THE UPPER CERVICAL MONOGRAPH

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C1 Subluxations, Short Leg and Pelvic Distortions

by Daniel C. Seeman October, 1978

INTRODUCTION

There has been considerable discussion over the past 100 years about the assessment of short leg discrepancy and the resultant pathology. Hilton (1863) indicated a need for "careful measurements" of the short leg. He felt the incidence of short leg occured frequently and was usually overlooked by medicine. He felt that a leg shortening of 6.25 mm could cause symptoms. Modern day researchers have been at variance over the types of assessment used and to what extent the short leg discrepancy can cause symptoms.

Judovich & Bates (1949) measured short leg discrepancy while the patient stood erect in the weight bearing position and palpated the iliac crests to determine the side of the short leg. They also used a more accurate method of determining short leg which was a fluoriscopic screen positioned in front of a standing patient. A rigid wire which could be raised or lowered on the screen was lined across the iliac crests. If the legs were even, both crests would touch the wire. If they were not, lifts were placed under the heel of the short leg until the lateral tilt was straight. Judovich & Bates noted that occasionally a patient's lumbar spine would tilt to the opposite side instead of toward the short leg. Raising the short leg in this instance would aggravate the pain and would be contraindicated. The authors also felt that 3/8 (9.375 mm) of an inch or more shortening could cause chronic back pain.

Clark (1972) was concerned about the accuracy of the measurement of the .short leg and compared X-ray (crest of the femus), iliac crest palpation and tape measure (anterior/superior iliac spine to the tip of the medial malleolus). Fifty patients who were known to have a short leg were assessed using the three different measurements. If the palpation and tape measure methods were within 5 mm of the X-ray findings, the particular method was considered to be in agreement. The results indicated that the palpation method agreed in only 32% of the cases and the tape measure agreed in only 40% of the cases. Clark concluded that the tape measure and iliac palpation method of assessing short leg is inadequate especially when measuring to the nearest ¼" to ½". His findings tend to support Rush & Steiner (1946), Nichols (1960) and Stoddard (1954) that a leg asymmetry of 10 mm or over, needs to be present before low back pain is realized in patients.

Fisk and Baigent (1975) attempted to find a reliable clinical method of assessing short leg in order to eliminate the need for excessive X-ray exposure. They compared the iliac palpation procedure with the radiological method used by Clark (1972). They came to the same conclusions as Clark, the X-ray procedure was far more accurate than the palpation method. Although they failed to find a reliable substitute for the X-ray method of assessing short leg, they made helpful suggestions about measuring short leg more accurately. For example, they found that when measuring patients in a standing position, greater accuracy was realized when the feet were set from 15 cm - 20 cm apart. With this procedure the hip joints were approximately above the feet, forming a rectangle. This tended to stabilize the relative height of the anterior superior iliac spines. They noticed that most patients with a short leg compensate by tilting the pelvis on the side opposite to the short leg. They also found that a certain degree of pelvic tension occurs which concurs with Bourdellon's findings (1973). The torsion is thought to be due to unilateral muscle spasm. In their summary, they felt a moderate degree of leg length difference did not cause low back pain.

Another method of assessing short leg discrepancies which is used by many upper cervical chiropractors is called the supine leg check. No one is sure when the method was adopted, but B.J. Palmer supposedly rejected the supine leg check as an inappropriate procedure. Gregory and Grostic began using this system of leg check in 1941. The basic procedure is to check the patient's leg while the patient is resting in a supine position on an adjustment table that is 12 inches above the floor. The head, body and legs are aligned to insure perfect symmetry on the table. The observer in a crouched position and with the heels of the patient in either hand, determines the leg discrepancy. This procedure is used to determine the extent of a short leg in a pretreatment examination and is also used in a post treatment examination. Successful upper cervical chiropractors do not use leg lifts to balance the pelvis. By reducing the cervical subluxation to its normal position it has been found that the short leg will return to its uncontractured length. An eighth of an inch or 3.25 mm was considered enough to cause back pain.

Other chiropractic investigators (Johnson, 1961, and Jenners et. al., 1974) while not concerned with leg shortness, investigated the effects of

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gravity on posture. The value of their research with regard to short leg discrepancy may be with understanding the gravity line in relationship to the short leg.

A summary of the literature reveals that the most accurate method of measuring short leg discrepancy, currently, is measuring the crest of the femur by X-ray. The tape measure method and palpation of the iliac crests were both found to be too gross of a measure to be accurate or reliable. The supine leg check although a subjective measurement seems to be superior to the tape measure and palpation methods.

There also is disagreement between the medical researchers and the upper cervical researchers as what degree of leg shortness cause symptoms. The medical researchers feels a minimum of 10 mm can cause symptoms whereas the upper cervical researchers feels that 3.25 mm can cause problems.

THE PROBLEM

A review of the literature reveals there are still several problems concerning the measurement of the short leg and its resultant pathology. Although the X-ray method as suggested by Clark (1975) is probably the most accurate of the methods discussed, a need for further evaluation is apparent. The most obvious problem is the unnecessary X-ray exposure to the patient and ensuing cost in time to the practitioner. Another problem is the lack of precision in measurement by the X-ray method. Fisk and Baigent (1975) indicate that people with short legs will compensate by tilting their pelvis on the side to the short leg. People with short legs also experience a certain degree of torsion in the pelvis. The torsion and tilt cannot be differentiated from the actual leg shortness during the film analysis, because of the one dimensional presentation of the X-ray film. The reader interprets actual leg shortness as a combination of leg shortness, pelvic tilt and torsion. This information would seem important for practitioners who use leg lifts as corrective therapy, because the tendency may be to incorrectly prescribe the proper thickness of the leg lift for the patient.

RESULTS OF EARLY ANATOMETER RESEARCH

The present study is the result of a concern the writer and Dr. Gregory have had with the accuracy in measuring the short leg and demonstrating a relationship between C-1 subluxations and pelvic distortions.

Upper cervical chiropractors are not directly concerned that a short leg will cause low back problems. A short leg indicates to an upper cervical chiropractor that the patient has nerve pressure caused by a subluxated C-1 vertebra. The theory is the leg shortness is caused by an overgenerated nerve flow to the contractured leg. This concept has not been generally understood by other health care practitioners, but it is a fact that a leg that is short will return to the same level as the other leg if a proper adjustment of C-1 is made. A need to determine greater precision in measuring short leg prompted the development of an instrument that might accomplish this goal.

The original intent of the project was to design an instrument which would eliminate the "subjectivity" used in checking legs in the supine position. It was found there was too much variability with the practitioners. It was felt, if the leg differences could be compared with some sort of scale where the practitioner could read a precise measurement, the "perceptual bias" could be eliminated.

It was also decided that the patients would be measured in a standing position because the gravitational forces are greater in the standing position. The forces of gravity on the spinal ~~cord~~ COLUMN in the supine position are approximately 30 lbs. per sq. in. whereas in the standing position the gravity stress ranges from 190-300 lbs. per sq. inch. The investigators felt the patient should stand while being measured.

The project began in early 1972 and has continued until 1977. The thrust of the early research with the instrument which had been named the ANATOMETER was to confirm its reliability and validity. If a patient was found to have a short leg (usually determined by a supine leg check) the anatometer would show a leg discrepancy also. But the anatometer also showed more: it showed that most people with short legs also have pelvic distortions; it also showed that some people will have a high iliac crest on the side of the short leg.

Figure 1 shows the final prototype of the ANATOMETER. The patient is positioned on foot pedals which can be raised or lowered. The measuring device is located posterior to the patient and can be moved and locked to accommodate a large range of patient sizes. The arms from the measuring device are placed on the crests of the ilium. Two measurements are recorded: The frontal plane displacement and the transverse plane displacement registered in degrees. The movable foot pedals allow the researchers to mechanically balance the pelvis by raising the appropriate pedal to the precise height required for the balance.

The importance of setting the feet apart while measuring the patient was early realized because it was found that measurements became unreliable if certain minimum separations were not maintained. It was finally reasoned that the width of the foot placement should be based on a line drawn from the foot through the ar-

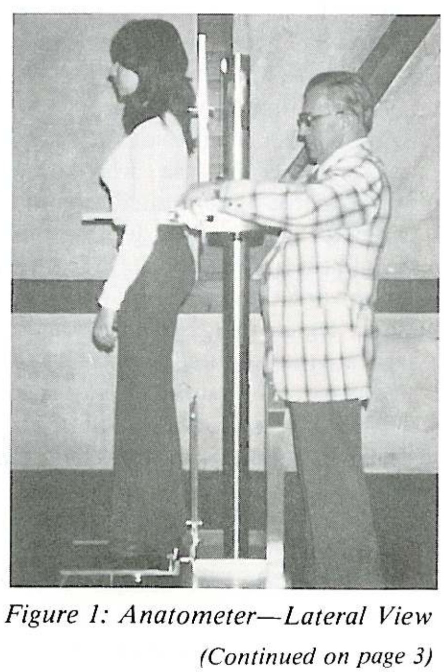

Figure 1: Anatometer—Lateral View

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ticulation of pelvic lever and crest of the ilium. Figure 2 illustrates this concept. The range of settings for the foot placement on the Anatometer for the adult population ranges from 7-12 inches.

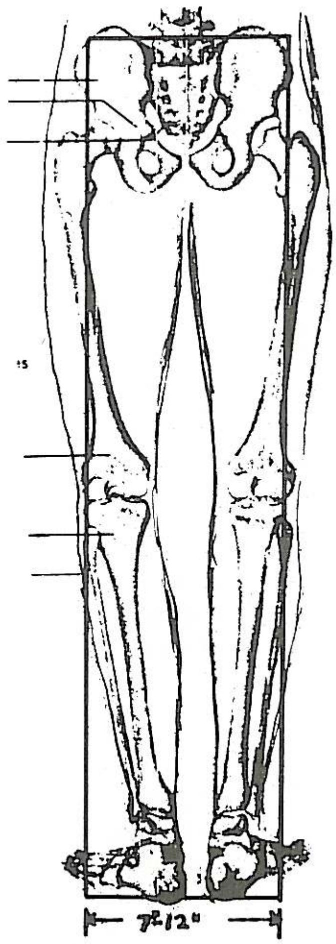

Figure 2: Illustration of Foot Placement on Anatometer

The anatometer revealed that when a patient had a short leg, the pelvis would shift into the frontal plane or into the transverse plane or both. A pilot study showed that the most frequently occuring shift was to both planes, the second, was to the transverse plane only and the least occuring shift was into the frontal plane only. Figures 3, 4, 5 illustrates the shifts that can occur with a short leg.

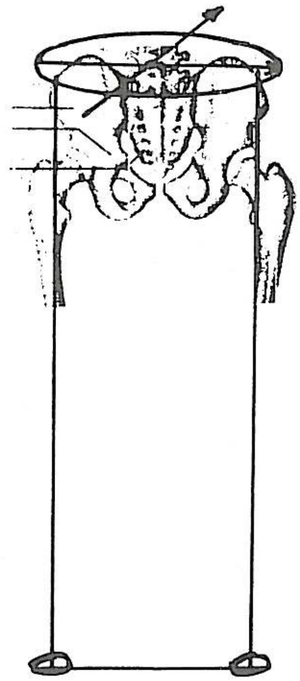

Figure 3: Pelvic Shift into the Transverse Plane only

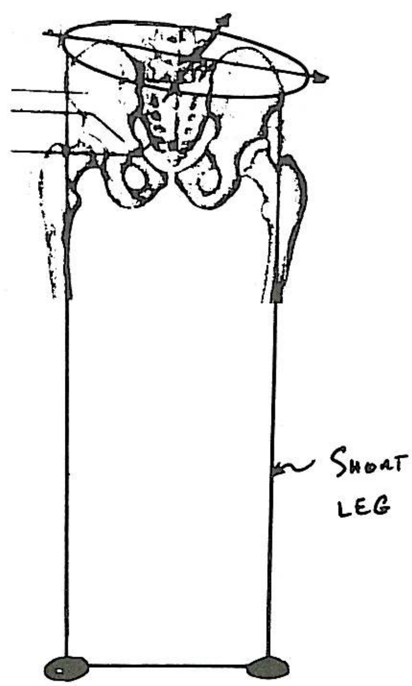

Figure 4: Pelvic Shift into the Frontal Plane only

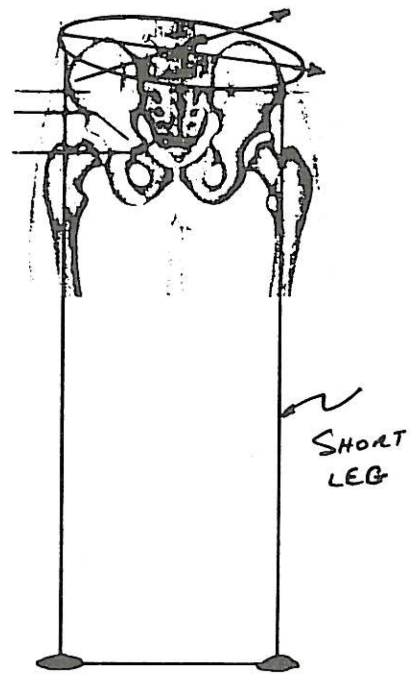

Figure 5: Pelvic Shift into the Frontal and Transverse Planes.

The anatometer proved to be a reliable measuring instrument and satisfied the needs not met by other methods of assessing the short leg. The need for X-ray measurement was eliminated, and more precision in measuring the pelvic distortion was realized.

The second part of the pilot study was concerned with relating the C-1 subluxation to the short leg and pelvic distortions. It was noted earlier that after a successful adjustment of the C-1, the short leg would resume a normal length. Taking pre and post treatment anatometer readings revealed similar findings. If the atlas had been successfully reduced in both planes, the frontal and transverse planes as measured on the anatometer would also register 0°. If the atlas had not been successfully reduced in either plan, the anatometer would also show the discrepancy. This information was invaluable to the practitioner in determining the effect of the adjustment.

This information was also a clue to the appropriateness of using plane lines in measuring biomechanical distortion. It seemed that the body's

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normal biomechanical position when not under stress was zero. When the pelvis was in a stress position, there was usually accompanying pain for the patient.

Occasionally patients would have a short leg and the resultant pelvic distortion, but no back pain which other researchers have noted (Steiner, 1940; Stoddard, 1955; and Nichols, 1960). In these cases, pain or numbness would usually manifest in the cervical or brachial plexus regions. If the nerve pressure was relieved by an adjustment, the short leg and the pelvic distortions would disappear and the cervical/brachial pain or numbness would stop.

If nerve pressure is present at the C-1 level, it is a logical premise to assume that pathology could occur at either the lumbar region or the cervical/brachial plexus area because the largest concentration of nerves are found in either of these two locations. As to why some patients register pain in the upper regions and not in the lower regions is not fully understood. A partial explanation may be with the type of subluxation that is produced; by the combinations of laterality or rotation with certain types of lower angles. Usually the fifth and sixth cervical vertebrae will be juxtaposed differently than other cervical vertebra with cervical/brachial pathology. The system of analysis used in determining the presence or absence of a subluxation of the C-1 was developed by Grostic and Gregory and further refined by Gregory over the past several years. The major components determined from an X-ray film, are laterality, rotation, and lower angle. Figure 6 illustrated the analysis of the nasium film which determines the laterality and the lower angle components.

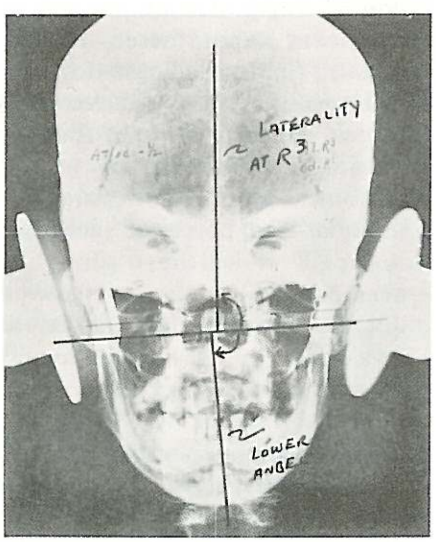

Figure 6: Laterality and Lower Angle Determined by X-ray Analysis.

PURPOSE OF STUDY

The purpose of this study was to compare the findings of the pilot study with other research/practitioners who adjusted the C-1; used the NUCCA system of X-ray analysis; and who used the ANATOMETER to measure pelvic distortion and short leg. It was necessary that an external validity be established for the ANATOMETER and that the relationship between C-1 subluxations and pelvic distortions be field tested.

Two questions were asked in the study. First, if laterality as measured by the film analysis reduced to zero or tended toward zero after adjusting the patient, would the corresponding frontal plane distortion as measured by the Anatometer also reduce to zero or tend toward zero? Second, if rotation as measured by the film analysis reduced to zero or tended toward zero, would the corresponding transverse plane distortion as measured by the Anatometer also reduce to zero or tend toward zero?

The questions do not ask if right laterality of the C-1 corresponds with the right frontal plane of the pelvis distortion. The pilot study indicated this did not occur.

The questions stated in hypotheses form, therefore are:

1) There will be a positive relationship between C-1 laterality and pelvic distortion in the frontal plane. As the C-1 laterality tends toward zero, pelvic distortions in the frontal plane will tend toward zero
2) There will be a positive relationship between C-1 rotations and pelvic distortions in the transverse plane. As the C-1 rotations tend toward zero, pelvic distortions in the transverse plane will tend toward zero.

METHOD

Subjects:

The participants were patients of four practitioners from Monroe, Michigan; Chicago, Illinois; Vancouver, British Columbia; and Farmington, New Mexico. There were 355 patients used in the study. Each patient chosen for the study was a new patient not familiar with the adjustment or measurement procedure in each of the four offices. Patient tenure was determined by the success of the adjustment and the response of the patient.

All of the patients had short legs and pelvic distortions prior to the adjustment. All complained of either low backache or brachial/cervical problems prior to the adjustment.

Apparatus:

Each of the four adjusters used the following equipment: an adjusting table; an anatometer, X-ray equipment and reader box, and neurocalograph.

Procedure:

The adjusters were asked to keep specific pre and post treatment information about each patient. During the first meeting with the patient, a neurocalograph check, a leg check, an Anatometer reading, and X-rays were taken. After the adjustment to the C-1 was made, the leg check, anatometer reading and post X-rays were taken. With successive visits, the same series of measurements were taken except for the X-ray.

As the new patients were released from the practitioner's care, the data was forwarded to the writer for computation.

RESULTS

Table 1 shows the relationship between C-1 laterality as measured by X-ray and pelvic distortion in the frontal plane as measured by the ANATOMETER. As the adjusted C-1 laterality reduced to zero the corresponding frontal plane distortions also reduced to zero. As noted, all

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355 patients responded in a like manner. In no cases did the pelvic frontal distortion increase as a result of the C-1 laterality decreasing.

TABLE 1

As C-1 Laterality (X-ray) Decreases, Pelvic Distortion in Frontal Plane Decreases (Anatometer).

	Yes	No
Laterality	355	0
Frontal	355	0

TABLE 2

As C-1 Rotation (X-ray) Decreases Pelvic Distortion in Transverse Plane Decreases (Anatometer).

	Yes	No
Rotation	353	2
Transverse	349	6

Table 2 shows the relationship between C-1 rotation as measured by X-ray and pelvic distortion in the transverse plane as measured by the Anatometer. As indicated, in 353 cases the adjuster was able to decrease the laterality and in 2 cases he was unable to reduce laterality. Of the 353 cases where laterality was decreased, pelvic distortion in the transverse plane decreased in 349 cases.

Both hypotheses were supported in the study. There was a perfect relationship between C-1 laterality reducing toward zero and pelvic distortion in the frontal plane reducing to zero. There was almost a perfect relationship (99%) between C-1 rotation reducing toward zero and pelvic distortions in the transverse plane reducing toward zero.

Discussion

The results of this study suggest a casual relationship between the C-1, pelvic distortions, and the short leg. As to how nerve pressure at the C-1 level causes the pelvis to distort is explained in part by Steindler (1955) and Gregory (1971). The need for direct observation of this relationship is apparent but the evidence from this study strongly supports the hypotheses that a causal link between a subluxated C-1 and pelvic distortions exists.

For the practitioner, regardless of the discipline, to know that a short leg or pelvic distortion indicates nerve pressure at the C-1 level and a procedure is available which would relieve the pressure and correct the problem without resorting to surgery or lifts or many unnecessary therapies, should be of some value to all people who treat spinal pathology.

It was possible to compare the biomechanics of the upper cervical area with biomechanics of the pelvic region because the system of measurement that has been developed by Gregory (the biomechanics of the upper cervical region) and by a system of measurement developed by Gregory and the writer for the Anatometer. Using the planes to describe human anatomy is used extensively by kinesiologists and anatomists. Using the planes as a system of measurement in comparing biomechanical structure is somewhat unique to chiropractic. All the indicators of the study show that the body, whether in the upper cervical or pelvic region, wants to return to a "normal" and normal appears to be zero in the horizontal, vertical or transverse planes.

Currently, health care practitioners do not have a system of measurement which establishes the presence or absence of biomechanical stress in the spinal column, and until those interested in the biomechanics of the spine can develop a system of communications which is understood, unbiased and reliable, agreement and progress in this area will be slow. Critical investigators are urged to evaluate the NUCCA premise that plane line measurement using rotatory indexes is a valid and reliable means of communication.

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Biomechanics of the Upper Cervical Spine

In the last issue of the MONOGRAPH (Vol. 2, NO. 4), Professor Daniel C. Seemann, NUCCRA Research Adviser, briefly discussed two laws of physics: one relating to centers of gravity and the other to levers. These laws and their application are important to an understanding of the Cl subluxation and its correction.

In saying that "disequilibrium (imbalance) of the skull produced by an angular rotation causes the gravitational stresses which are the precursors of the misalignment factors of the Atlas Subluxation Complex (Cl subluxation and its effects on the spinal column)", Seeman stated a new chiropractic concept; and is indicating that vertebral misalignments are caused by mechanical forces, that they are the result of the operation of physical principles, and that the real basis of the subluxation is mechanical in nature.

The basic elements of any spinal subluxation are (1) misalignment of the vertebral segment in one or more directions from its normal position, and (2) the occurrence of some type of detriment to the nervous system. Misalignment, or malposition, occur and is the reason for the adjustment. The cause of the misalignment is force resulting in abnormal motion. It logically follows, therefore, that the subluxation is a mechanical problem because motion, the action or process of change of position, is a mechanical study which in part deals with motion. It includes the action of forces on material bodies, and the action of gravitational stresses on the spine as a result of vertebral misalignment is a mechanical study as well as a mechanical problem. The study of the subluxation must be predicated upon that part of the broad field of mechanics that is concerned with objects in motion (kinematics).

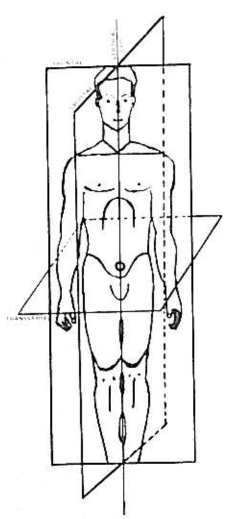
In sum, then, the causes of the vertebral misalignments are explainable in terms of known physical laws and principles. For example, the principle that "any force applied to an object imparts to it an acceleration, not only in a translatory direction, but also imparts to the object a rotary motion which turns it around its own center of gravity" applies when angular rotation causes the affected vertebrae to displace from the normal position.

ORIENTATION PLANES AND AXES OF MOTION

Better understanding of the elements involved in the production of the Cl subluxation may be obtained by a brief review of the orientation planes and the axes on motion.[1] The study of all joint motion, normal as well as abnormal, is clarified greatly by reference to the orientation planes of motion and the axes about which motion takes place, permitting description, location, and understanding of joint motion.

Three planes of motion, corresponding to the three dimensions of space, pass through the human body. Motion takes place in these planes and around the axes that have their locations at the intersections of any two planes. (When the planes divide the body into equal parts, they are referred to as cardinal planes.)

BODY PLANES



The three planes of motion are (1) the sagittal or anteroposterior which divides the body in half; (2) the frontal or lateral which divides the body equally from side to side, and the transverse plane, a horizontal plane dividing the body into upper and lower halves.

The three axes of motion are (1) the vertical axis which is perpendicular to the ground; (2) the frontal or lateral which passes horizontally from side to side, and (3) the sagittal or anteroposterior which passes horizontally from front to back.

An axis of motion is located at the intersection of the planes, and any motion that takes place does so at right angles to the plane in which the motion occurs. When Cl misaligns it usually displaces into the sagittal, the frontal or lateral, and the transverse planes. Therefore it must rotate about the frontal axis, the sagittal axis, and the vertical axis. As a general rule, the abnormal movements are not equal into each plane, and the three-directional movement is a factor requiring mathematical consideration in establishing a corrective adjustment. Frequently seen is the rotation of the atlas into either the transverse or frontal planes in which case the greater abnormal excursion is usually confined to one plane.

Because both normal and abnormal motion take place into planes of motion and about axes of motion, it is clear that all vertebral misalignment must constitute motion. Also clear is that the proper method of measuring the distance that a vertebra moves abnormally into a plane from its normal position is the unit of angular measurement referred to as the degree.

The orientation planes and axes of motion are a sort of frame of reference for the film analyser. They serve to permit visualization of the misaligned vertebrae as they abnormally move or misalign from the normal position. Utilizing this frame of reference, the film analyser can readily see the production path of the subluxation in terms of its misalignment factors, describe it, and understand it. He is then in a position to establish the best means for its cor-

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rection: the restoration to normal of the vertebra.

THE NORMAL

An axis may be defined for purposes of this article as a straight line about which a body or object rotates or may be conceived to rotate. The point at which the three orientation planes join is the vertical axis of the body, and represents the body's center of gravity, constituting the normal position. The centers of motion of the skull and pelvis and of every spinal vertebrae must align to the vertical axis of the body to be considered in a normal position. The vertical axis, therefore, may be considered as a point or line of reference, representing the body's center of gravity and the normal position.

When aligned to the vertical axis, a vertebra is capable only of normal motion. The same is true of the skull or pelvis. While the motion is always rotary in character, the vertebra moves concentrically because its center of motion in the disc is centered to the vertical axis. In response to muscular contraction, the vertebral segment that is aligned with the vertical axis must execute a normal range of motion.

Misaligned vertebrae and spinal subluxations, however, cannot take place within a normal range of motion. A subluxated vertebra must be first a misalignment and second a subluxation. Because misalignment precedes subluxation, a subluxation requires an abnormal range of motion. That is to say, an abnormal range of motion must exist; off-center rotation must occur. The vertebra that is subluxated is now rotating in an eccentric orbit. An abnormal change of position has taken place, but with its osseous locks (facets) any extent of abnormal motion involves the structures above and below the subluxation. It is, therefore, questionable practice to compare the misalignment of a suspected vertebra with the one above and the one below if the adjustment (correction) is to be made on the assumption that the one above and the one below are normal.

FIXATIONS

Fixations are misalignments that occur in an abnormal range of motion. Misalignments are fixations. In both, the eccentric motion takes place and in both a locking of the vertebra out of its normal range of motion occurs. They both are rotations taking place with displaced centers of gravity that are away from the vertical axis of the body. Gravitational stresses appear as a result of the rotational motion about the displaced centers, and muscle balance no longer obtains; an abnormal pathway of motion takes place upon muscle contraction and the vertebra is fixed.

Fixation and misalignment, then, are synonymous terms in the context of cervical spinal abnormal motion. All misaligned vertebrae are "fixed" within an abnormal range of motion, and seen only when off-center motion occurs, when the vertebral centers of motion no longer align to the vertical axis.

It should be clear, therefore, that when a subluxation is defined as a vertebra that is "fixed" in its **normal** range of motion that the definition indicates a lack of understanding of what constitutes abnormal vertebral motion. Simple mechanics precludes the possibility of a vertebral misalignment taking place within a normal range of motion. Stability is maintained and very little disruptive stress is present within a normal range of motion, although some may be present insufficient to cause lockage.

ANGULAR ROTATION OF CERVICAL SPINE AND SKULL

Angular rotation is a rotary motion or movement that occurs in a plane and around an axis which is at right angles to the plane.[2] In the cervical spine, angular rotation takes place when the cervical spine rotates **as a unit** into either of the two frontal planes, the right or left frontal plane, and around the vertical axis or juncture of the sagittal and frontal planes. The point of departure of the cervical spine and skull from the vertical axis is observed to exist at the first dorsal vertebra, known as the fixed point. To the extent that angular rotation takes place, an abnormal range of motion exists.

It is a kinesiological concept that when an object, or any part of an object, shifts its position the center of gravity of the shifted part moves with it. As the skull and cervical vertebrae rotate from the fixed point into a frontal plane, their centers of gravity, no longer aligned to the vertical axis, become subject to gravitational stress and become stressors themselves. The relatively greater weight of the skull enhances the problem of disequilibrium or instability with its displaced weight center and altered gravity influences. Its gravital line is no longer on the vertical axis.

Angular rotation is the first step in the production of the Cl subluxation. It can, then, be seen clearly that an atlas subluxation is not produced from above-down as previously claimed, but from below-up. When the angular rotation has taken place, all factors are present that are required to produce the misalignment factors of the cervical spinal vertebrae and skull: instability exists, displaced centers of motion are in existence ready to produce a rotation of the vertebral segments in a range of abnormal motion, and gravitational stress.

While the discussion has been restricted so far to osseous structure, it should be remembered that the forces of gravity acting in an angular rotation, tending to turn the vertebrae eccentrically about their displaced centers of motion, are opposed by other forces. Muscles and ligaments also play their part, attempting to resist the changes taking place as a result of the angular rotation, the movement of the segments into an abnormal range of motion. Synergism is detrimentally influenced. The part played by these structures will be discussed in a later article.

Angular rotation, disequilibrium, eccentric vertebral motion, and the misalignment factors caused by gravity stresses are measurable in over 90° of the nasium films analysed. Because these abnormal factors do take place, the fact of their existence and that they can be

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measured makes them a part of the reality of the Atlas Subluxation Complex. Existence is rather good evidence of reality. These factors are observed by competent analysers and measured and corrected, as recorded on x-rays after the adjustment. The value to the chiropractor of this knowledge will be seen to be an aid in placing patients for the corrective adjustment in later articles.

UNIT MOVEMENT

When the cervical spine and skull displace into the frontal plane, it is a unitary action that takes place: they move abnormally as a whole, a unit. This unit action is important to the adjustor because all the displaced structures are correctable from their abnormal movement into lateral and transverse planes of motion back to the vertical axis of the body if the adjustor corrects the degree of excursion from the normal. That is to say, if the adjustor measures the degree of excursion of the displaced segments from the vertical axis and computes it in the final adjustic resultant, the vertebral and skull misalignments will be automatically corrected. This fact is important both from the standpoint of knowledge and of performance to the adjustor who would realign to normal the malpositions of several vertebrae, incorporating in a single adjustment several vertebrae, and restoring them to their normal position.

All vertebrae, as are the cervical, are segmented structures—a series of vertebrae whose movements are largely controlled by the slope and position of their articular facets and contributing structures. In normal, as in abnormal motion, the action is of a unitary nature. The important difference is that in normal motion the cervical muscles act in a balanced manner as motivators of the action while in abnormal motion the muscles become involved in the eccentric motion of the displaced vertebral segment as it is moved by muscular contraction about its displaced center of motion in the disc.

As inferred above, it is important to the film analyser that he understand the unitary action of the cervical spine and skull. If he has drawn the excursion line correctly from the fixed point to a point midway between the center of the displaced odontoid process and the bifurcation of the axis process of C2, he has correctly established the line. By measuring the angle formed by the excursion line and the vertical axis line, the analyser can determine the number of degrees of excursion. If, in the adjustment, the chiropractor corrects this angle, he will correct the rotations that have resulted from the angular rotation.

The angle formed by the excursion line and the vertical axis indicates the distance that the cervical spine and skull have abnormally moved into one of the frontal planes. It also indicates the distance the adjustor must restore the displaced vertebrae and skull to normal. In those cases where the excursion line passes through the spinouses of all the subjacent cervical vertebrae, support of the unitary pattern is seen; it is only in those cases where the spinous of C2 is opposite the side of laterality of C1 that the unitary pattern is not supported by the passing of the excursion line through the spinouses of the subjacent vertebrae.

The exception to the excursion line pattern concept is also generally seen if the spinous process of C2 has not rotated to as great an extent as the odontoid or body of C2. This condition is understandable when dealing with eccentric vertebral motion because the center of motion is off-center in relation to the parts of the vertebra influenced by the off-center motion. As the vertebra moves around its off-centered axis of motion in the disc, its parts do not rotate as in normal motion.

That a very close relationship does exist between spinal vertebral rotations and the position of the excursion line can be observed in the normal spine. In the normal spine, no cervical vertebral rotations take place other than in normal motion, and upon completion of the movement, they return to the vertical axis. Any excursion line that would be drawn on the normal cervical spine would align to the vertical axis, demonstrating that this aligned condition is the normal so far as vertebral rotations are concerned.

Because of the unitary pattern motion of the cervical spinal vertebrae and skull as they misalign, it should be clear that attempted adjustments of C2 or any of the subjacent cervical vertebrae is futile. Misaligning as a unit, the adjustment must be structured to correct the cervical spine as a unit. So-called axis and 3rd cervical adjustments are mechanically inept because they do not change the pattern. The entire cervical spine must be adjusted to the vertical axis as a unit, using a single resultant of adjustic force—also a unit—to accomplish the correction of the misalignment factors. The relationship that exists between the correction of the excursion from the frontal plane is such that if it is not accomplished, and to the extent that it is not accomplished, reduction of the lateral movement of C1 on the condyles of occiput will not occur. The adjustment has failed in its objective.

PRODUCTION OF THE C1 SUBLUXATION

The C1 subluxation, because of its detrimental effect on the central nervous system, malaligning the spinal column from its normal position in the body and distorting the body parts generally, has been referred to as the Atlas Subluxation Complex (ASC). Because the correction of the C1 subluxation is essential to the correction of the imbalance of the spinal column and various distortions of the body, C1 adjusting must be considered as a full-spine technique. The production of the C1 subluxation predetermines its reduction: the subluxation decides the adjustment.

Detailed measurements with the ANATOMETER, a data-retrieval instrument used on thousands of patients over a seven-year period, have almost without exception established that the distortions of the subluxated body can be correlated with the misalignment factors of the C1

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subluxation. These bodily distortions, resulting from the C1 subluxation, are called the **Atlas Subluxation Complex Syndrome,** and include the pelvic girdle malalignment, the short or contractured leg, spinal imbalance, the displaced body's center of gravity and the like.

Research with the ANATOMETER has also confirmed the theory that cervical spinal misalignments can exist without detriment to the central nervous system. A malalignment or malposition of C2 can, and often does, exist in the complete absence of any clinical or measurable evidence of a subluxation at C2 or other spinal segment. This condition is also true of other cervical vertebrae.

For a C1 subluxation to manifest itself as injurious to the patient's nervous system, spastic contracture must be predominantly present on one side of the body. The detectable presence of spastic contracture of the extensor muscles on one side of the body is acceptable evidence of a C1 subluxation; it is also the effect of the subluxation on the central nervous system, and is the cause of the bodily distortions. Overinnervation of the motor neurons of the spinal cord is the pathological element of the C1 subluxation.

While misalignments of any or all vertebral segments of the cervical spine can occur without detectable injury to the nervous system, one exception exists: **lateral misalignment of C1 from the condyles of occiput.** All available, measurable evidence supports the theory that, until C1 moves laterally on the condyles of occiput, there will be no bodily distortions, no Atlas Subluxation Complex Syndrome, no interference to the patient's nervous system from the misalignment; in brief, no subluxated patient.

The C1 subluxation is, therefore, produced at that moment that C-1 misaligns laterally on the condyles of occiput. Prior to that moment, a misalignment status may be present of all vertebral segments in the cervical spine, including the misalignment of C1 into the transverse and sagittal planes of motion. Lateral misalignment is, then, the precursive element, the introductory element, to a C1 subluxation.

It should be stated, however, that the pre-subluxation misalignments of the cervical segments do create disequilibrium and act in their abnormal motion to set the stage for a C1 subluxation. After the C1 subluxation has established itself, the excursions of subjacent vertebral segments into the planes of motion no doubt enter into the complex in that they probably position the upper cervical cord and spinal canal contents and brain stem for the C1 subluxation, the lateral movement of C1 on the condyles of occiput that causes the detriment to the central nervous system and is posited to be the interference that causes a loss of the inhibitory influences of the reticular formation in the brain stem at its caudal end on the extensor muscles.

ASC—A STRESS-PRODUCER

In view of the ANATOMETER findings, probably the greatest single detriment of the C1 subluxation is its stress element. Not only is stress a subluxation-producer in the cervical spine as a result of angular rotation, but the C1 subluxation is a physical stress-producer in the patient's body. In its technical sense, stress refers to forces working on bodies. The C1 subluxation is capable of placing special demands on the body sufficient to unbalance its equilibrium, forces that distort the body by modifying the rate of nervous energy, of electro-chemical flow.

Because stress is produced by the imbalance of the C1 subluxation on the central nervous system, its removal from the body is a sign of the efficacy of the corrective adjustment. Both the production and the reduction of the C1 subluxation are mechanical processes. The adjustment, therefore, is a mechanical process. Unless the C1 subluxation-produced stress has been removed, and remains removed, barring trauma, a corrective adjustment has not been executed. Neither has alleviation of the neurologically caused imbalance been accomplished, nor has equilibrium been restored to the body. In other words, an adjustment is not corrective unless it restores equilibrium; or, in more more technical words, produces "a system in which the resultant of all acting forces is zero and the sum of all torques acting about an axis is zero". An adjustment is, therefore, an equilibrant, a force that is capable of balancing another system of forces, resulting in a balanced and stable condition.

CENTER OF GRAVITY OF THE SKULL

Authorities disagree as to the location of the skull's center of gravity. According to Steindler, it is positioned just above the occipital-atlanto joint. Steindler states: "—and the atlanto-occipital joint is situated precisely below the center of gravity of the head so the latter is balanced upon it.".[3] The greater weight of the head is at its base so the center of gravity should lie quite low in the skull, and a center of gravity of such a structure should lie in close jutaposition to a joint. Therefore, Steindler's analysis is accepted by NUCCRA rather than, for instance, Kapandji's who places the skull's center of gravity at or about the sella turcica of the sphenoid bone.[4]

A more detailed discussion of the skull's center of gravity and the prominent part it plays in the C1 subluxation will come later. How to locate it on the x-ray films will also be discussed

THE C1 BASE OF SUPPORT

The superior articulating surfaces of the axis vertebra serve to form a base of support for the C1 subluxation or the Atlas Subluxation Complex. These articulating surfaces can be seen to enter into, and to help create, the positional relationships of the subluxated skull to the vertical axis of the body in various basic types of C1 subluxations; there exists a reciprocal relationship between the degree of excursion, the angular rotation, of these articulating surfaces to the position of the skull and its relation to the vertical axis.

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Supportive of the notion regarding the articular surfaces of axis is the fact that adjustive correction of the head and cervical spine to the vertical axis requires that the superior articulating surfaces of C2 be used as fulcra in restoring the subluxation and all vertebral and skull misalignments. These articular surfaces are, therefore, supporting structures for the C1 vertebra and skull. Moving the axis base of support in the correct direction, is essential to the restoration of both C1 and the skull. Furthermore, any change of position of C2 initiates a counterbalancing change of position of C1 and of the skull. This is one of the reasons C2 should not be adjusted as a major subluxation; it is a mechanically inept procedure, comparable to moving a base supporting an object to influence the object toward its proper position.

Further functions of the axis base of support are found in its size. The larger the articulating surfaces are, the better it serves to help maintain stability of the C1 vertebra and the skull after the adjustment. The flatter the articulating surfaces, the greater the resistance to external forces. The principle that the balance of an object depends greatly on the size of its base of support is in operation in those cases where the articulatory surfaces of axis are large and flat. Subluxations, furthermore, have a tendency not to recur in these cases. As the sizes of articulating surfaces vary from quite small to an almost flat surface, the size of any given axis articulating surface is an important factor in helping to maintain equilibrium.

In the next issue of the MONOGRAPH, the three basic types of the ASC will be discussed. Each type will be considered from the standpoint of (1) fulcrum, (2) head position, (3) angular rotation, (4) center of skull gravity, and (5) correction.

MONOGRAPH

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"Clinical Findings"

According to information received by NUCCA, chiropractors would be reimbursed under Medicare for correcting subluxations "demonstrated by X-ray or other chiropractic clinical findings to exist." NUCCA objects to the addition of the words "other chiropractic clinical findings", and deplores the chiropractic testimony supporting the addition of the words quoted above. In our judgment, no one who knows the facts regarding a Cl subluxation can rationally equate the "correction" of a Cl subluxation with "clinical" methods. While the "existence" of a Cl subluxation can be determined by sound clinical procedures, the "correction" of a Cl subluxation must be based on X-ray findings. It must be a measurement procedure applied to X-ray films if a correction is to be made of the subluxation.

NUCCA is deeply concerned with this obvious weakening of the subluxation concept, and is disturbed by the fact that chiropractors would support the additional "clinical findings" addition. We are concerned because of public protection. **The public is entitled to receive a reduction-correction.** It is a matter of consumer interest. While we favor patient reimbursement by Medicare for X-ray costs, as is the case with doctors of medicine, osteopathy, and denstry, we definitely stand for the protection of the public from inept methods. One is a matter of discrimination; the other pure recklessness.

NUCCA
Scholarship Awards

At its October 22, 1977 meeting, the NUCCA Board received with thanks the $500.00 donation sent by Mrs. Upton X. Furman of Neenah, Wisconsin in memory of her late husband, Dr. Upton X. Furman, who died April 22, 1977. Dr. Furman was a supporter and long time member of NUCCA. The NUCCA Board voted to use the donation to help fund the Scholarship Awards as Dr. Furman often expressed his interest in college students and their financial problems. This is also in accordance with Mrs. Furman's wishes.

The NUCCA Board approved a continuation of the $250.00 scholarship grant-in-aid for the next three years, and that this sum be paid to any chiropractic student currently enrolled in a chartered college of chiropractic who submits to the **Monograph** editor an acceptable 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, corrective techniques for 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 Professor Seemann. Their judgment will be final. Accepted articles become the property of the National Upper Cervical Chiropractic Association, Inc. Winners will be announced at the following NUCCA Convention.

NUCCA will attempt to return all 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, 221 West Second Street, Monroe, Michigan 48161.