

Can the adverse complications of foot drop be prevented by an endoprosthesis: design and development of a prototype device

Abstract

Foot drop is a very old problem since Jacob from the bible was limping when he was wrestling with the angels. Foot drop occurs very often, and it is a very common condition in trauma, after surgery, and neurological diseases.

The aim of this project is to identify an endo-prosthesis and test it bio-mechanically and bio-medically in order to resolve the problem.

This endo-prosthesis must improve the quality of life for patients suffering from foot drop due to the injury to the common peroneal nerve. The device that must be created should be small and surgically will be attached to the muscle internally and work as if the muscles and nerve were intact. The device would be tested outside the human body. It is important to throw light on that the device should be made of a material that is accepted by the human body and should have a stiffness that is close to the weight of the foot to ensure a normal motion. The intent of this bio-mechanical device is to help patients suffering from foot drop to restore normal motion.

An endo-prosthesis that is implanted in the foot might be the solution to foot drop disease. The endo-prosthesis has a major role to do the opposite movement and bring the foot into the dorsiflexion position and insure the plantar and lateral movement of the foot. Therefore, the device must be small to be implanted under the skin and adaptable to human tissue to avoid degradation and rejection.

Keywords: Achilles' tendon, active force, AFO, anterior tibialis tendon, common peroneal nerve, dorsal flexion, Endo-prosthesis, foot ligaments, passive force, plantar flexion, posterior tibialis tendon.