideum are generally smooth and have a sclerotic appearance. Odontoid fractures usually appear serrated or jagged with non-sclerotic margins.

Posterior C1-2 fusion was performed in early June of 1991. The patient will be in Halo traction for three to six months.

Reference

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Optimizing Port Size For Cervical Films

Dr. Marshall Dickholtz, Sr.

There is stray radiation that comes from the port of an x-ray tube housing. This darkens your film and blurs the object image. To use the following procedure, your x-ray equipment must be aligned to the specifications of the NUCCA x-ray alignment booklet.

EQUIPMENT

1 - two inch square piece of lead 1/16" thick
1 - one hand drill and 1/8" drill bit
1 - one set of miniature needle-nose files
1 - piece of wire mesh screen approximately 4" x 8"
1 - one set of metal tip dividers
1 - flat file - average size
1 - roll of sticky tape (not electrical)
1 - scissors

The procedure to eliminate this problem is as follows:

Place the grid carrier or bucky in a vertical position with the wire screen taped to the right or left side of the unit (starting from the center). A lead letter or marker should also be placed on center of the grid carrier. NOW, place the x-ray head in as perfect, as possible, a vertical position (a level may be placed on the back of the x-ray tube housing). The collimator should be level from right to left. Raise or lower the tube until the central ray would be in a horizontal plane aimed at the center of your bucky or grid carrier. You should be using a string that is attached laterally from the focal spot. I have used an aluminum bar with a level to make sure this is aimed horizontally. Notice the exact spot that is crossed on the front of the collimator. This spot should be marked for all future x-ray exposures.

Next, lock the height of the cross shaft (it holds the x-ray tube). Remove the collimator, but have a chair handy to place it on so that the wires do not have to be disconnected.

Use the points of the dividers to measure the inside diameter of the port opening. Now, use the dividers and scribe a circle on the lead to the size of the port. Use the scissors to cut on the outside of the scribed line. The file is then used to finish the lead plug so that there is a tight fit. Drill a 1/8" hole in the center of the plug. With the point of the dividers, scribe a small arrow on the face of the plug, near the top, pointing out to the circumference. Tape it in the port with arrow pointing UP. The procedure is to make an oblong hole in the lead plug for the largest film and at the distance at which it is going to be taken. It has to be kept in mind that the smaller the port opening the sharper the films.

Set the distance for the projection that would require the largest opening.

With all your equipment aligned and squared make an x-ray exposure at 40 KVP and 5 Mas. This will give you a shadow of the hole in the lead plug as it is projected on a film with the reference points from the wire screen and lead letter.

The next and last few steps are performed without moving any of the equipment. Take the lead plug and file out a hole. File out a little at a time depending on the way the radiation is exposing the film. Test to determine if the shadow will be exactly where it should be. This should let the x-rays hit the full length of the film and almost 90% of the width. (Start to elongate the hole with a round file and finish the hole with a flat file). In testing the hole always make sure the arrow on the plug is pointing straight UP. When the final film shows that the projected shadow is perfect, tape it in place.

I strongly recommend that any chiropractor doing ONLY upper cervical work use a 10 x 12 grid carrier and use a 42" focal spot to film distance.

The port opening may end up being almost 1/4" x 1/2" depending upon the distance from the focal spot to the port and if you are NOT using any film larger than a 10 x 12.

Technical Changes in Measuring The Head Tilt Component of Atlas Laterality

The following becomes the second paragraph on page 20 of The NUCCA Basic Course: X-Ray Analysis.

Note: In most basic type twos and threes, atlas laterality is predominately head tilt towards the side of atlas laterality. It may contain some side-slip of C1. In most basic type fours, atlas laterality is a combination of head tilt and side-slip of C1. To understand the production and therefore the reduction mechanics, it is important to determine the percentage of each component.

To measure the degree of turning or tipping (head tilt) of the skull from vertical, place the protractor on the top edge of the film with the center mark on the junction of the edge of the film and the central skull line. Measure in degrees less than 90 and place the measurement in parentheses next to atlas laterality, where it is marked on the nasium film on the side of atlas laterality.

Technical Changes For Determining Odontoid Laterality (Nasium Film)

The following replaces paragraph 2 page 23 in The NUCCA Basic Course: X-Ray Analysis.

When measuring the C2 odontoid process with the relatoscope, first parallel the instrument's horizontal line located above the grids to the plane line of C1 with the horizontal line of the instrument placed in the area of the lateral masses at or near their upper tips. Next place the relatoscope bilaterally equidistant from the outer edges of the lateral masses of C1, using the vertical lines on the instrument that fit best. Use the instrument scale that agrees with the size of the condylar circle.

Atlas laterality is a combination of side-slip of C-1 and head tilt or turning in the frontal plane. Odontoid laterality refers to the measured displacement of the odontoid in the frontal plane relative to atlas side-slip. In basic types 2, 3, and 4, where head tilt is to the same side as atlas laterality (e.g., left atlas laterality with head tilt into the left frontal plane) the measured value of head tilt is subtracted from the measured atlas laterality to determine the calculated atlas side-slip. When head tilt is opposite to the side of atlas laterality as in some basic type 1's, head tilt is not a computed consideration when determining odontoid laterality. The measured atlas laterality is then considered side-slip.

Once the relatoscope is properly positioned over the atlas, the zero line represents the calculated atlas side-slip. Therefore odontoid laterality is measured relative to the atlas side-slip.

If the odontoid is normal, its center at its base will align with the relatoscope's zero line. This indicates that the odontoid laterality and the C-1 side-slip are equal; that is C-1, the odontoid process, and the relatoscope are equally displaced. By comparing the relatoscope's zero line to the odontoid center, it can be determined in degrees if the odontoid laterality is equal to, greater than, or less than C-1 side slip (Fig. 17).

-Procedure For Determining Odontoid Laterality

-Determine if head tilt is toward the side of atlas laterality.

-If head tilt is to the side of atlas laterality, subtract the measured head tilt from the measured atlas laterality. The difference is the calculated atlas side-slip.

Place the relatoscope over the atlas as per the above instructions.

-The zero line of the relatoscope is now equivalent to the calculated atlas side-slip.

-If the zero line is found to be superimposed over the odontoid center and/or the axis body center, then odontoid and/or axis body center laterality equals atlas side-slip.

An example of right atlas laterality:

If the odontoid center is to the right of the zero line, then the measured number of degrees to the right are added to the calculated atlas side-slip to arrive at the calculated odontoid laterality.

If the odontoid center is to the left of the zero line of the relatoscope, the measured number of degrees to the left are subtracted from the calculated atlas side-slip.

If the difference is great enough, the odontoid laterality may be calculated to be in the opposite frontal plane from atlas side-slip.

Technical Changes in Measuring Axis Spinous Misalignment (Nasium Film)

The following replaces paragraphs 3 and 4, page 23 in the NUCCA Basic Course: X-Ray Analysis.

The relatoscope is also used to measure the position of the axis spinous in comparison to C-1 side-slip. This measurement is vital because C-2 not only misaligns laterally but also rotates into the transverse plane as part of the Atlas Subluxation Complex in the vast majority of cases; its laterality is corrected in the adjustment as part of the nasium vector measurement and its rotation remedied by torque. The axis spinous process may be rotated to a greater degree than C-1 side-slip, to a lesser degree, or be equal to C-1 side-slip. The bifurcation of the laminae of the axis is dotted with a sharp pencil at its apex which is the point of measurement.

If the axis spinous registers a larger degree of rotation to the same side as C-1 side-slip, add the difference to the number of degrees of atlas side-slip. If less, subtract the number of degrees. For example, if C-1 laterality is 2 degrees and the spinous process bifurcation center measures 2 degrees more on the relatoscope scale, the spinous is rotated 4 degrees. If the spinous measures 2 degrees less on the scale, it is zero, not rotated. The position of the spinous process of C-2 on the nasium should always be compared with the position of the neural canal of C-2 on the vertex x-ray for agreement.

Technical Changes in the Atlas Odontoid/Body Center Relationship

The following replaces the first paragraph, page 28 in The NUCCA Basic Course: X-Ray Analysis.

ELEMENT NUMBER TWO: When both the atlas and odontoid/body center laterality are equal, no addition or subtraction is required to the nasium vector. They are listed as zero. This will occur in basic type ones and basic type twos with no head tilt towards the side of atlas laterality. The biomechanical rationale is that both structures are reduced towards normal at equal velocity.

When the odontoid/body center laterality is greater than C1 laterality, add one inch to the nasium vector for the first difference of one degree and one half inch for each additional difference of one degree. This will occur in basic type ones with extremely large lower angles. The biomechanical rationale is to raise the nasium vector to direct the force downward against the axial surface of C2 to move it at a greater velocity than C1.

When C1 laterality is greater than odontoid/body center laterality, subtract one half inch from the vector for each degree that the odontoid is of lesser laterality. This will occur in basic type twos, threes, and fours when the head tilt is towards the side of atlas laterality. The biomechanical rationale is to direct the force into the occipital condyle of the skull to turn the skull towards vertical, therefore helping to correct the head tilt component of atlas laterality.

NUCCA NEWS
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President's Message

The NUCCA May 1991 Convention represented twenty-five years since the founding of NUCCA. Following the Convention's social evening a number of doctors asked me to recall some of my personal highlights with NUCCA over the past twenty-four years. It is difficult to recall all the highlights, both major and minor, of my association with NUCCA. Many times over the years I have had to reflect on the main reason I accepted a director's position on the NUCCA Board.

Approximately one year following my initial attendance at a NUCCA Convention I received a telephone call from Dr. Gregory asking if I would like to become a director of NUCCA.

In the ensuing conversation I asked Dr. Gregory what NUCCA intended to do or accomplish that was different from any of the existing upper cervical associations.

Dr. Gregory's immediate reply was the need for an organization to research the production and reduction of the subluxation. Little did I realize that simple statement would hold me steadfast and committed for the next twenty-four years.

A few short years later I would read in one of the Monographs an editorial by Dr. Gregory outlining NUCCA's policy and position. I feel NUCCA's position and policy should be reflected upon once again. I would like to quote from Dr. Gregory's editorial.

"Both NUCCA and NUCCRA are pursuing a definite course of action. Underlying this course of action is the policy statement, adopted by NUCCA in 1966, which states in effect that chiropractic is predicated upon the restoration principle; the reduction to normal of the misalignment factors of the vertebral subluxation. This includes all methods and systems that reduce to or toward normal the misalignment factors of the vertebral subluxation and which are based upon scientific and acceptable principles of misalignment reductions, i.e., pre-determined and pre-directed processes of correction.

Neither organization is concerned with those differences of opinion existing within the profession over the merits of different techniques. In fact, neither organization is concerned with opinions at all, but they are concerned with data that can be observed, investigated, tested and measured relative to any and all techniques, including upper cervical. The reason that both organizations are "upper cervical" rests on the fact that it is, at present, the area of the spinal column that shows the most promise, the highest potential, in chiropractic research" — Dr. R. Gregory.

Within every organization there exist forces both internally and externally ever attempting to change that organization in order to enhance their own ideas either by dilution or broadening the basic premise on which the organization was founded. It appears that once the organization dilutes or broadens its basic premise, within a short period of time the organization becomes just another group offering and presenting the same ideas that it tried to avoid in the initial step of its founding. "The product becomes the same only the name is different." When this happens the forces that created the situation leave and attach themselves to another group and the process repeats itself again. NUCCA is not exempt from this scenario. Over the short span of twenty-five years NUCCA has weathered these forces a number of times and has become stronger because of its commitment to the basic premise upon which it was founded.

One of the reasons for the profession's present confusion is the consequence of the dilution and broadening of the basic premise by good intentioned forces of personalities lacking in character.

The NUCCA premise predicated upon the restoration principle — the reduction to normal of the misalignment factors of the vertebral subluxation — needs to be repeated again and again. We ask all doctors of chiropractic and chiropractic supporters who are prepared to embrace the NUCCA premise to become partners in NUCCA as we take NUCCA into the future.

Respectfully yours,

Albert A. Berti, D.C.

NUCCA/NUCCRA Calendar of Events

Aug. 10, 1991	Dr. A. Berti to speak at Palmer Homecoming
Oct. 19-22, 1991	NUCCA Fall Educational Conference Life Chiropractic College-West San Lorenzo, California
Nov. 2,3, 1991	NUCCA Elective Course-Palmer College
Nov. 16,17, 1991	NUCCA Elective Course-Palmer College
Dec. 1, 1991	Deadline for Monograph Articles
Dec. 7,8, 1991	NUCCA Elective Course-Palmer College
Dec. 14, 15, 1991	NUCCA Elective Course-Palmer College
Dec. 7-8, 1991	Upper Cervical Conference-Life Chiropractic College Marietta, Georgia
May 23-26, 1992	NUCCA Convention and Educational Conference - Holiday Inn, French Quarter, Perrysburg, Ohio
July 1, 1992	Deadline for Monograph Articles
Oct. 1992	NUCCA Fall Educational Conference - West Coast



Dickholtz Steps Down as Treasurer of NUCCA

Dr. Marshall Dickholtz, Sr., the last active founding board member and officer of NUCCA has stepped down from the treasurer's position. Over the past twenty five years, he has outstandingly fulfilled the interminable duties of his office.

Dr. Dickholtz's decision was influenced by his desire to become more involved in research, lecturing and teaching. He will remain on the NUCCA and NUCCRA boards.

Silver Anniversary The 25th Annual NUCCA Convention

The 25th annual NUCCA convention, co-sponsored by Palmer College of Chiropractic, was held in Perrysburg, Ohio on May 4-7, 1991. The conference was supervised by D.C. Seemann, Ph.D., and J.F. Palmer, M.S., both professors at the University of Toledo. The convention was coordinated by Keith Denton, D.C., and the convention chairman was Otto Portman, D.C.

Once again, the French Quarter Holiday Inn in Perrysburg provided an excellent location for the conference. Attendance was at an all-time high. 20 students took the two day basic course and were instructed by Drs. Keith Denton, Teresa Palmer, and Wayne Clark.

The level of instruction continues to become more focused and refined. Instructors at this conference included Drs. Al Berti, Lloyd Pond, Marshall Dickholtz, Sr., Keith Denton, Lonnie Pond, Ed Stein, Gordon Hasick, Teresa Palmer, Larry Schrock and Wayne Clark.

Once again, Dr. Berti in his presentation of biomechanics and headpiece placement, Dr. Pond in his presentation on adjusting, and Dr. Dickholtz, Sr., in his talk on x-ray technique, all ably explained new material while bringing new light to the body of established material.

Dr. Gordon Hasick presented several talks on management of the NUCCA practice. This was new material for NUCCA and we all look forward to more in the future.

The banquet this year, honored those who have been with NUCCA through the years. Among those so honored were Drs. K. Nakano, M. Dickholtz, Sr. (a board member of NUCCA since its inception), D. Ingram, G. Wentland, and G. Anderson. All of these doctors have been with NUCCA since the beginning in 1966. These pioneers helped to steer the course over the years of definition and growth in the NUCCA organization. The many doctors and students present at the banquet show that there is no shortage of leaders for tomorrow.

NUCCA Board Elections

The general membership re-elected the following board members to serve a two year term: Dr.'s Albert Berti, Marshall Dickholtz, Sr., Lloyd Pond, and Edward Stein. New officers are Dr. Berti, president; Dr. Pond, vice-president; Dr. Keith Denton, treasurer; and Dr. Glenn Cripe, secretary. Directors currently serving terms are Dr.'s Robert Brooks, Otto Portmann, and M. Wayne Clark.

NUCCA at LCCW

By Michael Zabelin, D.C. and George Wentland, D.C.

In the 1991 spring quarter, there were 38 students in the NUCCA class. The students were mainly in the eighth quarter with some special schedule students as well. The class studied x-ray analysis, leg check, patient placement and steps of the adjustment, simulating the actual adjustment on the coordinators. The class also included instruction on the steps in setting up an aligned x-ray machine, along with the attendant advantages of accuracy and radiation dose reduction, and of course the theories and current hypotheses on the importance of reducing the upper cervical subluxation correctly. Students analyzed line drawings as well as actual radiographs, and there was a remarkable consistency in the analysis by a majority of the students. The 1991 summer quarter class begins in July, and the enrollment approaches 25 students.

Enthusiasm for this work is increasing due to the support of both field doctors and the NUCCA organization. In the past year, Dr. Otto Portman of Pullyallup, Washington, toured the campus and spoke to the philosophy classes as well as the NUCCA class and the NUCCA club on campus. Dr. Marshall Dickholtz, Sr., was on campus for an enthusiastically received address to the student body, and equally well-received lectures to the NUCCA class and the NUCCA club.

The 1991 Fall Educational Conference for NUCCA will be held on the LCCW campus in October. Preparations too numerous to list are underway.

Drs. George Anderson and George Wentland have negotiated with Life Chiropractic College - West of San Lorenzo, California to open a NUCCA student clinic adjacent to the present LCCW student clinic but in another building known as the Hayward Professional Building, rooms 125 and 127 at 22455 Maple Court, Hayward, California. The 413 sq. ft. area will house the new Universal MP-300 high frequency generator with two 13 ft. high tension cables, a Eureka Rad 74 x-ray tube with 0.6/1.5 mm focal spots, high frequency, multipulse x-ray output, digital kVp display, and digital mAs display, automatic line voltage compensation, and a Duocon M-150 centering light collimator. All NUCCA procedures can be used on the 0.6 focal spot. High frequency provides up to 40% more mR/mAs than single phase generators, greatly reducing radiation levels.

Dr. Marshall Dickholtz of Chicago negotiated with John MacLennon, vice president of marketing at Universal Imaging, 4014 Grand Ave., in Chicago to place this unit in the NUCCA student clinic and update the machine as new technology appears. Diagnostic Imaging of San Jose, California, the Bay Area Universal Dealer, was assigned by Universal Imaging to set up the unit on an Utterback "L" frame. Dr. Dickholtz flew to the clinic to supervise, as well as align the equipment in the NUCCA manner.

Dr. Wentland trucked the "L" frame, tube column, grid carrier and headclamps from Bedford, Indiana and the new Anatometer II from Monroe, Michigan with the aid of student Paul Harrington as a relief driver. Paul was the first one to x-ray on the new setup. Kenny Treanor, who has taken over the Utterback operation, gave Dr. Wentland an institutional discount on the frame and accessories. Keith and Steve Hodges who manage Diagnostic Imaging in San Jose donated Kevlar cassettes and Rare Earth screens and also installed a Fischer Processor donated by Dr. Wentland. Besides the latest in cassettes and screens, a new carbon fiber covered 150 line fiber interspaced grid made by Smit-Roentgen is on order to help reduce radiation and give better clarity to x-rays.

Dr. Anderson renovated several old Grostic tables and made new headpieces. Dr. Kirk Wentland of Lodi, California supplied the clinic with a Thermoscribe II and Pickup. Office furniture is gradually being donated to complete the setup.

Although the walls are made of 10" concrete, lead panels were purchased to divide the room and dark room passage. Dr. Dickholtz sculptured lead filters and the focal spot lead insert. It took two days for x-ray framing and aligning, but the job was made easier with the help of NUCCA club members Larry Morse, Pres., Terry Erk, Sec., Jack Fischer and Paul Harrington who all did a great job in helping lift, running errands, and being there to learn. With all the necessary equipment in place, we feel we have more of an incentive to do the NUCCA work at Life West.

The NUCCA clinic will be strictly for the use of those students at Life West who want to use NUCCA as an exclusive technique. The rooms will be maintained and supervised by Dr. Wentland, Dr. Anderson and Dr. Zabelin, a NUCCA faculty instructor. The clinic will also be used during the NUCCA fall seminar, October 19, 20, 21 and 22, 1991.

NUCCA/Palmer Elective Course

The National Upper Cervical Chiropractic Association will be conducting the NUCCA elective course at Palmer College of Chiropractic. Dates of the four weekend course are November 2nd and 3rd, November 16th and 17th, December 7th and 8th, and December 14th and 15th.

Upper trimester students and D.C.'s are eligible to take the course. No C.E.U.'s or license renewal credits will be given. Interested D.C.'s should contact special programs at Palmer College. Dr. Ed Stein, 11109 Kent-Kangley Rd., Kent, Washington 98031, is the program coordinator for NUCCA.

NUCCA instructors include: Dr.'s Keith Denton, Monroe, Michigan; Lonnie Pond, Farmington, New Mexico; Marshall Dickholtz, Sr., Chicago, Illinois; Al Berti, Vancouver, British Columbia, Canada; Lloyd Pond, Farmington, New Mexico; Larry Schrock, Covington, Indiana; Ed Stein, Kent, Washington; and Gordon Hasick, Calgary, Alberta, Canada.

The board of directors of NUCCA is very pleased with the success and quality of students completing the course. Upon completion, the students may use the NUCCA procedure in the Palmer Clinic.

Announcements of Practice Openings



Dr. Kurt Sherwood announces the opening of his new office at 607 S.W. Grady Way, Suite 110, Renton, Washington 98055. Dr. Sherwood worked with Dr. Ed Stein the past two years and characterizes his time with Dr. Stein as a valuable experience.

Dr. Sherwood is co-author of "Postural Changes After Reduction of the Atlantal-Axial Subluxation," published in Journal of Chiropractic Research, Vol. 5, No. 4, Summer 1989.



Dr. Robert (Bobbe) Goodman is pleased to announce that he has moved into private practice and association with Dr. Glenn E. Cripe at 601 Dover Drive, Suite #1, Newport Beach, CA 92663.

Dr. Goodman began his studies of N.U.C.C.A. in 1985 through the influence of Dr. Robert Brooks. While enrolled at Palmer Chiropractic University in Davenport, Iowa, Dr. Goodman was President of the N.U.C.C.A. Club and received an outstanding service award from the N.U.C.C.A. organization.

Following graduation from Palmer in 1989, Dr. Goodman accepted an associate position with Dr. Cripe in Newport Beach (N.U.C.C.A. Beach). He is also developing a private practice and holds licenses in both California and Arizona.

Locally, Dr. Goodman is the Chairman of the Newport Beach Chamber of Commerce Health Committee, as well as Chairman of the Newport Health and Sports Exposition. He is currently serving on the N.U.C.C.A. public relations committee.



Dr. Dennis M. Cozzocrea recently assumed the practice of Dr. Wayne Laney in Yakima, Washington. Dr. Cozzocrea is a 1990 graduate of Palmer College of Chiropractic, receiving his B.S. and D.C. degrees at Palmer. Dr. Cozzocrea is originally from the state of New York.

Dr. Laney has taken over the position of Director of Clinical Health Sciences at Sherman College of Straight Chiropractic. He had previously practiced in Yakima, Washington for thirteen years.

Dr. Cozzocrea was also enrolled in the second NUCCA class to be taught at Palmer College and was a member of the NUCCA club. He was also president of the Delta Sigma Chi fraternity and was active in student council, campus guides, SICA, WCCS and various other student organizations.

Dr. Cozzocrea was introduced to NUCCA by Dr. Robert Brooks of Tulsa, Oklahoma and attended several NUCCA conventions while attending Palmer. He completed an internship with Dr. Hugh Crowe of College Park, Georgia.

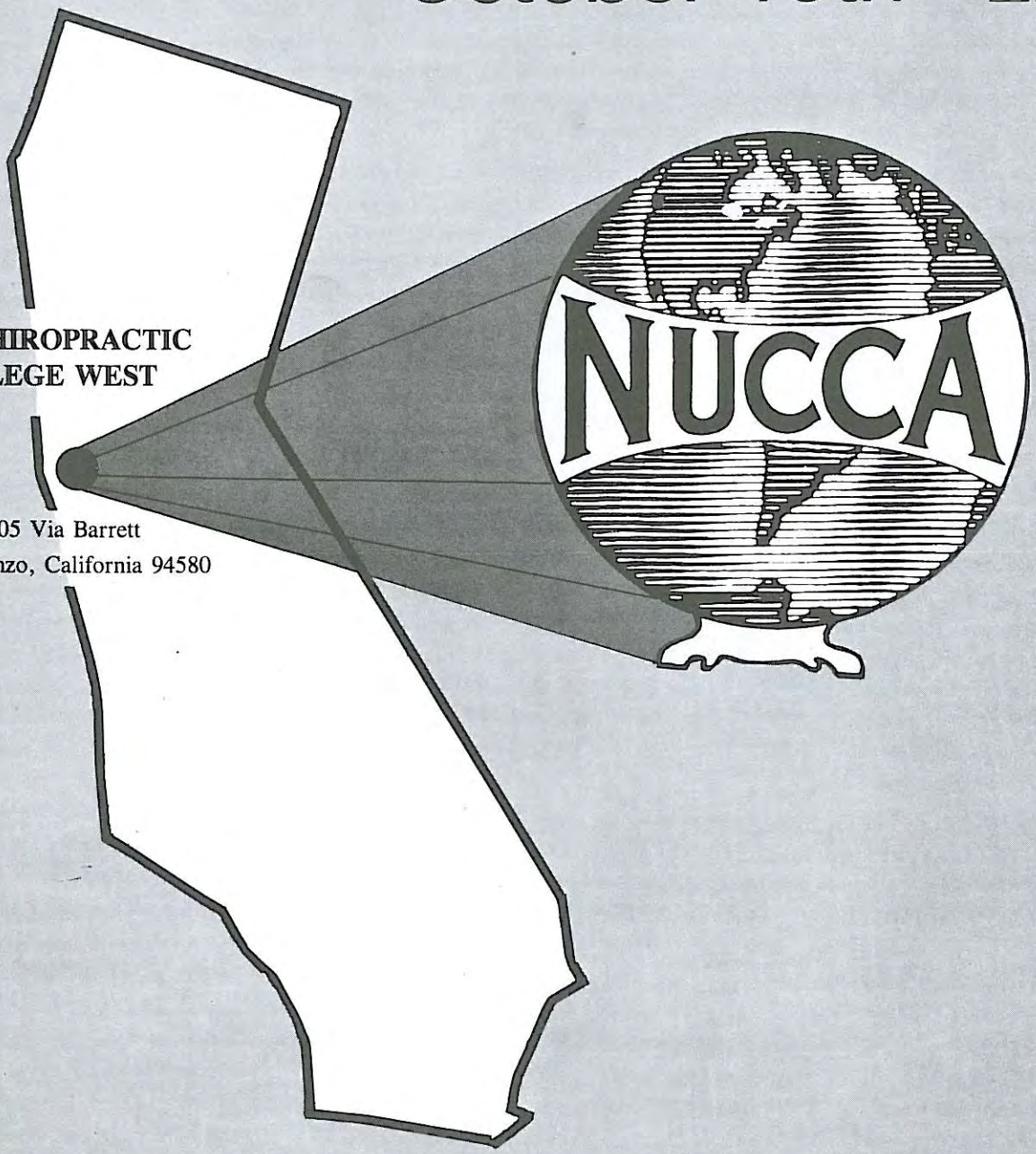


As of December, 1990, Dr. Robert C. Dees has been associated with Dr. William A. Dawson. Dr. Dawson, a 1977 graduate of Cleveland Chiropractic College and one time associate of Dr. Gregory's, is currently practicing NUCCA in Clovis, California. Dr. Dees is a 1990 graduate of Palmer College (Davenport), where he received his B.S. and D.C. degrees. A native of Pittsburgh, Pennsylvania, he received his undergraduate education at the University of Pittsburgh and Montefiore Hospital School of Radiology.

While at Palmer College Dr. Dees was an active member in the professional fraternity, Delta Sigma Chi. He was also the President of the honorary society, Pi Tau Delta. His future plans are to open a practice on his own or to purchase an existing upper cervical practice. He can be reached at 540 E. Nees #228, Fresno, California 93720.

1991

FALL CONFERENCE
October 19th - 22nd



LIFE CHIROPRACTIC COLLEGE WEST

2005 Via Barrett
San Lorenzo, California 94580

Celebrating 25 years of Excellence in Chiropractic, Education, Research and Patient Care. Dedicated to advancement, preservation and perpetuation of Chiropractic as a healing art.

1991 NUCCA FALL SEMINAR

Advanced Doctor's Schedule

October 19 - 22

Saturday, October 19	Sunday, October 20	Monday, October 21	Tuesday, October 22
8 - 9 a.m. **Registration**	8 - 9 a.m. **Video - Adjusting**	8 - 9 a.m. **Video - Four Basic Types**	8 - 9 a.m. **Video - Adjusting**
9 - 9:30 a.m. **Seminar Kick-Off**	9 - 10:30 a.m. **Advanced Biomechanics***	9 - 10 a.m. **Headpiece Placement and Leg Check Procedures***	9 - 11 a.m. **Problems from the field for the field doctors***
9:30 - 11 a.m. **Advanced Adjusting***	10:30 - Noon **Doctor's Choice** 1. Adv. Biomechanics 3. Adjusting 5. Basic Biomechanics	10:30 - Noon **Doctor's Choice** 2. Basic Biomechanics 3. Adjusting 5. X-ray Analysis	11 Noon **Seminar Summary**
11 - Noon **Doctor's Choice** 1. Adv. Biomechanics 2. Basic Biomechanics			
Lunch 12 - 1:30	**Lunch 12 - 1:30**	**Lunch 12 - 1:30**	
1:30 - 3 p.m. **X-ray Error in the Analysis of Film***	1:30 - 3 p.m. **Research Update***	1:30 - 3 p.m. **Neurological Components of the ASC***	
3:15 - 4:45 **Doctor's Choice** 1. Adv. Biomechanics 3. Adjusting	3 - 4:30 p.m. **Doctor's Choice** 2. Basic Biomechanics 3. Adjusting 4. Headpiece/Leg Ck. 5. X-ray Analysis	3:15 - 4:45 p.m. **Doctor's Choice** 1. Adv. Biomechanics 4. Head piece/Leg Ck. 6. X-ray Placement	
4:45 - 5 p.m. **Program Feedback**	4:45 - 5 p.m. **Program Feedback**	4:45 - 5 p.m. **Program Feedback**	
Evening Program	**Evening Program**	**Evening Program**	
Open	7:30 - 9 p.m. **NUCCA Practice Management***	7:30 - 9 p.m. **Video-Errors in Adjusting the ASC**	

Doctor's Choice

1. Advanced Biomechanics
2. Basic Biomechanics
3. Adjusting
4. Headpiece placement / Leg check
5. X-ray Analysis
6. X-ray Placement

NUCCA Certified Doctors

1. Berti
2. Cripe
3. Denton
4. Dickholtz
5. Hasick
6. Palmer
7. Pond LI
8. Pond Lo
9. Schrock
10. Stein

Summary of Hours

Doctor's Choice	8.5
Film Lectures	4.5
Colloquium	13.0
	26.0 hrs.

* Denotes lecture

1991 NUCCA FALL SEMINAR

Basic Doctor's Schedule

October 19 - 22

Saturday, October 19	Sunday, October 20	Monday, October 21
9:30 - 4:45 p.m. **Basic Course in X-ray Analysis**	9 - 10:30 a.m. **Review of X-ray Analysis**	9 - 10 a.m. **Headpiece Placement and Leg Check Procedures***
	10:30 - Noon **Basic Biomechanics**	10 - Noon **Basic Adjusting**
	1:30 - 3 p.m. **X-ray Placement**	3 - 4:30 p.m. **Headpiece Placement**
	3 - 4:40 p.m. **X-ray Analysis***	
4:45 - 5 p.m. **Program Feedback**	4:45 - 5 p.m. **Program Feedback**	4:45 - 5 p.m. **Program Feedback**
	*** Denotes part of the ongoing Advanced Course**	

The 1991 Fall Educational Conference

Life Chiropractic College West
2005 Via Barrett, San Lorenzo, CA 94580

The National Upper Cervical Chiropractic Association and Life Chiropractic College West proudly present the 1991 Fall Educational Conference to be held on campus at LCCW. The conference runs from 9:00 a.m. Saturday, October 19th through 12:00 p.m. Tuesday, October 22, 1991.

Supervising the conference will be Daniel C. Seemann, Ph.D., The University of Toledo. Program Co-ordinator is Dr. Ed Stein of Seattle, Washington. The Convention Chairman is Dr. George Wentland of Red Bluff, California.

Special emphasis for advanced doctors will be biomechanical theory and advanced problems, adjusting, and headpiece placement of the four basic types. Subjects will also include vectorial adjusting, resistances in the C-1 subluxation, leg checking exercises, x-ray alignment and patient placement. New doctors will be separated from advanced doctors during most of the seminar with emphasis on x-ray analysis, biomechanical theory, adjusting, x-ray placement and leg checking exercises.

License renewal is applied for in most states. Not all states approve all courses; therefore, you should check with your own state to see if individual courses are acceptable for license renewal. Participants at the conference who require license renewal must have their license number and be monitored each session.

Professional fees are $450.00; doctors in practice for two years or less, $250.00; and students are $150.00. A $25.00 fee is added for late registration. Please make your check payable to **NUCCA** and send to

NUCCA
217 West Second Street
Monroe, Michigan 48161

Phone: (313) 241-5755
Contact: E. L. Denton, Executive Secretary

1991 FALL APPLICATION FORM

Name _____ **Check here if this is your first NUCCA Seminar**

Address _____ Zip _____

Years in Practice _____ Student _____ School _____

DEADLINE: September 6, 1991 Make check payable to **N.U.C.C.A.**
Mail to: 217 West Second Street, Monroe, Michigan 48161

Please make your own motel reservations:
Executive Inn (415) 732-6300 or The Vagabond Inn 1-800-522-1555

Motel rooms have been reserved at **The Executive Inn**, Hayward and **The Vagabond Inn.**
Executive Inn - (800) 553-5083 or (415) 732-6300
Vagabond Inn (800) 522-1555

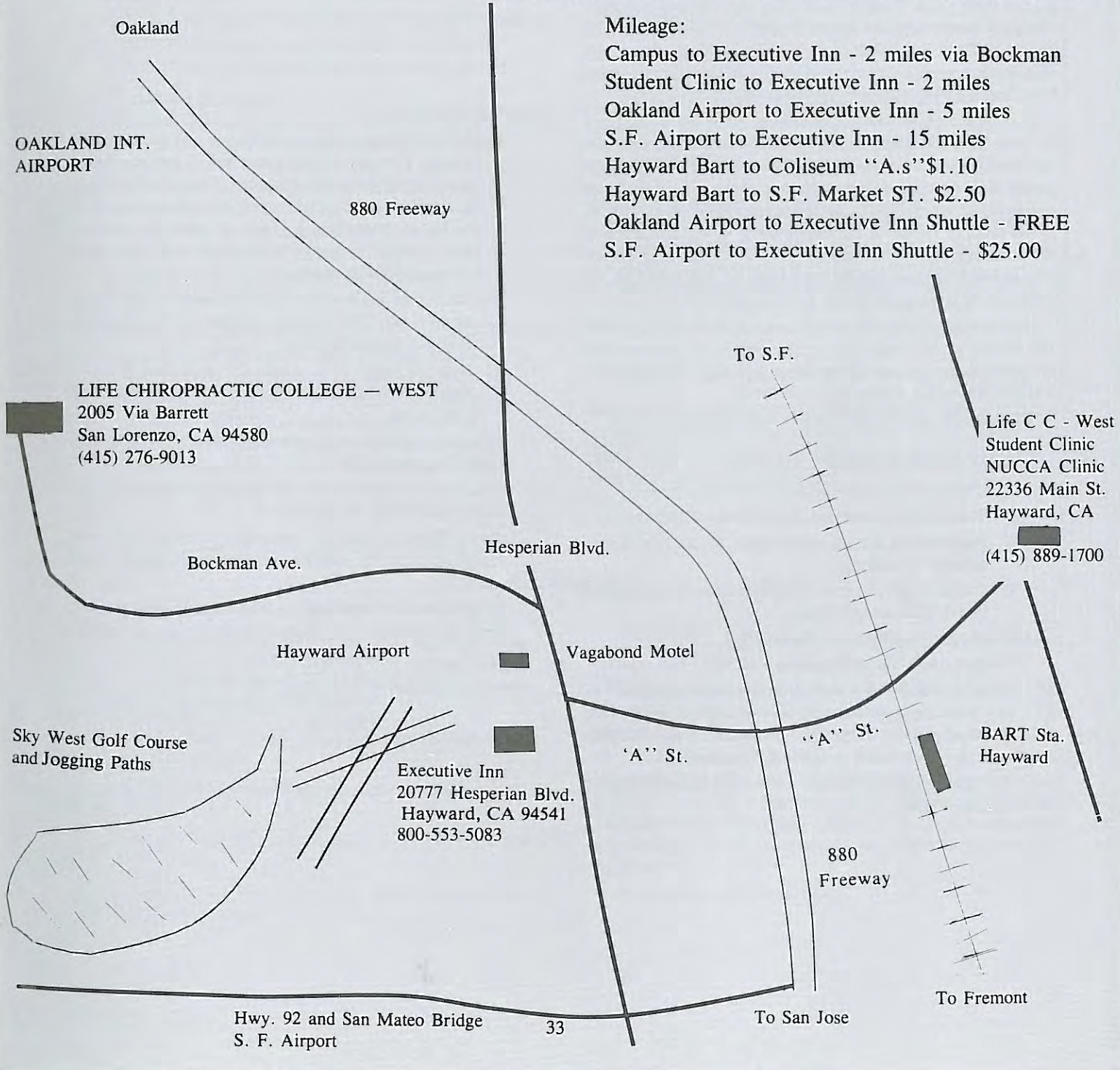
Both motels offer courtesy shuttle service from Oakland International Airport and shuttle service to Life College.

NUCCA has arranged for discounted air transportation and car rental. To book the air transportation, please contact **ALL ABOUT TRAVEL, INC.,** at **1-800-872-8350** and ask for either Grace Bialkowski or Bob Garza. Office hours are 9:00 a.m. - 5:30 p.m., Monday through Friday, C.S.T.

"Atlas" Rent-A-Car System is located at The Executive Inn Motel. They are giving a seminar special with free mileage. Phone: (415) 352-8400.

LIFE CHIROPRACTIC COLLEGE — WEST LOCATIONS

Mileage:
Campus to Executive Inn - 2 miles via Bockman
Student Clinic to Executive Inn - 2 miles
Oakland Airport to Executive Inn - 5 miles
S.F. Airport to Executive Inn - 15 miles
Hayward Bart to Coliseum "A.s" $1.10
Hayward Bart to S.F. Market ST. $2.50
Oakland Airport to Executive Inn Shuttle - FREE
S.F. Airport to Executive Inn Shuttle - $25.00



NUCCA Certification

A certification program has been initiated by the National Upper Cervical Chiropractic Association, Inc. (NUCCA). The purpose of the program is to NUCCA-qualify doctors in the NUCCA work and establish a set of standards for all NUCCA doctors to maintain. Doctors who successfully complete the program will be eligible to qualify as instructors in the NUCCA procedures. Examinations will be given at NUCCA seminars and conventions. Doctors who desire to take the examinations must make application to the certification committee one month prior to the seminar or convention date.

Doctors who wish to be NUCCA-certified must meet the following prior conditions: (1) be in practice for a period of at least three years; (2) have possession of, or access to, equipment and instrumentation recommended by NUCCA; and (3) permit NUCCA inspection of their office facilities. The entire examination must be completed within a three year period. Certificates will be issued to successful candidates.

Doctors who have not engaged in practice for three years but who have attended NUCCA seminars are eligible to take the examination or examinations which cover a three year period. A fee is charged for each examination. There are three examinations which must be passed in order to become certified. In the event of failure of the examination, or any part thereof, the candidate is re-examined on the part of the examination that is failed without paying an additional fee, provided re-examination takes place within a one year period.

Certification will be evaluated every three years and certified doctors will be requested to either take an oral examination on updated data or provide evidence that they have attended a NUCCA seminar at least once each year.

The examination is in three segments, as follows:

1. X-RAY AND INSTRUMENTATION
   - A. Understanding of x-ray alignment procedures
   - B. Theory about distortion, magnification, collimation
   - C. Produce five sets of consecutive pre-cervical x-rays suitable for analysis
   - D. Submit a set of x-ray alignment films as designated by NUCCA x-ray outline
   - E. Examination on x-ray procedures
   - F. Examination on instrumentation

   Parts A and B are a written examination composed of one hundred questions with a passing grade of 85. The practical portion, Parts C, D, E, and F cannot be taken until the written part is successfully completed.

   The fee for Segment 1 is fifty dollars and must be included with the application.

2. FILM ANALYSIS, BIO-MECHANICS AND ADJUSTING
   - A. Knowledge of osseous structures, bio-mechanics and adjusting. Written examination of 100 questions. Passing grade of 85.
   - B. Submit five consecutive pre-sets of analyzed cervical spinal x-rays. The analysis must be the analysis outlined by NUCCA. The x-ray analysis must pass an inter-observer reliability of .90.
   - C. Examination of film analysis.

   Parts B and C can not be submitted or taken until Part A is passed. X-ray sets from Segment 1 cannot be submitted for Segment 2.

   The fee for Segment 2 is one hundred dollars and must be included with the application.

3. ADJUSTING
   - A. Submit ten sets of consecutive pre and post cervical x-rays. The post x-rays presented to the examining board should be those taken after the initial adjustment. Reduction in the misalignment factors must be 85% or better. Reduction in cases of gross or abnormal misalignment factors to be evaluated at the discretion of the examining board.
   - B. Submit an outlined work-up for each of the above set of x-rays. The work-up outline is to be requested from the examining board.
   - C. Oral examination in which the candidate is given various listings for which he is to explain reduction procedures.

   The ten sets of x-rays submitted cannot be x-ray sets from Segments 1 and 2.

   The fee for Segment 3 is one hundred dollars and must be included with the application.

   Each Segment must be successfully completed before application can be made for the following Segment examination.

   Application for certification examinations must be submitted one month prior to seminar or convention date to:

   Dr. Albert Berti
   200 - 3825 Sunset Street
   Burnaby, B.C., Canada
   V5G 1T4

NOTICE

The NUCCA Board of Directors has decided to make the NUCCA collection of video tapes available to members. The price for tapes has been set at $100.00 per classroom hour. The entire set may be purchased for a discounted price of $795.00, or individual tapes may be purchased at prices listed below. Available titles include:

Osseous Structure Identification (45 min.) .....$ 90.00
This tape depicts the various bony structures involved in the NUCCA x-ray analysis. Included are structures that present analytical problems. X-rays of live and dry specimens are used.

NUCCA X-ray Analysis (60 min.) $100.00
Step-by-step procedure of the NUCCA analysis using x-rays of live specimens.

Leg Check and Headpiece Placement (45 min.) .....$ 90.00
Leg Check describes the planes of reference and how to align the examiner's body for accurate checking. Models and patient used. Errors are discussed. *Headpiece Placement* briefly describes the biomechanics of the correction of the four basic types. Center of Gravity of the skull and its placement on the three types of headpieces is shown.

Adjusting the A.S.C. (3½ hrs.) $300.00
Step-by-step procedures used to align the adjustor's body in addressing the various A.S.C.s. Includes the most common errors in each phase. Outline of video follows early *Monographs,* Vol. 1 No. 3 through Vol. 2 No. 4. Film includes various steps for posterior rotations and low vector listings.

Errors in Adjusting the A.S.C. (2 hrs.) $200.00
Complements *Adjusting the A.S.C.* This tape describes errors in adjusting, what causes them, and how to correct them.

Patient Placement For X-ray (45 min.) .....$ 90.00
Precision placement of the patient for the lateral, vertex, and nasium views are discussed.

X-ray Alignment (45 min.) .....$ 90.00
Step-by-step procedure used to align cervical x-ray equipment to N.U.C.C.A. standards. To be used with the N.U.C.C.A. X-ray Alignment booklet.

Biomechanics of The Four Basic Types (1 hr.) $100.00
Detailed discussion of the production and correction of The Four Basic Types of A.S.C.s. Headpiece placement and lever system shown in detail.

Questions And Answers, A Self Evaluation For Adjusting The A.S.C. (1 hr.) $100.00
Follows Monograph Vol. 3, No. 9 and No. 10. A chronological order as a guide for the adjustor when practicing the C-1 or triceps pull adjustment. By self-questioning, based on this tape, the adjustor is alerted to the adjusting steps he/she may have neglected or does not know, and the order in which the steps should be performed.

High quality video tapes have been used for reproduction, which carry a lifetime guarantee. Please specify BETA or VHS. Allow 4-6 weeks for delivery. Prices are subject to change with cost of reproduction.

NOTICE

Five patient education pamphlets are now available from NUCCA. The cost is $30.00 per hundred which includes postage and handling. All pamphlets must be paid for in advance due to our non-profit status.

1. *A Patient Guide,* (yellow), explains step by step office procedure to new patients.

2. *Questions and Answers,* (yellow), answers questions most frequently asked.

3. *A Patient Guide,* (green), explains what every patient should know.

4. *The Adjustment and the Patient,* (blue), explains the adjustment and how it works.

5. *The NUCCA System of Chiropractic,* (white), for patients, doctors, and students, explaining the NUCCA system.

Three new booklets have been published by NUCCA. The first booklet details the NUCCA x-ray analysis procedure: *The NUCCA Basic Course: X-ray Analysis;* the second booklet, *The NUCCA Advanced Course: Biomechanics,* explains the biomechanics of The Atlas Subluxation Complex, and the third booklet, *The NUCCA Course: Adjusting The Atlas Subluxation Complex* details the phases and steps of the C1 adjustment and explains *The Standing Positions.* A glossary of terms is included.

Each booklet sells for $15.00.

NUCCA Scholarship Awards

The NUCCA Board has approved the continuation of the $250.00 scholarship grant-in-aid for another two years, this sum to be paid to any chiropractic student currently enrolled in a chartered college of Chiropractic who submits to the **Monograph editor** an article pertaining to the upper cervical spine.

Submitted articles may deal with any aspect of the occipital-atlanto-axial area of the cervical spine: mechanics, neurological manifestations, analyses of cervical subluxations, detrimental effects of upper cervical subluxations on the human organism, and the like.

All entries will be judged by the NUCCA Directive Board and by Dr. Daniel C. Seemann of the University of Toledo. Their judgement will be final. Acceptable articles become the property of the NATIONAL UPPER CERVICAL CHIROPRACTIC ASSOCIATION, INC. (NUCCA). Winners will be announced at the following NUCCA convention.

NUCCA will attempt to return all submitted manuscripts that are accompanied by a self-addressed, stamped envelope. NUCCA will not be responsible for lost or mislaid material.

Further information is available by writing the Monograph editor, 217 West Second Street, Monroe, Michigan 48161.

The Ralph R. Gregory/ Ruth O. Gregory Research Funds

The Board of Directory of NUCCRA voted to combine the Ralph R. Gregory and the Ruth O. Gregory Memorial Research Funds. The perpetual funds shall be used to further research projects as deemed appropriate at the discretion of the Board of Directors of the National Upper Cervical Chiropractic Research Association. All donations are tax deductible.

Donors to this fund include:

Helen Fair Estate	Texas
Dr. Mary Thomas	California
Dr. S. Dickholtz	Illinois
Dr. R. Goodman	California
Dr. M. Tao	California
Dr. S. Nakano	California
Dr. R. Pull	California
Dr. A. Tomp	California
Dr. K. Nakano	California
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