LIMB LENGTH INEQUALITY

Common lawsuits in the US

Normal: 40% incidence less than 1.5 cm and 20% more than 1.5 cm

1 in 1000 is more than 2 cm

Causes

1. Malposition of stem or cup is the main cause: Level of cup fixation

2. Neck resection: length of femoral neck.

3. The valgus position of the stem increases the limb length

Problems with lengthening

Sciatic nerve

Stiffness

Low back ache

Impaired abductor function

?increased dislocation

Loosening due to increased supero-lateral acetabular stress

Gait analysis

Altered biomechanics is seen when discrepancy is more than 2 cm.
There is increased physiological work and increased oxygen consumption and minute ventilation.
There is increased Quadriceps activity in the longer leg and increased plantar flexion activity on the contralateral leg.

Gurney evaluated the effects of an artificial limb-length discrepancy

With 2 to 4 cm	increase in oxygen consumption.
With 3 and 4 cm	Increase in heart rate and quadriceps activity in the longer limb.
With a 4-cm	Increase in plantar flexor activity in the shorter limb.

Assessment

Preoperative Planning

1. It is useful to ask patients specifically whether their legs feel equal and whether they use a shoe lift.

2. A history of scoliosis, poliomyelitis, developmental dysplasia of the hip, degenerative disk disease of the lumbar or thoracic spine, or lumbar surgery, including spinal fusion, is important

Physical Examination

An abduction, adduction, or flexion contracture should be assessed and quantified because of the potential influence on perceived length.

A flexion contracture can lead to overestimating shortening, and an abduction contracture can increase perceived length.

Next, the pelvis should be leveled by placing a series of blocks under the shorter limb. Finally, the true and apparent limb lengths are measured.

The apparent leg length can be measured from the umbilicus to the medial malleolus. This technique provides a simple measure of the functional length; however, it does not assess the effect of soft-tissue contractures and pelvic obliquity. This measurement also can be influenced by the position of the limb and the pelvis.

The true leg length is measured from the anterior superior iliac spine to the medial malleolus. This is arguably the most reliable clinical measure of limb length; however, the technique requires precise identification of landmarks, which may be difficult, particularly in obese individuals. True leg-length measurement also is subject to variation because of changes in the position of limbs and pelvis and because of soft-tissue contractures.

The physical examination should include an assessment of spinal deformity and iliac crest symmetry. True leg-length differences may result in a compensatory scoliosis, which may be resolved by placing an appropriate lift beneath the shorter limb. Conversely, when contractures of the hip and knee cause a fixed pelvic obliquity, placing a lift beneath the shorter limb will not resolve the pelvic obliquity. Balancing by using wooden blocks provides easy assessment of functional leg- length discrepancy in a reproducible fashion; however, this method does not adequately separate the effects of soft-tissue contractures and fixed pelvic obliquity.

Of particular concern is the patient who presents with a leg-length discrepancy in which one leg is perceived to be longer than the other although the actual leg lengths are equal. Common causes of such a perceived "long leg" include scoliosis, fixed pelvic tilt, and contralateral leg deformity. Less commonly seen is an abduction contracture in which the true leg lengths are equal even though the apparent leg length is longer on the side of the contracture.

Patient Education and Informed Consent
Reassure the patient that most inequalities have little importance.

During the preoperative discussion, the surgeon should establish the expectation that equal leg lengths is not a guarantee after surgery.

However, studies have reported that, even after appropriate patient education was provided and consent given, approximately one half of patients with lengthened legs did not recall that this possibility had been communicated to them.

Additionally, patients whose affected side is longer preoperatively should be warned that further lengthening may occur as a result of surgery and that deliberate shortening may not be feasible.

Radiographic Assessment
Templating is useful for predicting limb lengths.

Defining Hip centre

Intra-operative

A variety of measuring calipers has been described in which one end articulates with a pin, pins, or spikes anchored into the pelvis, while a stylus at the other end references off a mark on the greater trochanter.

The accuracy of all of the methods that measure from pins anchored in the pelvis to a point on the greater trochanter may be affected by the inherent variability of the leg position when measurements are made.

Charnley Shunk test: Telescoping and soft tissue tension. Should be less than 1 cm

Check the level of knee with the Contralateral leg

The knee should be able to be flexed to 90® with hips in neutral position.

Treatment

1. Informed consent. Explain about high chance of 1 cm limb length discrepancy and need for heel raise

2. Most do not need any treatment: It is desirable to delay the use of a lift for approximately 6 months postoperatively to determine whether the perceived leg-length discrepancy will resolve. Some may need contra-lateral shoe raise

4. Adjust when opposite hip replacement

5. Rarely revision is required: include severe hip or back pain, hip instability, paresthesias, and foot drop

When shortening is done, it may be necessary either to exchange the femoral component for one with an increased offset, use a larger femoral head, or perform a trochanteric osteotomy to achieve stability. A further option is use of a constrained acetabular liner.

In the future, it is likely that advances in technology will lead to greater precision and accuracy in the management of leg length. With the advent of navigation/image-guided surgery technologies, correction of limb-length inequality may be dramatically enhanced.

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