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Thompson Terminal Point
Organization and Enhancements

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An Anteriorly Rotated Innominate is Statistically Linked to a Functional Leg Length Discrepancy

**Objective:** to determine whether a correlation exists between abnormal pronation and functional leg-length discrepancies.

**Method:** Visual assessment and a pelvic thrust maneuver were used to identify the functionally short leg. The Foot Posture Index was used with a modified stance position to identify the more pronated foot. The posterosuperior iliac spines were used to identify the "relative" position of the innominate bones.

**Results:** A significant positive correlation was found between abnormal pronation and hip position and between hip position and functional leg-length discrepancy.

**Conclusion:** These results are consistent with a theoretical ascending dysfunctional pelvic model: Abnormal pronation pulls the innominate bones anteriorly (forward); anterior rotation of the innominate bones shift the acetabula posteriorly and cephalad (backward and upward); and this shift in the acetabula hyperextends the knees and shortens the legs, with the shortest leg corresponding to the most pronated foot.
Friction-reduced table
Chiroslide

www.lafayetteinstrument.com
Allis (Galeazzi) test

Knee higher $\rightarrow$ long tibia

Knee distal $\rightarrow$ long femur
A Galeazzi test suggesting developmental dysplasia of the hip or a leg-length discrepancy. The test is positive when the knees are at different heights as the patient lies supine with ankles to buttocks and hips and knees flexed.
Conclusion: This pilot study suggests that in this group of volunteers (n=50) from the non-clinical general population, those who demonstrated a commonly used sign of subluxation/joint dysfunction - supine leg length alignment asymmetry - had a significantly (P=0.017) lower measure of general health as determined by the SF-12 survey than those volunteers without such asymmetry.
PURPOSE: To determine the most commonly used diagnostic methods for detecting subluxation.

PARTICIPANTS: All 554 chiropractors registered May 30, 1994, with the Chiropractors and Osteopaths Registration Board of Victoria.

RESULTS: The response rate was 85%. The most commonly used method was static palpation. Pain description, orthopedic tests, motion palpation, visual posture analysis, leg length discrepancy, neurological tests and plain static X-rays had mean scores greater than 4.0. All of these methods, as well as functional X-ray views and kinesiological muscle testing, were considered reliable.
Comparison of leg length inequality measurement methods as estimators of the femur head height difference on standing X-ray. Rhodes DW, Mansfield ER, Bishop PA, Smith JF. University of Alabama, USA.

OBJECTIVE: To assess the validity and reliability of prone and supine measurements of leg length inequality and to determine the potential use of measurements at the iliac crests and patient demographics as predictors to estimate standing leg length differential.

DESIGN: Repeated prone and supine measurements of leg length inequality were made by an experienced chiropractor and compared with iliac crest and femur head measurements made on X-rays of standing patients. Multiple regression analysis was performed.

PARTICIPANTS: The first 50 new patients with low back pain that were X-rayed were included in the study.

RESULTS: Intraexaminer reliability was excellent for the prone measurements. The supine tests were less reliable.
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OBJECTIVE: a) Establish a precise, standardized method to assess prone leg alignment changes (functional "leg length inequality"), which have, until now, been reported clinically to occur as a result putative chiropractic subluxation isolation tests [neck flexion (C5) and extension (C1)]; and b) describe differences in leg alignment changes in a group of healthy subjects and patients with chronic spinal complaints.

CONCLUSIONS: 1) small leg displacements (< 1 mm) were recorded by the optoelectric measurement system; 2) heel position changes during isolation tests were identifiable; 3) as a result of head-up maneuvers, patients exhibited more asymmetrical heel movement than controls.
The short leg observed in the legs-flexed position may result from guarding responses instigated by stretch reflexes involving asymmetry of quadriceps tone associated with pelvic asymmetry.
Validity of compressive leg checking in measuring artificial leg-length inequality.

Cooperstein R, Morschhauser E, Lisi A, Nick TG.

Department of Technique, Palmer College of Chiropractic West

OBJECTIVE: To determine the accuracy of instrumented prone compressive leg checking. DESIGN: Repeated measures (n = 26) on single subjects (n = 3).

METHODS: A pair of surgical boots were modified to permit continuous measurement of leg-length inequality (LLI). Multiple prone leg-check observations of a blinded examiner on 3 subjects were tested against artificial LLI that was created by randomly inserting 0 to 6 1.6-mm shims in either boot.

CONCLUSION: Compressive leg checking seems highly accurate, detecting artificial changes in leg length +/-1.87 mm, and thus possesses concurrent validity assessed against artificial LLI. Pre-leg-check and post-leg-check differences should exceed 3.74 mm to be confident a real change has occurred.
Are chiropractic tests for the lumbo-pelvic spine reliable and valid? A systematic critical literature review.

Hestbaek L, Leboeuf-Yde C.
Nordic Institute for Chiropractic and Clinical Biomechanics, Odense, Denmark.

Only tests for palpation for pain had consistently acceptable results. Motion palpation of the lumbar spine might be valid but showed poor reliability, whereas motion palpation of the sacroiliac joints seemed to be slightly reliable but was not shown to be valid. Measures of leg-length inequality seemed to correlate with radiographic measurements but consensus on method and interpretation is lacking. CONCLUSION: The detection of the manipulative lesion in the lumbo-pelvic spine depends on valid and reliable tests. Because such tests have not been established, the presence of the manipulative lesion remains hypothetical. Great effort is needed to develop, establish, and enforce valid and reliable test procedures.
Reliability of the Derifield-Thompson test for leg length inequality, and use of the test to demonstrate cervical adjusting efficacy.

Shambaugh P, Sclafani L, Fanselow D.
New York Chiropractic College Research Division, Glen Head 11545.

Twenty-six subjects walked into five successive examining rooms where a Derifield leg check was performed, including an estimate of the millimeters of difference in leg lengths. The subjects then entered a treatment room where they were randomly given no treatment, cervical adjusting, or gluteal massage. This process continued for 5 cycles. This study demonstrated that clinicians could reliably measure a LLI to less than 3 mm (both inter- and intraobserver), and also detect a change in LLI when the head was rotated.
CONCLUSION: There was good reproducibility between 2 examiners by using the Activator Method to detect leg length inequality in the prone extended position. This study does not address the validity or clinical significance of the measurement method. Future studies should include larger numbers, a wider variety of subjects, and a diversity of examiners.
CONCLUSION: There appears to be a lack of agreement concerning incidence, classification and point of clinical significance. However, the manifestations or consequences of LLI demonstrate greater accordance. Of the three most commonly utilized evaluation methods, radiographic measures such as the scanograms are recognized as the most reliable procedure for the evaluation of anatomical LLI. Much controversy exists with some of the clinical orthopedic methods and the visual "quick" leg check. Because there is such a vast range in estimates of reliability, few if any definitive conclusions can be made regarding these methods. Given this, it is evident that more research is needed before the use of certain orthopedic and visual checks are considered reliable and valid.
Precise measurement of functional leg length inequality and changes due to cervical spine rotation in pain-free students.
Falltrick DR, Pierson SD.
Research Department, Life Chiropractic College-West, San Lorenzo, CA 94580.

A series of blinded studies to determine the feasibility of documenting functional leg length inequalities and changes in functional leg length in normal and non-normal patients were performed.

Results indicated an absence of any significant effect of head rotation, type of table, galvanic stimulation, or any difference between persons classified as cervically lesioned or not cervically lesioned.

Failure to obtain subjects with frank pain as well as absence of an applied cephalad pressure (as is performed clinically) during leg length evaluation were considered as possible explanations for the failure to detect an effect of head rotation in the leg lengths. Discussion addresses the need for sensitive leg length inequality assessment techniques which eliminate subjectivity and contribute to decreased error variances.
Interexaminer reliability of an isolation test for the identification of cervical subluxation.
Youngquist MW, Fuhr AW, Osterbauer PJ.
Activator Methods, Inc., Phoenix, AZ 85060-0317.

To determine whether prone leg length analysis in association with an isolation test maneuver was reproducible.

The results indicate **good reliability using this method of analysis for putative upper cervical subluxation in this patient population.**
An inter- and intra-examiner reliability study was performed to validate a prone leg length-differential test. Naive students (n = 40) were called, in random order, into three adjacent examining rooms where three experienced chiropractic clinicians measured differential leg lengths. Using standard placement a tape measure was read to the nearest mm to detect inequalities at the shoe-sole interface. The leg length differences were recorded, for both the straight and flexed legs prone positions, twice by each of the three clinicians. Intraclass correlations were significant for the two independent readings for all three examiners, indicating high reliability of the test. Good agreement among examiners was indicated as well by significant intraclass correlation in two of the three possible examiner combinations. These results argue strongly for the reality of the leg length inequality phenomenon and also that it can be reliably measured.
Visual leg length insufficiency detection and correction is compared with established radiographic procedures on 41 consecutive patients presenting to a chiropractic clinic with low back pain. It is commonly accepted that the most accurate procedure of short leg demonstration is the standing X ray. Visual correction, as described by Rene Cailliet, uses three anatomical points of reference: a) iliac crest levelness, b) vertical appraisal of the spine from the sacral base (the spine should be perpendicular to the sacral base) and c) levelness of the posterosuperior iliac spine (PSIS) dimples.

Continued on next slide:
Lifts of varying thickness were placed under the foot of the short leg in both leg length corrective procedures. This study found that the visual method of measurement did not differ significantly from the X-ray method of measurement for leg length insufficiency. Further, it was found that when comparing those in which the visual measure was less than the X-ray measure and those in which the visual measure was greater, there was a significant relationship between visual and X-ray measures. Eta (eta 2) demonstrates that there is a very strong relationship between visual and X-ray methods of measurement. A review of the literature is presented regarding the correlation of leg length insufficiency and musculoskeletal disorders, as well as the discrepancy required to alter biomechanical properties of the trunk and lower extremity.
The short leg is likely due to differences in suprapelvic muscle tone left vs. right, which, in turn, is due to differences in the central integrative states (CIS) of the anterior horn cells of the alpha motor neurons that innervate those muscles. The difference in CIS is likely due to changes at the **SEGMENTAL LEVEL:**

1. Autogenic facilitation (1a fibers from spindles)
2. Reflex inhibition from the contracted muscles
3. Automatic flexor reflex afferents or the **SUPRASEGMENTAL LEVEL:**
   1. Voluntary cortex
   2. Cerebellum
   3. Brain stem
Segmental Level:
- Autogenic Facilitation
- Contralateral Inhibition
- Flexor Reflex Afferents

Suprasegmental Levels:
- Cortex
- Cerebellum
- Brain Stem

Central Integrated State of AMNs

Leg Check Finding
The Neck: Cervical Syndromes

Syndrome: a collection of findings
Why the cervicals before the pelvis?

- THOMPSON’S ORGANIZATION OF LEG-LENGTH RELATED SPINAL SYNDROMES IS ONLY USABLE IN THE ABSENCE OF CERVICAL ROTATION INTERFERENCE WITH THE PRONE LEG CHECK.
Unilateral Cervical Syndrome

Look for trigger point on side opposite head turn (side of body rotation). If no trigger point, think Atlas.
Cervical Syndrome

- SCP- LPJ
- SSP- Zygomatic Arch
- LOC- L-M, P-A, I-S
- Rotate the head completely before adjusting.
- Maintain contact during rotation
- Chin is 1” above the bottom of the head piece

This adjustment can also be done from the head of the table, with more of an S-I line of drive for the lower cervicals, to follow the plane line of the disc and stay perpendicular to the facets.
Cervical Syndrome ATLAS

Palpation reveals no tender nodulations

If right rotation balances the legs, the listing is LP Atlas
If left rotation balances the legs, the listing is RP Atlas
The Atlas cervical syndrome adjustment is the toggle recoil

Since the listing will be and LP or RP, the line of drive will be: L-M, S-I and P-A.
Double Cervical Lock

Palpate for tender nodules bilaterally at different segments. Adjust the more superior segment 1st, then recheck for a unilateral cervical syndrome to adjust the more inferior segment.
Cervical Syndrome- Posterior Cervical

Legs balance on head rotation to both sides

Palpation reveals tender nodulations on the right and left of the same segment. X-ray analysis may confirm a military neck
Posterior Cervical Adjustment
Double Thumb Method
Xception Derifield Cervical Syndrome

Cervical Rotation

Cervical Rotation
Xception Derifield Cervical Syndrome

Balanced legs extended. Cervical rotation has no effect.

Short leg appears on flexion. Cervical rotation balanced legs.

If right cervical rotation, with the legs flexed, creates balanced legs, you have a RXDCS.

If left cervical rotation, with the legs flexed, creates balanced legs, you have a LXDCS.
X-Derifield Cervical Syndrome

vs.

X-Derifield Negative Derifield

Cervical Rotation

= XD CS

Cervical Rotation

= XD -D
Overcompensated Cervical Syndrome (OCCS)

- Suspected with chronic C2 subluxation
- Decreasing spinous laterality down to C7
- Very tight trapezius muscle opposite side of axis spinous laterality
- Often seen in torticollis
- Often found when the sacroiliac joint is in severe need of correction

Left Overcompensated Cervical Syndrome (LOCS)

aka: Right 1st Rib
Over Compensated Cervical Syndrome

- SCP - 1st Rib Head
- SSP - Zygomatic Arch
- LOC - L-M, S-I, I-S
- Number of thrusts: 1
- Laterally flex the head;
- mimic modified cervical set
- This move eliminates multiple cervical fixations.
- Effective for torticollis

Patient’s head is rotated fully to her left in this picture. (may be impossible) Dr’s. stance is on the right (side of trapezius spasm).
Bilateral Cervical Syndrome

NOT automatically a double PS or AS Occiput

Rt. Cerv. Rotation

Lt. Cerv. Rotation

The “experts” disagree on the segmental listing associated with this finding. It is variably an indicator of counter-rotation of upper cervical segments (Occiput/C1, or C/C2).
Bilateral Cervical Syndrome

- Palpatory C2 Spinous Pain
- SCP- Inferior nuchal line
- CPs- Bilateral thenars
- LOC- A-P, I-S scoop with a flip to ceiling
- Number of thrusts: 1
- Tuck the chin in
- Effective for removal of C1-Occiput fixations

Rt. Cerv. Rotation
Lt. Cerv. Rotation
Bilateral Cervical Syndrome: I-S with a flip
Positive and Negative Derifield
Negative Derifield (-D) 
The most common leg check

-\text{-D} \, \text{Left}

\begin{array}{c c c}
\uparrow & \uparrow & T \\
\uparrow & \uparrow & \uparrow \\
\end{array}
\quad \text{OR} \\
\begin{array}{c c c c}
\uparrow & \uparrow & \uparrow \\
\uparrow & \uparrow & \uparrow \\
\end{array}

The short leg in extension either remains short OR balances out with the other leg in flexion. 
With the associated trigger points, this finding suggests an anterior &/or inferior ipsilateral sacrum.
-Derifield AI Sacrum Trigger Points (Ideally get at least 3 trigger points)

1. Ipsilateral achilles tendon
2. Medial tibial condyle (medial hamstrings)
3. Inferior medial ishial tuberosity
4. Medial and inferior to PSIS
5. Ipsi pubic tubercle
6. Contralateral T2-6 costo-transverse junction and mid-clavicular 1st or 2nd intercostal space pain anteriorly
Negative Derifield Trigger Points
Negative Derifield Trigger Points
Negative D as AI Sacrum Parts 1 & 2

- SCP - Ischial Tuberosity
- SSP - Roll in Toggle
- LOC - I-S, slight M-L
- Number of thrusts - 3-5

- SCP - Medial to PSIS
- SSP - Top of knee
- LOC - Medial to Lateral
- Number of thrusts - 3-5

Think: Pro Wrestling
Negative Derifield-
Part 2
Alternate Moves

- SCP - Just Medial to PSIS
- SSP - Top of knee
- LOC - Medial to Lateral
- Number of thrusts - 3-5
Negative Derifield Supine (Preferred) Parts 1&2

- SCP: Ischial Tuberosity
- SSP: ASIS
- LOC: I-S, M-L
- Number of thrusts: 3-5

Think: Deliver the baby

- SCP: Inguinal Ligament
- SSP: Top of Knee
- LOC: Fingers lateral, A-P
- Number of thrusts: 3-5

Think: Torque
If the AI Trigger points are not found, check for:

- Posterior rocked ischium (usually ipsilateral)
- PI ilium (with leg lag on the involved side)
- Sacral apex left or right
- IN or EX
- L5 or L4
Positive Derifield (+D)

When combined with ipsilateral leg lag, this finding indicates a PI ilium.
The Positive Derfield is often associated with the PI ilium. However, the PI ilium must exhibit the following triggers:

1. Insertion of sartorius on medial anterior knee
2. Palpatory pain on upper inguinal ligament
3. Resistance to flexion of the leg
PI Ilium Trigger Points:

Upper Inguinal Ligament (Sartorius Origin)

Medial Knee (Sartorius Insertion)
Prone Positive
Derifield PI Ilium

- SCP  PSIS
- SSP  Ishial tuberosity
- LOC  P-A, I-S, M-L.
- Thrusts  3-5
- Note: Pelvic piece drops toward feet to allow ASIS to drop inferiorly
Supine Positive Derifield

This move helps correct anterior pelvic muscular dysfunction

- SCP: Inguinal Ligament one inch above pubic tubercle
- SSP: Roll in like toggle
- LOC: A-P, S-I, L-M
- Thrusts 3-5
- Use arm fossa test for exact SCP
Frontal plane sacral rotation
Testing for Sacral Rotation

Sacral Apex Right

Sacral Apex Left
Rotated Sacrum Test Results

Pt. Prone

Right leg is free to lift higher

Left leg is free to lift higher
Rotated Sacrum Test Showing Sacral Apex Left (SAL)
“Bend the left knee and lock the right knee into extension”

This exacerbates a LEFT sacral apex.
“Bend the right knee and lock the left knee into extension”

This accentuates a right sacral apex.
Sacral Base Rotation
(for any coronal plane sacral rotation affecting either S-I joint or L5 disc)

- SCPs- Sacral apex and medial PSIS
- LOC- Scissors Thrust (M-L, and L-M)
- Number of thrusts- 3-5
- Cross Involved( lower) leg over higher leg
- Done on side of higher leg prone
Posterior Rocked Ischium


- SCP  Ishial Tuberosity
- SSP  Roll in like toggle
- LOD  P-A, S-I with a roll.
- Thrusts 3-5
Opening the IN

Making the EX worse

Closing the EX

Making the EX Better
Testing for the IN ilium on the left
Testing for an EX on the left
Adjusting the IN Ilium

Thumb web at lateral posterior distal thigh

Stabilizing at the ASIS
Adjusting the EX

Stabilize