Prosthetic Resources

The Fitting Process

When your surgeon or provider has given clearance to begin the prosthetic fitting, your prosthetist will take a plaster cast of your limb which will provide him/her with a model to make your prosthesis. Prior to casting, your prosthetist will have assessed your individual needs and goals for life as an amputee. This includes but is not limited to determining how active you are or would like to be, your goals, your current weight, your occupation or leisure activities, your current health status (if there are other factors that may need to be accommodated), and the condition of your residual limb. This information is extremely important when determining the components and which type of prosthetic device is most suitable for you.

Diagnostic Socket and Component Selection

A clear plastic (test or temporary) socket is then made from your model; this is what your prosthetist will use for the initial fitting. The diagnostic socket's material is translucent and can be modified easily. Your prosthetist will be able to easily make changes to the fit of the prosthesis or to change the alignment as you begin to stand/walk during your diagnostic fitting appointment. You will typically utilize the diagnostic socket for one to two weeks while you begin physical therapy. It is important to follow your initial wear schedule provided to you by your prosthetist. It will take some time for your residual limb to acclimate to weight bearing socket pressures. You will need to gradually increase your prosthetic wear time per day to avoid residual limb irritation and discomfort. Your prosthetist will follow-up with you to make sure the fit and the function of your prosthesis is optimal and to address any issues immediately. As you become stronger, more flexible and confident in your prosthesis, your gait (the way you walk) will change and therefore your prosthetist will need to make changes to your alignment. Your diagnostic socket will consist of a clear socket, means of suspension, a knee (if you are an above knee amputee), pylon and a foot. The components that are used in your prosthesis are determined by your prosthetist and your functional goals.

Definitive Prosthesis

Once the fit of your prosthesis has been determined and no immediate changes are needed, your definitive (permanent) prosthesis will be made; typically, this is after you have completed physical therapy. The time it takes to finish your prosthesis is typically 1 to 2 weeks. A definitive prosthesis is a much stronger and more durable version of the diagnostic socket you used in the fitting process. This socket is constructed of carbon fiber, nylon, resin and other materials that give it its strength. The look of your definitive prosthetic socket can be customized as much as you would like. If you have a unique or specific request don't hesitate to ask your prosthetist. Oftentimes a t-shirt is utilized to create the design that you would like on your socket. If you have a favorite t-shirt and would like it to be utilized, bring this to your prosthetist at your diagnostic fitting appointment.

Your socket can also be made to resemble your other leg. This means that the color and protective cover is shaped and finished to match your other leg as closely as possible.

Typically, your limb will continue to change as you begin to wear your prosthesis more consistently. You will need to follow-up with your prosthetist regularly so that he/she can accommodate those changes. To become a successful wearer of a prosthesis it is best to follow the recommendations of your physician, prosthetist and physical therapist and it is imperative that you follow through with all appointments and call when you are having issues. If you are having pain or discomfort, call immediately so that your prosthetist may remedy any problems before they worsen.

Suspension Designs

There are many ways to suspend a prosthesis. Some of the more common techniques are as follows: **Supracondylar suspension** which is suspension above the bony anatomy of your knee. **Pin locking suspension** uses a liner that is rolled onto your limb which has a pin attached and locks into a mechanism inside the prosthesis. **Seal-in suction** is also a liner that is rolled onto your limb but this design has a sealing ring, or rings, that seal against the walls of the prosthesis. **Suction suspension** utilizes a suspension sleeve that seals on your thigh and a one-way valve located at the bottom of the socket. When stepping into a socket the air is expelled through the suction valve. Once the suspension sleeve is rolled up and sealed to your thigh air cannot be brought into the socket, only expelled, creating suction. **Vacuum suspension** is another technique that uses the total surface bearing socket design and a vacuum pump to mechanically hold the prosthesis on the limb with suction.

This design provides excellent adhesion and improved wearer comfort. Vacuum suspension is most appropriate when your residual limb shape and volume have matured and stabilized.

Prosthetic Knees for Above Knee Amputations

Prosthetic knees today offer many different options for amputees of all levels. Depending on your level of activity and specific circumstances, your prosthetist will choose a knee that will provide you with the most appropriate function to accommodate your unique goals and presentation. The 2 main types of knee joints are single axis and polycentric. Single axis knees are simple, durable and generally lightweight. Polycentric knee joints consist of multiple bars connecting the upper and lower sections, thus creating a moving center of rotation and inherent stability. Knee joints can be made up of several design features such as a manual lock, weight activated brake or a stance flexion feature. Some knees bend with constant friction while others utilize fluid friction that can vary. The friction or tightness of these knees can typically be controlled and adjusted by your prosthetist. Knee friction can be accomplished by hydraulic (fluid) resistance, pneumatic (air) resistance and sometimes rotary resistance. A Microprocessor Knee is a computerized knee that responds automatically to varying walking patterns and has added stability.

Prosthetic Resources

Below are a few examples of these knees with previously mentioned features:



Single axis knee with a manual lock and weight activated brake



Microprocessor Knee



Single axis knee with manual lock



Polycentric knee with stance flexion



Single axis knee with hydraulic resistance



Polycentric knee with hydraulic resistance

Prosthetic Feet

Prosthetic feet are categorized by levels of activity; this means how well you ambulate (walk.) Examples are: if you walk with an assistive device (walker or cane), if you can walk at varying speeds, or if you lead an active lifestyle and participate in sports, high impact or recreational activities. The type of foot that is prescribed will vary. Other factors that determine the type of foot that are chosen are your body weight, if you walk on uneven surfaces, the type of job you have and the length of your residual limb. Prosthetic feet are categorized as: SACH (solid ankle cushioned heel), single-axis (one plane of movement), multi-axial (more than one plane of movement), dynamic response (materials used in the foot return energy to the patient when walking). A few examples of common activity specific feet can include vertical shock pylons (to reduce vertical shear forces on your residual limb), torsion units (to reduce rotational shear forces on your limb) and hydraulic ankles (to provide greater range of motion when manipulating uneven terrain). Speaking with your physician and prosthetist will help them make the best choices prosthetically and will help you return to life as you knew it prior to your amputation.



SACH Foot



Single Axis



Dynamic Response



Multi Axial



Hydraulic Ankle



Vertical Shock with torsion

Prosthetic Resources

All feet above are fit with foot shells to protect internal foot structure, provide cosmetic appearance and enable proper shoe fit.



Prosthetic Supplies / Consumables

Shrinkers

Prosthetic shrinkers are elastic garments that are made to control swelling, promote healing and assist in shaping your residual limb. Shrinkers are available in a variety of materials and pressure gradients for both above knee (AKA) and below knee (BKA).

Soon after your amputation, you will be provided two shrinkers *which will not be worn until after your staples or sutures have been removed by your surgeon*. Your first experience will be with a lower grade compression shrinker which will be utilized to compress and shape the residual limb. Shrinkers also help enhance circulation to the limb and reduce fluid accumulations. Wearing shrinkers help prepare the residual limb for future prosthetic interventions by reducing scarring and contour the residual limb for a better prosthetic fit. Numerous studies have supported the benefits of the application of gradual compression garments to reduce phantom limb pains, promote wound healing post-operatively and the reduction of swelling and scar tissue.

Once the initial surgical swelling has reduced, typically around 4-8 weeks, your shrinker may need to be replaced from a bigger to a smaller size or from a lower compression to a higher compression depending on your residual limb volume changes. This will be determined by your prosthetist as you progress through the process.

Application

Every time the shrinker is applied (or donned), you should make sure that the bottom of the shrinker is pulled snug to the bottom of your residual limb and that there are no wrinkles in the material. It is advisable to stretch the shrinker in all four directions with assistance from a caregiver or family member initially to reduce pain while donning if any pain remains. It is extremely important to make sure that there are no wrinkles or creases when you apply (donn) the shrinker as it may cause skin irritation and in some adverse cases, skin breakdown. If you experience any discomfort or skin irritation such as redness, rashes or abrasions, report those immediately to your prosthetist or healthcare provider. Most common areas where you may experience discomfort are along bony prominences, groin region where the edge of the shrinker might roll over for the above knee amputees and back side of the knee and thigh for below knee amputees.

Prosthetic Resources

Various shrinker types and applications:



Shrinker Wear Schedule

After initial healing is complete:

Once you have healed fully and your limb is ready to begin the fitting process, your prosthetist may choose to provide additional shrinkers with a higher compression to reduce edema and continue the shaping process before casting you for your prosthesis.

General Wearing Schedule:

It is recommended to wear your shrinker both night and day and remove it to bathe or do limb massage. It is also recommended to remove and then re-apply the shrinker 2-3 times per day to maintain uniform circumferential compression and to remove any wrinkles that may have occurred throughout the day. It is highly recommended to perform a thorough skin inspection every time you remove your shrinker. Discontinue use and consult a medical professional and/or your prosthetist if any issues or changes of the limb or skin develop.

Cleaning and Maintenance:

Follow the washing instructions provided by the manufacturer. You can hand wash daily with warm water or machine wash using the lowest permanent-press setting. It is highly recommended to use a mild soap and not launder with fabric softener, bleach or other additives. It is also recommended to alternate between your shrinkers daily or every other day. Wash and proper care usually restores your shrinkers shape as wearing a shrinker for long durations can stretch it out.