

LIMB LENGTH DISCREPANCY

by Luke D. Sinclair, BHSc(Pod), M.A.P.A.

Limb length discrepancy (LLD) is a condition whereby a difference exists between the lengths of both legs. A difference of greater than 1cm affects normal body alignment affecting the spine, sacroiliac and hip joints as well as the foot. (Merriman and Tollafield, 1995)

Classification:

Limb length discrepancy can be classified as anatomical or physiological:

Anatomical: describes a true constant anatomical difference in the lengths of the femurs or tibia/fibula. It is found in both neutral calcaneal stance position (NCSP) and relaxed calcaneal stance position (RCSP). This can be due to congenital factors, disease, trauma and surgical treatment. The height of the femoral heads on x-ray is diagnostic. (Lorimer, French and West, 1997)

Physiological: describes an apparent, functional difference. The limbs are actually the same length but because of the alignment they are functionally different. This can be due to scoliosis, muscle imbalance or abnormal biomechanics of the foot. (Lorimer, French and West, 1997)

In order to effectively manage this condition it is necessary to identify not only the difference in length between the two limbs but also differentiate between anatomical and physiological discrepancy prior to commencing treatment. (Merriman and Tollafield, 1995)

Clinical Features:

Clinically it is necessary to perform a thorough bio-mechanical assessment in order to evaluate the discrepancy. This examination should include the following:

- * Measure the limbs and limb segments
- * Comparison of joint range and quality of motion
- * Evaluate compensation

Clinical measurements to determine and quantify the discrepancy can be direct or indirect. The more common direct method (Fig. 1) involves the use of a tape measure and relies on palpation of bony landmarks to determine the distance from the ASIS to the medial malleolus. (Rudolph, 1991) The indirect method involves palpation of the iliac crests in a standing position. The level of the hands indicate the discrepancy. Blocks are then placed under the shorter leg until the hands are level. The blocks are then measured giving the difference. (Blake and Ferguson, 1992) An error of up to 10% should be expected with clinical measurements due to palpation, alignment and measuring. (Merriman and Tollafield, 1995). If surgical intervention is considered then x-rays will be required to provide a more accurate measure of the discrepancy.

A person who has had a discrepancy for quite some time will have adapted and compensated by altering their body posture.



VASYLI

cont'd overleaf



Limb Length Discrepancy

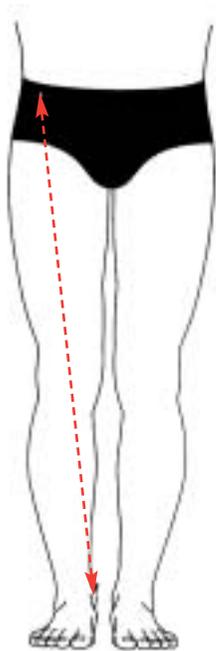


Figure 1: Direct method of measuring limb length. (Lorimer, French and West, 1997)

Merriman and Tollafield (1995) state that the presence of a limb length discrepancy can be observed during gait analysis by the following:

- * Shoulder tilt to one side
- * Unequal arm swing
- * Pelvic tilt
- * Foot supinated and plantarflexed on the short side
- * Foot pronated on the long side
- * Knee flexed on the long side

Whilst Blake and Ferguson (1992) state that the most common compensation for limb length discrepancy in posture is a functional scoliosis.

Furthermore, due to the compensation, the shorter leg may be prone to stress fractures due to the non-shock absorbing nature of the supinated foot. Likewise the long leg may be prone to knee pain and medial structure strain due to the internal rotation of the tibia due to the pronation. (Lorimer, French and West, 1997)

Treatment

The treatment of limb length discrepancy must consider the individual patient.

The three general treatment options are:

- * Accept and accommodate
- * Shorten the longer limb
- * Lengthen the shorter limb

Anatomical LLD is effectively treated by the use of a simple heel lift. For discrepancies greater than 1cm it is suggested that full length lifts be added to the sole of the shoe to prevent achilles contracture. Furthermore if larger lifts are required, adding heights in small increments is advised. (Blake and Ferguson, 1992) Physiological LLD may require an orthotic in conjunction to heel lifts if the aetiology is related to poor foot mechanics.

It may also be of benefit to incorporate physical therapy to stretch and strengthen the muscles, thus enabling the body to better adapt to the realigned position.

Conclusion

Limb length discrepancy may be asymptomatic or as previously mentioned can affect the spine, sacroiliac and hip joints and the foot. For this reason it is important to include a limb length measurement into a standard biomechanical assessment in all cases involving such symptoms. If a LLD is evident it should be treated accordingly based on the individual presenting patient.

References:

1. Blake, R.L. and Ferguson, H. (1992) *Limb Length Discrepancies*. JAPMA 82(1):33-8
2. Lorimer, D.L., French, G. and West, S. (1997) *Neale's Common Foot Disorders: Diagnosis and Management*. Churchill Livingstone, Singapore
3. Merriman, L.M. and Tollafield, D.R. (1995) *Assessment of the Lower Limb*. Churchill Livingstone, Singapore
4. Rudolph, A.M. (1991) *Rudolph's Pediatrics*. Appleton & Lange. Connecticut

