



Gait

When we refer to gait, we simply mean a person's manner of walking. In *Physical Therapy Management of Lower Extremity Amputations* by Gertrude Mensch and Patricia M. Ellis, it is indicated that about 40 per cent of a person's gait cycle is when the leg is in swing phase or when the foot is off the floor or ground and swinging through, while about 60 per cent of the gait cycle is in stance phase when the foot is in contact with the floor or ground. Over the years, leg amputees have been told time and time again by doctors, physical therapists and prosthetists that they have to work at walking properly, or having a "good gait." Many leg amputees have acquired bad walking habits that are, once developed, difficult to break. Leg amputees, particularly those with higher levels of amputation, will often have some degree of a limp.

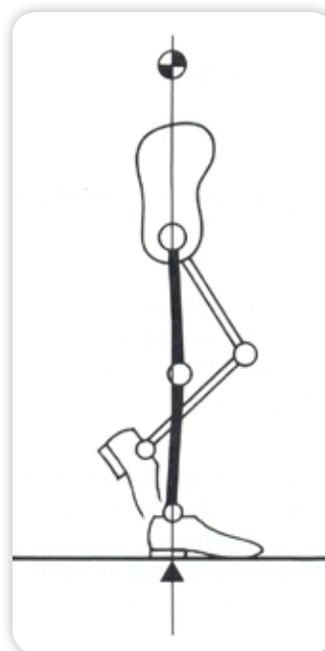
When they limp, they are actually bending their upper bodies sideways in order to put their weight over the artificial leg. In reality, their pelvis should do this work; it naturally moves sideways to keep the body aligned when walking. When somebody becomes a leg amputee, the natural mechanics of the body are thrown out of whack, so they have to learn to rely on the pelvis to do its job, and not bend or limp to the side instead, which is not easy.

Some other gait deviations that are seen in leg amputees are:

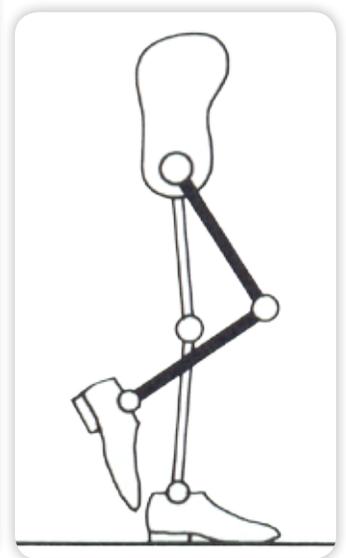
- **Abducted gait** – the prosthetic leg is swung out to the side of the body and may be caused by poor balance, pinching of the residual limb by the inside socket brim or fear of the prosthetic knee buckling.

- **Hip hiking** – keeping the prosthetic knee stiff and hiking up on the toes of the sound foot to ensure the prosthetic foot clears the ground, it may be caused by an inability to manage the weight of the prosthesis, not using the knee properly, unequal step lengths or problems like osteoarthritis of the hip.
- **Stiff-legged walking** – caused by amputees with short residual limbs keeping the knee stiff due to poor leverage or a fear of falling.
- **Uneven step length** – caused when amputees take a longer step with the prosthesis than the sound limb resulting in less time bearing weight on the prosthesis, it may be caused from lack of perception, fear of falling or residual limb pain.

The Stance Phase: midstance



The Swing Phase: midswing



Why is it so important to walk well – to have good gait? The answer is simple: walking well actually minimizes the additional stresses put on the body. Amputees automatically use more energy to walk. With poor gait (e.g., limp), the amputee puts stress on the residual limb, the sound limb and other body parts like the trunk and back, thus using more energy to walk because he/she has to work harder to bring the body back into balance and alignment. The article “Understanding Gait Deviations” in *O&P Business News* (December 2006) states “Many lower limb amputees take on pathological gait patterns where certain movement deviations substitute for those that the amputee cannot perform. Jacqueline Perry, MD, said in her book *Gait Analysis: Normal and Pathological Function*, these compensations cause energy cost to increase and often compromise function.

To enable the pelvis to do its job in gait, amputees need to build up the muscles of the buttocks and hips with specific exercises. Initially, the idea of an exercise program may seem daunting, but just a little effort will result in a better gait down the road. Paying close attention to the advice of physical therapists and prosthetists in this area will facilitate proper walking techniques, and reduce the likelihood of poor walking habits. A comfortably fitting socket, a properly aligned artificial leg and proper training are, of course, imperative. A suggestion to help develop a good gait, or to break bad habits, is to walk in front of a mirror. You will see how it feels when you do walk properly and you can then duplicate it on a regular basis. Or, you can videotape yourself walking to determine how you are doing. Your physical therapist, prosthetist and others on your “team” can offer advice and suggestions on exercises and any gait training programs that might be available to you. Always, of course, consult your doctor before starting a new exercise program.

Back Problems (Scoliosis)

Leg amputees should have their backs regularly checked by their doctors, as problems like scoliosis can develop due to the continued imbalance of walking patterns like limping. It is also important that the prosthetist check the height of the artificial limb to make sure it is correct, as wearing a leg that is too high or too short can cause back and spine problems that over time might require extensive therapy to remedy. Scoliosis can lead to discomfort, pain and other problems, so it is important for your doctor to monitor your back and to deal with any problems that may arise. Generally, the back muscles work harder to enable the amputee to use an artificial limb or to compensate for a missing limb. Therefore, simple back exercises can improve an amputee’s comfort and ability to function, and prevent future problems. Again, you should consult your doctor before starting a new exercise program.