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Prosthetics. Orthotics.

Hip Disarticulation (HD) and Hemi Pelvectomy (HP) Protheses

General Description

Less than 1% of the amputees in the United States are either Hip Disarticulation (HD) or Hemi Pelvectomy (HP) amputees. It is estimated that energy consumption required to walk at this level is 200% of normal walking. As a result, many individuals choose not to be full-time prosthetic users. The "Canadian Design" for fitting, introduced in 1954, is still the standard for fitting in the United States today. The challenge has been to create a socket that is strong but also flexible enough to put on easily.

There have been great advances in materials and components in prosthetics in the last 10-15 years. The industry has begun to use thermoplastic materials such as polypropylene and copolymer to fabricate sockets and has achieved good results (See figure1). Flexible plastics are used as the interface between the individual's limb and the prosthesis. A Prosthetist can choose from many different types of flexible plastics.

Utilizing these materials, the prosthetist has the option of making the socket more or less flexible depending on the patient's needs (See figure 2). With HP sockets, the plastic of the socket must extend higher on the torso due to the lack of bony anatomy with which to bear weight. With flexible plastics, the plastic remains high on the torso but is more flexible and thus far more comfortable to the individual. Body heat helps make the plastics more flexible and reshape itself to the user's needs (See figure 3). This material is strong, but due to its flexibility, it cannot support a person's body weight by itself on a prosthetic hip joint without collapsing. A rigid frame is fabricated over the flexible socket. Materials such as carbon graphite and polypropylene are used to form the main support and structure of the socket. The rigid frame encompasses the prosthetic hip joint and the socket.

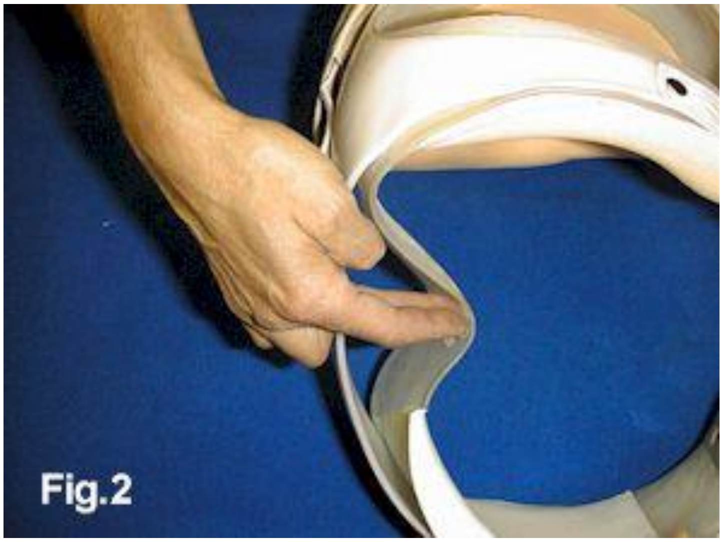

Fig.2

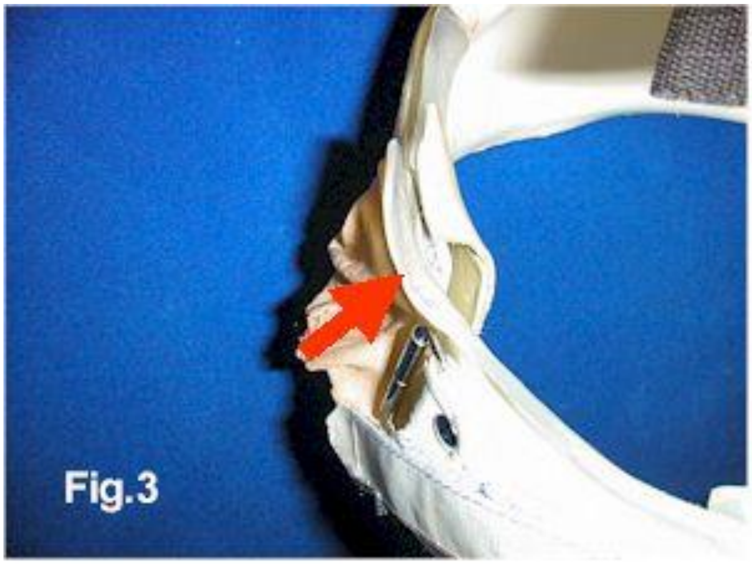

Fig.3

The height of the frame is usually lower than the flexible interface to achieve the benefit of the flexible plastic. Depending on the condition of the residual limb, areas of the frame can be cut out to help relieve problem areas in the socket (See figure 4).

Fig.4

The biggest advance in the fitting of HD prostheses has been in designing sockets that capture as much of the underlying skeletal anatomy as possible. Careful casting and a good knowledge of anatomy helps the prosthetist to utilize these contours to improve weight bearing surfaces as well as control movement within the socket. Much attention is now paid to containing the ischium (sitting bone) in the socket (See figure 6) . This may help the individual to achieve a more natural gait but also may reduce energy consumption. By containing the ischium within a HD prosthesis, excessive movement of the pelvis is minimized, thereby giving the individual more control of the socket. Any extra movement of the pelvis can result in the possibility of abrasions or breakdown, and may result in the individual requiring more energy to walk.

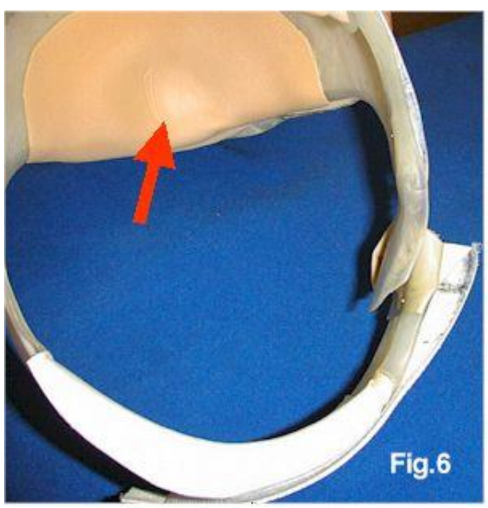

Fig.6

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Proper selection of components plays a crucial part in a successful fitting. Many new components in the prosthetic industry have been introduced over the past few years. Computerized knees, hydraulic hip joints, and polycentric knees with stance flexion features can make ambulation easier, safer, and more natural. Torsion adaptors reduce sheer forces inside the socket while thigh turntables allow individuals to sit more comfortably. Hip Flexion bias systems assist in getting the thigh section out to take the next step more quickly, thus reducing energy consumption. There are many different types of prosthetic feet available today. Lightweight componentry such as aluminum, titanium, and carbon are all used to reduce the overall weight of the prosthesis. With all of the different components available, the user and his or her prosthetist can find the one that best suits the user's needs.

Application

1. First put on a donning sock. This may be worn with or without underwear. Some amputees prefer not to wear a sock. Some amputees have specially made underwear that has the amputated side sewed shut.
2. While standing, pull the flaps of the socket open and slide the amputated side into the prosthetic socket.
3. Tighten the straps firmly across the front of the body, closing in the flaps of the socket. The socket may be secured with Velcro straps or buckles. Make sure the wedges on the sides of the socket fit firmly above the hipbones.

Cleaning and Maintenance

The inside of the socket can be cleaned with warm, soapy water or anti-bacterial baby wipes. Do not submerge the socket in water and keep the prosthesis away from heat, as this can damage the socket.

Tips and Problem Solving

Most sores or abrasions that occur are caused by movement within the socket, usually due to the socket being loose. Make sure the straps are tight across the front of the socket. If you have recently lost weight, you may need to see your prosthetist to have the socket padded or lined.

If you have recently gained weight, sores may also develop. See your prosthetist to see if adjustments can be made to accommodate the weight change. Otherwise, you may need a new socket.

Depending on the type of hip joint, knee, and foot, scheduled maintenance checks may be needed with the prosthetist. Please consult your prosthetist as to your schedule. Between checkups, let your prosthetist know if you experience any problems such as a squeaky hip joint, changes in knee function, alignment issues or fit issues.