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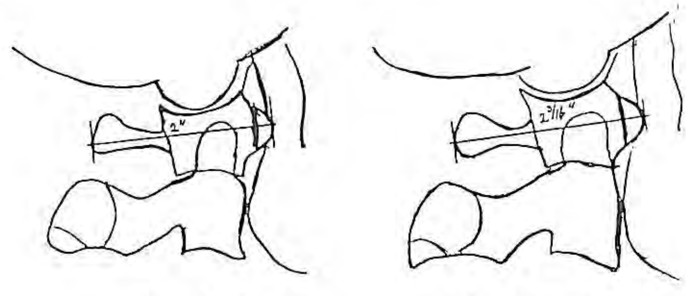

Atlas 4½ inches from cassette — *Atlas 8½ inches from cassette*

Figure 1.

Identifying And Locating the Transverse Process of C1

By Albert Berti, D.C.

This article will describe the process of identifying the transverse process on the lateral film utilizing identification of structures in the nasium and vertex x-rays.

Procedure

When identifying structures using x-rays, the x-ray machine should be in alignment and all views taken as accurately as possible. In the lateral x-rays, the distance from the atlas to the cassette face will average approximately eight and one-half inches—and with the vertex film, the atlas is approximately four and one-half inches from the cassette. This difference will cause the atlas to be three-sixteenths of an inch longer from the anterior tubercle to the posterior tubercle in the lateral projection, than the distance between the same structures in the vertex projection. The difference is illustrated in Figure 1 where two lateral films were taken, one at four and one-half inches from the cassette and one at eight and one-half inches from the cassette and the difference of 3/16″ was found. This is critical in identifying and locating the transverse process of C1 using the following steps.

Step 1

The initial step in identifying the transverse process on the lateral view is to identify the posterior margins of the transverse processes in the vertex view (Fig. 2.), points A and A1, draw a line joining these two points. Measure the distance between the anterior tubercle of the atlas and the drawn line, B to B1. In this case the distance is three-quarters of an inch. Measure the same distance from the anterior tubercle, minus one-eighth of an inch (magnification factor difference), on the lateral projection, C to C1. C1 now represents the posterior aspect of the transverse process. Review the vertex film and measure the distance between the posterior margin of the transverse process and the anterior margin, in this case three-sixteenths of an inch. Transfer this measurement to the lateral projection, measuring three-sixteenths of an inch anterior to the previous mark (C1). C2 now represents the anterior margin of the transverse process.

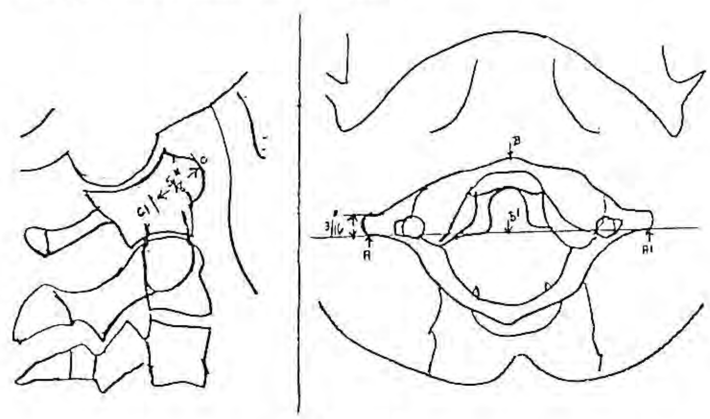

Figure 2.

Step 2

The next step is to view the nasium projection. (Fig. 3). Locate the medial, inferior margin of the condyles, D and D1, draw a line joining these two points. Locate the superior margin of the transverse process, E. Measure the distance between point E and the line previously drawn. This represents the distance the transverse process is inferior to the inferior margin of the condyle; in this case, one-eighth of an inch. Locate and mark the inferior margin of the condyle in the lateral projection, Fig. 3A. From this marked point measure down one-eighth of an inch.

This will locate the superior margin of the transverse process, point F. Review the nasium film and measure the distance between the superior margin and inferior margin of the transverse process of C1; in this case, three-eighths of an inch. Transfer this measurement inferior from point F on the lateral view and you now have the inferior margin of the transverse process, point G. Draw in the transverse process by relating points C1, C2, F and G.

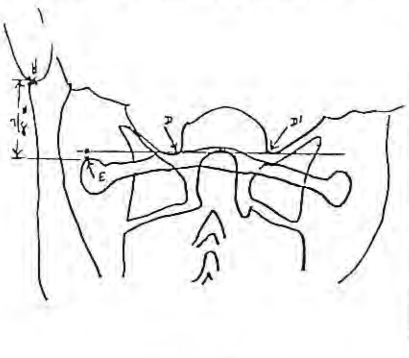

Figure 3.

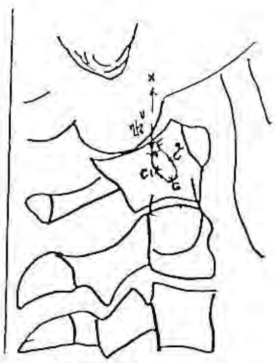

Figure 3A

Step 3

On the nasium projection locate the superior margin of the transverse process, Fig. 3, point E. Extend this mark or point laterally approximately one-half inch and from this point measure vertically to the inferior tip of the mastoid process, Fig. 3, point H. In this case the measurement is seven-eighths of an inch. Locate the superior margin of the transverse process on the lateral projection Fig. 3A, point F, and from this point measure vertically seven-eighths of an inch. The inferior tip of the mastoid process will be observed posterior from this mark or point. Draw in the mastoid process and relate the structures to each other.

If this method is practiced a number of times, locating and identifying the transverse process will require very little time and will certainly result in a better reduction of the vertebral misalignment.

A Clinical Investigation Into Upper-Cervical Biomechanical Stability: Part I

By T. Palmer, D.C., K. Denton, D.C., J. Palmer

A study was undertaken for the purpose of determining the degree of stability or instability of upper-cervical biomechanical misalignment factors. Patient files of the late R. R. Gregory were the source of data.

Six criteria were used to define the population of patients used in this study. These criteria were as follows:

1. All x-rays were pre-adjustment x-rays.
2. All patients had one set of pre-adjustment x-rays within the last 5 years (4-1-85 to 4-1-90).
3. All patients had one set of pre-adjustment x-rays that preceded the set in #2 by at least 7 years.
4. No intervening set of pre-adjustment x-rays between the above two sets (#2 & #3) of pre-adjustment x-rays.
5. None of the patients were chiropractors.
6. No known ambiguities were present.

These six criteria were chosen for the following reasons:

Criterion #1. Pre-adjustment x-rays were used so that misalignment factors could be readily ascertained. Since previous studies utilizing the files of R. R. Gregory indicated an average reduction in the 90-95 percent range, many if not most post x-rays probably would give insufficient information as to preexisting misalignment factors. However a rigorous look at post-adjustment x-rays would potentially yield information as to whether or not R. R. Gregory would have attempted a complete reduction on those not "zeroed" as determined from the analysis of the post x-ray. If structural biomechanical asymmetries of sufficient magnitude existed that would have prevented further reduction, then in all likelihood further reduction would not have been attempted. Certainly a process yielding, on the average, almost total reduction of the misalignment factors would increase the efficacy of using post-adjustment x-rays in determining the existing anatomical/biomechanical asymmetries. It is realized that structural/anatomical biomechanical asymmetries would affect the limits of stability as well as the probable range of misalignment factors.

Criterion #2. The 5-year time constraint assured that at least one of the doctors in this study knew the patient, since all x-rays within the last eight years in the clinic were taken by either K. Denton or T. Palmer. Also, the April 1, 1990, time constraint indicates that at least some of the patients in this study are now under the care of the authors.

Criterion #3. The 7-year time constraint assured that there were at least two sets of pre-adjustment x-rays and that the patient had been a "patient" for at least seven years.

Criterion #4. This restrictive constraint assured the authors that in all probability there were no contraindications to adjusting on the last stated listing; i.e., the first (earlier) of the two sets of listings ascertained by analysis of the pre-adjustment x-rays.

Criterion #5. Chiropractors adjust/manipulate chiropractors. Many probably would have been patients of other chiropractors between visits to R. R. Gregory's office. All but two of the patients in this study probably had not been adjusted by another chiropractor prior to January 1, 1990. Two of the patients had seen the authors when R. R. Gregory was not available; but again, this study only used pre-adjustment x-rays and both practicing authors are NUCCA Board Certified.

Criterion #6. No known ambiguities in the data were present. All x-rays listed as Type I were checked to see if they were Type IV; if they were, then the data used were "corrected" to reflect that change in the understanding of upper-cervical biomechanics.

The length of time as a patient and the skill of R. R. Gregory would lead us to believe for the most part, that these patients had not seen another chiropractor, except possibly one of the authors, since becoming a patient. It should be noted that listings used in this study have not been "corrected" to be in compliance with the format discussed in another article in this issue of *The Upper Cervical Monograph* (head turning, laterality, etc.).

The requirements for the "design of experiment" to have reasonably significant results necessitated several additional criteria:

1. Nearly equal numbers of patients under the continuous care and noncontinuous care categories.
2. At least 20 patients in each care category.

For the purpose of this study continuous care is defined as at least one patient visit per year after the initial visit. Approximately 80 patient files were checked to find 52 patients fitting this criteria. The resulting "stability" population is shown in Table 1.

TABLE 1. STABILITY POPULATION

CARE TYPE	NUMBER	MALE	FEMALE
Continuous	24	10	14
Noncontinuous	28	11	17
Totals	52	21	31

The suitability of the population under investigation was determined by the degree of conformance with previously published data of other populations. Measurements of atlas rotation and atlas laterality and classification by basic type for the "stability" population were compared with published data for other populations.

Table 2 on atlas rotation, Table 3 on atlas laterality, and Table 4 on classification by basic type, when taken together, strongly suggest the appropriateness (normalcy) of the population under study.

The most widely available data for comparison is that on atlas laterality. As can readily be seen from Table 3, the means are statistically from the "same" population. Even the standard deviations support a homoscedastic argument.

It is important to notice that the data in Tables 2, 3, and 4 are based on the original sets of pre-adjustment x-rays (the first set of x-rays taken of the new patient).

TABLE 2.
ATLAS ROTATION: VERTEX MEASUREMENT ON ORIGINAL SET OF X-RAYS (Stability Study)

	Anterior	**Posterior**
Continuous Care N = 24	17 (70%)	7 (30%)
Noncontinuous Care N = 28	21 (75%)	7 (25%)
Composite N = 52	38 (73%)	14 (27%)
Literature N = 200, 1000, 100[1,2,3]	68%	32%

TABLE 3.
ATLAS LATERALITY: NASIUM MEASUREMENT ON ORIGINAL SET OF PRE-ADJUSTMENT X-RAYS.

Stability Study	Mean	Standard Deviation
N = 52	2.69°	1.45°
Grostic/Deborer[4] N = 523	2.63°	1.40°
Palmer[5] N = 108	2.64°	1.37°

TABLE 4.
FOUR BASIC TYPES: DATA "CORRECTED" TO ORIGINAL THREE BASIC TYPES CLASSIFICATION SYSTEM

	Type I	Type II	Type III
Stability Study (N = 52)	56%	40%	4%
Seemann[2] (N = 1000)	60%	34%	6%

It is the understanding of the authors that all the data from the studies used for comparison are also based on original sets of pre-adjustment x-rays. However the reader should keep in mind that this stability study has restrictive criteria that did not apply for the referenced studies.

Table 5 is a more detailed breakdown of the data in Table 4 and reflects Type I/Type IV "corrections". Again it should be noted that the data is from the original set of pre-adjustment x-rays.

It is appropriate to note here that the recognition of Type IV is the result of increased understanding of biomechanics; previously all basic Type IV were categorized as Type I.

TABLE 5.
FOUR BASIC TYPES: ORIGINAL SET OF PRE-ADJUSTMENT X-RAYS, PERCENTS, STABILITY STUDY

	Type I	Type II	Type III	Type IV
Composite (N = 52)	42%	40%	4%	14%
Noncontinuous Care (N = 28)	46%	32%	4%	18%
Continuous Care (N = 24)	38%	50%	4%	8%
Males (N = 21)	48%	43%	0%	9%
Females (N = 31)	39%	39%	6%	16%

The cynosure of Part I of this study is based on the data satisfying criteria 2, 3, and 4; that is, the 5-year, the 7-year minimum, and the no-intervening set of pre-adjustment x-rays, respectively. It is the 7-year minimum period with no pre-adjustment x-rays that is the most significant. The implication is that the side of contractured leg and its relative measurements, the anatometer measurements of pelvic distortion, and any other non-x-ray measurements were consistent to R. R. Gregory in that they did not suggest a change in misalignment **patterns.** Since the misalignment **patterns** (not to be confused with basic types) apparently were not changed, the adjustic process/vectors did not have to be changed.

The reader should be aware that it is not the intent of the authors to be making or suggesting an explicit statement about standard of care. Certainly the standard of care is what is expected of competent practitioners and is set by them and not the expert, the most highly skilled practitioner that competent practitioners have representing them.

Besides experience and clinical investigation, R. R. Gregory's "proof" was that if they were adjusted, then the patients' clinically measureable symptoms would disappear; that is, the contractured leg, pelvic distortion, and any other non-x-ray measurements. The reader should also be aware that all of these measurements may not have shown a totally "cleared-up" patient before leaving the office. Three days after a complete reduction the patient should be free of clinical symptoms; that is, symptoms that are quantitatively measurable, e.g., length and side of contractured leg. If the next office visit resulted because the patient was not free of clinical symptoms, then pre-adjustment x-rays would have been taken. Anatomical asymmetries and problems aggravated by the patient between visits would have to be considered.

The patients' proof—what keeps the patient coming back—is the disappearance of headaches, low back pain, sciatica, seizures, etc.; that is, the health complaints of the patient.

In the final analysis, R. R. Gregory did not consider any of the above scientific proof of the effectiveness of the adjustment and therefore never accepted responsibility for "curing" the patient. The only real proof to him was the level of his reductions of the misalignment factors/measurements and this always necessitated post-adjustment x-rays. The post-adjustment x-ray was his **chiropractic scientific standard** and the x-ray analysis system was his way of determining both his conformance to a biomechanical/anatomical normal and his success or failure with the atlas subluxation complex.

The reader also needs to be aware that R. R. Gregory, in the earlier years of his practice, would pre and post x-ray the patient much more frequently than in more recent years to "see" what mechanically had been accomplished. From pre-adjustment x-rays he was aware that **patterns** would stay the same while the range of misalignment factors would become proportionately smaller, unless of course trauma occurred to the patient between visits to the office.

The practice in R. R. Gregory's office and the office of the practicing authors has in recent years been significantly affected by out-of-pattern basic types. Based on our day-to-day clinical observations of the initial pre-adjustment x-rays, approximately 1/2 of our new patients are out-of-pattern basic types. Misalignment patterns that do not succinctly fit into one of the four basic types but rather appear to be hybrids of the defining characteristics of several of the four basic types form the population of the out-of-pattern basic types.

The out-of-pattern basic types are indicative, in our opinion, of manipulation by chiropractors or other health care professionals that has resulted in biomechanical patterns that apparently are not produced by the general environment, nor even by environmental trauma.

The authors believe that these 52 cases are not typical of our present practice but represent the misalignment patterns of patients who never have been manipulated; these patients only have been adjusted. These patients reflect what is environmentally normal.

Because the nature of the new patient practice is changing and because of the restrictive criteria involved in this study, it is very doubtful that this study could ever be replicated in today's population of patients, even without considering the skill requirements of the adjuster. Obviously a major reason for excluding chiropractors as patients in this study is the high probability of them having been manipulated.

To the knowledge of the authors, none of the studies referenced in this article excluded out-of-pattern basic types from their populations. Even the most recent Seemann study (N=100), which is the first to explicitly use all four basic types, does not state whether its population excluded out-of-pattern basic types.

The authors cannot overemphasize the restrictive nature of the criteria for this study. Table 6 illustrates the restrictive nature of criteria 2, 3, and 4 by providing some statistics on the distribution of time for the 7-year minimum window. The median (the "middle" number) for both care categories is over eleven years. The longest time interval between pre-adjustment x-rays for a continuous care patient is 39.23 years!

Caution must be exercised by the reader in drawing "absolute" conclusions. The authors believe that some of

TABLE 6.
TIME BETWEEN PRE-ADJUSTMENT X-RAYS SATISFYING CRITERION #3 AND CRITERION #2. (ALL DATA IN YEARS.)

	Noncontinuous Care		Continuous Care	
	Males N = 11	Females N = 17	Males N = 10	Females N = 14
Mean	15.34	15.00	14.14	13.25
Median	9.27	13.25	11.61	11.47
Maximum	37.45	28.65	39.23	34.96
Minimum	7.05	7.11	7.15	7.02
Range	30.40	21.54	32.08	27.94

these patients probably had their more recent set (Criterion #2) of pre-adjustment x-rays because R. R. Gregory thought that it was time, and not necessarily because of any change in patterns of clinical measurements.

Tables 7-10 focus on the cynosure of Part I of this study, the stability of the four basic types.

Table 7 depicts the four basic types based on the set of pre-adjustment x-rays satisfying the 7-year minimum criterion. In 22 of the 52 cases, the original set of pre-adjustment x-rays satisfied the 7-year minimum criterion.

Table 8 shows the four basic types based on the set of pre-adjustment x-rays satisfying the 5-year criterion and is therefore the more recent set.

Table 9 is based on calculations using the data in Tables 7 and 8. Table 9 illustrates the net relative percent change of each of the four basic types over the 7-year minimum window. Table 9 is affected only by net changes in the number of cases of each basic type. For example, if a Type I went to a Type II and a Type IV went to a Type I, then the net change in Type I is zero. Consequently, Table 9 does not provide a measure of absolute change and is therefore not the best measure of the stability of the four basic types; it does, however, provide an exact measure of how the population's distribution among basic types has changed.

Analysis of Tables 7, 8, and 9 suggests that the 67% net increase in Type IIs for continuous care is probably significant and the 40% increase in Type IVs for noncontinuous care may be significant.

TABLE 7.
FOUR BASIC TYPES: BASED ON THE SET OF PRE-ADJUSTMENT X-RAYS SATISFYING CRITERION #3 (& 4). (7-YEAR CRITERION).

	Noncontinuous			Continuous			Composite	
Type	M	F	C	M	F	C		
1	7	4	11	3	9	12	23	44%
2	4	6	10	2	4	6	16	30%
3	0	2	2	2	0	2	4	8%
4	0	5	5	3	1	4	9	18%

M = Male; F = Female; C = Composite

TABLE 8.
FOUR BASIC TYPES: BASED ON THE SET OF PRE-ADJUSTMENT X-RAYS SATISFYING CRITERION #2 (& 4). (5-YEAR CRITERION).

	Noncontinuous			Continuous			Composite	
Type	M	F	C	M	F	C		
1	6	3	9	3	6	9	18	35%
2	2	7	9	4	6	10	19	37%
3	1	2	3	1	0	1	4	7%
4	2	5	7	2	2	4	11	21%

TABLE 9.
FOUR BASIC TYPES: BASED ON THE TWO SETS OF PRE-ADJUSTMENT X-RAYS SATISFYING BOTH CRITERIA #3 AND #2. (7-YEAR AND 5-YEAR CRITERIA.) NET RELATIVE PERCENT CHANGE.

	Continuous Care	Non Continuous Care
	$\frac{\Delta X}{X} \bullet 100\%$	$\frac{\Delta X}{X} \bullet 100\%$
Type		
1	− 25%	− 18%
2	+ 67%	− 10%
3	− 50%	+ 50%
4	0%	+ 40%

ΔX = Criterion #2 — Criterion #3; X = Criterion #3

Table 10 is based on criteria 2, 3, and 4 and gives the actual number and percent of cases that changed basic type. For example, four out of ten males under continuous care changed basic type and that statistic is recorded as "4 (40%)" in the table. Table 10 indicates that 9 out of 24 (38%) of the continuous care patients changed basic types while 16 out of 28 (57%) of the noncontinuous care patients changed basic types.

The most significant result of Part I of the stability study is that there were 52% more changes in basic type in noncontinuous care patients than in continuous care patients, even with this very liberal definition of continuous care. That is, continuous care made a difference.

TABLE 10.
FOUR BASIC TYPES: BASED ON CRITERIA 2, 3, AND 4. ACTUAL NUMBER AND PERCENT THAT HAD TYPE CHANGE.

Noncontinuous Care			Continuous Care		
N = 28			N = 24		
M	F	C	M	F	C
6 (55%)	10 (59%)	16 (57%)	4 (40%)	5 (36%)	9 (38%)

Table 11 is based on criteria 2, 3, and 4 and gives the actual number and percent of cases that change basic type by basic type. This table provides a more detailed breakdown of the data in Table 10. Table 11 indicates that for noncontinuous care patients, the percent change in basic type by basic type was remarkably uniform (all 50-60 percent) while there is more variation in percent basic type by basic type for the continuous care patient.

TABLE 11.
FOUR BASIC TYPES: BASED ON CRITERIA 2, 3, AND 4. ACTUAL NUMBER AND PERCENT THAT HAD TYPE CHANGE FOR EACH BASIC TYPE.

	Noncontinuous Care			Continuous Care		
		N = 28			N = 24	
	M	F	C	M	F	C
Type						
1	3	3	6 (55%)	1	4	5 (42%)
2	3	3	6 (60%)	1	1	2 (33%)
3	--	1	1 (50%)	1	--	1 (50%)
4	--	3	3 (60%)	1	0	1 (25%)

Table 12 is a listing of some basic observations on changes in basic type. No attempt has been made by the authors in this part of the study to assess probabilities of these changes.

TABLE 12.
FOUR BASIC TYPES: OBSERVATIONS OF DATA ON CHANGES IN BASIC TYPE.

For continuous and noncontinuous care

1. No Type 1 changed to Type 3
2. No Type 3 changed to Type 1
3. No Type 4 changed to Type 1*

For continuous care

1. No Type 2 changed to Type 3
2. No Type 4 changed to Type 3
3. No Type 2 changed to Type 4

For noncontinuous care

1. No Type 3 changed to Type 2

*More recent x-rays in two of the type 4s under continuous care showed that they became Type 1. Note—No Type 3s resulted from continuous care.

TABLE 13.
OBSERVATIONS ON CARE TYPE AND HEIGHT VECTOR

Continuous Care
N = 24
1 had no change in height vector
1 had 1/4 inch change in height vector*

Noncontinuous Care
N = 28
1 had no change in height vector
4 had 1/4 inch change in height vector*

*3 out of 5 cases were Type 4; all 3 stayed Type 4

Table 12 observations suggested to the authors that, at least for this study with its very population-limiting criteria, a Type 4 would only change to a Type 2 if it was going to change at all. Consequently, we investigated pattern stability for the basic types that were not changing. Table 13 provides observations on the height vector (pattern) and stability of basic types.

Of the 12 out of the 28 (43%) noncontinuous care patients that did not change basic types, 4 (33%) had height vectors that were no more than 1/4″ different from that on the corresponding earlier set of pre-adjustment x-rays (criterion #3). Two of these four (50%) were for Type 4.

Of the 15 out of the 24 (62%) continuous care patients that did not change basic types, only 2 (13%) had height vectors that were no more than 1/4″ different from that on the corresponding earlier set of pre-adjustment x-rays. One of these two (50%) was for Type 4.

Therefore of the 27 patients that did not change basic type, 6 (22%) had essentially the same adjustic height vector, and more importantly, of these 6, 3 (50%) were a Type 4. This is a remarkable statistic when one takes into consideration that less than 20% of researched populations (including this one) consist of Type 4. This is two or three times what is randomly expected. This statistic and its implications is probably the second most important result of this study.

The authors suggest that this pilot stability study be further developed to include: (1) the frequency of patient visits over the total time since the initial visit, (2) the frequency of patient visits during the 7-year minimum window, and (3) the frequency of patient visits before and after the 7-year minimum window. The existence or nonexistence of post x-rays in the 7-year window needs to be established. The time base line should be lengthened to include the present basic type, thus permitting a comparison with initial type.

The progression of basic types over a long time interval needs to be ascertained. Tendencies/probabilities of each basic type for change to other basic types needs to be investigated. Frequencies in basic type changes also need to be investigated, especially as a function of frequency (and quality) of care. All populations need to be "corrected" for head turning and laterality arguments.

Longitudinal studies should be a specific area of focus in upper cervical chiropractic for the wealth of potential insight into cervical biomechanics and patient care with concomitant implications for standards of care and understanding of the Atlas Subluxation Complex.

The authors express their gratitude for research support from the NUCCRA Board of Directors and from the members of NUCCA.

We have a special respect and appreciation of the legacy that R. R. Gregory has provided for upper cervical chiropractic.

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Chiropractic Terminology

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The inadequate defining of basic chiropractic terms has caused both intra-professional division and public confusion. Chiropractors take sides over scope of practice and offend each other. Chiropractors who practice conventional chiropractic are referred to as "subluxation fixers" and as practicing a "religious system". Their critics infer that they themselves are practicing a more scientific system. Through the printed page, their sometimes sordid disputes often become public knowledge. Both sides lack tested and irrefutable evidence to support their assertions.

Because practitioners are influenced in practice by the terminology used in their procedures, the patient unfortunately becomes the victim in this professional schism over untested terms. The properties or characteristics of a term guide them in performing their services, and their adherence to properties of the researched term protects the patient. Any health science or system that neglects to investigate and adequately research its terminology contains the seeds of confusion and the probability of harm.

Terminology concerns itself with the investigation, arrangement, and construction of terms. The investigation of a term's properties or characteristics leads to its specific or specialized meaning that defines the term's usage, making clear its meaning and behavior and governing its use in the appropriate science.

Some chiropractic terminology has not been empirically tested. Not only does this cause misunderstanding and disagreement about chiropractic procedures and practices both within and outside of the profession, but it has also been one of the major reasons why chiropractic has moved away from its basic principles.

The gradual movement of the chiropractic profession away from the restoration principle is an example. This principle - the restoration of displaced vertebrae by the adjustment toward or to their normal position - is one of the significant differences between chiropractic and other spinal therapies. It is the principle upon which D. D. Palmer founded chiropractic and distinguished it from other spinal systems, such as manipulation. Forsaking this basic principle has opened the chiropractic door to other spinal procedures, the substitution of terminology foreign to chiropractic, and methods outside the chiropractic system.

Consequently, many chiropractors advocate relinquishing conventional terms and substituting terms from other health fields, terms that do not describe or define conventional chiropractic procedures. Consequently, patients receive the treatments dictated by these substituted terms from chiropractors in the name of chiropractic.

Because the restoration principle is not included and is not a property of the substituted term, these practices adopted by many chiropractors affect patients seeking chiropractic services who are thus deprived of a corrective procedure. i.e., one that restores the subluxation complex to its normal architectural position.

The following is an example of a problem resulting from not restoring vertebral displacements that imbalance neurological structures: changes occur in a subluxation's properties (distance and direction) because of trauma to the patient. These traumatic changes may be slight compared to the original x-ray films, yet they cause patient relapses or new symptoms and neurological detriment. To continue adjusting is harmful in these cases unless the patient is re-x-rayed, re-analyzed, and then adjusted according to the new changes in the traumatized subluxation's properties.

This situation will occur in every case when a patient suffers trauma while under adjustment, and it exemplifies the dangers and ineffectiveness of a force applied to the cervical spine when the subluxation's properties have changed and are not correctly re-analyzed. The evidence is overwhelming that the adjustment must be dictated by the subluxation analysis. Clinical research fully supports the proposition that spinal biomechanical correction is essential to symptomatic alleviation and totally agrees with the restoration principle.

Despite this kind of everyday clinical evidence, NUCCA members number among those chiropractors who are included in the references to those practitioners who are "religious leaders of the 'subluxation fixers' ", narrow-minded and unscientific. Yet, to this writer's knowledge, not one of the critics has made an effort to fully investigate and test the properties of conventional chiropractic terms such as subluxation and adjustment.

For example, take the term subluxation which has been rejected by some chiropractors for the terms "lesion" and "joint dysfunction." These terms have been substituted because they are believed to be more acceptable. Is the meaning and behavior of the substituted terms better understood? Are their properties more descriptive of the chiropractor's service to the public? Are their limits set by a testing of their properties? Do the substituted terms guide the chiropractor in delivering a more corrective service?

The term "lesion" suggests a pathological or traumatic discontinuity of tissue or loss of function. As a term substituted for the chiropractic term subluxation, it does not include all the properties essential to accurately describe the detriment caused to the nervous system by a vertebral displacement. At best it could be classified as only one property of a subluxation.

The term "joint dysfunction" is the malfunction of a joint, and is insufficient to satisfy the meaning and behavior of the term subluxation in the conventional chiropractic sense. All subluxations have the elements of joint dysfunction. As with the term "lesion", none of the several properties that define the term subluxation can be included.

Another broadly rejected term "adjustment" is being replaced by the word "manipulation". Do chiropractors manipulate a displaced vertebra or do they reposition it? These are terms expressing two entirely different procedures with separate characteristics. Any spinal system that does not restore the displacement of a subluxation to or toward normal position is not an adjustment. Establishing a normal range of motion by manipulation fails to be corrective unless all vertebral displacements have their axis of motion aligned to the vertical axis of the body.

The properties of the term subluxation are observable, describable, measurable, and if accurately analyzed, permit a prediction of the biomechanical outcome of the adjustment. These properties include, among others, displacement, or abnormal vertebral motion which is the distance and the direction that the displaced vertebrae have moved from the starting point or origin of coordinates. The properties of neurological tractionization caused by the displacements into each plane of motion, spastic contracture of the spinal and pelvic extensors, bodily distortion, interactive stresses within the subluxation and the measurement of corrective vectors are included properties that are essentially a part of the analysis. Only when these properties (and others) are fully analyzed can a corrective adjustment be applied. The entire procedure can be classified as a scientific process.

A subluxation occurs because of a displacement that changes the neuro-chemical flow. It is a mechanical aberration, therefore correctible only through the application of mechanical energy - the adjustment. The term means to re-align, to rest. The term manipulation does not denote correction or restoration. Like joint mobilization, manipulation induces joint movement. The former does not cause a joint to move beyond its normal range of motion, but manipulation does. Adjustments restore joint facets to their proper apposition with one another. A subluxation can still exist within a range of motion that is palpably normal.

Substituted terms express the procedures and practices of those systems from which the terms are derived, and which predate chiropractic. If chiropractic procedures are to be governed by substituted terms, then chiropractic should no longer claim to be a separate and distinct science, art and philosophy.

The relevant principles of physics and mechanics are basic to the scientific investigation and testing of any term by empirical methods. Physics explains and clarifies why things happen. Mechanics, which predates physics, is the science on which chiropractic rests. Both sciences present relevant principles that aid in describing and defining the chiropractic terminology which serves to govern procedures and practices by setting limits to terms so they are clear and fixed and control the chiropractic methodology.

Manipulation or Adjustment: Direction, Force and Direction in the Cervical Spine

By Daniel C. Seemann

The Problem

Gregory (1983, 1986) has discussed the difference between adjustment and manipulation over the past several years, but it is clear from the chiropractic, osteopathic, and medical literature the terms are used synonymously. As a matter of fact, the word "adjustment" is not used in any of the review articles for this paper. Gregory wrote that manipulation is "the forceful passive movement of vertebral joints beyond their active limits of motion . . . and movements of vertebrae of the cervical spine beyond their normal ranges of motion do not require further abnormal movement, but correction to the normal position."

The intent of an adjustment is to move vertebrae towards their normal position away from an abnormal position. The crucial difference between adjusting and manipulation according to Gregory is . . . "any form of chiropractic, that aims solely to alleviate a patient's symptoms without regard to the biomechanical consequences can only be classified as a form of manipulation." When misaligned vertebrae are returned to normal architecture, a true adjustment takes place.

The dilemma with manipulation is, there is no way to test the validity of the procedure. Since the misalignment is located by palpation rather than x-ray, the precise location in relation to the adjacent vertebrae is unclear. A force is then directed toward the misalignment taking it beyond its normal range of motion. Without taking post x-rays, it is not known whether the misalignment has been reduced. The patient's symptoms may disappear because the sensory nerves were traumatized, but the misalignment may remain.

With an adjustment, pre and post x-rays are required to verify whether the misalignment was reduced. There is enough evidence to support the fact that line drawings on x-rays are a valid measurement if a rotatory procedure is used. (Seemann, 1986) Yet a large segment of chiropractic refuses to believe that x-rays can be used to determine a reduction pathway, on the one hand, but continues to use a procedure which never has been fully tested as a valid therapeutic method. Until some form of scientific inquiry determines that manipulation is a valid technique, those who teach and practice manipulation are home free.

The purpose of this paper is to raise some questions about the biomechanics of manipulation. Some examples are: 1) What are the possible outcomes of excessive force directed to the cervical spine? 2) What happens when the force is not directed along a prescribed pathway? 3) What happens when too much depth is used?

As one examines the literature about manipulation, the literature is kind in that the number of harmful manipulations are relatively small. A brief review of the literature follows.

Review of the Literature

The first article relating to cervical manipulation is mentioned in 1927 (Dekleyn and Nieuwenhuyse), where cadavers were examined and a relationship between manipulation and vascular insult was noted. Perhaps the most critical research was done by Pratt-Thomas et al. in 1947 and is still referred to frequently as a case against manipulation. The findings were based on the examination of three cadavers.

A study of Hosek, Schram et al. (1981) countered the Pratt-Thomas findings by saying that the probability of inducing ischemic vascular insult is very small, perhaps, one in a million cases. If the patient had a vascular insult, chances are the patient was predisposed to injury in the first place, and manipulation was not the sole reason for death. There are several articles (Smith & Estridge, 1962; Fast, Zinicola et al. 1986) which are critical of manipulation, ie, description of patients' condition after a cervical manipulation—but are also anecdotal and not helpful in generating trends. Both studies recommend an evaluation of "manipulation as a valid therapeutic procedure."

As to trends, Kleynhans (1979) reported only 34 cases, and a 1983 study reported only 49 cases of vascular injury as a result of manipulation.

Crawford et al. (1984) is a good summary of vascular ischemia as it relates to manipulation. The authors give a balanced review. They remind the reader that vascular ischemia in the cervical area can be caused by both external and internal factors. External factors mentioned are manipulation, athletic injuries, or accidents where the head had been rotated or hyper-extended. Internal factors included occlusion of the vertebral arteries due to osteophytes, fibrosis, plaque or narrowing of the lumen. Stopford (1960) found that in 92% of the cadavers he dissected, the vertebral arteries were of unequal size. In rare cases the cadaver had only one artery.

In practically all of the articles that were reviewed, a plea was made by the authors to analyze the efficacy, the value and the safety of manipulation. There is growing sentiment that chiropractic (perhaps the colleges) should evaluate these manipulative procedures, or someone outside chiropractic will do it. It may already be too late since manipulation is becoming popular with the medics, osteopaths and the physical therapists.

Possible Problems with Cervical Manipulation

Most practitioners would agree that a manipulation to the cervical area is more risky than a full spine procedure, because of the forces that are directed to the brain stem.

It was indicated earlier that one type of problem that can occur is vascular insult to the vertebral arteries. See Figure 1. Netter states, "the most vulnerable to trauma, especially a sudden neck movement as in chiropractic manipulation, is at C-1 where . . . "the vertebral artery pursues a tortuous course after exiting from the intervertebral foramina." The vertebral artery turns 90 degrees and heads toward the posterior fossa. This segment is short and fixed at each end, making this segment of the artery particularly vulnerable to extreme rotatory movements of the head. The "artery is easily dissected or torn which may cause clot formation within one or both arteries," according to Netter.

FIGURE 1.
Path of the vertebral artery in the cervical spine.

Occlusion of the fourth segment, where the vertebral artery enters the skull is fairly common, but usually is not related to chiropractic manipulation. Occlusion of this segment results in stroke-like symptoms known as the Wallenberg Syndrome. These symptoms include hoarseness, dizziness, clumsiness of the ipsilateral limbs especially the leg, loss of pain, and temperature on the contralateral side. Also vomiting, tachycardia and hiccups are common symptoms.

Punjabi and White (1979) vividly show (See Figure 2) the excursion of the vertebral artery when displacement takes place between C-1 and C-2. Notice the 90 degree position of the artery as it leaves the foramina of C-1 and traces to the posterior fossa. When C-1 is rotated to the right in the example, the vertebral artery is not only stretched but compressed to approximately 45 degrees.

Punjabi and White report that C-1/C-2 can tolerate ±47 degree axial rotation, but the effects of stretching and kinking the vertebral artery start to show as early as 30 degrees.

FIGURE 2

The vertebral artery at C-1/C-2 in normal position (left) and in stressed position (right) as C-1 rotates to the right.

From Punjabi and White

The other problem is neurological. Neurological insult as a result of manipulation is probably less dramatic than vascular insult because it is very difficult to detect. Yet neurological insult is in all probability more pervasive than vascular insult. Not a great deal has been written about this problem, because very few standards have been set to determine if the patient has improved as a result of manipulation. As was indicated earlier, usually the only dependent variable that is used is whether a patient will indicate they are feeling better and this is not always reliable (symptoms versus reduction of the misalignment). Some reliable methods of measuring the restoring of the misalignment need to be devised. The following considerations are offered.

Considerations for Measurement when Adjusting in the Cervical Area

Gregory (1990) discusses the restoration of displaced vertebrae and suggests there are three critical elements necessary to restore misaligned vertebrae: direction, depth and force.

With direction, Gregory's position was that each particular subluxation was unique as to how it developed. Not all misalignments developed in the same way. Seemann calculated that as many as 10,000 different subluxations could occur taking into consideration the ten major variables such as laterality rotation, spinous process, ondontoid, etc. that determine a misalignment. These 10,000 possible subluxations each have a unique restoration pathway. So the idea that a non-specific directive force to the cervical region would reduce a subluxation has little chance of being effective given the requirement for a specific directional pathway.

Force and direction are a function of control and velocity, because with greater force there is usually greater depth and unfortunately less control. Logically, as there is more force rendered to the cervical area there should be more control, and less depth.

It has been emphasized earlier what excessive force can do to a vertebral artery or to the neurological network in the human body as the result of certain kinds of head manipulations. Tremendous forces can be generated either manually or mechanically to the cervical area. Using a 10 pound skull as a lever, rotated around the atlas as the fulcrum, it is not difficult to generate large pressures. The magnitude is being determined in a dissertation at the U. of Mich. Mechanically, the force can be set at any level. For an example, one group recommends at least 105 pounds for heavy-set, thick-necked individuals.

With excessive force, there is the danger of driving the atlas through its proper position and increasing the severity of the subluxation. So the question for investigators is how can the subluxation be restored to its proper architecture without harm to the C-1/C-2 area? The writer feels the essential elements in discussing the question are direction, force and depth.

Conclusions

It is the writer's opinion that the reported incidents of vascular and neurological insult to the cervical area is much too conservative. There are 75,000,000 manipulations given per year and only one in a million result in vascular problems. The one in a million figure probably was an extrapolation made on incomplete data. Using the normal curve as a standard, one could expect at least 2000 cases per year that were serious. A check with insurance companies would probably support this hypothesis.

The problem, as this writer sees it, comes back to the original premise of this paper which asks — how do you classify manipulation? It is obvious from the pertinent literature that most people do not distinguish or know the difference between manipulation and adjustments. An anecdote will make the point. I recently talked with a former patient of Dr. Gregory's who had a vertebral artery problem. Every time he turned his head to the left he became dizzy and confused. After an "adjustment" which reduced a rotatory misalignment to zero he was able to resume his love for golf. I noted that he had not been checked for quite a while and he said that his medical doctor had recommended he not continue his treatment because he felt that manipulations were risky especially in the cervical spine.

OTHER HEALTH CARE PROVIDERS AND THE PUBLIC IN GENERAL HAVE NOT BEEN PROPERLY EDUCATED AS TO THE DIFFERENCE BETWEEN MANIPULATION AND ADJUSTMENT. AS A CONSEQUENCE, THOSE PRACTITIONERS WHO DO SUCCESSFULLY REDUCE SUBLUXATIONS ARE GETTING A BUM RAP, BECAUSE THEY ARE BEING LUMPED WITH THOSE WHO DO NOT. IF CHIROPRACTIC IS TO HOLD ITS OWN IN THE 21ST CENTURY, PROOF THAT A SUBLUXATION CAN BE REDUCED MUST BE HIGH ON THE AGENDA.

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A Review Of Biomechanics

By Keith E. Denton, D.C.

The N.U.C.C.A. practitioner requires skill in precision x-ray placement, careful x-ray analysis, and a thorough understanding of biomechanics before maximal reduction of the Atlas Subluxation Complex (ASC) occurs. Errors in any of these three, decrease the quality of patient care.

In the development of the x-ray analysis procedure, Grostic and Gregory[1] tried to implement a system that would give the clinician a precise mathematical model designed to maximally reduce the ASC. Today, knowledge of the four basic types of ASC's, particularly the production of, takes precedence over blindly following a set of rules that determine correction vectors and headpiece placement. This is not a slur against the early work of Grostic and Gregory, but an evolution of knowledge. X-ray analysis was developed in the forties and the biomechanics of the ASC have evolved over the past 20 years as a result of constant testing and research.

The purpose of this review is to concentrate on the production of three of the four basic types described by Gregory and Seemann[2], and to describe two out-of-pattern misalignments that require special biomechanical consideration.

The first abnormal movement occurs when the cervical spine moves as a unit away from the vertical axis into the right or left frontal plane. N.U.C.C.A. calls this abnormal movement Angular Rotation.

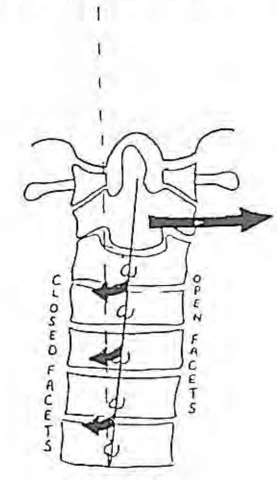


FIGURE 1

Angular Rotation is composed of two factors: (1) the degree of excursion of the cervical spine from the vertical axis, which also includes the coupling mechanism of the spinous processes, and (2) the degree of C-2 rotation in the transverse plane. The coordinate system describes this as X axis movement of the lower angle combined with Y axis rotation of the bodies and spinous processes. A similar coupling mechanism has been described in normal lateral flexions with spinous process rotation in the opposite direction.[4]

The pre and post zygapophysial joints have been described by N.U.C.C.A. and others as a circular pathway.[5] Figure 1 depicts right angular rotation with the left zygapophysial joints closing and the zygapophysial joints on the right side opening following the circular pathway.

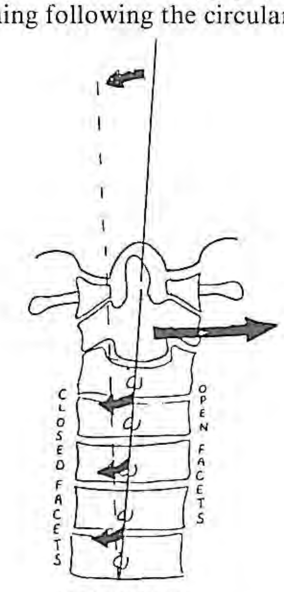


FIGURE 2

Figure 2 shows the skull moving with angular rotation away from the vertical axis, resulting in an unstable equilibrium. Gregory further described this process as "angular rotation moving the base of support (C-2), out from under C-1 and the skull."[6]

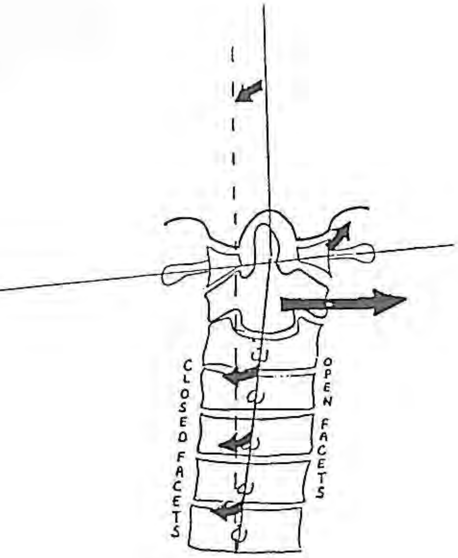


FIGURE 3

Figure 3 depicts the skull turning back toward the vertical axis to lower its center of gravity. Angular rotation carried C-1 into the same frontal plane, causing it to misalign or climb the occipital condyle on the right, or side of angular rotation. This misalignment is called the **first basic type**. The amount of turning of the skull on the superior articulating surfaces of C-1, back toward the vertical axis, results in two variations of the first basic type misalignment. Figure 3 shows the skull parallel to the vertical axis. Figure 4 represents the skull turning beyond parallel toward the vertical axis.

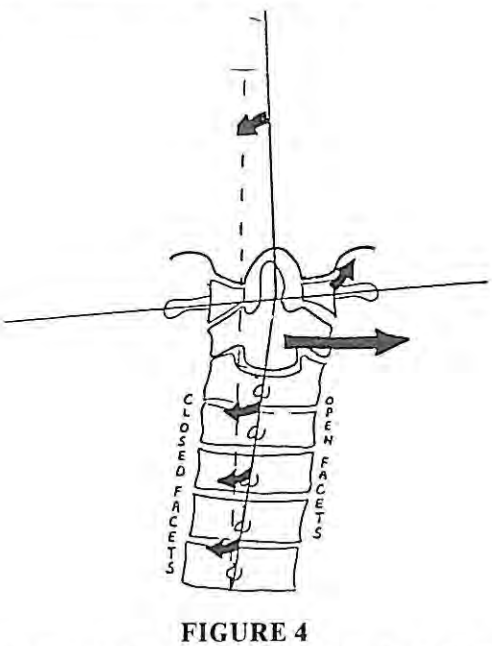


FIGURE 4

The characteristics of the first basic type of misalignment are: C-1 laterality is on the same side as angular rotation, the skull is parallel to or toward the vertical axis. The C-1 plane is high or above horizontal and the acute angles are opposite.[7]

The vector used to reverse or correct the production of the first basic type misalignment is usually consistent with the mathematical model described by Grostic and Gregory. This vector is derived from four relationships: plane line, atlas/odontoid, condylar/axial and angles. Occasionally, a slight addition to the height or nasium vector may be used to help influence the direction of the correction. The vector is always above the condylar/axial vector (also called the constant) to direct the movement into the superior articulating surface of C-2 on the side of angular rotation.

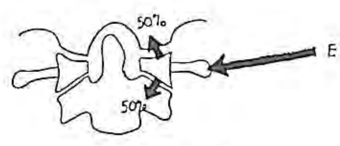


FIGURE 5

3½C / 4A
E = C/A Vector

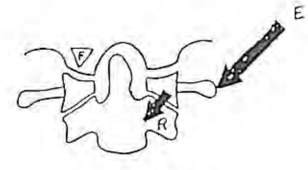


FIGURE 6

1st Basic Type
R = Axial Circle
E Above C/A Vector

Figure 5 represents the adjusting effort directed along the condylar/axial vector. The condylar circle is three and one-half, with the axial circle, four. The condylar/axial vector is high or plus one-half. The adjustive effort directed along this vector will cause equal movement into the occipital condyle and the superior articulating surface of C-2. Figure 6 represents a vector above the constant or condylar/axial vector to direct the effort into the superior articulating surface of C-2.

The mechanical resistances of type one include: the degree of angular rotation with closing of the circular pathway, the size of the axial circle, and the unmeasurable supportive tissue.[8] The effort is directed toward the transverse process of C-1 on the side of atlas laterality. The fulcrum is located in the occipital condyle, opposite the side of atlas laterality. This description uses C-1 as a second class lever to reverse angular rotation. When the angular rotation or lower angle moves toward the vertical axis, it will move C-1 with it, correcting atlas laterality.

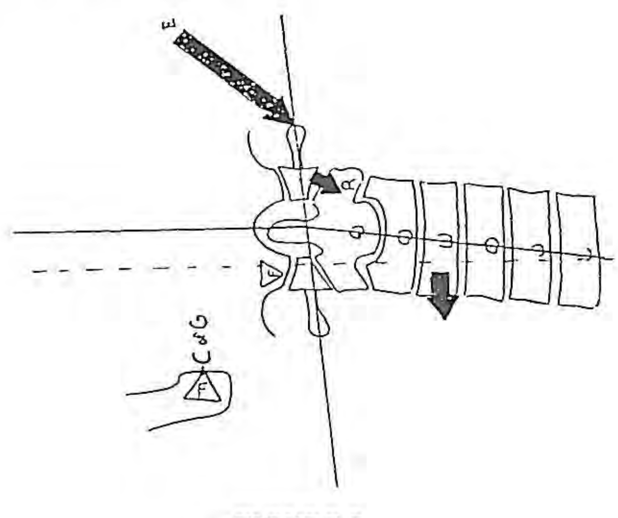


FIGURE 7

Headpiece with apex of fulcrum — the point of support

Figure 7 represents the first variation of the first basic type. The skull position is parallel to the vertical axis. The skull does not need to turn as angular rotation and C-1 laterality are corrected. The center of gravity of the skull is balanced on the mastoid support, preventing turning in any direction.

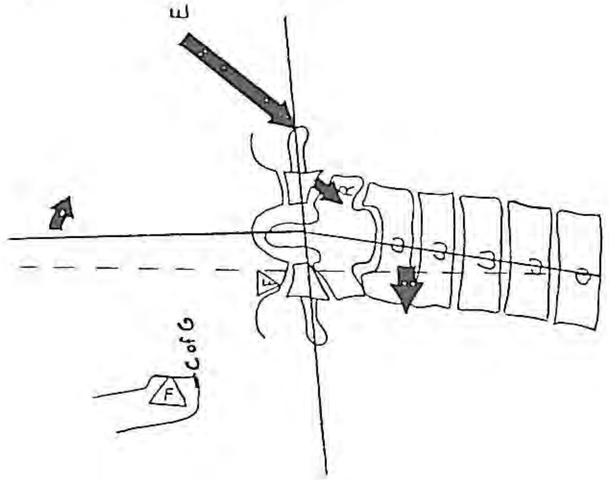


FIGURE 8

Apex of fulcrum — the point of support

Figure 8 shows the second variation of the first basic type. The skull position is beyond parallel to the vertical axis. Current N.U.C.C.A. terminology describes this position as the skull turning away from C-1 laterality, beyond vertical, towards the vertical axis. The center of gravity of the skull is placed slightly below, or inferior to, the point of support of the mastoid. This type of support allows the skull to turn while the lower angle is corrected. The skull should not turn when the adjustment is given. If this happens, too much depth has been used with the adjustive effort.

The fulcrum, effort, and mechanical resistances are the same as the first variation of the first basic type. C-1 is used as a second class lever to move the lower angle towards vertical, carrying C-1 with it.

The axis of rotation of C-1 in the transverse plane is that single point about which rotation occurs. In normal movement it is located in the center of the odontoid process of C-2. Three factors in the misaligned spine may influence the location of the axis of rotation and the direction of C-1 rotation. The first is the location of the center of gravity of the skull—the second is angular rotation—and the third is the rotation of C-2 in the transverse plane. When a pressure is applied to one of the lateral masses of C-1, the anatomical design causes it to rotate anterior. The most common source of the pressure is the shift of the skull's center of gravity towards one of the lateral masses.

When the skull is parallel to the vertical axis, the most common source of the pressure is angular rotation, causing C-2 to leave its horizontal position. The side of C-2, above horizontal, applies an upward pressure against the inferior articulating surface of C-1, forcing it against the occipital condyle of the skull, resulting in anterior rotation of C-1 on that side.

When C-2 spinous rotation is opposite the side of angular rotation, the influence is toward a posterior rotation of C-1 on the side of angular rotation. It is hypothesized that this rotation of C-2 negates the influence of angular rotation, allowing the skull position to become predominant.

It should be noted that many combinations are present in the various misalignments. The anatomical structure of the occipital condyles and the superior articulating surfaces of C-1 play a major role in the direction of C-1 rotation when gravitational and misalignment pressures are applied. (See Figures 9, 10 and 11.)

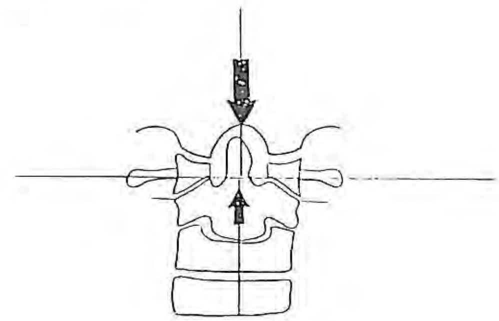


FIGURE 9

Axis of rotation at center of odontoid, no gravitational influences from the turning of the skull or angular rotation.

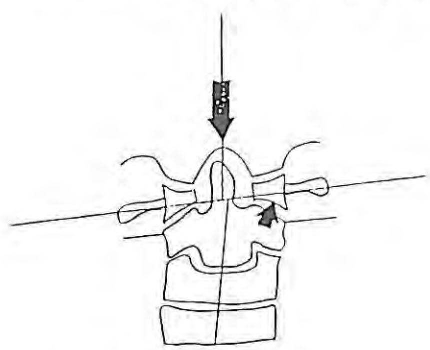


FIGURE 10

No gravitational influence from the turning of the skull. Shift of the axis of rotation toward the right lateral mass, from angular rotation.

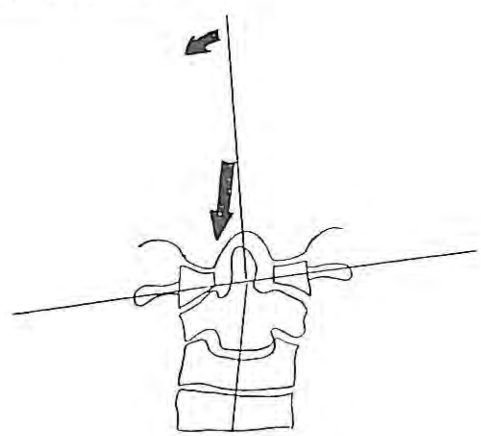


FIGURE 11

Axis or rotation shifted toward the left lateral mass, caused by the skull turning to the left.

The statistical studies done by Seemann[9] show that the first variation of the first basic type results in anterior or posterior rotations of C-1. The second variation indicates a high incidence of posterior rotations of C-1.

The second basic type misalignment begins with the same process of angular rotation moving the cervical spine into one of the frontal planes. The base of support of the skull (C-2) is moved out from under the skull. The skull moves toward the same frontal plane, then turns back toward the vertical axis. This turns the occipital condyles on the superior articulating surfaces of C-1. The difference between the first and second basic type is that angular rotation does not carry C-1 with it.

C-1 remains fairly horizontal and most of the atlas laterality is caused by the turning of the skull. Only a small percentage of atlas laterality is caused by a lateral movement of C-1. (See Figure 12)

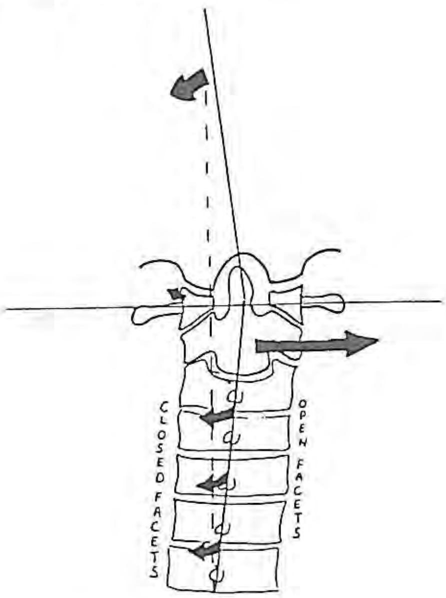


FIGURE 12

It is important that the adjuster determine the percentage of turning of the skull and the percentage of lateral movement of C-1. This plays an important role in the selection of correction vectors and headpiece placement. The adjuster should subtract the degree of turning of the skull from the atlas laterality in order to determine these percentages.

The primary resistance to the correction of the second basic type misalignment is the turning of the skull and specifically, the occipital condyle on the side of C-1 laterality. The effort is the transverse process on the side of C-1 laterality. The fulcrum is the superior articulating surface of C-2, opposite the side of atlas laterality.

The vector used to correct the basic type two misalignment is almost always below the condylar/axial vector to direct the adjustive movement upward into the occipital condyle. It must be noted that below the condylar/axial vector is not always below a true horizontal vector. The adjuster's position may be a high one with a large axial circle: i.e. 10, 11 or 12 and still the effort is well below the condylar/axial vector, resulting in an upward direction of movement.

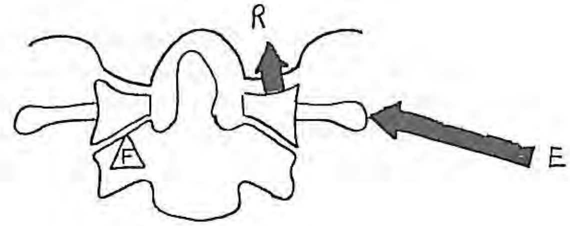


FIGURE 13

2nd & 3rd Basic Types
R = Skull Turning
E is Below C/A Vector

The axis of rotation of C-1 is generally moved into the lateral mass on the side of atlas laterality. The major influence is the shift of the skull's center of gravity. This results in a very high incidence of anterior rotations with basic type two misalignments.[10]

The headpiece of choice for the basic type two contains a circular mastoid support. This support allows for only one point, the apex of the curve, to support the skull. This type of headpiece allows the skull to turn easily back toward the vertical axis.

When large lower angles are present, C-1 movement and the turning of the skull must direct the force into the superior articulating surface of C-2, opposite the side of laterality. This will reverse angular rotation. This may necessitate the lowering of the correction vector slightly to accomplish the circular direction of the force. (See Figure 14)

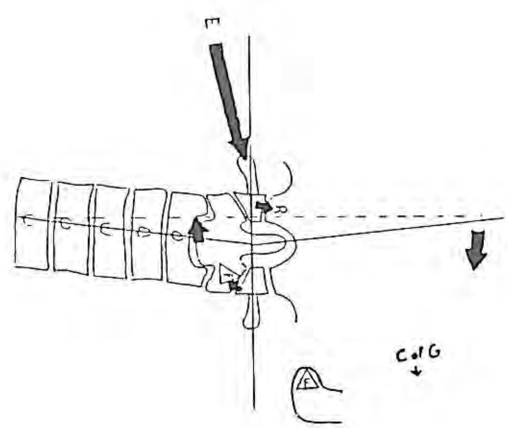


FIGURE 14

The very skillful adjuster may choose a low vector even when an unusually high percentage of C-1 laterality is caused by movement of C-1 on the occipital condyles. The characteristic of this misalignment is a high plane line, type two. The mechanics require that a rebound force off the occipital condyle, move C-1 to a horizontal position while turning the skull to vertical. The adjuster must produce a very complete triceps pull to insure success.

The positive results are a more vertical position of the skull and a state of equilibrium. The negative results of a poor production of the triceps pull are an increase in the plane line or percentage of movement caused by lateral side slip of C-1. The skull would most likely return to vertical, but a change in the basic type can occur. (See Figure 15)

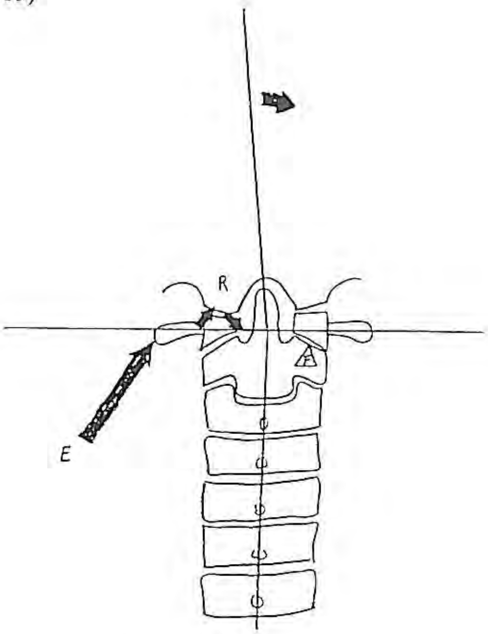


FIGURE 15

Current N.U.C.C.A. theory holds that the fourth basic type misalignment occurs as a result of a combination of injuries. The first injury results in a basic type one misalignment. The second injury causes the skull to turn toward the side of atlas laterality.

This type of misalignment presents the adjuster with an interesting study of mechanics. Because the adjuster loses the mechanical lever system, it must be determined which

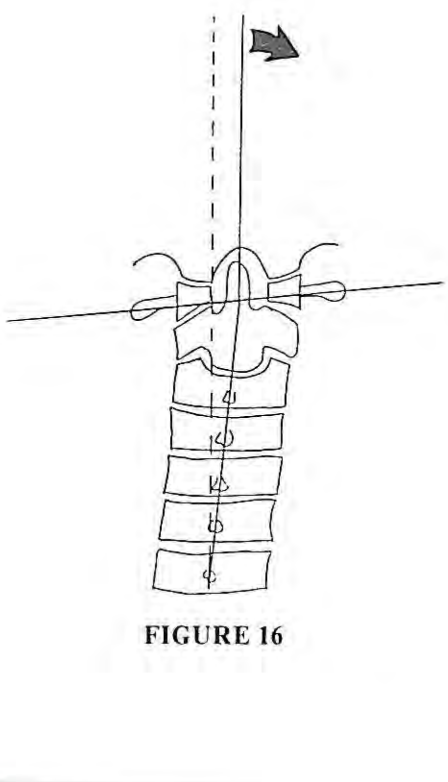


FIGURE 16

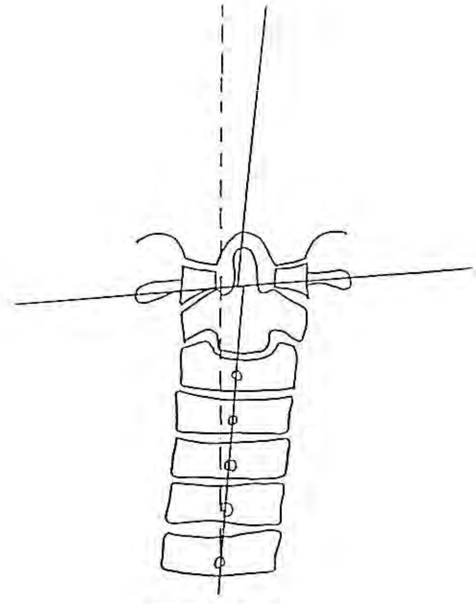


FIGURE 17

element is most difficult to correct and which factor is causing the greatest insult to the nervous system.

With the fourth basic type, the adjuster must scatter the corrective force to direct movement into the occipital condyle on the side of laterality simultaneously turning the skull into the superior articulating surface of C-2, to move the lower cervical spine toward vertical.[10] The adjuster must return to the condylar/axial vector which causes 50% movement upward and 50% movement downward. The degree of turning of the skull must be subtracted from the total atlas laterality and a percentage assigned to each.

Figure 18 depicts a condylar/axial vector of high one-half. Hypothetically, the skull turning would have caused 30% of atlas laterality and angular rotation is causing 70% of atlas laterality. The adjusting vector is slightly above the condylar/axial vector to influence the desired movement. The headpiece placement of the skull must also

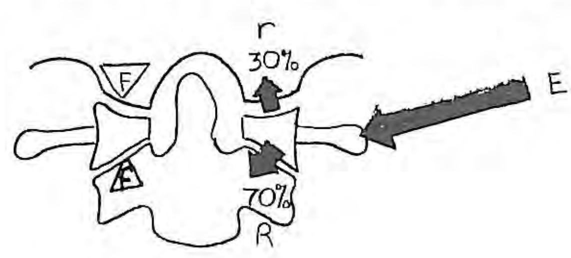


FIGURE 18

4th Basic Type
R = Axial Circle and Angular Rotation
r = Skull Turning

reflect the 30:70 relationship. The large "R" represents the major resistance of the lower angle. The small "r" represents the minor resistance of the skull turning. "E" is the effort located at C-1 transverse. "F" is the major fulcrum and "f" is the minor fulcrum.

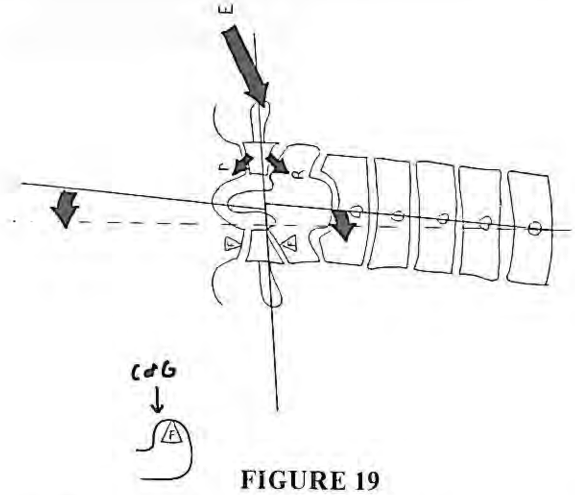


FIGURE 19

Figure 19 shows the headpiece placement of the fourth basic type with the described 30% skull/70% lower angle relationship. The skull must be placed so it turns back toward vertical, but not in such a position that it prevents the reduction of the lower angle.

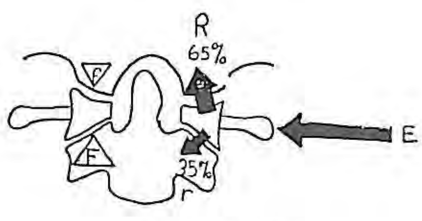


FIGURE 20
4th Basic Type
R = Turning of Skull
r = Axial Circle Angular Rotation

Figure 20 represents a hypothetical 65% skull turning and a 35% angular rotation relationship. The condylar/axial vector is the same as Figure 18, with the adjusting vector slightly below the condylar/axial vector. This vector should influence the correction of skull turning and angular rotation in the desired 65:35 relationship. The major and minor resistances and fulcrums have been reversed, compared to Figure 18, with the effort still at the transverse process.

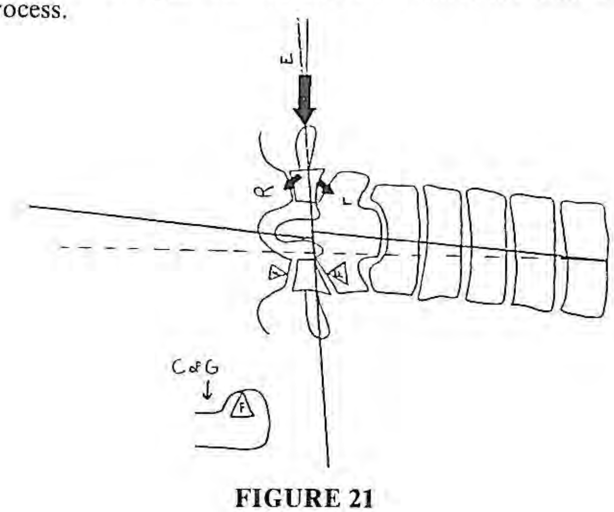


FIGURE 21

Figure 21 shows the headpiece placement for Figure 20. The center of gravity of the skull is placed superior, or above the point of support, reflecting the greater need to turn the skull toward vertical. Once again, moving the center of gravity of the skull too far above the point of support, will cause a decrease in the reduction of the lower angle, and a resulting unstable base of support for the skull and C-1.

The adjusting vector used to correct the fourth basic type misalignment is seldom consistent with the x-ray analysis mathematical formula. The formula gives us the starting point and the adjuster's knowledge of biomechanics must determine the correction vector and headpiece placement to proportionately reduce all misalignment factors toward normal.

Severe trauma, nonspecific care, or bone anomalies, occasionally present the upper cervical practitioner with misalignments that do not seemingly fit the pattern of the four basic types. The adjuster must consider x-ray placement and analysis before the biomechanical rationale is applied.

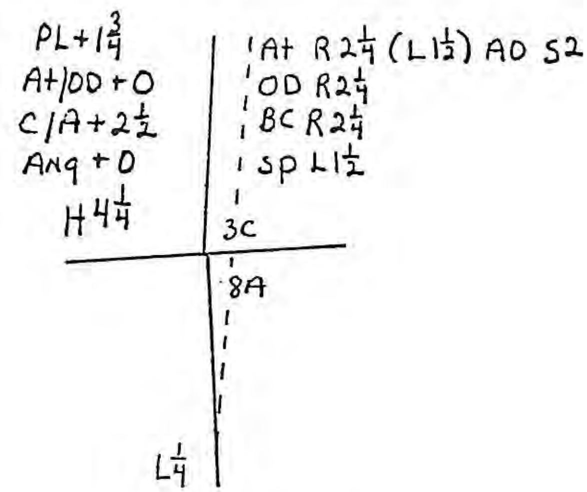


FIGURE 22

Figure 22 represents an unusual pattern of the first basic type. The characteristics include: opposite acute angles, a high plane line, the skull turned away from the vertical axis, and both the skull and lower angle leaning into the same frontal plane. The production of this pattern is not fully understood at this time.

The mechanical problem requires the skull to turn toward the vertical position, while C-1 moves around the superior articulating surface of C-2 (axial circle) without directing the force into the lower angle. If too much of the corrective force is directed into the lower angle, a new basic type will be produced. If a new basic type is produced, the adjuster must re x-ray the patient to determine the new pattern, the next time neurological insult is recorded. This raises management and ethical questions.

To achieve the desired mechanical change with this pattern the author suggests that the adjustive vector be lowered closer to the condylar/axial vector. The smaller the lower angle, and plane line, the closer the adjuster should approximate the condylar/axial vector. This should allow C-1 to move around the axial circle without kinking the lower angle. The skull support should reflect the degree of turning of the skull away from vertical. The very round skull is the most difficult type to turn with this pattern. Special care should be given not to support the parietal region of the skull, while maintaining a support above the center of gravity. Figure 23 represents the use of a correction vector of High 2¾. The condylar/axial vector from Figure 22 is High 2½, while the computed vector from the mathematical formula calls for a High 4¼.

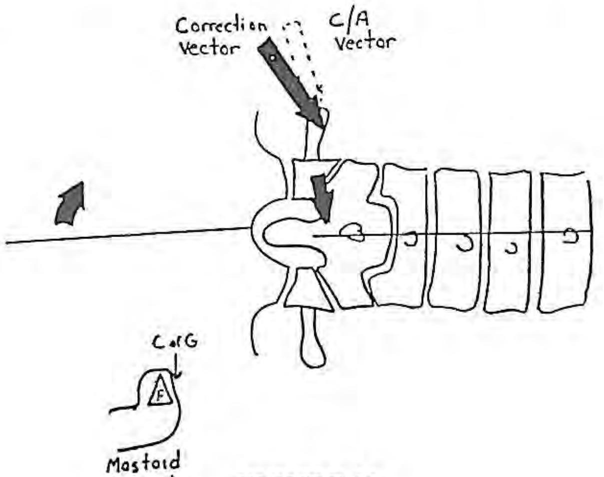


FIGURE 23

The next unusual misalignment is a variation of the second basic type. The characteristics include: ipsilateral acute angles, a high plane line, the skull turned away from a true vertical, and both the skull and lower angle leaning into the same frontal plane. The pattern appears similar to Figure 23 with the exception of acute angles being ipsilateral. (See Figure 24) Again the production of this misalignment is not fully understood.

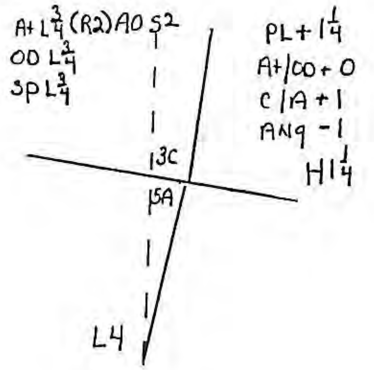


FIGURE 24

The unusual characteristic of this second basic type is that C-1 laterality is caused by lateral side slip of C-1, and not the turning of the skull toward the vertical axis. The lever system used to correct this misalignment is similar to the second basic type, but the ability to bring the misalignment back to the vertical axis is greatly diminished.

The mechanical problem is the difficulty in achieving the circular direction required to bring the lower cervical spine back to vertical while simultaneously correcting the side slip of C-1. The circular direction requires a lowering of the correction vector; the correction of the side slip requires some height vector.

The adjuster must choose to either correct the angle relationships and leave the entire pattern leaning into the frontal plane, or attempt to use the rebound force described in Figure 15. Both choices require that the skull turn away from vertical with the skull or mastoid support well below the center of gravity.

When the adjuster decides to keep some height vector, he/she is dependent upon the righting or equilibrium mechanisms to bring the corrected angle relationship back to the vertical position. This may require a period of two or three days in which the correction is very unstable and has a high tendency to recur.

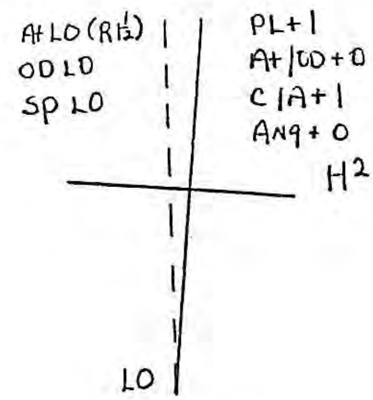


FIGURE 25

Figure 25 represents a very common post x-ray of this unusual second basic type when the adjuster chooses to retain some height vector. The author recommends that the correction vector be lower than the condylar/axial vector. The high plane line should not intimidate the adjuster into staying above the condylar/axial vector.

On occasion, unusual variation of the four basic types do occur. If the adjuster uses the mechanical rationale developed by N.U.C.C.A., the result will be a correction of these patterns toward normal. Further study of the production of the out-of-pattern misalignment is a priority of N.U.C.C.A.

NUCCA NEWS
Published by: THE NATIONAL UPPER CERVICAL CHIROPRACTIC ASSOCIATION, INC.

Al Berti: New President of NUCCA/NUCCRA

As it was announced earlier Al Berti has been elected the new President of NUCCA and NUCCRA. I know he feels a tremendous responsibility to take the helm and keep the ship headed on course. With the cooperation of a good NUCCA and NUCCRA Board there is no reason why our goals can't be realized through Al's leadership.

A first step will be for the NUCCA/NUCCRA Boards to meet in Denver, July 20-22 to determine a strategic plan for the future of NUCCA/NUCCRA. One of the goals of the meeting will be to decide how the collective responsibilities of the two boards can be shared with board members and the membership.

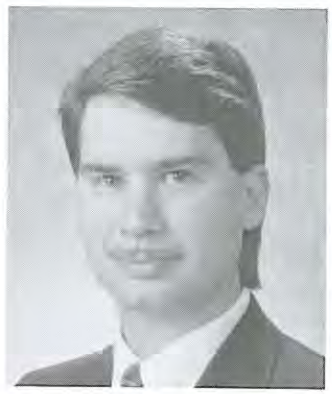
Structurally both organizations are in good shape. So it's up to all of us to support Al as best we can and continue the work. I know in Monroe, we are ready to support Al any way we can. Best wishes.

Dan Seemann
Executive Director, NUCCA

The National Upper Cervical Chiropractic Association is pleased to announce the results of the election of Directors and appointment of officers for the 1990-91 year.

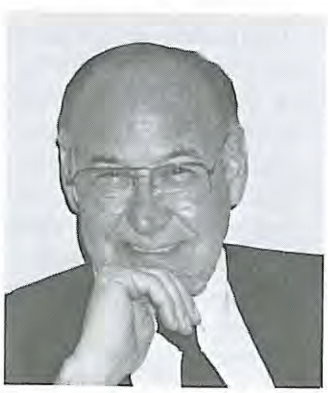
N.U.C.C.A. is very pleased with the talent of the members of the Board and the support staff. All members are available to answer questions and support the organization in any way possible.

President — NUCCA/NUCCRA
Dr. Albert A. Berti
200-3825 Sunset Street
Burnaby, B.C.
Canada V5G 1T4



Secretary — NUCCA/NUCCRA
Vice-President
Dr. Keith E. Denton
217 West Second Street
Monroe, Michigan 48161

Vice-President — NUCCA/NUCCRA
Director
Dr. Lloyd C. Pond
4540 East Main Street
Farmington, New Mexico 87401



Treasurer — NUCCA/NUCCRA
Dr. Marshall Dickholtz, Sr.
3420 West Peterson Avenue
Chicago, Illinois 60659

NUCCA Director
Dr. Glenn E. Cripe
601 Dover Dr., Suite 1
Newport Beach, California 92663

NUCCRA Director
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Farmington, New Mexico 87401

NUCCA Director
Dr. Otto E. Portmann
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Puyallup, Washington 98371

NUCCA Director
Dr. Edward J. Stein
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Kent, Washington 98031

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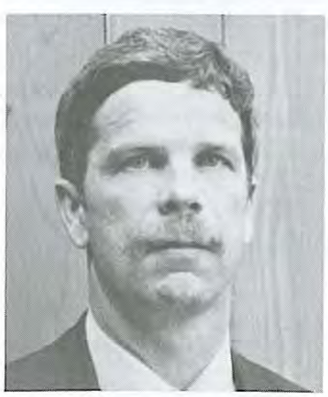
Dr. Robert T. Brooks
3100 University Club Towers
1722 South Carson
Tulsa, Oklahoma 74119

NUCCA Director
Dr. M. Wayne Clark
5700 S. Pennsylvania
Oklahoma City, Oklahoma 73119

Executive Secretary
Edna L. Denton
217 West Second Street
Monroe, Michigan 48161
Hours: M-Th 9:00-11:30 a.m.
Phone: (313) 241-5755

Executive Director — NUCCA
Research Consultant — NUCCRA
Daniel C. Seemann, Ph.D.
217 West Second Street
Monroe, Michigan 48161
Hours: Th 9:00-12:00 a.m.
Phone: (313) 241-5755



Research Consultant — NUCCA/ NUCCRA
James F. Palmer, M.S.
217 West Second Street
Monroe, Michigan 48161

Attorney — NUCCA/NUCCRA
Mr. Donald A. Miller
1916 Penobscot Building
Detroit, Michigan 48226

NUCCA/NUCCRA Calendar of Events

July, 1990	Monograph
July 21, 22, 1990	Board of Directors - Strategic Planning Session Denver, Colorado
August 6, 1990	Introduction to NUCCA — Palmer College — Dr. Hasick
August 8, 1990	Biomechanics of the Four Basic Types — Palmer College — Dr. Denton
October 27-30, 1990	NUCCA Fall Conference — Holiday Inn, French Quarter, Perrysburg, Ohio
November 10, 11, 1990	NUCCA Elective Course — Palmer College
November 17, 18, 1990	NUCCA Elective Course — Palmer College
December 1, 1990	Deadline for Monograph Articles
December 1, 2, 1990	NUCCA Elective Course — Palmer College
December 15, 16, 1990	NUCCA Elective Course — Palmer College
December, 1990	NUCCA/Upper Cervical Conference — Life Chiropractic College — Marietta, Georgia
January, 1991	Monograph
May 4-7, 1991	NUCCA Convention and Educational Conference — Michigan or Ohio
June 1, 1991	Deadline for Monograph Articles
July 1, 1991	Monograph
October, 1991	NUCCA Fall Conference — West Coast
October — November, 1991	NUCCA Elective — Palmer College

The 1990 NUCCA Fall Conference Co-sponsored By Palmer College of Chiropractic

The 1990 NUCCA FALL CONFERENCE will be held at the Holiday Inn French Quarter, 10630 Fremont Pike, Perrysburg, Ohio starting Saturday, October 27 through noon, Tuesday, October 30, 1990. The telephone number is 1-419-874-3111.

Supervising the conference will be Daniel C. Seemann, Ph.D. The University of Toledo and James F. Palmer, M.S., The University of Toledo. Both professors are members of NUCCA and NUCCRA. Each will present research updates on current NUCCRA work.

New doctors will be separated from advanced for the first two days. Subjects will include basic and advanced film analysis, classifications of the C-1 subluxation complex, patient placement for the four basic types, vectorial adjusting, resistances in the C-1 subluxation, leg checking exercises, biomechanics, x-ray machine and patient alignment.

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

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

Professional fees are $450.00; doctors in practice for two years or less, $250.00 and students are $150.00. Registration deadline is September 15, 1990. A $25.00 fee is added for late registration. A non-refundable deposit of $50.00 will hold your reservation. Please make checks payable to **Palmer College of Chiropractic,** but send checks to NUCCA at 217 West Second Street, Monroe, MI 48161, 1-313-241-6923.

1990 FALL APPLICATION FORM

NAME______________________________

ADDRESS________________________ ZIP________

DEADLINE: SEPTEMBER 15, 1990

MAKE CHECKS PAYABLE TO PALMER COLLEGE OF CHIROPRACTIC

MAIL TO NUCCA, 217 WEST SECOND STREET, MONROE, MI 48161 (Phone) 1-313-241-6923

PLEASE MAKE YOUR OWN MOTEL RESERVATIONS. (419) 874-3111

1990 NUCCA FALL SEMINAR

Holiday Inn French Quarter, Perrysburg, OH

NOVEMBER 27-30, 1990

SAT. NOV. 27	SUN. NOV. 28	MON. NOV. 29	TUES. NOV. 30
8:00-9:00 REGISTRATION	8:00-9:00 - VIDEO ADJUSTING THE ASC	8:00-9:00 - VIDEO BIOMECHANICS OF THE 4 BASIC TYPES	8:00-9:00 - VIDEO ADJUSTING THE ASC
9:00-9:30 OPENING REMARKS	9:00-10:30 X-RAY ERROR & THE EFFECT ON ADJUSTING (DICKHOLTZ, SR.)	9:00-11:00 BIOMECHANICS & HEAD PIECE PLACEMENT (DENTON)	9:00-10:30 ADJUSTING REVIEW TRICEPS (POND)
9:30-11:00 ADVANCED ADJUSTING LECTURE & PROBLEM LISTINGS (POND & BERTI)	10:45-12:00 ADJUSTING- ROLL-IN & TRICEPS PULL (POND & BERTI)	11:00-12:00 LOCATING THE TRANSVERSE PROCESS (BERTI)	10:45-12:00 CASE MANAGEMENT
11:00-12:00 SPINOUS LOCATION, ATLAS/ODONTOID LATERALITY LECTURE (BERTI)			

12:00-1:30 LUNCH	12:00-1:30 LUNCH	12:00-1:30 LUNCH	
1:30-3:15 DOCTORS CHOICE (1,2,3,5) & DISCUSSION	1:30-3:00 RESEARCH UPDATE (SEEMANN & PALMER)	1:30-3:00 DOCTORS CHOICE (1,2,3,5)	
3:30-5:00 DOCTORS CHOICE (1,2,3,6) & DISCUSSION	3:15-5:00 DOCTORS CHOICE (1,2,3,6) & DISCUSSION	3:15-5:00 DOCTORS CHOICE (1,2,3,4,6) & DISCUSSION	

INSTRUCTORS

K. DENTON (5)
M. DICKHOLTZ (1,6)
E. STEIN (1)
LLOYD POND (2)
G. CRIPE (BASIC, 1)
G. HASICK (BASIC)
W. CLARK (BASIC)
LONNIE POND (2,4)
T. PALMER (2)
A. BERTI (3)

EVENING PROGRAM

CERTIFICATION EXAMS
LEG CHECK LECTURE

DOCTORS CHOICE

1. X-RAY ANALYSIS
2. ADJUSTING
3. BIOMECHANICS
4. LEG CHECK
5. HEADPIECE PLACEMENT
6. X-RAY PLACEMENT

EVENING PROGRAM

7:30 VIDEO
OSSEOUS STRUCTURE IDENTIFICATION

SUMMARY OF HOURS

1. LECTURE - 12.5
2. *DOCTOR'S CHOICE-7.
3. FILM LECTURE - 4.0
4. RESEARCH UPDATE-1.5

TOTAL - 25 HOURS

*DOCTOR CAN MAXIMIZE A TOTAL OF 7.0 HOURS IN 1, 2, & 3.

NEW DOCTORS SCHEDULE

NOVEMBER 27-30, 1990

SAT. NOV. 27	SUN. NOV. 28	MON. NOV. 29	TUES. NOV. 30
9:30-12:00 INTRODUCTION TO NUCCA, X-RAY ANALYSIS (CRIPE, HASICK, CLARK)	8:00-9:00 - VIDEO ADJUSTING THE ASC 9:15-10:30 GROUP I LEG CHECK ANATOMETER (SCHROCK) GROUP II ADJUSTING (LONNIE POND) GROUP III X-RAY PLACEMENT (DICKHOLTZ) 10:45-12:00 GROUP I ADJUSTING (LONNIE POND) GROUP II X-RAY PLACEMENT (DICKHOLTZ) GROUP III LEG CHECK (SCHROCK)	SAME SCHEDULE AS ADVANCED DOCTORS	SAME SCHEDULE AS ADVANCED DOCTORS
12:00-1:30 LUNCH	**12:00-1:30 LUNCH**		
1:30-5:00 X-RAY ANALYSIS CONTINUED	1:30-3:00 RESEARCH UPDATE (SEEMANN, PALMER) 3:15-5:00 GROUP I X-RAY PLACEMENT (DICKHOLTZ) GROUP II LEG CHECK (SCHROCK) GROUP III ADJUSTING (LONNIE POND)		

The Work Continues: Spring Seminar A Success

The 1990 NUCCA Convention and Educational Conference was held at the Holiday Inn May 5-8th and it was a unanimous decision that the seminar was an unqualified success. The Holiday Inn had adequate space and services to accommodate the NUCCA group.

There was a good cross section of field doctors and students. Approximately 25 people took the basic class. A new format, instituted this year by the NUCCA Board, gave two days of instruction to all those taking the basic class.

The conference was under the supervision of Dan Seemann, Ph.D., professor emeritus at The University of Toledo, and was coordinated by James Palmer, M.S., also a professor at The University of Toledo.

A particularly good job was done by our instructors; they included: Drs. Keith Denton, Al Berti, Lloyd Pond, Marshall Dickholtz, Teresa Palmer, Lonnie Pond, Glenn Cripe, Ed Stein, Larry Schrock, Wayne Clark, and Gordon Hasick.

The Doctor's Choice format continues to be popular at the conference with the top choice being headpiece placement, adjusting, and biomechanics.

The banquet this year honored Dr. Gregory who passed away March 1, 1990. Dr. Gordon Hasick compiled a video tape of remembrances about Dr. Gregory dating back to his childhood. The tape was particularly well done and accompanied by music. There were not many dry eyes after the presentation.

It was evident at the conference, that everyone took up the slack left by Dr. Gregory and all are determined to carry on the work.

NUCCA/Palmer Elective Course

The National Upper Cervical Chiropractic Association will be conducting the N.U.C.C.A. elective course at Palmer College of Chiropractic. Dates of the four weekend course are November 10th and 11th, November 17th and 18th, December 1st and 2nd and December 15th and 16th.

Upper trimester Palmer students and D.C.'s are eligible to take the course. No C.E.U.'s or license renewal credits will be given. Interested D.C.'s should contact special programs at Palmer College. Dr. Glenn Cripe, 601 Dover - Suite 11, Newport Beach, CA 92663, is the program coordinator for N.U.C.C.A.

Weekend I, instructed by Glenn Cripe, will cover introduction to N.U.C.C.A., x-ray analysis and adjusting. Weekend II, instructed by Dr. Marshall Dickholtz, Sr., of Illinois and Dr. Keith Denton of Michigan will present adjusting, biomechanics, and x-ray placement. Weekend III, with Dr. Lloyd Pond of New Mexico and Dr. Larry Schrock of Indiana, will concentrate on adjusting, leg check and headpiece placement. Weekend IV, instructed by Dr. Al Berti of British Columbia and Dr. Ed Stein of Washington, will cover adjusting positions and a review of biomechanics — written and practical examinations.

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

Palmer College—Introduction to NUCCA

Dr. D. Gordon Hasick of Calgary, Alberta, will be presenting "Introduction to NUCCA" at Palmer College, Monday, August 6, 1990. The presentation is open to all students at no charge and is designed to help the students decide if they have an interest in taking the NUCCA elective course.

Dr. Hasick is Board Certified by NUCCA, past member of the board of directors, and a NUCCA instructor.

Palmer Homecoming

Dr. Keith Denton of Monroe, Michigan will be presenting "Introduction to NUCCA" and biomechanics of the four basic types at Palmer Homecoming, Saturday, August 11, 1990.

Dr. Denton is Board Certified by NUCCA, a member of the board of directors and a NUCCA member.

NOTICE

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

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

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

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

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

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

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

Each booklet sells for $15.00.

NUCCA 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 to successful candidates.

Doctors who have not been 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 on 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.

Enquiries concerning certification should be made to NUCCA President, and Vice-President, Drs. Albert A. Berti, 200-3825 Sunset Street, Burnaby, B. C. Canada V5G and Lloyd C. Pond, 4540 East Main Street, Farmington, New Mexico 87401. Exams will only be given during the NUCCA Educational Conferences.

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

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

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

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

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

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NOTICE

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

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

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

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

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

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

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

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

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

Questions And Answers, A Self Evaluation For Adjusting The A.S.C. (1 hr.) $100.00
Follows Monograph Vol. 3, No. 9 and No. 10. A chronological order as a guide for the adjuster when practicing the C-1 or triceps pull adjustment. By self-questioning, based on this tape, the adjuster 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 Ralph R. Gregory/ Ruth O. Gregory Research Funds

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

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