The risk of developing osteoarthritis (OA) of the knee is 17 times higher for trans-tibial (below-knee) amputees than it is for non-disabled people. This shocking statistic regarding the sound leg stems mainly from two key factors: asymmetrical gait and increased impact.

Asymmetrical gait and greater impact are the two key factors behind this increased risk.

Trans-tibial amputees are known to load their sound limb to a greater extent than their prosthetic limb during gait, and the differences in two limbs in terms of knee pain and degeneration suggests that mechanical stress is a contributory factor. Minor compensatory movements, as well as asymmetrical gait, can increase stress on the sound limb and potentially predispose the long-term prosthetic user to premature degenerative arthritis.

The increased risk of hip and knee OA has prompted researchers to investigate the condition among amputees. This type of comorbidity often goes hand-in-hand with osteoarthritis.

Comparative studies from 1993 and 2012 show that the prevalence of OA in France, for example, had risen by 54% and that the direct medical costs by 56% in the 9 years between 2000 and 2006, and that rate continues to rise. The risk of total knee replacement has increased to $514 million in 2010, a rise of 66% over the preceding decade. OA accounted for 100% of OA’s due to musculoskeletal conditions.

In the UK, the rate of total knee replacement increased by 15% between 2000 and 2004, and that rate continues to rise. The cost of a total knee replacement in the US is as significant as $4,000, and needs revision after 10 years. A patient suffering from knee OA can expect to require health care services at a cost of about $5,100 per year. But society pays even more due to indirect costs (such as loss of productivity). During the years leading up to the procedure patients and society can expect to lose a total of $3,400 per year due to pain.

The choice of prosthetic foot can influence impact levels on the sound side. More specifically, the Flex-Foot design has been shown to reduce ground reaction forces (GRF) on the sound side, unlike standard foot designs, which increase significantly both impact and knee instability.

The new Pro-Flex foot (from the makers of Flex-Foot) exhibits exceptional behavior in terms of roll over. Its smooth and consistent progression towards terminal stance terminates with a powerful push-off. This unprecedented push-off power pushes the body’s center of pressure is less elevated on the prosthetic side at the time of stepping forward onto the sound side. The result is a smoother, more symmetrical gait and reduced impact or load on the sound side—the opposite of what is observed with standard mechanical feet.

Compared to Tran-Flex™, the current gold standard energy return foot, Pro-Flex almost double the ankle motion when walking on level ground and ramps, and its push-off power is about twice as high. The roll over progression of prosthetic feet typically slows down in milisecond, while Pro-Flex allows the user to progress over the mid-stance, utilizing the momentum to generate power. This type of gait is more efficient, reducing the drop-off effect and loading on the sound side. General feel at toe-off, as well as vertical ground reaction forces, are significantly reduced. Both are important in countering the development of osteoarthritis.

In addition to increased pain and diminished mobility for the individual, the financial costs associated with knee OA have risen by 54% over the last 10 years, and are predicted to rise by a further 55% in the next two decades. Responding to this challenge, Össur has developed Pro-Flex, the world’s first prosthetic foot to provide proven protection of the sound side. By enhancing gait symmetry and reducing peak impact forces and knee key factors in reducing the risk of osteoarthritis.

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