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Osseointegration insights

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Osseointegration

Artlimb.com is a non-profit, independent project dedicated to sharing knowledge and discussing information about artificial limbs, and in this article we explain Osseointegration in simple words.

The general idea

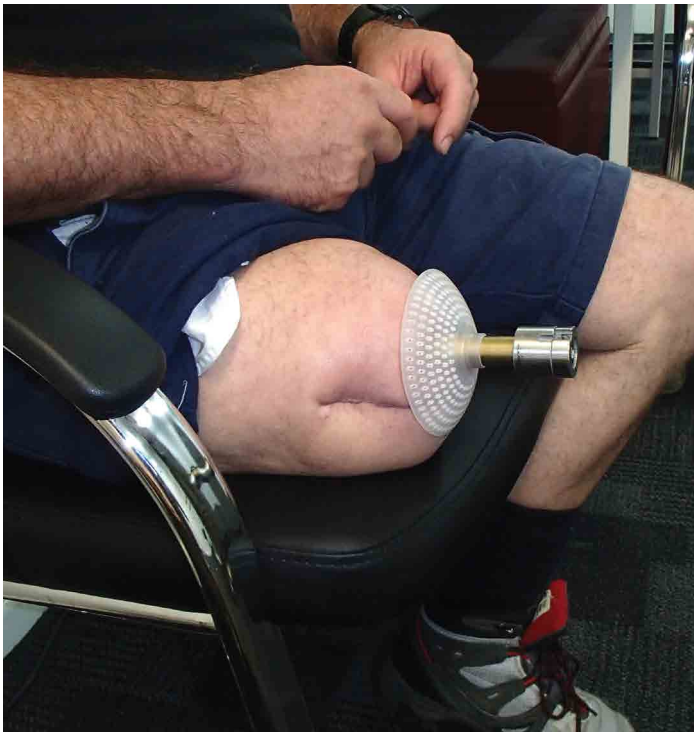
Osseointegration is a direct structural and functional connection between living bone and the surface of a load carrying implant. This implant is inserted into the bone during a surgical operation.

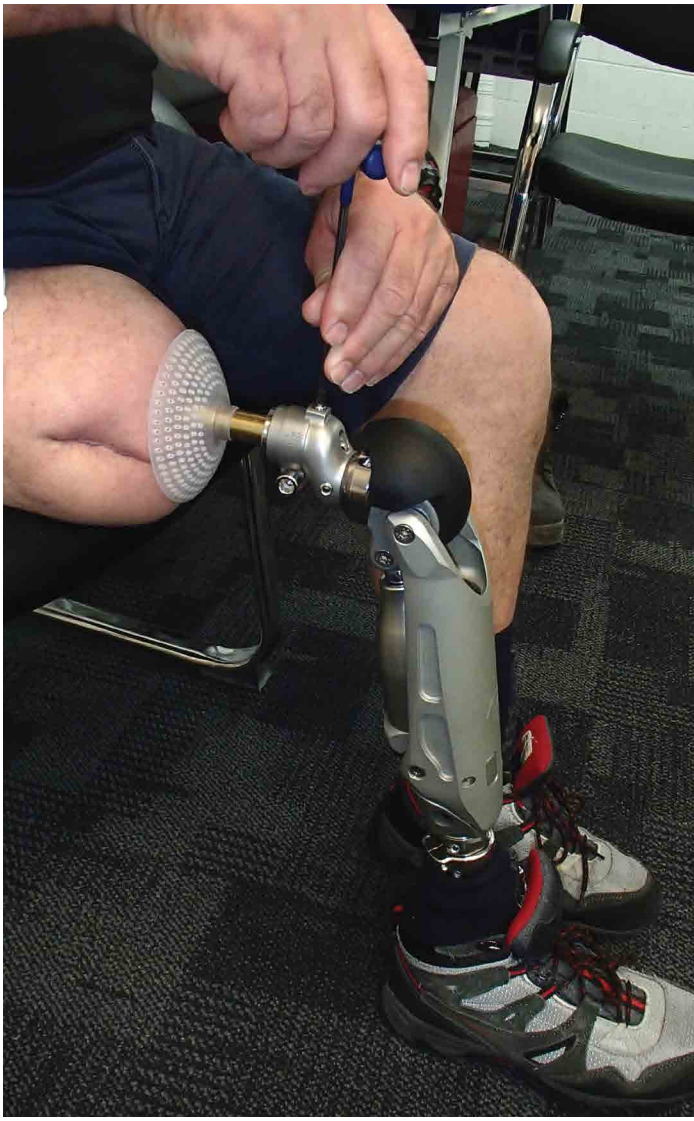
In simple words, it is a metal rod which has a very reliable direct connection with the bone. Over the recovery period, bone grows into the implant increasing the strength and reliability of the connection. Once this connection is reliable enough to load through, a prosthesis can be designed and fitted to the implant by your prosthetist. In a traditional socket prosthesis, the artificial limb uses the surface of the stump as a connection. This connection can be very firm and controlled but there will still be some movement between the underlying skeleton and the prosthetic socket.

You can experience this by gripping your arm and turning your wrist. No matter how hard you grip, your bones will still move under the skin and muscle.

An osseointegrated prosthesis has a direct connection to the skeleton, which means that there is no movement between the prosthesis and the bone. This direct connection allows the amputee greater control over the prosthetic limb while providing a very simple and reliable fixation.

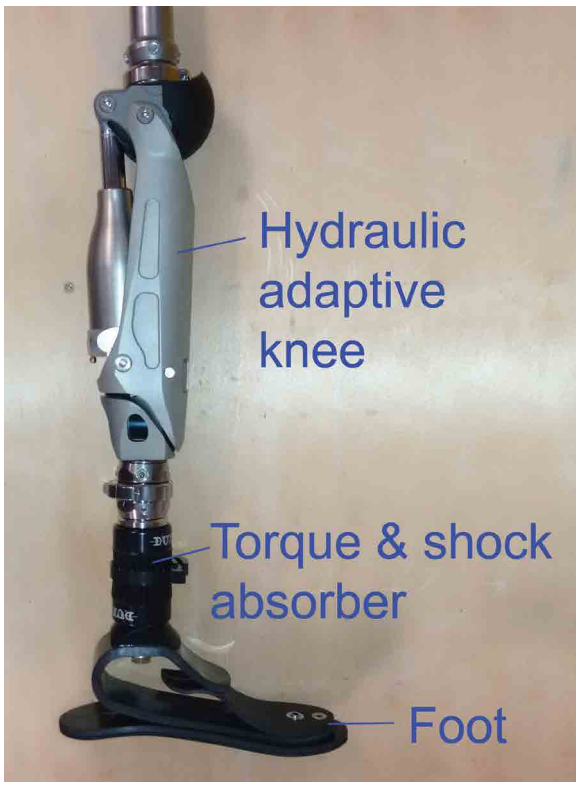
Due to this direct connection, a prosthetic socket is not required. By removing the socket, the skin and soft tissues are not subjected to the traditional forces experienced in a socket prosthesis. As a result of this, the skin has a much lower risk of getting rubbed or over pressed by the prosthetic socket. With the skin uncovered, there are also less issues with sweat retention and overheating of the limb. An additional benefit is that to put on the prosthesis, the amputee simply needs to clip the limb onto the metal connector that sticks out through the skin.





Without the socket, prosthetic knee units are no longer restricted, allowing the amputee greater range of motion and improved sitting/kneeling comfort.

Functional differences



When walking on a prosthetic limb, there are a lot of forces acting through the prosthesis. In a socket prosthesis, all of these forces are partially absorbed by the soft tissue of the stump. This dulls the sensation of what surface is being walked on and how the mechanical parts of the prosthesis are working. In an osseointegrated prosthesis, the direct connection to the bone heightens these sensations which can be uncomfortable if the incorrect componentry is used.

The most common forces that can cause discomfort and need to be accommodated for are vertical shock, rotation and, in above knee patients, terminal impact (caused by the prosthetic knee). To compensate for vertical shock and rotation, shock and torque absorbing adapters can be installed. Additionally, an appropriately designed modern foot can be used to further reduce these forces. Terminal impact is when the knee comes to a sudden stop with a visible and perceivable impact when it fully straightens as it swings through. To prevent uncomfortable terminal impact sensations, an appropriate knee unit with a hydraulic control specifically designed to prevent this impact is required. If the forces acting on the prostheses get excessively high and potentially dangerous for the amputee, there is usually a safety device installed in the prostheses that will disconnect it from the body and prevent serious injury.

Points to consider

When deciding if osseointegration is suitable or not, there are several considerations to keep in mind:

- Osseointegration is a surgical operation and it is important to discuss the risks with the surgical team.
- As there is a metal abutment protruding through the skin, there will be a permanent stoma on the stump. Because of this opening between the outside environment and your stump, a special cleaning regime may be required to ensure proper hygiene of the stoma.
- Currently osseointegration is expensive. The specific cost and funding options are constantly changing and vary depending on individual cases.

Osseointegration is a very modern approach to prosthetics and has shown rapid development over a short period of time. For further information on your individual situation in relation to osseointegration, consult your doctor and prosthetist.

If you are interested in reading more information about prosthetics, please visit **ArtLimb online at www.artlimb.com**

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