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Exploring The Relationship Between Anatometer Measurements And X-ray Listings

By
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Background

This article is a continuation of the predominant theory articles concerning prediction of the short leg (Gregory, 1969; Seemann, 1972, 1984, 1987, 1988 and 1989). Better understanding of the predominant theory will clarify the relationship between the atlas subluxation complex and pelvic distortion.

The present study was made possible because of the research done with the Anatometer (Seemann, 1978) and the information that has been generated from measurements taken from patients over the past 11 years. Some of the more important findings have been: (1) a short leg measured in the supine position will change in the standing position and displace the pelvis either to the frontal plane, to the transverse plane or both, (2) if the atlas is restored to its proper position, all of the pelvic distortion will be removed and all planes will return to zero, (3) about 30% of all the cases will displace high on the side of the short leg when measured in the standing position and (4) in most cases, pelvic distortion can be mechanically removed by lowering or raising the pedals of the Anatometer. If the distortion cannot be removed using the method, it is probable the distortion has congenital or pathological origins.

There are three measurements that are taken from the Anatometer in degrees: (1) the frontal plane (FR), (2) the transverse plane (TR), and the fixed point (FP). The frontal plane can be measured either high or low from 0 degrees. The transverse plane measurement is either posterior or anterior and the fixed point measurement is either left or right of vertical zero. When the three measurements are in-pattern, the frontal plane is low (FP:L), the transverse plane is posterior (TR:P) and the fixed point (FP) is ipsilateral to the short leg. See Figure 1.

An out of pattern set of measurements would be, the frontal plane will be high, the transverse plane is anterior and the fixed point is either contralateral or ipsilateral to the short leg. See Figure 2.

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Some Comments on Atlas Laterality

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This article is not intended to be a research article. It does contain, however, heretofore unpublished data. The data and statistics are valid and were obtained in accordance with scientific standards.

What is the case for the validity of atlas laterality? What is the case for precision, for efficacy, for inter-examiner and intra-examiner reliability studies of atlas laterality?

The most appropriate place to begin is at the beginning. John F. Grostic originated the concept of atlas laterality. Ralph R. Gregory was the collaborator on what is now called the Grostic Technique. Original ideas and work flowed freely, in both directions, between the two individuals. No two persons could have agreed more on the definition of atlas laterality and on how to measure it. Therefore their data on atlas laterality set the highest professional standards; their data should be supportive and consistent.

TABLE #1 indicates that for a sufficient sample size (N≥100) the pre-adjustment means and standard deviations are almost identical; statistically the result is obvious: they are of the same population. The weighted mean of the two smallest samples is 2.72°; this is remarkably consistent with the larger samples (N≥100).

The studies in TABLE #1 were arranged in chronological order so that the reader can more quickly ascertain that the efficacy of the adjustment as manifested in the post-adjustment means and standard deviations is improving with time.

TABLE #1 ATLAS LATERALITY. PRE-AND-POST-ADJUSTMENT MEANS AND STANDARD DEVIATIONS. [1,2,3]

	#	PRE-ADJUSTMENT		POST-ADJUSTMENT	
ADJUSTER	CASES	MEAN	STD. DEV.	MEAN	STD. DEV.
Grostic[a]	523	2.63°	1.49°	1.40°	1.60°
Gregory[b]	50	3.01°	1.81°	0.87°	1.25°
Gregory[c]	108	2.64°	1.37°	0.23°	0.51°
Gregory[d]	100*	2.63°	1.39°		
G, D, P[e]	36	2.31°	1.51°	0.23°	0.34°

[a] Grostic (1948-1950, 1963)
[b] Gregory (1958)
[c] Gregory (1982)
[d] Gregory (1989)
[e] Gregory, Denton, Palmer (1989)
* Provided by D. Seemann.

(Continued on page 5)

Exploring The Relationship Between Anatometer Measurements And X-Ray Listings

(Continued from page 1)

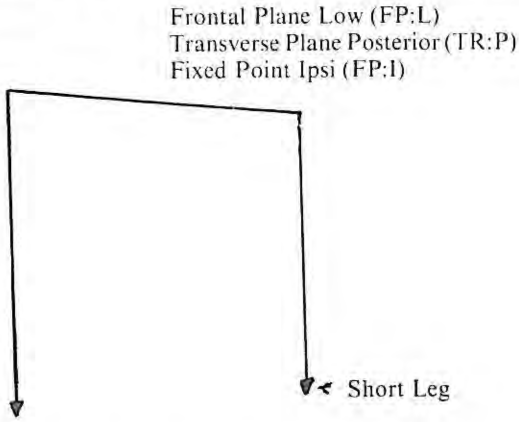

Figure 1. Three in-pattern measurements taken from the Anatometer.

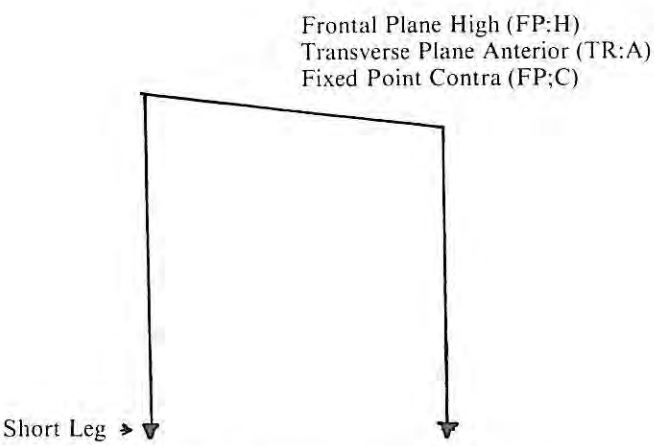

Figure 2. Three out-pattern measurements taken from the Anatometer.

As to why 30% of the cases that have a short leg will be high on the side of the short leg is not totally understood. Probably the best explanation is the pelvis torques in such a way to cause the illium to ride high on the side of the short leg.

Related to the question of how the pelvis torques in the standing position is what happens to the center of gravity (COG) when a short leg exists? The prediction is the COG shifts to the side of the short leg. This position is supported by the fact that usually the stressed joint or nerve is found on the same side as the short leg.

But there are cases where this is not true, the stressed areas are contralateral to the short leg. It is the writer's opinion the COG of the pelvis is contralateral to the short leg in these type cases, because the hip is high on the side of the short leg. The COG shifts to opposite side of the body and stresses the contralateral side.

NUCCA is in the process of testing the COG hypothesis on a new version of the Anatometer. The motorized pedals have been removed and foot plates have been installed with a transducer placed in each plate. The weight from each pedal is then given in one/one hundreths of a pound, a very sensitive measure. Preliminary findings shows the COG is not always found on the side of the short leg (in the standing position). What does seem to be consistent is there is a considerable weight difference prior to the adjustment, after the adjustment, there is more of a balance in the weight distribution on the pedals. The discussion about the COG of the pelvis is a slight excursion from the theme of this paper, but it will help the reader better understand the relationships between x-ray listings and Anatometer measurements as this paper develops.

Method

NUCCA's Pat Data '89 file of 100 cases contains 18 bits of information. See Figure 3. The thrust of this paper was to compare three Anatometer measurements (frontal, transverse and fixed point) with three x-ray listings (laterality, rotation and head position). The matchups for the study were: frontal plane/laterality, transverse plane/rotation, and fixed point/head position.

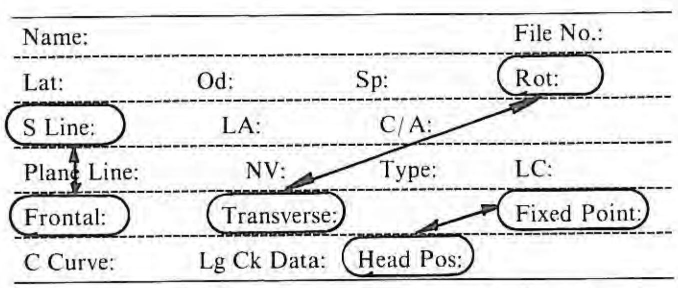

Figure 3. Pat '89 Data File. The three relationships that will be compared in the study: the frontal plane/laterality, the transverse plane/rotation, and fixed point/head position.

The rationale for the match-ups are biomechanical, ie, both the frontal plane and laterality deal with the frontal plane of the vertical axis. Rotation and the transverse plane are concerned with the transverse plane of the vertical axis. Matching the fixed point and head position attempt to show another relationship in the frontal plane.

Seventy cases were chosen from the Pat Data '89 data. All cases were the in-pattern types where the frontal plane was low (FP:L) and the short leg was ipsilateral. The measurements were calculated without regard to handedness, or position, only the magnitude of the degrees was considered. A null hypothesis was assumed with the three calculations.

Results

The results of the first calculation are found in Table 1 which was concerned with the relationship between the frontal plane and laterality. The mean for laterality was 2.35 with a SD of 1.39. Laterality for the 70 cases was 2.61 and a

Table 1. The relationship between the frontal plane (Anatometer) and laterality (x-ray) N=70.

Measurement	Mean	SD
Frontal Pl.	2.35°	.99
Laterality	2.61°	1.39
t=.92		t=2.00 p <.05

Degrees	Hits	Percentage	R
0 degrees	22/70	.31	.12
±1 degrees	48/70	.68	.40
±2 degrees	65/70	.93	.95

Table 2. The relationship between the transverse plane (Anatometer) and rotation (x-ray) N=70.

Measurement	Mean	SD
Transverse	1.49°	1.49
Rotation	2.46°	1.48
t=4.04		t=2.00 p <.05

Degrees	Hits	Percentage	R
0 degrees	16/70	.22	.10
±1 degrees	37/70	.52	.29
±2 degrees	55/70	.78	.59

SD of .99. A t-test of the means was .92 which was not significant and supported the null hypothesis. The percentage of "hits" where the measurement for the frontal plane was the same as for laterality was also calculated.

Table 2 shows the relationship between the transverse plane and rotation. The mean for the transverse plane is 1.49 and the SD is also 1.49. The mean for rotation was 2.46 and the SD was 1.48. The difference between the means is significant and rejects the null hypothesis. The number of "hits is also lower than with frontal/laterality measurements.

Table 3 indicates the mean for the fixed point is 1.04 and the SD is .57. The mean for head position is 1.13 and the SD is .72. The difference between the means is not significant and supports the null hypothesis.

Discussion

The results support two out of three of the hypotheses. The means between the frontal plane and laterality are quite close (2.35-2.61). Therefore there is a good chance that if the frontal plane reading is small then laterality will also be small, especially if a tolerance of one degree is used. The means between the transverse plane and rotation are significant (1.49-2.46). This difference was expected. It was found in an earlier study (Seemann, 1984) the more variance occurs with the transverse plane measurement both with inter and intra reliability. Clinically it has also been shown the transverse measurement will not always return to zero degrees immediately after the adjustment as the frontal plane does if the atlas is successfully reduced to zero. NUCCA therefore will allow a ± 2 degrees tolerance on the preliminary examination.

Table 3. The relationship between the fixed point (Anatometer) and head position (x-ray) N=70.

Measurement	Mean	SD
Fixed Point	1.04°	.57
Head Position	1.13°	.72
t=.30		t=2.10 p <.05

Degrees	Hits	Percentage	R
0 degrees	10/17	.59	.30

The relationship between the fixed point and the head position is more difficult to analyze. The NUCCA position is the subluxation has it origins in the lower cervical region. The rationale is as the cervicals displace to either frontal plane, the skull will also displace in a way that will compensate toward the true vertical which also determines the type rotation. Deductively, there must be some relationship between the fixed point and head position. Head position is a relatively new measurement which determines the amount of degrees the head turns on the vertical axis after the amount of laterality is found.

The head position may help our understanding about the predominant theory. Theory states the major factors in predicting the short leg are laterality and rotation. If laterality is dominant, the short leg will be contralateral to laterality. If rotation is dominant, the short leg will be ipsilateral to laterality. Research with the basic types has further refined the theory because type 2 and 3 subluxations usually will be ipsilateral and type 1 and 4 subluxations will be contralateral.

Biomechanically, the atlas subluxation involve two major factors, (1) the degree to which the atlas shifts on the condyles and (2) the degree to which the skull turns on the condyles or (3) a combination of both. The skull shifting on the condyles (type 1 or 4), is thought to be less detrimental neurologically to the spinal cord. With the skull rotating on the condyles (types 2 and 3), the spinal cord is more traumatized. The head position measurement may become more critical in predicting the short leg than rotation, because the amount the skull turns on the condyles indicates whether the atlas has shifted or turned. If the atlas has shifted more than turned, the chances are the short leg will

Name:			File No.: 8008
Lat: L4	Od: L4	Sp: L9	Rot: A3
S Line: S3	LA: 0	C/A: 3/4.5	
Plane Line: +1.75	NV: =2.7	Type: 3	LC: R.75
Frontal: H2	Transverse: A1		Fixed Point: R1
C Curve: L	Lg Ck Data:	Head Pos: L.5	

Exhibit 1. An example where laterality is due more to the shift on the condyles than the skull turning on the condyles and the leg shortness opposite to laterality.

Name:			File No.: 9127
Lat: L3	Od: L3	Sp: L6	Rot: A3
S Line: S1	LA: 0	C/A: 4/6	
Plane Line: +.125	NV: +1.1	Type: 3	LC: L1
Frontal: L1	Transverse: A1		Fixed Point: 0
C Curve: K	Lg Ck Data:	Head Pos: L2.75	

Exhibit 2. An example where laterality is due more to the skull turning on the condyles than the skull shifting on the condyles and the leg shortness on the same side as laterality.

be contralateral. If the atlas has turned on the condyles, the chances are the short leg will be ipsilateral. Exhibit 1 illustrates an example from the "Pat '89" data of a type 3 subluxation. Normally a type 3 would be ipsilateral. In the example, laterality is L4 and head position is L.5. Most of the laterality is due the skull shifting rather than turning (HP.5) and the prediction is the short leg should be contralateral and it is, R.75.

Exhibit 2 is an example where laterality is L3 and HP is L2.75. The prediction here is most of the laterality is due to the head turning on the condyles, therefore, the short leg should be ipsilateral and it is. The short leg is L1. With an N=7 (all type 3's), 6 cases validated the above hypothesis.

Conclusions

Although two out of three hypotheses were supported, the reader should be careful about the findings for a couple of reasons. The reader must not conclude the x-ray listings and the Anatometer measurements are interchangeable. They are not the same measurements. The reduction vector must be still determined from the x-ray listings. The value of knowing the Anatometer measurements as it relates to x-ray listings is if Anatometer measurements are small in magnitude, the x-ray listings (laterality and head position) should also be small. For example, if the frontal plane is small FP:1 chances are laterality will be small also.

The second reason is a statistical one. In the analysis as the range for the "hits" went from 0 degrees to ± 2 degrees and the percentage of "hits" improves, making the comparisons look better and the investigator a hero, the fact is, widening the range approaches what the normal curve would have done anyway. It is for these two reasons the writer recommends caution with regard to equating these sets of measurements.

Seemann December 1989.

REFERENCES:

1. Gregory, R. R., The ASC and leg imbalance. The NUCCA News. Vol. 1, No. 7, March 1969.
2. Seemann, D. C., A statistical analysis of some hypotheses about the Atlas Subluxation Complex. Paper presented at NUCCA May Convention, 1971 Monroe, Michigan.
3. Seemann, D. C., Some hypotheses as to how rotations are produced with cervical subluxations. *Upper Cervical Monograph,* Vol. 3, No. 8, June 1984.
4. Seemann, D. C., The predominant factor theory re-examined. *Upper Cervical Monograph,* Vol. 4, No. 4, June 1987.
5. Seemann, D. C., Posterior rotations. *The Upper Cervical Monograph,* Vol. 4, No. 5, January 1988.
6. Seemann, D. C., Predicting the short leg using x-ray listings. *The Upper Cervical Monograph,* Vol. 4, No. 8, June 1989.
7. Seemann, D. C., C-1 Subluxations, short leg and pelvic distortions. *The Upper Cervical Monograph,* Vol. 2, No. 5, November 1978.

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NOTICE

The fees set by the NUCCA Board of Directors for applicants taking the Certification Tests are as follows:

1st Segment -	$ 50.00
2nd Segment -	$100.00
3rd Segment -	$100.00

Fees are payable prior to taking each segment. Applicants should make checks payable to NUCCA, Inc.

Some Comments On Atlas Laterality

(Continued from page 1)

TABLE #2 indicates that the absolute difference between pre-adjustment and post-adjustment atlas laterality means progressively increased (improved) with time. Also it indicates that the relative change between pre-adjustment and post-adjustment atlas laterality means progressively increased (improved). It is important to note that both the absolute difference and the relative change nearly doubled.

TABLE #2 ATLAS LATERALITY. DIFFERENCE OF PRE-ADJUSTMENT AND POST-ADJUSTMENT MEANS ($\Delta\bar{x}$); RELATIVE CHANGE OF PRE-ADJUSTMENT AND POST-ADJUSTMENT MEANS $\frac{\Delta\bar{x}}{\bar{x}\text{ PRE}}$ [1,2]

ADJUSTER	$\Delta\bar{x}$	$\frac{\Delta\bar{x}}{\bar{x}\text{ PRE}}$
Grostic[a]	1.23°	.47 (47%)
Gregory[b]	2.14°	.71 (71%)
Gregory[c]	2.41°	.92 (92%)
G, D, P[d]	2.08°	.90 (90%)

[a] Grostic (1948-1950, 1963)
[b] Gregory (1958)
[c] Gregory (1982)
[d] Gregory, Denton, Palmer (1989)

The 1.23° difference (TABLE #2) in pre-adjustment and post-adjustment means of atlas laterality in the Grostic and DeBoer study of Grostic was used by Keating and Boline as their precision criterion.[1,4] Based on this number, the data in the Sigler and Howe article and the two studies by Jackson et al, Keating and Boline concluded that "despite high reliability findings (linear coefficients) in all three studies, the precision of measuring atlas laterality changes is still in doubt." The Gregory (NUCCA: post-Grostic) data nearly doubles this difference, and in this author's opinion the precision of measuring atlas laterality changes is **no more in doubt.**

What solved this problem was both quality measurement and excellent adjusting. To this author's knowledge, NUCCA has always been relatively confident about the reliability of the analytical procedures and therefore did not attempt to publish data until early 1982's (pre-Sigler and Howe). When they did, it was submitted to **JMPT** and rejected. It was not until **JMPT** published Sigler's challenge to NUCCA that the NUCCRA board decided to devote about 1/3 of its time to directly answering the challenge.

Is is disturbing to note that only Grostic and De Boer (on Grostic), Seemann (NUCCRA), and Palmer (NUCCRA) have published post-adjustment data—at least to this author's knowledge. Even more disturbing, only NUCCRA has published (albeit non-indexed) post-adjustment data for cases in the last 25 years. (Grostic data: 1963).

NUCCRA would welcome any appropriate joint study with its upper cervical counterparts—at a college or in a field setting. NUCCRA would quickly agree to being part of the analysis of the original 20 nasiums used in the Sigler and Howe article—the post x-rays too. This would help in establishing the efficacy of adjusting and would concurrently promote upper cervical as a specialty within chiropractic.

Using data provided from the NUCCRA files (collated in 1982 by D. Seemann) the following statistics on inter-observer reliability for 10 sets of randomly chosen nasiums were calculated and comprise TABLE 3 through 6.

TABLE #3 INTER-OBSERVOR RELIABILITY (1982 data). ATLAS LATERALITY.

OBSERVER		GREGORY	DENTON
Mean	=	2.700°	2.675°
Std. Dev.	=	1.855°	1.795°
Linear correlation coefficient			= .987
Standard error of estimate			= .305°
Absolute value of deviations averaged			= .275°

TABLE #4 INTER-OBSERVER RELIABILITY (1982 data). ODONTOID.

OBSERVER		GREGORY	DENTON
Mean	=	2.900°	2.875°
Std. Dev.	=	1.810°	1.758°
Linear correlation coefficient			= .988
Standard error of estimate			= .306°
Absolute value of deviations averaged			= .275°

TABLE #5 INTER-OBSERVER RELIABILITY (1982 data). LOWER ANGLE.

OBSERVER		GREGORY	DENTON
Mean	=	3.650°	3.550°
Std. Dev.	=	2.944°	2.983°
Linear correlation coefficient			= .987
Standard error of estimate			= .503°
Absolute value of deviations averaged			= .350°

TABLE #6 INTER-OBSERVER RELIABILITY (1982 data). HEIGHT VECTOR.

OBSERVER		GREGORY	DENTON
Mean	=	4.025	4.075
Std. Dev.	=	2.043	2.135
Linear correlation coefficient			= .995
Standard error of estimate			= .228
Absolute value of deviations averaged			= .150

Although atlas laterality, odontoid, and lower angle are measured quantitives, the height vector is a calculated quantity. Because the height vector is calculated from signed elements it tends to dampen or smooth out the effects of variation in the measured quantities that are elements in its calculus. Thus its linear correlation coefficient would be expected to be higher than in the measured quantities that are elements in its calculus. This is desirable because the height vector is directly used in determining the line of drive of the adjustic process. In a sense, small errors in measured quantities are somewhat forgiving in the final analysis.

Several arguments can be made by considering TABLES #3-6. Linear correlation coefficients are very high; that is they explain more than 95% of the variance. Standard error of estimates are also very high—as good as if not better than any other available data in any study that has come to the attention of this author. These examples illustrate that many aspects of the analysis system can be measured reliably. NUCCRA members are of the opinion that the very best NUCCA doctors are practicing at today's highest standards of upper cervical care.

Using data provided from the NUCCRA files (collated in 1982 by D. Seemann) the following statistics on intra-observer reliability for 10 sets of randomly chosen nasiums were calculated (TABLE #7). At least one month elapsed between remarkings. This set of 10 is the same set referred to in TABLES #3-6.

TABLE #7 INTRA-OBSERVER RELIABILITY (1982 data). HEIGHT VECTOR.
Observer: Denton

	MEAN	STD. DEVIATION
Trial #1	4.075	2.135
Trial #2	4.125	1.145

Linear correlation coefficient	= .991
Standard error of estimate	= .301
Absolute value of deviation averaged	= .200

Now that the inter-examiner and intra-examiner reliability have been established, let us take a look at the 1989 study (N = 36). Participating doctors in the study were Gregory, Denton, and Palmer. Approximately 90 percent of the cases were by Gregory and Denton, the two doctors whose inter-correlation data has just been presented. Both Drs. Palmer and Denton have been associates of Dr. Gregory for about ten years. All three doctors are Board Certified NUCCA doctors. All x-rays were taken by Drs. Denton and Palmer.

TABLE #8 LATERALITY: PRE-ADJUSTMENT CUMULATIVE DISTRIBUTION. ABSOLUTE VALUE OF RANGE LIMITS (1989; N = 36)

ABSOLUTE VALUE OF RANGE LIMITS	# CASES	PERCENT
0.00°	0	0
0.25°	0	0
0.50°	0	0
0.75°	3	8
1.00°	10	28
2.00°	22	61
2.50°	25	69
3.00°	28	78
4.00°	32	89
5.00°	33	92
8.00°	36	100

TABLE #9 LATERALITY: PRE-ADJUSTMENT CUMULATIVE DISTRIBUTION. ABSOLUTE VALUE OF RANGE LIMITS (1989)

ABSOLUTE VALUE OF RANGE LIMITS	# CASES	PERCENT
0.000°	21	58
0.125°	23	64
0.250°	25	69
0.500°	32	89
0.750°	33	92
1.000°	35	97
1.250°	36	100

TABLE #10 LATERALITY: PRE-ADJUSTMENT AND POST-ADJUSTMENT CASES WITH 0.00 DEGREES LATERALITY (1989).

# cases	Pre-adjustment # cases/percent	Post-adjustment # cases/percent
36	0/0%	21/58%

TABLE #11 LATERALITY: PRE- AND POST-ADJUSTMENT MEANS AND STANDARD DEVIATIONS. (1989).
#Cases = 36

PRE-ADJUSTMENT		POST-ADJUSTMENT	
Mean	Std. Dev.	Mean	Std. Dev.
2.31°	1.51°	0.23°	0.34°

TABLE #8 illustrates the clinical basis for NUCCRA'S neurophysiology/spastic contracture arguments in that all cases had to have had at least 3/4° of atlas laterality in concert with other misalignment factors for the leg check and the anatometer measurements to yield a non-zero observable reading.

TABLE #9 illustrates that approximately 90 percent of all cases—at the time of the post x-ray—have less than 3/4° of atlas laterality remaining. Approximately 60 percent of all cases have no remaining laterality whereas 10 percent of all cases have 3/4° or more remaining. For those cases not zeroed (about 40%) the post x-ray becomes the new pre x-ray and the upper cervical specialist proceeds to further reduce the misalignment factors such as atlas laterality.

TABLE #10 illustrates that approximately 60% of the cases have been "zeroed" at the time of the post x-ray.

TABLE #11 illustrates the magnitude of the pre-adjustment and post-adjustment laterality means and standard deviations.

TABLE #12 ODONTOID: PRE- AND POST-ADJUSTMENT MEANS AND STANDARD DEVIATIONS. (1989).

#Cases = 36

PRE-ADJUSTMENT		POST-ADJUSTMENT	
Mean	Std. Dev.	Mean	Std. Dev.
1.93°	1.61°	0.18°	0.30°

TABLE #13 SPINOUS: PRE- AND POST-ADJUSTMENT MEANS AND STANDARD DEVIATIONS. (1989).

#Cases = 36

PRE-ADJUSTMENT		POST-ADJUSTMENT	
Mean	Std. Dev.	Mean	Std. Dev.
3.24°	2.50°	0.50°	0.69°

TABLES #12 AND 13 are included to illustrate that other misalignment factors (in this case odontoid and spinous) are also reduced.

Discussion. In the December 1986 issue of *JMPT* (Vol. 9, No. 4 p. 285), D. Sigler in his reply to the participants of the Sigler and Howe article "Inter-and Intra-Examiner Reliability of the Upper Cervical X-ray Marking System" (*JMPT* 1985; 8:75-80) challenged.

"The National Upper Cervical Chiropractic Association (NUCCA), to subject their claims to the following tests within the next two years:

1. demonstrate acceptable inter-and intra-examiner reliability of x-ray measurements,
2. demonstrate acceptable inter-and intra-examiner reliability of leg check measurements,
3. demonstrate correlation of leg check measurements to atlas vertebra position,
4. demonstrate effectiveness of adjusting instruments in repositioning of the atlas vertebra,
5. demonstrate effect of atlas vertebra repositioning on spine as a whole, and
6. demonstrate accuracy of pre-and post-measurement procedures as they may be adversely influenced by anatomic asymmetry, patient positioning and radiograpic distortion.

As to point 1, NUCCA's first "response" (to *JMPT)* preceeded Sigler's 1985 article in *JMPT;* a form of that first response eventually appeared in *The Upper Cervical Monograph* in January 1986 (Vol. 4, No. 1) in the article "Observer Reliability and Objectivity Using Rotatory Measurements on X-Ray" by D. Seemann. Jackson et al, more than a year and a half later (August 1987), provided the second response and still a third response (April 1988 *Chiropractic).* This author had the fourth response in the article "An Investigation Into the Validity of Laterality" *(Upper Cervical Monograph* June 1989). This article constitutes the fifth response, the second by this author, and the third response in *The Upper Cervical Monograph.*

In the June 1988 issue of *JMPT* (Vol. 11, No. 3 pp. 228-229). Sigler and Howe state:

"1. The other individual measurements (besides atlas laterality) that are used for the adjusting formula need to be tested for inter- and intra-examiner reliability. This is especially important with the more difficult measurements. The range of error of these individual measurements taken together in totality would have to be small enough so as not to affect the reliability and validity of the adjusting formula. After all, it is the adjusting formula that is ultimately computed and used in patient treatment and not any one measurement by itself."

This article and Seemann's article on rotatory measurements certainly address both number ones. It has been my experience and the experience of most students that atlas laterality is probably the most difficult of all upper cervical measurements.

As to point 2, NUCCRA is developing a transducer based leg check table to better quantify measurements.

As to point 3, many articles have appeared in *The Upper Cervical Monograph* that investigate leg check / anatometer measurements and their relationship with the misalignment factors / basic types as determined from x-rays. The development of a transducer-based leg-check will help address point 3.

As to point 4, the NUCCA adjustment is a hand adjustment, not a mechanical or a mechanical-electrical machine!

As to point 5, NUCCA is putting its case together from the files of NUCCA doctors who do take full spine x-rays.

As to point 6, this author is in the process of submitting an article to a journal for publication that should adequately deal with this problem perceived by chiropractic radiologists.

REFERENCES:

1. Grostic, J. D., DeBoer, K. F., Roentgenographic Measurement of Atlas Laterality and Rotation: A Retrospetic Pre- and Post-manipulation Study, *JMPT,* 1982 5(3), 63-71.
2. Palmer, J. F., An Investigation Into The Validity of Laterality, *The Upper Cervical Monograph,* 1989, 4(8), 1, 3-6.
3. Seemann, D. C., Predicting the Short Leg Using X-Ray Listings, *The Upper Cervical Monograph,* 1989, 4(8), 1-3.
4. Keating, J. D., Boline, P. D., The Precision and Reliability of an Upper Cervical X-Ray Marking System: Lessons from the Literature, *Chiropractic,* 1988, 1(2), 1-7.
5. Sigler, D. C., Howe, J. W., Inter-and Intra-Examiner Reliability of the Upper Cervical X-Ray Marking System, *JMPT,* 1985, 8(2), 75-80.
6. Jackson, B. L., et al, Inter-and Intra-Examiner Reliability of the Upper Cervical Marking System: A Second Look, *JMPT,* 1987, 10, 157-163.
7. Jackson, B. L., et al, Reliability of the Upper Cervical X-Ray Marking System: A Replication Study, *Chiropractic,* 1988, 1(1), 10-13.

Force and Depth in Adjusting C1 Subluxations

By Ralph R. Gregory, D.C.

Conventional chiropractic to be successful and scientifically acceptable must be based on the relevant principles of the physical sciences. Chiropractic is a mechanical system. It deals with mechanical stresses. The adjustment, which restores displaced vertebrae (subluxations) to their normal positions as vertebrae are architecturally designed to be, is a mechanical force. As such it is based on the applicable principles of mechanics.

Displacement of any object, including spinal vertebrae, the skull, and pelvis, is its distance and its direction from a starting point or origin of coordinates. Replacement of vertebral and skull displacements is their restoration to their normal positions or to the vertical axis of the orientation planes, (the Y coordinate) the amount of the displaced distance with the adjustic force controlled along the correct direction.

The vertical axis of the orientation planes is that point where the sagittal, transverse, and frontal planes of the body join. (Fig. 1) Each plane bisects the body; therefore, each plane passes through the body's center of gravity. The spinal column is the "gravital line" of the body and the longitudinal

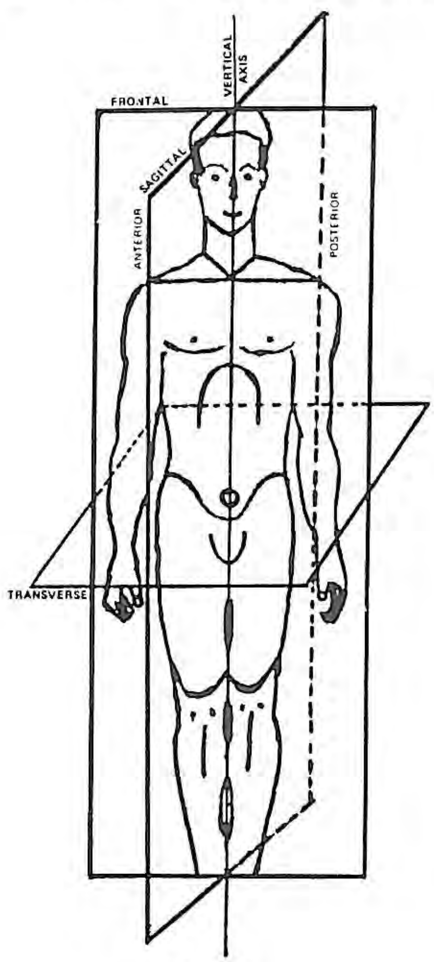


Figure 1
BODY PLANES

axis of the body, its support, and its dividing line. It must, therefore, align to the Y coordinate formed by the intersection of the three planes to be in its normal position, free of gravitational stresses and architecturally aligned to function normally. Only when spinal vertebrae are aligned can they function normally, articulate with one another in a natural fashion, and perform normal ranges of motion.

Many professions use the orientation planes as a frame of reference. Among which are kinesiologists and practitioners of general and orthopedic medicine. The planes are particularly important for chiropractic.

The vertical axis is the normal position for the axis of motion of a vertebrae which is in alignment, including the skull and pelvis. The three planes at right angles intersect producing three perpendicular lines, serving as coordinates of the three coordinate system.

Three axes of motion exist: (1) the vertical axis which is perpendicular to the ground; (2) the frontal or lateral horizontal axis which passes from side to side, and (3) the sagittal or antero-posterior axis which passes horizontally from front to back.

A rotatory (axial or angular) movement of a vertebra occurs in a plane and around an axis. The axis about which the movement takes place is always at right angles to the plane in which it occurs.

The above comments give some idea of how vertebrae displace. Displacement of a vertebra is the cause of a subluxation and is a basic property of a subluxation. The adjuster must know the distance and direction of the displaced vertebra if restoration is the objective. Without exact knowledge of the coordinate from which the vertebral displacement occurs, any force introduced into the vertebra may displace it farther.

The chiropractic profession has held itself out to the public as correctors of subluxations, but the cause of the subluxation—the displacement—has not been shown to be remedied. In fact, many practitioners claim that restoration of displaced vertebrae is not possible, and reject the concept substituting other spinal therapies even though they apply force to the vertebra. Not using a normal position toward which to direct the force, such therapies raise questions about creating more mechanical stress.

Force has been defined as simply a push or pull or as causing physical change. Newton's Laws describe force as "that which can impose a change of velocity on a material body." Perhaps more applicable for chiropractors is the definition that force is power made operative against resistance. Resistance is the over-coming of an opposing force, and exists in all subluxations.

C1 subluxations have osseous resistances that must be over-come when the subluxation is subjected to adjustic force. Muscles, ligaments, and tendons provide additional resistance in all cases. In some cases, the skull is the resistance; in other cases, the resistances are the superior articulating surfaces of C2, which vary because their sizes vary, and the abnormal movement of the cervical spine as a unit into one of the two frontal planes. These resistances must be subdued by the adjustic force if a restoration of the displaced structures is to occur. The adjustic force must be sufficient but cannot be excessive. Excessive adjustic force can cause damage, greater traction, and neurological involvement.

When an object, or part of an object, shifts its position, the center of gravity moves with it. When the axis or center of motion of the skull and/or spinal vertebrae move from the vertical axis, their centers of gravity move with them. Distance and direction from the vertical axis, or normal position, is therefore an essential fact of information before restoration is attempted by applying the adjustic force.

The skull, for example, that has moved from the vertical axis presents an abnormal gravital line because its axis has displaced. The gravital line so caused is an internal force because it detrimentally affects the cervical vertebrae below it, locking them out of their normal positions. In all cases, the skull's displaced axis must be corrected to the vertical axis and a normal gravital line established.

If the objective of an applied force to any object is to move the object to a predetermined position, the direction of the object must be controlled and the force's magnitude sufficient to overcome the resistance offered by the object. The same, simple reasoning applies to adjustically moving vertebrae and skulls to their normal positions.

The C1 vertebra is used as a lever to correct the vertebral displacements subjacent to it. Vectors established from x-ray measurements determine direction or "which way" the adjustic force must be delivered. Force is a vector quantity for the simple reason that it has direction. Force can be described in terms of its magnitude, its direction, and the point of the object at which it is applied.

The effort of the C1 lever, or point of force application, is the transverse process of C1 in all cases. The subluxation resistance in a type one is the superior articulating surface of C2 and the angulation of the cervical spine as a unit into a frontal plane. (Fig. 2) The fulcrum is the superior articulation surface of C2 opposite the side of laterality. This type is also a second class lever. (Fig. 3 and Fig. 4)

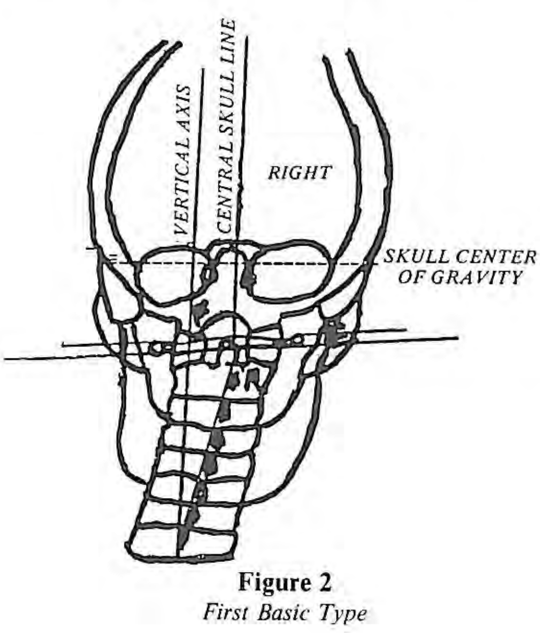


Figure 2
First Basic Type

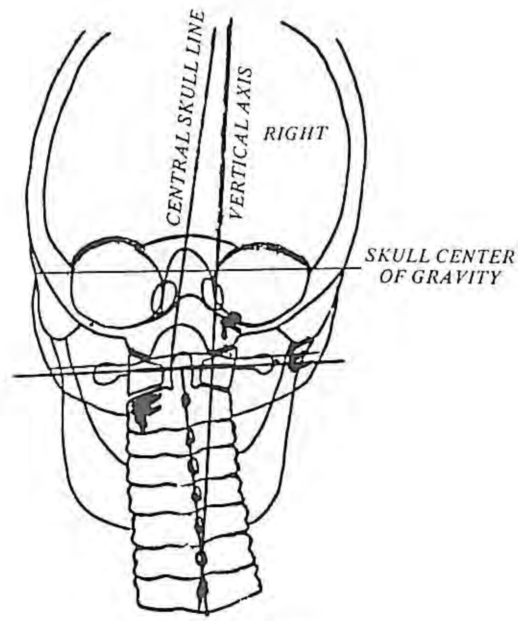


Figure 3
Second Basic Type

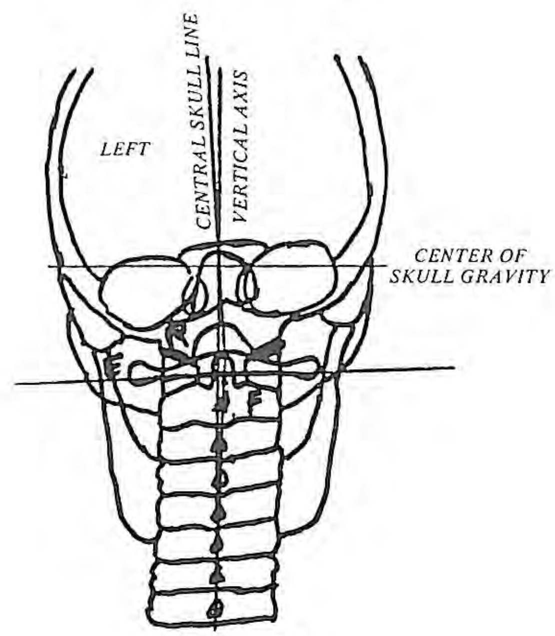


Figure 4
Third Basic Type

Type four, which is a combination of type one and two, varies as to its resistances. If the skull is tipped to the side of C1 laterality to a considerable degree, the skull will constitute the resistance because the vector should be lowered to raise the skull toward the vertical axis. If the superior articulating surfaces of C2 are large, they can be the resistance to the C1 lever. The cervical angulation in a type four does not constitute a resistance as abnormal movement of this type into either fronal plane is slight. In either case, the lever is second class. (Fig. 5)

Several C1 subluxations exist and have been recorded, each with varied displacements and different adjusting problems. A system was needed to codify or classify these C1

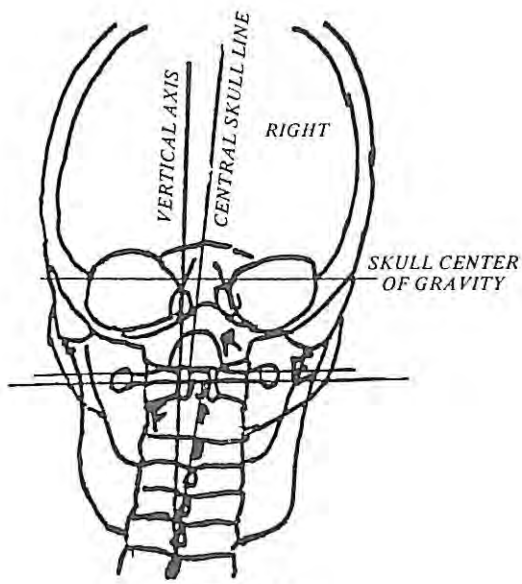


Figure 5
Fourth Basic Type

subluxations into basic types. The results of this study is the four basic types. Every known C1 subluxation fits naturally and biomechanically into one of the basic types. Knowing the type by first erecting the vertical axis, clarifies the vector, thus the direction to use to correct the displacements, how the patient should be placed on the adjusting table and obtain the proper reaction from the adjustic force. Knowing the basic type helps to analyse the x-ray film as each type presents separate characteristics.

Placing the patient on the adjusting table in accordance with the biomechanical findings on the x-ray reduces the amount of force required to restore the C1 subluxation complex, a term that includes the skull and entire spinal column. Adjusting vectors have recently changed because of the additional biomechanical information derived from the four types.

In a first basic type (see Fig. 2) the adjustic force must come down and around the superior articulating surface of C2 so that the excursion of the cervical spine is forced back to the vertical axis. This action accomplishes two functions: (1) it restores the cervicals and dorsals subjacent to C2 that have rotated into the transverse plane, and (2) aligns C1 to the occipital condyles. It is the frontal plane excursion that causes cervical vertebrae subjacent to C2 to rotate into the transverse plane.

In basic types two and three (see Fig. 3 & 4) the adjustic force must be delivered up and around the superior articulating surface of C2 to overcome the resistance of the skull. In types two, cervical angulation occurs into the frontal plane opposite the side of laterality so cervical vertebral rotations into the transverse plane occurs. In type three, no cervical rotations are measurable because no excursion of the cervical spine into a frontal plane occurs.

Basic type fours (see Fig. 5) require judgment in determining the vector. A vector slightly high will increase the laterality of C1; a vector slightly low will increase cervical angulation. This vector must be very exact.

This discussion of vectors, however, is not inclusive of all the factors involved in establishing the exact vector. The rotation vector, for example, is not included as are several elements that could cause a change or modification of the adjustic force.

Adjustic force has been labelled as light, shallow, deep, and no force. These terms tell us little. No one can look at an x-ray film and accurately compute the amount of force required to restore displaced vertebrae and skull to the vertical axis. As suggested, too excessive an adjustic force will cause further displacements, can change a basic type, increase the subluxation, and produce greater neurological insult. An adjustic force of too small magnitude will not realign the displacements and fail to correct neurological detriment. The force must be accurate in magnitude and direction when moving any object to a predetermined position.

An adjustic force that emanates from a rapid contraction of the elbow levers down into the C1 transverse process gains force as the adjuster's arms contract, such an adjustment is a building force, and moving directly from the adjuster to the patient, increasing as the adjustment completes. Such an adjustic force is usually excessive. Neither force nor depth are under the adjuster's control which is determined by the resistance of the subluxation which is unknown to the adjuster. An attempt by the adjuster to "lighten" the adjustment will fail to work because he/she does not know the subluxation's resistance. Both force and depth may be either excessive or insufficient resulting in increased subluxation or an ineffective reduction.

For example, if the subluxation's resistance requires two pounds of adjustic force to subdue it, one pound will fail to restore the displaced structures to the vertical axis. If three pounds of adjustic force is applied, the result will be an increase in the displacements, a change from one basic type to another with detrimental neurological effects and more instability. Control of adjustic force is essential.

To correlate the amount of force essential to overcoming a C1 subluxation resistance and to balance the adjustic force to each resistance, NUCCA developed an adjustic system that controlled both force and depth, and eliminated the increasing force moving downward from adjuster to patient. The required amount of force is generated and maintained in the adjuster's shoulder girdle until the force is sufficient to overcome the subluxation's resistance(s). This is accomplished by pulling back toward the shoulder with the contact arm and maintaining a steady pressure against the anatomic fossa of the contact wrist with the roll-in arm. The triceps muscles of both arms execute a function that is the reverse of extension, i.e., functional reversibility, which action forces the heads of the humeri into the glenoid fossae. Resultantly, the scapulae are compressed medially and potential energy is built up. When sufficient energy builds to a point where it can overcome the resistance(s) of the C1 subluxation being addressed, the vertebral displacements move. If the adjuster's analysis of the vectors is accurate, and he is properly positioned to deliver the vector, the subluxation complex is corrected.

When the shoulder girdle begins to compress, the episternal notch starts to protrude in a line with the action lines from the adjuster's pelvis and coplanar with the adjusting vector. Momentum is transferred to the adjuster's body and follow through results after the C1 vertebral displacements have moved. (Fig. 6)

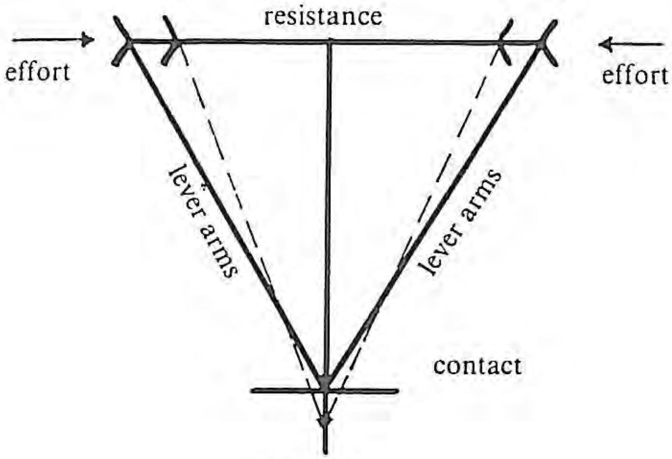


Figure 6

It is important to note that the force of the adjustment is to compress the adjuster's shoulder girdle until the stored-up potential energy is converted to kinetic or moving energy by the release of the subluxation resistance. The adjustic force is not against the patient's neck, except for the slight displacment downward of the adjuster's arms instantaneous with the resistance's breakdown.

Correcting or restoring displaced vertebrae has been questioned by both medics and chiropractors. The implication is that it cannot be done. This writer's opinion is the opposite; it can be done, and is being done by those few practitioners who understand and apply the relevant principles of physics and mechanics to their work. It is not surprising so few doctors do not succeed or abandon vertebral restoration, substituting non-chiropractic procedures, because students in chiropractic colleges are not taught the basic physical principles that apply to restoration. Yet, it is this restoration principle that separates chiropractic from methods used prior to the advent of chiropractic and now being adopted by chiropractors as a substitute.

The contents of this article are based on twenty years of research by NUCCA of the C1 subluxation and its detrimental influences on the body.

REFERENCES

Kinesiology, K. F. Wells, Ph.D., W. B. Saunders Co., Philadelphia and London, 1955.

Concepts in Kinesiology, Groves & Camaione, W. B. Saunders Co., 1975.

Physics, The Easy Way, R. L. Lehrman, Barron's Educational Series, Inc., 1984.

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. Doctors who successfully complete the program will be eligible to conduct and teach basic classes. A certification committee will be established from the initial group of doctors first certified. Examinations will be given at NUCCA seminars and conventions.

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 in two years. Certificates will be issued successful candidates.

Doctors who have not engaged in practice for three years but who have attended NUCCA seminars are eligible to take the examination which covers a two-year period. A fee is charged each candidate. In the event of failure of the examination, or any part thereof, the candidate is re-examined in the part of the examination he failed without paying an additional fee, provided re-examination takes place within the two-year period.

Certification will be evaluated every three to five 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 ten sets of cervical films suitable for analysis
   - D. Examination on x-ray procedures
   - E. Submit a set of x-ray alignment films
   - F. Examination on instrumentation

2. FILM ANALYSIS
   - A. Knowledge of osseous structures
   - B. Read ten sets of cervical spinal x-rays with an inter-observer reliability of .90
   - C. Examination of film analysis

3. ADJUSTING
   - A. Submit ten sets of consecutive pre and post cervical x-rays. The post x-rays presented to the examining board be those taken after the initial adjustment. Reductions in the height and rotation vectors to be evaluated at the discretion of the examining board.
   - B. Oral examination in which the candidate is given various listings for which he is to explain reduction procedures.
   - C. Written examination on adjusting. 100 questions with a passing grade of 85.

NUCCA Scholarship Awards

The NUCCA Board of Directors has authorized a scholarship grant-in-aid award of $200.00. The award will be paid to chiropractic students currently enrolled in a chartered college of chiropractic who submit to the *Monograph* editor an acceptable article pertaining to the upper cervical spine.

Submitted articles should relate to the Occipital-atlanto-axial spine. They may relate to biomechanics of the cervical spine, analysis of cervical subluxations, corrective techniques for cervical subluxation, detrimental effects of C1 subluxations on the spinal column (distortion), or any other phase of chiropractic in which the upper cervical subluxation is shown to be an etiogenic factor.

Articles must be accurately and properly referenced. All entries will be judged by the NUCCA Board and by Daniel C. Seemann, Ph.D., NUCCA Executive Director. Accepted articles become the property of the National Upper Cervical Chiropractic Association, Inc. (NUCCA). The names of the authors of the accepted manuscripts will be announced at the next NUCCA Convention. Payment of the award will be made upon acceptance of the article.

NUCCA will attempt to return all manuscripts that are accompanied by a self-addressed, stamped envelope. The organization will not be responsible for lost or mislaid submitted material. The judgment of the NUCCA Board of Directors will be final. The writer should retain a carbon copy.

Students are encouraged to submit articles.

Further information is available by writing:

NUCCA MONOGRAPH EDITOR
217 West Second Street
Monroe, Michigan 48161

NUCCA at Palmer

NUCCA has completed its third elective course at Palmer. The student response to this system of chiropractic has been excellent. Several field doctors who have been certified after passing the two year certification program by NUCCA have assisted in teaching at the college. Others qualified, but as yet not certified, have assisted certified doctors. NUCCA publicly thanks each of these doctors for a first class performance.

Doctors who have taught the elective at the college are: Drs. K.E. Denton, Teresa Palmer, Marshall Dickholtz, Sr., Larry Schrock, Lloyd and Lonnie Pond, D. Gordon Hasick, Albert Berti, Glenn Cripe, Julia Cirigliano, E. Stein, and R.R. Gregory.

NUCCA is now included in the Palmer College Continuing Education Program and approved as an elective technique for the Palmer Clinic. Classes are held over four separate weekends of 45 hours of instruction.

Classes include X-ray Patient Placement, X-ray Film Analysis, Spinal Biomechanics, Patient Table Placement, Leg Checking, and Adjusting Techniques. Students are taught the normal position for vertebrae that are displaced, and how to restore displaced vertebrae to normal position.

The Ruth O. Gregory Memorial Fund

To the many and generous contributors to the Ruth O. Gregory Memorial Fund, NUCCRA extends its thanks. Your contributions to the Fund have helped to finance C1 subluxation research, advance your profession, and assist your colleagues in the practice of subluxation-reduction, thereby helping your profession, your patients, and yourselves.

The NUCCRA Directive Board unanimously voted in November 1982 to establish a memorial fund as a tribute to Ruth O. Gregory in appreciation of the time and effort she so unselflessly gave to the NUCCA-NUCCRA organizations, a fund that will exist as long as the organizations do. It was her desire that chiropractic become more scientifically acceptable and of greater benefit to mankind. She saw bona fide research as the only means of achieving these goals. To this end she devoted her time, effort, and money.

Since her death in June of 1982, unsolicited donations have been received by NUCCRA from doctors, students, and lay persons. These contributions will forward Ruth O. Gregory's interest in the advancement of chiropractic for the benefit of all.

Most recent donors to the Fund are:

Marynell Shields	Indiana
Michael Thomas	Iowa
Markey Foundation (Mr. & Mrs. M.G. Anderson)	Ohio
M. Dickholtz, Sr.	Illinois
Dr. & Mrs. Sheppard	California
Dr. D. Hawk	Georgia
Dr. K. Nakano	California
Dr. J. Holler	Washington
Dr. L.W. Rutherford	Oregon
Dr. R.R. Gregory	Michigan

NUCCA Installs X-Ray Equipment at Palmer

The NUCCA Board of Directors unanimously voted to provide the Palmer College of Chiropractic with an upper cervical x-ray unit. This type of x-ray unit is needed at the Palmer College for students who are taking the current elective in NUCCA procedures at Palmer College.

Dr. D. Gordon Hasick of Calgary, Canada and Dr. Marshall Dickholtz, Sr. of Chicago, Illinois negotiated with the manufacturer on behalf of the NUCCA Directive Board. Dr. Dickholtz made several trips to Davenport, Iowa for the purpose of inspecting the installation and making changes that improved the equipment. The NUCCA Board expresses its gratitude to Dr. Dickholtz for his successful efforts on behalf of NUCCA and the Palmer College, and for the time spent away from his office.

Students practicing the NUCCA procedures in the Palmer College Clinic are now provided with x-ray equipment suitable to their NUCCA training and their procedural needs.

The Relationship of Pelvic Distortion to the Center of Gravity of the Skull

By Dr. Glenn E. Cripe

Introduction

The purpose of this paper is to determine what the relationship between the location of the center of gravity of the skull and the center of gravity of the pelvic in the frontal plane might be.

Up until recently most of the research has been on predicting pelvic distortion and the short leg, based on the neurological components of the C-1 subluxation.[1] This paper will look more from a structural standpoint where equilibrium or stability is the area of focus. More specifically, how the position of the head in the frontal plane affects pelvis distortion in the frontal plane.

Hypothesis

The hypothesis is this: As the center of gravity of the skull shifts into the right frontal plane the pelvis will shift causing the left iliac crest to be low. As the center of gravity of the skull shifts into the left frontal plane the pelvis will shift causing the right iliac crest to be low. The tilting of the pelvis is in order for the center of gravity of the pelvis approximately the upper third of the sacrum)[2] to realign itself under the center of gravity the skull. As the center of gravity approximate each other the more stable the person.

Background

As stated by Wells and Luttgen, "The center of gravity will be displaced in the direction of the added weight," (the shift of the skull to the right or left of the vertical axis," "and the line of gravity will shift accordingly. Its new location will be governed by the nature of compensation made to accommodate the additional weight."[3]

Further excerpts from Wells and Luttgens explain the importance of equilibrium of the body, and the facts on how the body must compensate when under the force of gravity; particularly if in a state of disalignment.

"The Relation of the Line of Gravity to the Base of Support." An object retains its equilibrium only so long as its line of gravity falls in its base of support. When the force that the body is resisting is the downward force of gravity, the nearer the line of gravity to the **center** of the base of support, the greater the stability, and conversely, the nearer the line of gravity to the **margin** of the base of support, the more precarious the equilibrium."[4]

"Segmentation. Maximum stability of the segmented body is assured when the centers of gravity of all the weight-bearing segments lie in a vertical line which is centered over the base of support . . . When one segment gets out of line, there is usually a compensatory disalignment of another segment in order to maintain a balanced position of the body as a whole."[5]

N.U.C.C.A. over the years has demonstrated that the most significant structural and neurological area of the spine that is subject to "being out of line" is the occipital-atlanto-axial complex.[8] Once this relationship is "out of line" the rest of the subjacent vertebrae would compensate down to and including the pelvis. It is also important to note the neurological system that initiates this compensating or righting reflex.

The neurological component whose function it is to help maintain body equilibrium is the vestibular system. This system is made up of the vestibular division of the eighth cranial nerve that has a complex series of connections whose major function is maintaining equilibrium.

"From the inner ear, primary neurons pass to the brain, with their cell bodies aggregated in the vestibular ganglion. Axons leave this ganglion and enter the brainstem, where they terminate in four vestibular nuclei situated in the area of the floor or the fourth ventricle. These nuclei have five major connections . . ."[6]

These five connections are:

1. Vestibulocerebellar Connections
2. Vestibulospinal Tracts
3. Vestibulo-ocular Connections
4. Vesticulocortical Connections
5. Accessory Pathway

The importance of this involved system is significant first in its series of nerve tracts down into the brainstem where it is considered part of the extrapyramidal tracts. Its actions of equilibrium are reflexive not voluntary. And secondly the location of the vestibular cochlea apparatus is located around the center of gravity of the skull. As Dr. Seemann states, "The notion that the center of gravity of the head is located slightly above the auditory meatus and on a horizontal line at the mid-sagittal plane of the head seems to be logical because it is along this line that the semi-circular canals are located. The semi-circular canals maintain the body's equilibrium. It is possible that the true center of gravity lies between the two canals."

Method

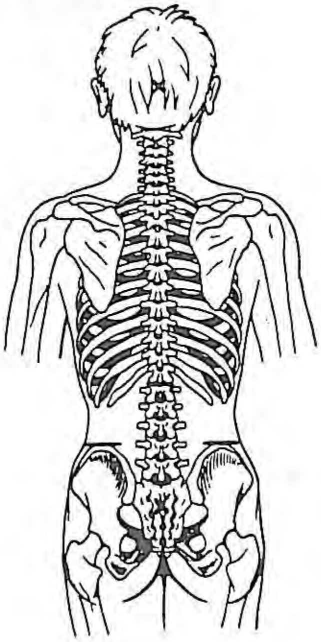
The study was done using 33 recent case studies randomly chosen between the dates 9-5-89 and 11-20-89.

The anatometer was the instrumentation used to determine the degree of pelvic distortion. The measurements were taken and documented on each case prior to the x-ray procedure. The only measurement used in this case was the frontal plane which indicated a low or high iliac crest. For consistency purpose the low hip was always used. There was only one examiner, proper foot spread of the patients was used as well as having the instrument level.

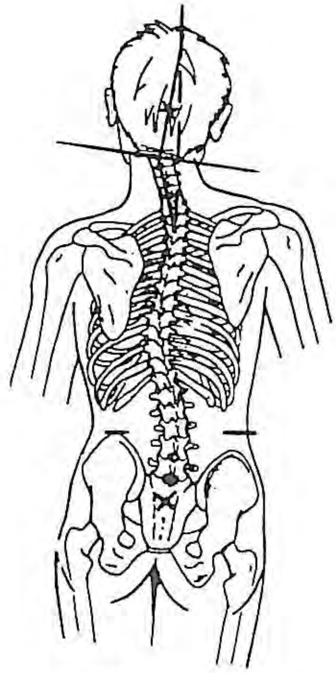
The N.U.C.C.A. x-ray procedure and x-ray analysis were used in each case. Only the nasium film however was considered in this study. (The author realizes the other findings on the anatometer and other films could play a role in the distortion of the pelvis relative to the A.S.C.S. however only the frontal planes of both the skull and pelvis will be addressed in the article.)

In analyzing the nasium film the vertical axis line was drawn from the fixed point, T-1 or T-2 up past the center of

Figure 1 (A-F)

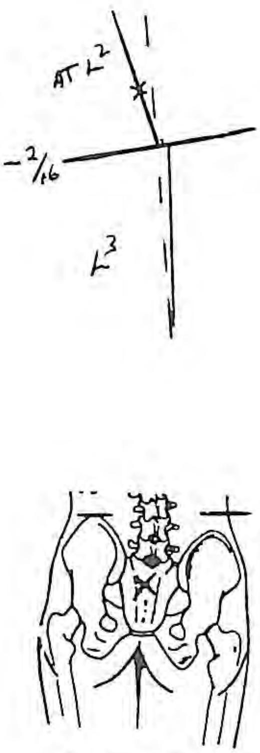


A. Normal Spine

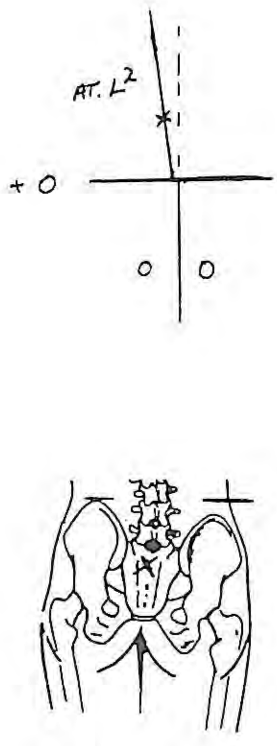


B. Full Spine Showing Spinal/Pelvic Compensation.

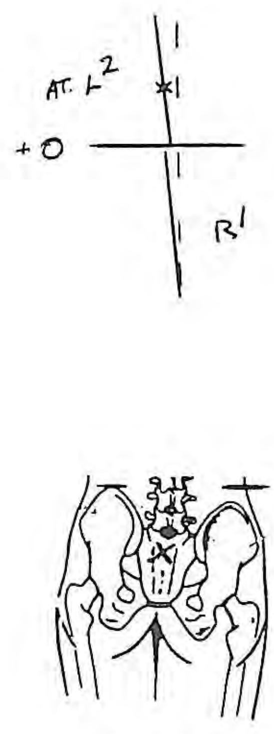
C. Basic Type 1
C G of Skull in the
Left Frontal Plane.
Low Rt. Iliac Crest.



D. Basic Type 2
C G of Skull in the
Left Frontal Plane.
Low Rt. Iliac Crest.



E. Basic Type 3
C G of Skull in the
Left Frontal Plane.
Low Rt. Iliac Crest.



F. Basic Type 4
C G of Skull in the
Left Frontal Plane.
Low Rt. Iliac Crest.

gravity of the skull. The center of gravity was then determined to be either to the right or left of the vertical axis. This is now noted as the center of gravity being in the right or left frontal plane relative to the vertical axis.

Discussion

In discussing this idea of pelvic tilt or shift one must be able to visualize the center of gravity of the skull; where it is in relation to the vertical axis and how the pelvis would tilt in order to bring it under the head.

Refer to Figure 1 A-F.

Figure 1A depicts the normal spine with the center of gravity of the skull, vertebrae, and pelvis on the vertical axis. As stated earlier by Wells and Luttgens "**Maximum stability** of a segmented body is assured when the centers of gravity of all weight bearing segments lie in a vertical line which is centered over the base of support."[5]

Figure 1B is depicting the compensatory misalignment of the spine and pelvis as they seek equilibrium under the "out of line" skull.

Figure 1C-F illustrates the four basic types with the predicted pelvic tilt directly below. All examples use a left C-1 laterality along with the skull center of gravity displaced into the left frontal plane. The pelvis in each case in order to maintain a state of stability would shift low on the right so that the base of support would be more directly under the center of the skull.

In all of the 4 preceding examples, if the pelvis were to tilt in the opposite direction (low on the left) the gravitational line of the skull would then fall further out to the margin of the base of support (pelvis) hence making the body quite unstable.

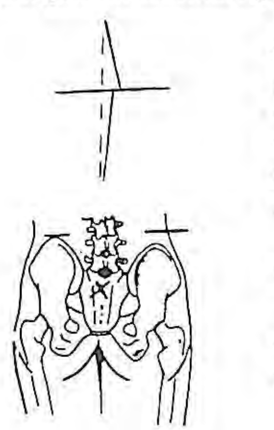
In the study of 33 cases all four basic types were represented. Six out of the thirty three did not fit the pattern of having the center of gravity of the skull in one plane with the low hip on the opposite side. They were #4,8,17,18,19,23. Attempting to explain these six cases I looked into their case histories and reviewed their films.

Case #2

Systemic lupus for 10 years with generalized pains. X-ray findings and unremarkable.

*Case #8

Pain between scapula with low back pain on and off for 1 year general constant tightness in low back. X-ray findings:



Even though the center of gravity of the skull is in the right frontal plane there is such a great amount of head tilt to the left I see where the right hip could be low in order to keep the base of support under the skull.

The amount of head tilt could be a factor in this type of case.

If the hip was low on the left it would send the patient in a very unstable lean to the left.

*Case #17

Occasional stiff neck. X-ray findings: This case is the only one where the head and neck were on the vertical axis. The subluxation was produced by the atlas riding under the condyles with the head and neck remaining on the vertical axis. In this case the hips could go either way.

Case #18

Auto accident 14 days prior to first examination. X-ray findings: Unremarkable.

*Case #19

Patient has a thoraco-lumbar rotatory scoliosis and was in a brace for 3 years as a youth. X-rays unremarkable.

Case #23

Neck pain and an old low back football injury. X-ray findings: Unremarkable.

Reviewing Figure 2, the last two columns demonstrate how the pelvis will tilt low opposite to the center of gravity of the skull. Six cases did not fit the theory. Here the center of gravity of the skull and the low iliac crest were on the same side. These cases would be quite unstable in that the center of gravity of the skulls are farther away from the center of the pelvis. The three cases (8, 17, and 19) in my opinion have

FIGURE 2

A comparison between the center of gravity of the skull as seen on the nasium film and the side of the low hip as determined by the anatometer.

B-T	C-1 Laterality	Lower Angle	C-1 Plane Line	Center of Gravity of skull in relation to vertical axis	Low Hip in Degrees
1. 2	R 1 (1)	R 2	- 1/16	L Frontal Plane	R 1 ½
2. 1	R 2 ½	L 5	+ 4/16	R Frontal Plane	L 5
3. 1	L 1	R 4 ½	+ 8/16	R Frontal Plane	L 2
4. *2	L 1 (1)	L 3 ½	0	R Frontal Plane	R 2
5. 1	L 2 ½	R 5 ½	+ 8/16	R Frontal Plane	L 2 ½
6. 3	L 2 (0)	0	+ 4/16	R Frontal Plane	L 2
7. 4	R 2 ½ (4)	L 1	- 3/16	R Frontal Plane	L 3
8. *2	L 1 (3)	L 4 ½	- 3/16	R Frontal Plane	R 1 3/4
9. 4	R 7 (4½)	L 4 ½	+ 2/16	R Frontal Plane	L 2
10. 1	R 3	L 6	+ 2/16	R Frontal Plane	L 2
11. 2	R 2 ½ (1½)	R 3 ¼	+ 1/16	L Frontal Plane	R 2
12. 2	L 2 ½ (0)	L 1 ¼	+ 4/16	R Frontal Plane	L 3
13. 4	R 4 (5½)	L 1	- 2/16	R Frontal Plane	L 2½
14. 1	R 1 ½	L 3 ½	+ 3/16	R Frontal Plane	L 3
15. 1	L 3	R 5	+ 7/16	R Frontal Plane	L 3 ½
16. 3	L 5 ½ (½)	0	+ 6/16	R Frontal Plane	L 2 ½
17. *1	L 3	R 3	+ 3/16	R Frontal Plane	R 1
18. *1	R 3/4	L 2 ½	+ 1/16	R Frontal Plane	R 3
19. *1	R 1 ½	L 5	+ 2/16	R Frontal Plane	R 1 ½
20. 1	R 4 ¼	L 9	+ 5/16	R Frontal Plane	L 3
21. 1	R 2 ½	L 2 3/4	+ 4/16	R Frontal Plane	L 2 ½
22. 2	L 1 (3)	L 3 ½	- 2/16	R Frontal Plane	L 2
23. *1	R 1 ½	L 6	+ 3/16	R Frontal Plane	R 1 ½
24. 2	L 1 ½ (0)	L 3 ¼	+ 3/16	R Frontal Plane	L 1 ½
25. 1	R 1 (1)	L 3 3/4	+ 5/16	R Frontal Plane	L 1
26. 2	R 1 (1)	R 1 ½	0	L Frontal Plane	R 1
27. 1	L 2 ½	R 1 ½	+ 6/16	R Frontal Plane	L 2 ½
28. 3	L 3 (3)	0	0	R Frontal Plane	L 1
29. 2	R 2 (1)	R 3 ½	0	L Frontal Plane	R 1 ½
30. 1	R 8 ½	L 3 ½	+ 9/16	L Frontal Plane	R 1
31. 1	L 3 ½	R 1	+ 8/16	R Frontal Plane	L 3 ½
32. 1	L 3/4	R 4 ½	+ 1/16	L Frontal Plane	R 1
33. 4	R 2 (1½)	L 1	+ ½/16	R Frontal Plane	L 2 ½

( ) Indicates the amount of head tilt, that is producing the subluxation.
* Indicates the cases that do not follow the normal pattern.

a legitimate rationale for "not fitting" the typical pattern (see above in the case study). For the other three (4, 18, 23) however are unexplainable at this time.

In conclusion I feel there appears to be enough evidence to support further investigations of this hypothesis.

References

1. Seemann, D.C., "Predicting the Short Leg Using X-ray Listings." *The Upper Cervical Monograph*, Vol. 4, No. 8, June 1989.
2. Wells and Luttgen, *Kinesiology: Scientific Basics of Human Motion* 6th Edition. Pg. 358, 1976 W.B. Saunders Company, Philadelphia, London, Ontario.
3. Wells and Luttgen, *Kinesiology: Scientific Basics of Human Motion* 6th Edition. Pg. 364, 1976 W.B. Saunders Company, Philadelphia, London, Toronto.
4. Wells and Luttgen, *Kinesiology: Scientific Basics of Human Motion* 6th Edition. Pg. 358, 1976 W.B. Saunders Company, Philadelphia, London, Toronto.
5. Wells and Luttgen, *Kinesiology: Scientific Basics of Human Motion* 6th Edition. Pg. 363, 1976 W.B. Saunders Company, Philadelphia, London, Toronto.
6. Liebman M. "The Vestibular System" *Neuroanatomy*, 2nd Edition. Pg. 30-32, 1983, University Park Press, Baltimore.
7. Seemann, D.C. "The Center of Gravity of the Skull." *The Upper Cervical Monograph* Vol. 2, No. 9, July 1980.

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. 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 specimen.

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
Compliments *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.

The 1990 NUCCA Convention and Educational Conference

The 1990 NUCCA Convention and Educational Conference will be held at the Holiday Inn, 1225 North Dixie, Monroe, Michigan, 48161, starting Saturday, May 5, 1990 through Tuesday, May 8, 1990. The telephone number is: (313) 242-6000.

The theme of the educational conference is: Biomechanics and the spinal column.

Supervising the conference will be Daniel C. Seemann, Ph.D., the University of Toledo; and James F. Palmer, M.S., University of Toledo. Both these professors are members of the NUCCRA Research Board and advisors to NUCCRA in research. Each will present research update on current work being done by NUCCRA.

Subjects will include basic and advanced film analysis, classifications of the C1 subluxation complex, patient placement for the four basic types, vectorial changes in adjusting the C1 subluxation, resistances in the C1 subluxation, anatometer exercises, leg-checking exercises, spinal biomechanics, adjusting exercises, and x-ray machine and patient alignment.

Videotapes on adjusting errors, film analysis, phases and steps of the adjustment, and others, will be optional and presented as time permits.

Past NUCCA educational seminars have been accepted by several state examining boards for license-renewal. Participants at the 1990 NUCCA Educational Conference who require credit for attendance must obtain a NUCCA attendance card at the registration desk, be monitored each session, have their attendance cards punched with the special NUCCA punch each session, sign the card and leave the duplicate with us.

Professional fees are $450.00; doctors in practice for two years or less, the fee is $250.00. Students are admitted for $150.00.

NOTE THE DEADLINE FOR REGISTERING AND KINDLY OBSERVE IT. THE DEADLINE IS APRIL 1, 1990. We have had problems in obtaining space; please cooperate and register by April 1, 1990. A $25.00 charge is added if an applicant fails to register by the deadline.

Because of the space problem, it is hoped that applicants to the convention and seminar will register at the *Holiday*. The Inn is providing us with a block of rooms for applicants. If applicants stay at one motel, time will be saved (and problems) on transportation and meals. The motel will reserve this block of rooms until April 4, 1990, not later.

Professional service will be given to a limited number, not more than twelve. All x-rays must be taken on Thursday, May 3rd. Friday is reserved for adjustments and posts. The deadline for professional services is April 1, 1990. The fee is $120.00, payable to R.R. Gregory, D.C.

All monies above expenses will be donated to NUCCRA for research.

Further information may be obtained by writing NUCCA, 217 West Second Street, Monroe, Michigan 48161, or calling (313) 241-5755.

Notice of Price Increase

Due to increased cost of production, the x-ray analytical instruments will be increased from $45.00 per set to $60.00 per set. The N.U.C.C.A. Board has established a fee of $30.00 per set for students enrolled in N.U.C.C.A. courses at any of the chiropractic colleges.

N.U.C.C.A.'s status as a non-profit organization requires that pre-payment on all items must be received before shipping can occur.

The 1989 NUCCA Fall Seminar

The 1989 NUCCA Fall seminar was held at the St. Mary Conference Center, 502 West Elm Street, Monroe, Michigan from Saturday, October 28th through Tuesday, October 31st. It was well attended by doctors and students from around the United States and Canada. Dr. Peter Esdaile from North Rockhampton, Queensland, Australia, and Dr. Norbu Ikuse, Tokoname, Aichi, Japan represented participants from abroad.

The educational program was supervised by Dr. Daniel C. Seemann, NUCCRA Research Board member and a professor at the University of Toledo. Coordinating the educational program was James F. Palmer, M.S., a NUCCRA Board member and also a professor at the University of Toledo.

Instructors were Drs. K.E. Denton, Glenn Cripe, Lloyd Pond, Lonnie Pond, M. Dickholtz, Sr., A.A. Berti, Teresa Palmer, L. Schrock, E. Stein, and R.R. Gregory.

The educational program was a "hands on" sequence including anatometer measurements, film analysis, biomechanics, leg-checking, headpiece placement, patient x-ray machine alignment and patient placement and adjusting exercises. Doctors were granted a choice of subjects.

All monies above expenses will be used to advance NUCCRA research for the benefit of the profession, individual chiropractors, and patients.

NUCCA Visits Life College Upper Cervical Conference

NUCCA was represented at the Annual Upper Cervical Conference held at Life College in Marietta, Georgia during the weekend of November 11, 1989. Representing NUCCA at the Conference were Professor James F. Palmer from the University of Toledo and a NUCCRA Research advisor and Board member; Dr. Daniel C. Seemann, also a professor at the University of Toledo and a NUCCRA Research advisor and member of the NUCCRA Board, and Dr. Ralph R. Gregory, president to the NUCCA-NUCCRA organizations. The three NUCCA representatives made a block presentation of some of the NUCCRA research findings.

The Life College Upper Cervical Conference was well attended and successful. Speakers from several chiropractic groups made interesting and informative presentations.

A Report on "The Role of Chiropractic"

"This study is clearly a serious effort to put the subject of chiropractic into historical and scientific perspective. Eventually the volume will be placed in our library of resources, where it will be available to departmental researchers" so states the United States Department of Education, Office of the Under-Secretary.

What does this mean for the chiropractic profession? It means that factual, authoritative, data and information has been submitted to, and accepted by the U.S.D.E. relative to chiropractic. The historical and scientific aspects may well ultimately be reflected in all major federal programs relating to chiropractic — areas such as education, accreditation, insurance and legislation.

As a source of reference, the facts cannot be denied. The information holds the potential of being most valuable in our professional advancement and acceptance.

Many have also indicated that if it is good information for the chiropractor, it is also good information for the patient, the attorney, the library, the legislator, and, in fact, people in many walks of life. I have just received a phone call from a chiropractor who intends to use the books for patient education. A teacher is making the book available to career counsellors in the school. The list of those desiring the information seems endless.

Mark it well. If chiropractic is to survive and progress as a separate, distinct profession, understanding our role is a must. This, not only for our profession, but, also for all peoples concerned. In this effort, each chiropractor plays a part.

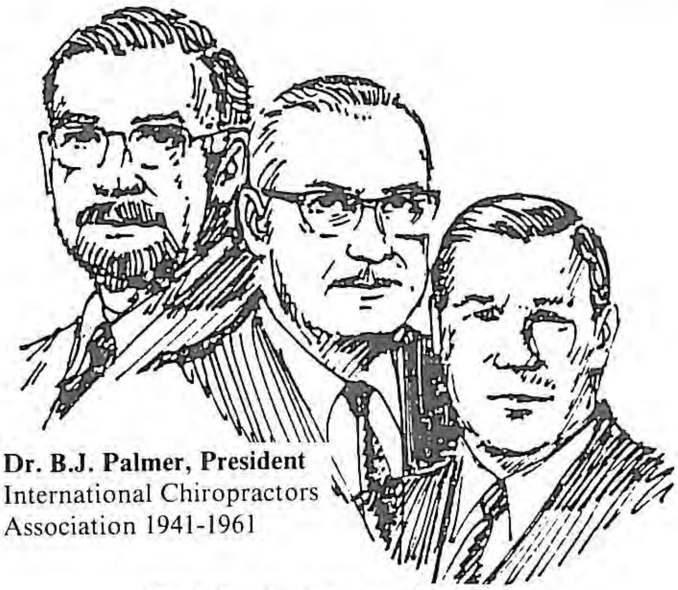
It is heartening too, that some of our chiropractic colleges have indicated that the book may be used as required reading or used as a text for students.

In this respect I am pleased that Dr. Ralph Gregory has seen fit to make use of it in the NUCCA program.

This report is written to inform you of the progress of The Role of Chiropractic as it takes its place in the arena of chiropractic education and knowledge. I am grateful to all who are making this happen.

For truth it is, our actions today to maintain and project chiropractic — separate and distinct — builds a profession for those who follow.

Submitted by L.W. Rutherford, D.C.
November 17, 1989



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NOTICE

Five educational pamphlets are now available from NUCCA. The cost is $30 per hundred which includes postage and handling. Pamphlets must be paid for in advance because of our non-profit status.

1. A Patient Guide (yellow), explains the 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), explains the NUCCA system to patients, doctors, and students.

Three booklets have been published by NUCCA for doctors and students. The first booklet, The NUCCA Basic Course: X-ray Analysis details the NUCCA x-ray analysis.

The second booklet, The NUCCA Advanced Course: Biomechanics, explains the biomechanics of The Atlas Subluxation Complex.

The third booklet, The NUCCA Course, Adjusting the Atlas Subluxation Complex details the phases and steps of the C1 adjustment and explains, using text and pictures, The Standing Positions. A glossary of terms is included.

Each booklet is priced at $15.00.

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