

Things I Have Learned: The Short-Leg Dilemma

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During the course of an evaluation, it is common to note a relative shortening of one leg to the other. You can pick up almost any chiropractic publication and see ads marketing products to help you evaluate, measure and treat a short leg. You can even buy little gauges to measure the difference in leg length to help you prescribe the right size heel lift - whether or not that is even appropriate. Leg-length inequity has become a very controversial topic, as many either fail to recognize its significance or the possible causes.

The problem we now face is that the mere finding of a short leg causes many doctors and therapists to default to a single treatment option, such as a heel lift. As the chiropractic profession grows in respect and acceptance, we should not trivialize relevant biomechanical findings - they may often make the difference in defining a subluxation. Medical physicians, insurance companies, and attorneys may all be looking over our records at some point in time. It is critical that what is documented is both credible and understandable. If, during the course of your examination, you suspect that one of your patient's legs is shorter than the other, you must be able to validate that finding and rule out other more serious possibilities. It is important to recognize the different causes of a shortened leg, and what that finding may mean to that particular patient. Often the treatment for a true short leg is a corrective lift or surgery, while a functional short leg may be effectively treated with chiropractic. Clearly, the practitioner must be able to identify the different causes of the short-leg finding.

When a difference in leg length is suspected, the textbook protocol is to measure and compare the extremities. Anatomical length is measured from one fixed bony landmark to another. Leg length is measured from the lower ASIS to the top of the medial malleolus of the ankle, crossing the knee on the medial side. (Up to 1 cm difference is considered anatomically within normal limits.)¹ Unequal distances between these fixed points indicate that one lower extremity is shorter than the other. To determine where the discrepancy lies (tibia or femur), have the patient lie supine with his or her knees flexed to 90 degrees and the feet flat on the table. If one knee projects further anteriorly than the other, the femur of that extremity is longer. If one knee appears higher than the other, the tibia of that extremity is longer.² Femoral portion deficiency suggests congenital dislocation of the hip joint, while tibial deficiency suggests bony dysplasia. This finding is often referred to as Allis' Sign or Saleazzi's Sign.³ If there is any question of true leg-length discrepancy, further radiographic evaluation is required to define the inequity. The lower extremities may be viewed on a single radiograph (both legs from above the hips to below the feet); then measure the bones to compare. Such findings warrant referral to an orthopedic specialist for further evaluation and management.

It must be determined that there is no true leg-length discrepancy before you can test for an apparent discrepancy. Short-leg syndrome may be characterized as arising from structural, pathological, or functional etiologies. Functional causes refer to leg-length differences not attributed to an anatomical deficiency - including foot pronation, adduction or flexion deformity of the hip secondary to muscular

contraction, and pelvic and sacral subluxations. The majority of apparent leg-length discrepancy is due to pelvic torsion.⁴ Appropriate evaluation is necessary if you are going to document and treat the patient for a short-leg syndrome or a related pelvic torsion. It should be obvious that unless all of the possible causes of leg-length discrepancy are considered, a diagnosis will be reached either on historical dogma or ritual, rather than by applying the appropriate rules of differential diagnosis.⁵

During inspection, pelvic obliquity manifests itself as unleveling across the ASIS or PSIS while the patient is standing. If this is noted, have the patient lie supine with his or her legs in as neutral a position as possible, and take a measurement for the umbilicus or xiphisternum to the medial malleoli. An unequal measurement signifies an apparent leg-length discrepancy, particularly if the true leg-length measurements are equal.⁶

During the course of an examination, several simple maneuvers may be used to define the biomechanical root of the shortened leg. These are collectively referred to as the Derifield (*deer* - field) Maneuver. Have the patient lie prone on the table, and evaluate the relative leg length using the internal malleoli, calcaneus, or where the heel of the shoe joins the shoe as reference points. (The base of the heel is not a good reference, as this may not be even due to shoe wear.) The examiner will then ask the patient to turn his or her head to one side and then the other. With cervical rotation, the examiner may note that the leg discrepancy has now resolved or reversed, thus indicating that the leg imbalance is due to compensation for cervical dysfunction. The examiner may palpate the contralateral cervical spine for taut and tender fibers, and will often find C5 rotated posterior on that side. This finding is referred to as a Derifield Cervical Syndrome. (For example, if turning the head to the left causes the legs to be equal, you could note a positive left cervical syndrome.) The patient is then asked to return his or her head to midline/neutral. The knees are flexed to 90 degrees relative to the table and the examiner notes any changes in the short leg relative to the long. There are three possible findings at this time:

1. The short leg stays short. If there is an anatomical shortness in the tibia, and there are no pelvic involvements, the pivot points remain constant and the short leg will remain short.
2. The short leg gets shorter. If there is sacral involvement, the muscles of the thigh will tend to shorten the leg in appearance as it is flexed.
3. The short leg gets longer. When the ilium drops posterior and inferior, it pulls the femur up, thus bringing the knee on that side farther up the table. When the short leg is flexed to 90 degrees, it reaches the highest point on the arc traveled by the foot. However, since the long leg's pivot point is the knee, it is farther down the table, and it reaches its highest peak in the arc before the other side; it is actually going down the arc formed by the motion when it is "taken an equal distance." With the above in mind, we can see how a posterior-inferior ilium may cause a short leg to cross over and become longer.⁷ However, this does not mean that every time this test is positive, the patient has a PI ilium, you still have to pursue additional examination to document a subluxation.⁸

While the patient is in this position, it is also advantageous to drop the heels to the buttocks to see if one leg falls farther than the other. When noted, the heel that falls farther indicates posterior rotation of the sacrum on that side. This finding is noted as a positive Webster's Sign.

The practical problem with the above information is that the one finding quickly becomes the deciding factor in a diagnosis. Many chiropractic techniques have defined algorithms connecting specific examination findings to specific adjustive procedures. For example: "If the short leg stays short, adjust

with a particular maneuver; but if it becomes long, then you must adjust some other way." Rules such as this become overly simplistic and denigrate the art of chiropractic to a brainless therapy. Clinical pearls are a fantastic tool when applied with understanding, but the practitioner must always keep the big picture in mind as they follow through the course of the examination.⁹ What is outlined in a textbook is great foundation, but most patients have never read the textbook. Dogmatic dedication to a single technique system is of no clinical value if it does not serve the needs of the patient.

As professional members of the health care community, we are obligated to keep the big picture in mind. There are many other causes for the finding of a short leg, and we are responsible to define what is going on with that patient at that time. Beyond subluxation, there are possible traumatic and pathologic causes as well. Slipped femoral capital epiphysis (SFCE) is a serious orthopedic condition requiring radiographic evaluation and orthopedic surgical assessment.¹⁰ Scoliosis may cause torsion in the spine and pelvic imbalance. Soft-tissue congestion or adhesion may also contribute to both pelvic torsion and leg-length inequity.¹¹ Sometimes, the problem may be traced to a patient sitting on a fat wallet. If the short leg is caused by factors such as these, the issue won't be corrected with the best adjustment or the newest type of heel lift on the market - you can bet the patient will back with the same pain very soon.

So, what have I learned from all this? When a patient presents with a short leg, I need to think a little bit. The initial finding of short leg is an indicator of imbalance requiring further evaluation. First, I must rule out anatomic or pathologic causes, especially in the patient with lower back pain. Then, I may consider musculoskeletal causes. While there are many ways to evaluate a short leg, none of them is adequate to fully assess all the possible causes. Derfield is a great test, and may indicate the root problem, but it will not always tell me what is going on in the spine and pelvis. Other testing is reasonable and necessary.

As my instructor in diagnosis taught, you should have at least three positive orthopedic indicators before confirming a musculoskeletal diagnosis. Basing a diagnosis or treatment plan on the finding of one screening maneuver is below the standard of care for any practitioner. There is no quick shortcut in a good examination; if you find a leg-length discrepancy, take the time to fully evaluate the patient so that your diagnosis is correct and your treatment is appropriate. Your patient will thank you for your quality care.

References

1. Seidel, H.M., Ball, J.W., Dains, J.E., Benedict, G.W. *Mosby's Guide to Physical Examination*, 2nd ed. St. Louis, Missouri: Mosby, 1991.
2. Hoppenfeld, S. *Physical Examination of the Spine and Extremities*. San Mateo, CA: Appleton & Lange, 1976.
3. Evans, R.C. *Illustrated Essentials in Orthopedic Physical Assessment*. St. Louis, Missouri: Mosby, 1994.
4. Ibid.
5. Innes, K. Leg length discrepancy, its causes, and its importance. *Dynamic Chiropractic*, Oct. 7, 1996; vol. 14, issue 21.
6. Hoppenfeld, S. *Physical Examination of the Spine and Extremities* San Mateo, CA: Appleton & Lange, 1976.
7. Bovee, M.L. *The Essentials of the Orthopedic & Neurological Examination*. Davenport, IA: Palmer College, 1977.

8. Kurnik, J.D. Let's get something straight! *Dynamic Chiropractic*, May 5, 2003; vol. 21, issue 10.
9. Cooperstein, R. Derifield and me. *Dynamic Chiropractic*, June 30, 2003; vol. 21, issue 14.
10. Yochum, T.R., Barry, M.S. Short leg syndrome: a hidden cause. *Success Express*; vol 18, no. 4.
11. Laws, S., Franklin, D.J. *The Receptor-Tonus Technique* (Available from: Holistic Health Enhancement, 1210 N. 24th St., Quincy, IL 62301).

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FEBRUARY 2005