Osseointegration gives amputees more freedom

In a first for South Africa, a 28-year-old patient with a previous trans-femoral amputation has received a successful osseointegration prosthetic limb implant.

Osseointegration uses a skeletally integrated titanium implant that is connected through an opening in the stump to an external prosthetic limb. The procedure was originally used in bone- and joint-replacement surgery and is suitable for both above- and below-the-knee amputees.

The surgery was performed by Professor Nando Ferreira, an orthopaedic surgeon at Stellenbosch University, as the lead surgeon. He was assisted by Dr Gerhard Pienaar, an orthopaedic surgeon at Mediclinic Stellenbosch. They were joined by Dr Munjed Al Muderis, an orthopaedic surgeon from Sydney, Australia, who has pioneered the technique and the device itself. Ferreira travelled to Sydney in 2018 to learn the procedure, and he is currently the only surgeon in South Africa who is certified to use the implant

Addresses limitations of traditional prosthesis

“This is a revolutionary technology,” says Muderis. “It changes the whole philosophy of how to treat and manage someone with an amputated limb. Before we would use a bucket prosthesis that encases the residual limb. With this procedure, we can directly attach the prosthetic limb to the skeleton. This reorganises the muscles and nerves to operate the limb.”

This procedure addresses a number of limitations of the traditional prosthesis approach, says Muderis. “The vast majority of amputee patients will at some stage have trouble fitting a bucket or socket prosthesis. They will struggle with skin issues, as the contact can cause friction, heat and chafing, and over time lead to blisters and infections, as well as mobility and fit. The human body changes as time goes by, and a bucket prosthesis that fitted perfectly in the morning will often not suffice by the afternoon or evening, as the residual limb swells in response to weather and pressure conditions.”

He says an osseointegration prosthetic limb implant can also help amputee patients regain their sense of confidence. “With a socket prosthesis, there is a lack of feedback from the ground. So when you walk, you walk as if you are on a hovermat. They do not feel the ground. So they will need to look at the floor all the time as they move, and are unable to walk in dark rooms. With this technology, they get 100% feedback from the ground.”

It also addresses a number of long-term issues. “In a traditional socket prosthesis, both the femur and hip joint are not loaded naturally, which results in degeneration and atrophy of the bone and can lead to osteoporosis," says Muderis.

Modelled on anatomy

The osseointegration prosthetic limb is modelled on the anatomy of the human body. “This prosthetic implant takes the load back to the femur and the hip joint when walking. This allows for direct contact to the ground, which provides greater stability and more control, and minimises energy exerted.”

During the procedure, surgeons refashion the muscles around the implant, says Muderis, using a technique known as myodesis. They will then implant the device into the bone, which over time will allow the bone to grow into the implant. This has the effect of allowing the muscles around the bone to operate the limb.

Only 750 cases of this surgery have been performed globally in the past 10 years. This procedure is still seen as revolutionary and only performed on a relatively regular basis in Sydney, Australia. Other centres in England, the Netherlands and Sweden are performing these procedures, albeit in limited numbers.

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Source: Mediclinic Southern Africa