



The Effect of Weak Hip Abduction

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In order to discuss the role of hip abduction in running, we need to re-examine the gait cycle. The gait cycle is said to have two phases:

1. Stance Phase 2. Swing Phase

During these phases muscles undergo phasic contraction. Each phase of the gait cycle requires a different group of muscles to contract. If the contractions of individual muscles last too long and continue into the next phase then gait will be altered. Similarly if the contraction does not last long enough there will be alterations in the gait cycle (1) and (2). There are two major types of muscles involved. Those involved in the stabilisation of the trunk and limb, and those that provide power for forward movement. The stabilising muscles use mainly Type 1 "endurance" muscle fibre. If all muscles are in perfect place, then great savings are made in the energy costs both metabolically and mechanically. As locomotion progresses the muscle action becomes mainly eccentric which is a more energy efficient form of contraction.

In order to study the effects of weak hip abduction I would like to break up the cycle of the stance phase into four components:

- 1. Initial Contact:** Position foot, begins decelerating.
- 2. Loading Response:** Accepts weight, stabilises pelvis, decelerates mass.
- 3. Mid Stance:** Stabilises knee, preserves momentum
- 4. Terminal Stance:** Accelerates mass.

Hip abductors are required maximally during the loading response. Their role is to stabilise the pelvis and the hip joint. If they are unable to maintain their contraction then the iliac crest on the stance side tends to drop, forcing the femur into an internally rotated position. This then causes a valgus stress on the knee and the tibia internally rotates to compensate.

The resultant of all these above factors is that the foot over-pronates to help accommodate. At the point of loading response the pelvis should rotate lightly forward, however both iliac crests should remain the same height. This cannot be assessed by looking at the patient standing. Video tape analysis of the patient walking and running (at least from waist to foot) - should enable the clinician to observe the weakness at the hip.

Although the above information has been gathered on walking subjects - stability of trunk and pelvis becomes even more critical in running and sprinting. If the patient is not stabilised then the prime movers are unable to generate speed and the running action becomes more biomechanically inefficient. In sprinting the stance phase is very short, with foot fall actually occurring on the forefoot. This requires the lower trunk and pelvis to work their stabilisers much harder. It therefore follows that if there is a problem with walking it will compound in sprinting.

If this is present then orthotics may help a little to correct the hip weakness by refusing to allow the



foot to accommodate and thereby forcing a change. However, specific functional strengthening exercises are usually required and then once strength has been gained a functional program to change walking and the running gait needs to be introduced. Neglect of functional training will lead to a poor result or development of other overuse problems related to the faulty biomechanics. Truncal muscles also have a role to play in normal locomotion but are beyond the scope of this paper. #

