

CATEGORY SEVEN – THE OBLIQUE SACRUM

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It would be a fairly correct statement that most chiropractors check leg length as an indication of spinal and pelvic balance. It is also noted that chiropractors are not the only profession concerned with this problem. However, chiropractors are in the unique position of being able to assess the effect that spinal and pelvic misalignment has on leg length and what effect leg length has on spinal and pelvic balance.

Historically, our profession has used the terms *true short leg* and *functional short leg*. The true short leg or anatomical short leg is that person who has been born with a height imbalance from femur to calcaneus or who has acquired a short leg from fracture, injury or disease. The functional short leg is a unique focus of chiropractors as this is the leg differential produced by pelvic rotation, lumbar spine misalignment, diaphragm contracture and/or upper cervical subluxation.

DeJarnette discussed the problems of the deficient extremity in the 1970 SOT manual which he classified as Category Seven in that year's eight category system¹. The questions which are posed in short leg analysis and correction are: does this person have a true short leg or a functional short leg? If they do have a true short leg what do I do – add a shoe lift, a heel lift, or sole lift? For that matter, can a lift temporarily help a functional short leg? If a lift is to be placed, what amount and for how long?

In SOT terms, we are dealing within our framework with the question of, “how does the presence of a true short leg affect our categories I, II, and III?”

Analytical Methods

DeJarnette's position statement from the 1970 notes^{2,3} was that: “extremity inequality means that normal skeletal balance and function are not possible. If left unsolved, the patient fails to recover.” And further: “The short leg is a cause of many musculoskeletal problems as well as the cause of many visceral problems. A continuous short leg problem can lead to severe cardiac problems and circulatory failure. The diaphragm must be balanced to function. It cannot be balanced if the pelvis is under a constant stress due to this extremity deficiency.”

DeJarnette showed caution in using a lift when he wrote⁴: “it is erroneous to substitute a lift for a corrective adjustment when that adjustment is specifically indicated.” And emphasized the fact that you had to make sure that you did, indeed, have a true short leg before you, in his words⁵, “condemned a patient to a lifetime of a built-up shoe and not walking without wearing these shoes.”

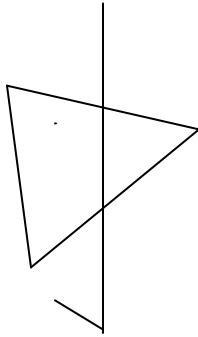
Apart from using a tape measure, which has limitations, there are the two main methods which have been used in chiropractic to determine true short leg measurement and its biomechanical effect – visual analysis and x-ray analysis. Let's look at each.

Visual Analysis

DeJarnette's Distortion Analyser is a good place to start in the search for an existing leg deficiency. We know that a functional short leg as found with the categories

gives us a lateral sway, an A-P sway or an antalgia, but the true short leg, when present, gives a different manifestation. Visual analysis with the true short leg has the plumbline bisecting the sacrum, placing the base on one side and the apex on the opposite side – thus we get the term “oblique sacrum.”

(DIAG. 1)



There are, in fact, three other measurements the true short leg will exhibit. First, there will be a low hip and pelvis in standing position and this can be measured by thumb over the top of the crest comparison. Of course, this measurement can be a difficulty with the obese patient.

Second, in the prone position, by leg stretch and malleoli comparison there will be a short leg on the same side as the low hip in the upright position and last, the supine leg check position must agree with the upright and prone positions and yet, with the four factors mentioned – oblique sacrum cutting the plumbline, pelvic height, prone & supine leg checks – it is still good to have x-ray verification.

At this stage of the discussion you are probably thinking about the interplay between true short leg and functional short leg. We know we were!

By this, we mean to answer the question of what is underlying that true short leg; the patient is still category I, II, or III along with their Category VII.

This is best expressed in diagram form.

(DIAG. 2)

This pelvis has moved laterally to the right. This occurs and is definitive of a sacroiliac slip separation. You can experiment with the posture by pushing the patient's pelvis to the left, as far as you like, it will still come back and settle in the right-of-centre position.

(DIAG. 3)

This pelvis is sacrum near the centre and vertical. This is a sacroiliac boot subluxation. It is not weight-bearing so does not produce lateral movement.

(DIAG. 4)

This is the oblique pelvis which is always associated with anomalies or deficient leg. Always do an upright pelvic film to verify.

In diagrams 2, 3, 4 we can see the differences but now for some combinations and some DeJarnette practicality⁶.

(DIAG. 5)

A heel and sole lift is made up for testing purposes, consisting of a left 9mm heel, 6mm sole then turn it upside down and it's a right 9mm heel, 6mm sole (DeJarnette suggested an heel and sole lift – these have gone out of fashion as has the bootmaker, so it has got us wondering what effect it would have now that people use heel lifts only; research project!). You can make the lift out of your choice of material be it leather, rubber or cardboard. In diagram 5, there was an oblique sacrum with base right and apex left. Right heel and sole lift placement stabilizes the pelvis and gives us a Category I patient for block technique.

(DIAG. 6)

This was also an oblique sacrum with base right and apex left. Heel and sole lift to the right produces a left shift of the total pelvis.

This gives us a Category II patient.

(DIAG. 7)

This is an oblique sacrum with heel and sole lift and a left sciatica of many weeks duration. The right heel and sole lift produces a fifth lumbar right inferior. Adjust as a right inferior with total relief of left sciatica.

X-Ray Analysis

DeJarnette favoured the sectional 14x17 inch film with the focal spot at the acetabular head line for gaining an estimate of leg imbalance⁷ (as opposed to the 14x36 full spine radiograph). The key word is “estimate” as there are the factors of parallax error, patient placement fault and the loss of imaging that goes with transforming a 3D object onto a 2D image.

DeJarnette summarised: “Empiricism says to x-ray and believe what you see and act according to doctrine. This is perhaps a wise move in 15% of all cases seen, but a foolish move in 85% of your case load.”⁸

The sort of contradiction that can occur is when the x-rays show a right deficiency and the patient presents as a left short leg, supine category II.

We have already mentioned DeJarnette's Distortion Analysis and Combination findings so as to differentiate the categories I, II, III from the oblique sacrum, which we could summarize as: look for the functional short leg (categories) and block accordingly. Then, if you do find the true short leg which is not a category I, II or III and it presents with the sacral incline with base on one side of the plumbline and apex on the other, which is confirmed by x-ray then the measurement is taken and if over 12mm, the heel is built up to the full amount and the sole to 9mm⁹.

We have next included some discussions from other authors, Otto Reimert¹⁰, Hugh and Victor Logan¹¹ and William Coggins¹² who all happen to have come out of the state of Missouri.

People from this American state have the reputation of having "street smarts." Whereas a Californian might listen to wonderful stories about the sale of a certain harbour bridge, a Missourian has the slogan "show me." They want visual evidence. So it is no surprise that these Missourian Chiropractors have developed visual and x-ray analysis methods to assess the short leg. Here we present their findings as "food for thought" methods which are not without criticism, however.

Reinert Rationale

Otto Reinert was a professor at Missouri College in the 1960s which later merged with Logan College. We have included his thoughts and opinions, not just because his "Chiropractic Procedure and Practice" textbook is a "cult classic" nor the fact that he visited our shores in the late 70s, but because he introduced some original concepts to the literature.

On the use of Lifts, Reinert wrote¹³ that: "When pelvic tilt occurs from anatomical leg deficiency, the resulting spinal curvature may be prevented, reduced or controlled by the timely insertion of a lift in one shoe, further complemented during sitting by an ischial lift (a procedure also favoured by the Logans). Even when there is not true leg deficiency, a lift may be used to compensate for structural anomaly in the spine, or to alter the relative attitude of the spinal segments (with this last statement, we can visualise the steam coming out of DeJarnette's ears and there is a vision of BJ Palmer doing cartwheels down the corridor).

A change in the level of the pelvis resulting from the placement of a lift will induce compression of the intervertebral disc on the elevated side, producing the greatest change at the lowermost movable vertebral joint. This compression of the annulus fibrosus alters the shape of the nucleus pulposus and often its relative location within the disc. This, the fulcrum of balance for the superior vertebra is varied, forced in the direction away from the site of compression.

The radiographic evidence of eccentric displacement of the nucleus pulposus is the increased intervertebral space on the side of displacement. Accordingly, if there is increased intervertebral space at the level of the lowermost movable vertebral joint on the same side as pelvic deficiency, the placement of a lift on this side will restore the nucleus toward central position and improve spinal balance. Conversely, if there is increased intervertebral space at the level of the lowermost movable vertebral joint on the side opposite pelvic deficiency, the placement of a lift under the deficient side will only serve to force the nucleus pulposus to greater eccentricity and increase the acuity of local curvature, even though the pelvic level may have been improved.

Summarising and establishing a rule: (a) Always use a lift under the side of pelvic deficiency if there is increased intervertebral space at the level of the lowermost movable vertebral joint on the side of deficiency.

(DIAG. 8)

(b) Tentatively use a lift under the side of pelvic deficiency if the intervertebral space at the lowermost movable vertebral joint is bilaterally equal, subsequently rechecking and removing lift if the space becomes less on the side of lift.

(DIAG. 9)

(c) Never use a lift under the side of pelvic deficiency if the intervertebral space at the lowermost movable joint is less on the side of deficiency.

(DIAG. 10)

(d) In conditions of lumbosacral anomaly, a shift of the nucleus and thickening of the annulus may compensate for the deficiency, permitting the lowermost movable vertebra to rest in level attitude. There is no need for a lift even though there is pelvic deficiency.

(DIAG. 11)

Reinert also had some thoughts on the amount of lift to be used in the compensation of a leg deficiency. He wrote¹⁴: “following leg trauma which may have drastically altered leg length, total compensation for the deficiency should be made. However, no more than 7 – 9 millimetres of the deficiency should be compensated by a heel lift alone, since unilateral elevation of the heel alone will induce an anterior drift of the pelvis on that side among other complications. In severe deficiency, the entire under surface of the shoe, including the sole, should be elevated.” This last, the heel and sole lift as we have previously mentioned was favoured by DeJarnette. Two points of note, DeJarnette used it only when it didn’t interfere with category correction and the second point we have hinted on is the practicality of finding a bootmaker to heel and sole your shoe in these times.

Another point which we will make more mention of a bit later in this article is the matter of arch support v. heel lift. As described by Reimert¹⁵: “In many cases, leg deficiency is actually a result of a prolapse of the longitudinal arch in one foot. The fitting with a suitable arch support rather than a heel lift is the indicated correction.”

Logan Rationale

We have described how DeJarnette termed the true short leg situation as the “oblique sacrum.” DeJarnette also talked about the “V” sacrolumbar curve which resulted when the lumbar curve moved back to the plumbline as in diagram 12, below.

(DIAG. 12)

The Logans (father, Hugh – son Vinton of Logan basic fame) went one step further by stating that¹⁵ there are three points at which unilateral deficiency may occur, namely, at the point of support by the head of the femur because of traumatic or pathological leg deficiency, at the sacral articulation with the ilium because of inferior and anterior sacral subluxation and thirdly, at the fifth lumbar body which may become unilaterally thinned or wedged and thereby decrease the support offered on the side of wedging.

Their rationale produced a system of ratios and rules to apply their heel lifts and ischial lifts. We have included their method, not just to pad out our article nor to give you eyestrain but to offer an insight into an aspect of chiropractic that had been given some attention years ago. Here is Vinton Logan and Fern Murray's¹⁷ explanation followed by our comments.

“Locomotive needs of the human body provide that the two lower extremities support the body and articulate with the pelvic structure at its most lateral extremity. The distance between the femur heads at their articulations with the acetabula, is approximately nine and one-half inches in the normal, average body. The sacrum, medially situated between the heads of the femurs, under like provisions measures about four and three-fourths inches across or from the centre of one articular surface to the other. Lastly, the fifth lumbar measures approximately two and three-eighth inches across. Taking these three measurements gives us a ratio of 4:2:1

(DIAG. 13)

While the actual measurements differ, of course, according to the anatomical structure and proportionate size of different bodies as a whole, the ratio in which they stand to one another remains alike. From the Logan ratio system it is suggested that a 1” leg deficiency on one side, causes the sacrum on the same side to be ½” deficient in relationship to the opposite side of the sacrum, and the same side of the fifth lumbar to be ¼” deficient with the opposite side of the fifth lumbar. Or, as can be seen, the relative amounts of deficiency caused are in the same ratio (4:2:1) as the relative measurements of the three structures.

The Converse (yes it is starting to look like second form geometry class) is stated as “¼” wedging of the fifth lumbar vertebra is equal in effect upon the support of the spine to ½” unilateral sacral inferiority, or to a 1” unilateral leg deficiency.”

Logan When Which and How Much

One of the Logan System's rules was that a lift be placed under the side to which the body of the lowest freely movable vertebra rotates thus the side of inferior support. Remembering that the Logans suggested three points at which unilateral deficiency can occur gives us these five cases to think about.

1. If the defect in support arises entirely from leg deficiency, a lift must be used under the side of the leg deficiency when the patient is standing, but no lift is required when he is sitting.

2. If the inferior support is caused only by the two factors above the acetabula i.e. sacral inferiority or unilateral fifth lumbar wedging or both, a lift will be needed when he is standing and when he is sitting i.e. the ischial lift (under one cheek).
3. If there is a leg deficiency, sacral inferiority and unilateral wedging all on the same side, the lift will be required on the same side both standing and sitting, but in different amounts; when the patient is standing, it must compensate for all three; when he is sitting, it must compensate for only the two latter factors.
4. If there is a leg deficiency on one side with sacral inferiority and unilateral wedging on the opposite side, and the leg deficiency is more than enough to overshadow the other two factors, then a lift will be needed on the side of leg deficiency when the patient stands, but on the opposite side when he is sitting.
5. If in a similar case of leg deficiency on one side, sacral inferiority and unilateral wedging on the opposite, the leg deficiency is just enough to compensate for the other two deficiencies, then no lift will be required when the patient is standing, but an ischial lift will be needed when he is sitting, on the opposite side to the leg deficiency. (Our comment: see DeJarnette and BJ Palmer's previous actions of doing backflips and cartwheels down the corridor)

Next, the Logans had a similar conservative approach to Reinert when they stated that ¼" lift (6mm) is sufficient in the beginning; a greater amount of lift would make too radical and immediate a change in the spine.

Foot Levelers

Although there are other orthotic suppliers to the chiropractic profession here in Australasia, we have chosen to write about Foot Levelers because they tend to look at their product from a chiropractic viewpoint and are concerned with the three arches of the foot in respect to correction in terms of spinal-pelvic stabilisation. Foot levellers offer a Velcro region to the lower surface of their arch to which a 3, 5, 7 or 9mm lift is attached when needed. We noticed that they are in agreement with Otto Reinert's rule of not going higher than 9mm.

Conclusion:

We have examined the work of a few Authors including "the Major" to gain an understanding of the "oblique sacrum" or true anatomical short leg deficiency.

Our conclusion is that much more work is needed on this subject.

DeJarnette's conclusion was (by inference, as he did give it 1970 Category status) don't ignore the true short leg as an item in your analysis but only give it its correct amount of importance. As with all of our *Expression* articles we hope you found this one of practical value and if you do have any feedback we would love to hear from you. In the next issue of "Expression" we will present the last of

the 1970 Eight Category System's topic which was the occipito-atlantal complex.
Until then, we remain:

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References: