



Working Through the Stages of Rehabilitation

There are several stages an amputee may go through during the first year following an amputation. Keep in mind that everyone goes through the stages of rehabilitation at his or her own pace and many factors like age, health and type of amputation come into play. Some stages will be shorter or longer than others, and certain stages may overlap. The clinic team will develop a rehabilitation plan to guide the amputee along the way. It is important that the amputee remain an active participant throughout the whole process.

Stage 1: Healing and Starting Physiotherapy

Overview

Following the amputation, there will be a healing phase – during which time the incision and surrounding tissue will recover. This timeframe can vary between a matter of weeks, a couple of months or even more depending on the type of amputation, how much scar tissue may be involved and how the limb heals. In the hospital, the physiotherapist (PT) will teach exercises to improve muscle function and will show how to get around on crutches or a wheelchair (if it is required). The clinic team will recommend any rehabilitation therapy, prosthesis and physio- or occupational therapy that may be needed.

In the early days following the amputation, healing of the incision and the residual limb (the part of your limb remaining after surgery) is the main goal. Part of the healing process involves promoting shrinkage. Swelling is always an issue after surgery and bandaging the residual limb helps with this. The nurse and

physiotherapist are the professionals you will deal with most frequently at the beginning of your rehabilitation, and may coordinate your care.

The nurse changes the bandages on your residual limb or checks your cast, depending on the type of dressing you have. Be sure to tell the surgeon or nurse about any pressure points in the dressing, any pain you feel in your residual limb, or if you are experiencing phantom limb sensations or phantom limb pain.

Shortly after surgery, your physiotherapist will begin massaging and stretching the residual limb (or teach you to do so) a few times a day. The physiotherapist helps you gradually restore physical function and movement to the area around your amputation. As your strength improves, you will play a more active role in your physiotherapy, exercising a few times a day to increase circulation, strengthening muscle tone and the range of movement you can achieve with your residual limb (range of motion). The exercises also reduce swelling and the chance of developing contractures (muscles tightening around a joint). Lower limb amputees may also do upper-body strength training exercises if they will be using crutches or a walker.

If you are a lower limb amputee, you will probably be moving around the hospital on crutches or using a wheelchair within a few days. Your physiotherapist will complete any training on walking aids before you leave the hospital if it is needed. If you are an upper limb amputee, you will probably become mobile as soon as you recover from the effects of the anaesthetic.

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Upon returning home, a post-operative dressing is applied to the residual limb. Commonly, you may visit the physiotherapist around three to five times a week. You may also return to the hospital to have your bandage or cast changed/removed; alternatively, a local nurse or health care professional may be requested to handle this. After the sutures are removed, a compressive sock called a “shrinker sock” or a tensor bandage helps reduce swelling (edema), and molds and shapes the limb so the prosthesis will fit more comfortably.

Stage 2: Visiting the Prosthetist

Overview

A prosthetist is the professional who makes the prosthesis (artificial limb). Once the clinic team is satisfied that the residual limb has healed well enough, a prosthesis can be fitted. A temporary prosthesis (more common for leg amputees) provides early mobility while allowing the residual limb to continue to shrink and change shape (which is normal following any amputation). Once the residual limb has settled into its final shape and the incision has healed, a “definitive” prosthesis (for permanent use) will be made. Arm amputees, unlike leg amputees who need a limb for mobility, are usually fitted once their limb has finished shrinking and changing shape. Many amputees are fitted with a simple prosthesis at first (for example a passive arm that has no grip function), which allows them to get used to wearing a limb and to help early on with balance. Later on, the amputee and prosthetist often decide together on a more complex and functional limb.

Working Closely With Your Prosthetist

The prosthetist (often with the help of prosthetic technicians) is the professional who will fabricate your prosthesis. The clinic team, working with you, recommends the type of fitting appropriate for you and a prescription will be provided to the prosthetist. In

many cases (especially in larger centres), the prosthetist attends a clinic right at the hospital at which the other rehabilitation professionals are present. Sometimes you are referred to a prosthetic centre.

It is important to remember that you have the choice of which prosthetic centre in your province you will attend. As the person who makes, adjusts and repairs your artificial limb, visits to the prosthetist will be part of your life from this point on. Having an open relationship with your prosthetist and feeling comfortable discussing your needs is critical.

The Process of Being Fitted

Once your residual limb is healed and the swelling is reduced, you are ready for your first fitting for an artificial limb. This is usually about one to two months following surgery, but underlying medical conditions such as vascular disease or an infection might extend this time period.

During a fitting, your prosthetist will examine your residual limb closely. It is a very personal experience and it can take some time to feel at ease with the process. When going for your first fitting, wearing a T-shirt will make fitting easier if you are an arm amputee. If you are a leg amputee, it is a good idea to wear shorts as well as a comfortable shoe and bring its mate for the foot of your artificial limb. Do not forget to bring your prescription or any other relevant documents that you may have been given.

The first step in making your prosthesis is to create a mold; this usually starts with a plaster cast being taken of your residual limb. Generally, the prosthetist uses a “hands-on” method, as he/she manually checks the residual limb for cysts or similar conditions which may



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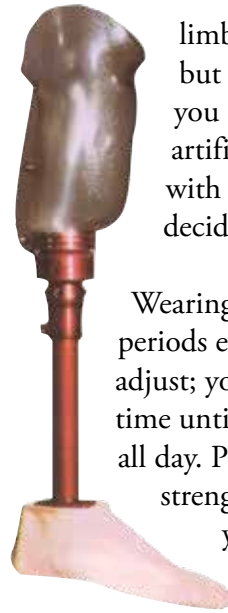
need special consideration during the fitting process. However, some prosthetists use “CAD-CAM,” a computer-aided design method, instead – after entering your measurements into a computer – a milling machine carves out a reproduction of your residual limb. The finished product in both cases is the mold, which is used to fashion a socket to custom fit your residual limb. Prosthetists use a “check socket,” a test socket often made of clear material, to visually inspect the fit. Stump socks and liners can help provide proper padding and comfort within the socket.

The most important considerations during a fitting are that the socket fits properly and that the artificial limb is aligned well with the rest of the body. Your feedback to the prosthetist is needed to help him/her provide the best fitting for you. For example, be sure to tell the prosthetist if your residual limb is slipping up and down (called pistoning) inside the socket, or if your artificial limb “feels” too long or too short.

Your First Limb

Depending on your situation, you may be fitted with a temporary limb early on. Before a fitting is considered, your clinic team will want to ensure your residual limb has healed enough.

As the name suggests, the temporary limb is worn temporarily as the residual limb continues to gradually change shape. The temporary limb allows you to improve your balance and, if you are a leg amputee, learn how to walk. The prosthetist will make adjustments to the temporary prosthesis if necessary. A leg amputee may often have a metal pylon (a rigid central shaft) attached to a basic prosthetic foot as a temporary limb. An arm amputee may be fitted with a passive prosthesis as a first



limb – one that has no grip function but which helps with balance and gets you used to the weight of wearing an artificial arm – you may be fitted later with a more functional prosthesis or may decide to stay with the passive prosthesis.

Wearing the temporary limb for short periods everyday will allow your body to adjust; you can then gradually increase the time until you are able to wear it comfortably all day. Physiotherapy exercises will help strengthen your residual limb and allow you to wear the artificial limb for longer periods.

A definitive or permanent limb can be fitted once the residual limb has stabilized and you are comfortable wearing the temporary prosthesis. Your definitive prosthesis is customized to your body and is made for long-term use. Usually, it will last about three years or more for an adult amputee. A child amputee may need a new limb once a year or even more often because of growth spurts. Some amputees have a spare limb to use when their definitive limb is being repaired or a new limb is being made.

Stage 3: Choosing an Artificial Limb(s)

Overview

There are many different components and prostheses available and a detailed discussion with the prosthetist will help in making the right choices. Factors to consider include level of activity, health, level of amputation(s) and the importance of cosmetic look versus the functionality of the prosthesis.

Artificial limbs have come a long way from the early wooden and aluminum versions used after the First and Second World Wars. New technology is making artificial limbs more cosmetically appealing and functional. Artificial legs are very useful for providing mobility and stability, and artificial arms can help with many daily household activities. There are many specific types of prostheses, including special limbs or devices for certain

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tasks and activities so it is very important to discuss your expectations and requirements with the prosthetist.

To make the best use of the time during your appointments with the prosthetist, it is a good idea to write down any questions you think of in advance. You do not want to forget anything. Taking notes during these meetings that you can refer back to later is also helpful – with so much information coming your way these notes can be reviewed when you have more time. If you are an arm amputee, your choices range from a passive to a more functional prosthesis. Passive arms have no grasping function but have a good cosmetic appearance. Functional arms can either be body powered or electric.

Cable-operated hands and hooks are known as “body powered” prostheses and are operated by means of a cable and harness system. By using the back and shoulder muscles, the cable is pulled and either opens (“voluntary opening”) or closes (“voluntary closing”) the terminal device.

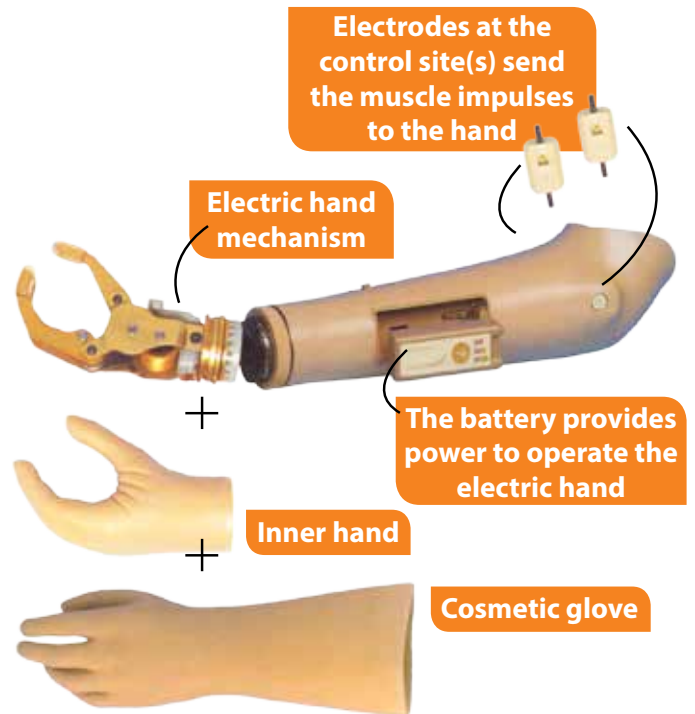


Body powered prosthesis with a figure 8 harness

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A “myoelectric” prosthesis is operated when the electrodes pick up muscle (Greek: myo) impulses from your residual limb. These are then translated into electrical signals that are sent to the electric hand to open or close it. The power is provided by a battery in the prosthesis. Although less common than myoelectric arms, there are also electric arms that are operated by

other means, like a switch that you can turn on and off. Some types of arms have the option of either being myoelectrically controlled or switch-controlled. If you are a leg amputee, you will be fitted with one of two types of limbs. An exoskeletal prosthesis has a hard outer shell made primarily of plastics and laminates.



An endoskeletal, or modular prosthesis, has the tube or pylon frame that acts as a type of “skeleton.” A soft foam cover might be applied over the prosthesis, which is shaped to match the sound limb.

There are many pros and cons for different types of artificial limbs and with your prosthetist you will discuss which characteristics are the most important for you. Please refer to the considerations below.

Your Level of Activity

Artificial limbs are designed for low-, medium- and high-level activities. Usually low-activity limbs are simpler in design and may be lighter in weight than high-activity ones, which may contain more complex components. Endoskeletal components are lightweight, require few adjustments, and have parts that are easily interchanged. Exoskeletal components are durable, last longer and can endure strenuous wear.

Your Health

Amputees with an active lifestyle may require limbs with more advanced function (though there might be extra maintenance involved). Sometimes less active amputees, and those who have conditions like diabetes and vascular disease, choose to use simple artificial limbs that are comfortable, easy to use and/or expend less energy. For example, a “slide-on socket” which is easy to slip on with a lightweight activity belt could be useful if you are a senior amputee. Stance control safety knees are useful for leg amputees with limited muscle control since they contain a weight-activated safety brake.

Your Level of Amputation(s)

Leg amputees will need to consider the type of foot that is suitable for them. For instance, a partial foot amputee can use a shoe filler for better function. Some leg amputees will consider an articulated ankle (with jointed parts that move) and an above knee amputee will also consider the type of knee joint they require.

Similarly, partial hand amputees might be interested in an opposition post (a device that allows partial hand amputees to grasp while retaining sensation). Arm amputees will consider the type of terminal device they will use for hand function as well as possibly a wrist joint. Above elbow amputees will also consider the type of elbow joint. Hybrid fittings that incorporate at least two different features – such as a body powered and myoelectric hybrid arm combining an electric hand and a cable-operated elbow – are common in above elbow fittings.

The weight of each component becomes an important consideration for high-level amputees. Most bilateral and multiple amputees can be fitted with (an) artificial limb(s), but sometimes other mobility aids like a wheelchair are more suitable. Some amputees who use prostheses for certain activities rely on their wheelchair for activities involving long distances.

Cosmetic Look Versus Functionality

There is sometimes a trade-off between the cosmetic look (cosmesis) of an artificial limb and its function. If you are a leg amputee, for example, highly cosmetic coverings are expensive and may be easily damaged if you

lead a very active lifestyle. If you are an arm amputee, hooks are very functional because of their good pinch and grasp function, but do not look as natural as a passive or myoelectric hand. You have to find the right balance of cosmesis and function to suit your needs.

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Other Options

In addition to the standard limb, you may consider whether you need additional specialized limbs. Many amputees have different artificial limbs for specific activities. A prosthetist can make a recreational arm or leg specially designed for sports, such as skiing or swimming. Specific devices, like a simple ring attached to the handlebars of a bicycle for upper limb amputees, can also be made. Remember, the prosthetist is an expert on artificial limbs, but you are an expert on yourself and what you need!

Stage 4: Learning to Use Your Artificial Limb

Overview

Prosthetists or physiotherapists (PTs) teach leg amputees how to walk with their artificial limb (gait training). Arm amputees will be trained by an occupational therapist (OT) on how to use their prosthesis for daily activities; this may take longer and be more involved depending on the type of prosthesis being fitted. Occupational therapists also teach amputees adaptive skills, such as how to get dressed with one hand or with an artificial arm.



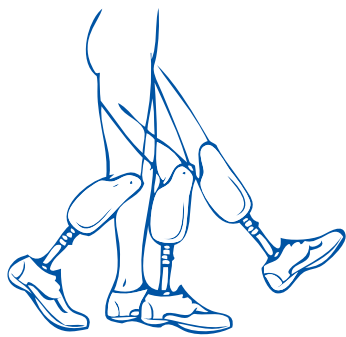
Your centre of gravity is determined by balancing your body's weight. As a new amputee, you have lost a percentage of your body weight during your amputation

(from 0.84 per cent for a hand to 18.7 per cent for an entire leg), and you will need to learn how to redistribute your weight accordingly. Sometimes, while still in the hospital, weights are strapped to your residual limb to help with balance control, and to get you used to added weight before you are fitted with an artificial limb.

Learning How to Fall and Get Up

Most physiotherapists or occupational therapists include a lesson in falling safely during your training. If you are a leg amputee, falling might be part of the process of learning how to walk with your artificial leg(s). Since falling is something you probably will encounter, learning the proper techniques that minimize injury to your body and to the artificial limb is important.

Gait Training for Leg Amputees



Gait is the individualized manner in which each person walks, and gait training is the process of learning how to walk with your prosthesis. Developing a “good gait” is key to having a comfortable and efficient walking stride. It reduces

the stress and wear and tear placed on your residual limb and the rest of your body. Gait also affects posture and energy expenditure. Either a physiotherapist or prosthetist will provide gait training to teach you proper techniques. Bad habits are hard to break later on, so it is in your best interest to learn the right way from the start. Later on, if you feel you are developing bad patterns, you can analyze your gait yourself in the mirror or visit your physiotherapist again for correction.

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Occupational Therapy for Arm Amputees

An occupational therapist teaches arm amputees how to operate their artificial arm(s) and terminal device(s) as well as adaptive skills. The lessons begin with general functions like learning how to move your arm and hand in a smooth manner, and progress to task-oriented functions like eating with a knife and fork. If your dominant arm was amputated, the occupational therapist sometimes helps you learn how to write with your sound limb. Since myoelectric arms are sophisticated devices, more training is necessary to learn how to control the muscles so your artificial limb can function properly. Training will progress to more complex tasks that include fine motor skills.

Stage 5: Life as a New Amputee

Overview

Once an amputee is regularly wearing an artificial limb and rehabilitation is coming to an end, the individual may gradually return to their regular lifestyle and activities. Bigger stepping stones, which may take longer to achieve, can include driving a car (with modifications if needed) and returning to the workforce.

When it comes to rehabilitation, both in gait training for leg amputees and learning how to use your terminal device for arm amputees, the process may at times seem a little daunting or frustrating. Your rehabilitation team may suggest certain daily living aids and adaptations to the home or workplace to make life easier. Mobility aids can also help you stay active. Keeping a positive attitude is very important – the training you will undergo is an investment for a more independent and fulfilling future!

During the first year, you will acquire a great deal of knowledge about amputation and deal with many professionals involved in your care. There is a lot to handle, and you may at times feel overwhelmed but this should not take away from the sense of accomplishment in how far you have come on your journey. By the end of the first year, you will likely be wearing your artificial limb regularly and have returned to your usual lifestyle.