Osseointegration and Bone Anchored Prostheses

What is Osseointegration and Integrated Limb Prosthesis?

Osseointegration refers to a direct structural and functional connection between, living bone and the surface of a load-carrying implant. An implant is considered to be osseo-integrated when the bone has grown onto and attached itself to the three dimensional surface of the implant.

Once the implant has is secure in the bone, the prosthesis can be directly connected to it, making the need for a socket redundant.

Osseointegration is performed on various levels of amputation on both the upper and lower limbs.

Where can you have surgery?

Osseointegration surgery is currently available privately in Germany, Sweden, Netherlands and Australia. It is not generally available within the UK.

At Pace Rehabilitation we can help you prepare for surgery and provide your post-surgical follow up care.

Our clinicians have connections and have previously worked with the surgical and local rehabilitation teams overseas.

Initially, you will need to be screened by the team performing the operation. At that time, you will find out more about the actual process. If you then decide you would like to go through the process and have been found to be a suitable candidate, surgery will be scheduled and rehabilitation planned. During the operation, the surgeon may shorten your bone a little and remove excessive skin and soft tissue. A permanent implant is inserted into your bone and a shorter abutment will protrude permanently through your skin. Your surgeon will determine whether this is done over one or two operations.

For lower limb amputation levels, you may experience some pain in your muscles and joints when you start walking. This will most likely settle down unless there is some underlying pathology causing it.

The stoma

The opening in your skin and soft tissues, where the abutment protrudes, is known as the stoma.

It takes a few weeks for primary healing to take place. It will weep a lot as it moves over the abutment and you will need to build up your activity levels gradually.

Pain and weeping wound secretions dictate the amount of loading and walking you can initially do.

It may take months for the skin edges to heal. In some types of surgery, depending on the surgical technique, they do not seal on the abutment but the skin slides along the abutment as you move.

Stoma care

Usually you will require protective gauze and you may require a soft thin cap over the stoma at all times. Keep the gauze next to your skin and not around the abutment, as this results in the gauze going inside the stoma at times, which can irritate the tissues. Use individual sterile gauze squares, cut right shape.

Silver nitrate may be recommended on areas of skin over granulation, otherwise excessive skin will need surgical refashioning. Your surgical team and practise nurse will advise you about this.

You can use a soft shaving brush in the shower to clean the stoma, use a normal skin wash solution. Irrigate gently around skin with shower head but not into stoma.

No alcoholic solutions are required.

If you suffer from ingrowing hairs or inflamed hair follicles around the stoma, laser hair removal treatment is recommended for an area of 2cm circumference.

Prosthetic issues

Above knee prostheses

A microprocessor controlled prosthetic knee (MPK) is recommended for use following above the knee osseointegration surgery. A physiotherapist will teach you how this works if you have not used one before.

Additional adaptors may be required for leg amputees in order to align the prosthetic limbs to maximise your upright posture and hip position.

Physiotherapists will show you how to work on improving your muscle range and strength.

Abutment screws

Full loading of the abutment over the first 3 months tends to loosen the screws initially and these will need inspecting and tightening regularly by your prosthetist.

Controlling this screw movement is very important. Screws may need replacing at certain intervals following surgery. This will be explained to you by your surgical team.

Connectors

The connectors are the part that attach your prosthesis to the abutment. There are different types, and designs may continue to evolve as this technology is currently developing.

The prosthetist will supply you with any tools if required, which you will need to make 'hand tight' to secure your prosthesis.

Connection adapters vary according to the technique and country where surgery is performed.

Warranties

Your prosthetist will advise you about the warranty for prosthetic devices used.

Connection adapters will be provided with a warranty of 2-3 years depending on type. Additional adapters or replacement adapters required after this period will incur additional expense.

Cosmesis

It is difficult to make a full cosmetic cover for the prosthesis due to daily secretions from your stoma or wound site. There is a high infection risk with the foam contamination. A cosmesis can cover the lower portion of your prosthesis if required.

Rehabilitation

Before surgery

It is useful to have physiotherapy before your surgery, to start the appropriate exercises whilst you are not walking. The physiotherapist can also ensure that you have safe crutches or wheelchair for the period after your surgery when you are unable to wear the prosthesis.

After surgery, for lower limb amputations, when you are first allowed to walk, you will initially need to use 2 elbow crutches, for comfort and to reduce falls. After approximately one week, you can progress to one crutch. Continue on one elbow crutch for up to 3 months, to reduce the risk of falls and to help with any hip or soft tissue discomfort. Reliance on elbow crutches is often dictated by soft tissue pain and muscle pain. Your prosthetist and physiotherapist will guide you about progressing with walking aids.

It is useful to continue to have physiotherapy to retrain your muscles to walk without a socket and to maximise your walking pattern and function.

Current expectations for lower limb amputation levels:

Two stage surgery - 3 months after second stage surgery, you should be walking and fully weight bearing up to 8 hours a day. By 12 months, you should be walking unaided all the time.

One stage surgery – It is likely that you will be walking with aids 2 weeks following surgery. By 3 months, you should be walking with full weight bearing up to 8 hours a day.

Please be aware that some techniques have a longer period between first and second stage surgery. Rehabilitation recommendations may also vary according to the type of procedure carried out. The Swedish approach currently takes between 12 and 18 months.

Functional issues

Osseointegration and bone anchored prostheses should allow you the freedom of movement and comfort of wearing clothes and sitting, which are currently difficult in some conventional prosthetic sockets.

Falls are to be avoided, especially in the first 12 months. The main reason MPK knees are recommended is because of their enhanced safety features when compared to non-microprocessor controlled designs.

Climbing stairs using the function available with the Genium MPK knee should be tried after 6 months.

Activity in public swimming pools and the sea can be carried out. Your surgeon will provide you with their recommendations.

Getting sand near your stoma is not recommended, so try not to kneel or fall on the beach.

Running is generally not recommended for lower limb amputation levels. Your surgeon will provide you with their recommendations.

Other considerations and ongoing costs

Charges will apply when you attend to see your prosthetist for adjustments and check-ups.

There may be a requirement for connection adapter changes. Significant costs can apply for this. Please discuss with your prosthetist.

Physiotherapy in the private sector is charged at an hourly rate.

You may need to return to your surgeon for check-ups or if complications arise.

Useful information

http://www.amputeeimplantdevices.com/

There are various video clips on You Tube of individuals who have undergone osseointegration surgery.

There are also amputation discussion forums available online.