Rancho Los Amigos Post-Polio Support Group

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Bracing in the 21st Century

With David Porter, CPO and Randell Miller, CO
Damar Medical Industries, Downey California

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This report is based upon a presentation to the Rancho Los Amigos Post-Polio Support Group on April 25, 2009. There was a brief review of the early years of bracing followed by a discussion on some of the newer ideas. We were able to inspect models of leg braces provided by several manufacturers, including Allard and Otto Bock. One leg brace, which is still in the developmental stage, will be used in testing new designs. Recommendations for people who wear braces and contact information are at the end of this report.

David Porter first presented some background information on his career and the Orthotics department at Rancho. In 1992 he began working in the brace shop (Orthotics) at Rancho Los Amigos Medical Center. At that time the brace shop was really remarkable; not only did they have the staff to provide appropriate updates but they also had two full-time machinists, other people who fabricated useful items, plus three engineers. Some really unusual things came from this shop, including development of one of the first power wheelchairs which could be operated with a puff of air from a patient or by using only the patient's little finger or a toe.

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Then

Braces in the 1950s were made out of metal and leather. Polyester resin was the only type of plastic available then and it was heavy, bulky, and basically non-adjustable. It wasn't until the late 1960s that other plastics came in to use. Today about 80% of all leg braces are made of some type of plastic that is easy to heat in an oven and is then draped over a plastic mold. There are probably about 100 different variations of plastics in use today for braces.

Up until a few years ago, bracing for polio survivors and others hadn't really changed in 5000 years. However, what is in use now is mimicking what was developed for use in recent prosthetics – by using some of the newly developed knee and ankle mechanisms. Some veterans are using computer activated knee mechanisms (made by 5 or 6 different manufacturers), but in most cases they are still big and bulky and ugly. These braces are a beginning and will be down-sized very soon. Once the coding mechanisms for Medicare are in place, the new knee and ankle mechanisms will probably be used more frequently.

Current Models

Randell Miller presented some current and future models of leg braces. With older leg braces there were sometimes problems with springs and moving parts which could fail. The biggest change now is that newer composite materials and carbon fiber are being used in braces.

The Allard "ToeOFF" stance control brace does the same thing as an articulating AFO (ankle-foot orthosis) but it has no moving parts. It stores energy and gives back 90% of the energy the wearer puts into it. It is very flat, light weight, and fits into a shoe. This is one of the newest innovations seen in bracing. Manufacturers will be getting away from metals and moving parts and begin using carbon fiber because of its light weight and rigidity. Take a look at this example at the right.

Many of the KAFOs (knee-ankle-foot orthoses) have only one upright bar on the outside of the leg. That

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makes it nice if you are "knock-kneed" so you don't hit the other knee. They are very light weight. To make one in carbon graphite, the first step is to make a plastic test orthosis so any modifications can be made to be sure it fits correctly. Once the brace is made in carbon graphite it is very, very difficult to adjust the bands, etc., although padding can be added.

Otto Bock's Free Walk stance control brace is a locked brace until you step down on it and follow through - then it will walk by itself. It is activated through the ankle joint and has cables running through it. Most manufacturers will be making a stance control brace. The problem for people who have been wearing a long leg brace for many years is that it is very hard to retrain their walking. Trying to change that person's walking pattern is almost impossible, because the patient wants to get his knee back and hear the click, and this style brace doesn't do that. That is a problem going into the new era of bracing.

The E-MAG Control orthosis could be used by someone who uses the old drop-lock style brace. It is a combination of electronics and mechanical components; there is an electronic joint that works off a remote control. The remote control could be put in a pocket or on the hand bar of a crutch. You can push on it and a beeper or vibration will tell you it is unlocking. When you stand up, it beeps to let you know it is locked and you can start walking. Although this brace is pricey (about $10,000), Mr. Miller really likes it.

There is another brace (not on display) that has a joint which works off a pendulum. It is set up so that when you go through the swing phase, it locks and it knows the angle of your knee and it unlocks automatically, all from action of the pendulum.

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The Future

In the news there have been pictures of veterans with prosthetics set up with a computer which allows them to walk. Within the next year, this mechanism will be put into a knee joint and will be set up using Bluetooth technology and it will walk the way the patient walks. That is the big thing on the horizon.

Mr. Porter discussed this prototype tool – an evaluation device which will be used to determine proper adjustments. It is an adjustable leg brace in which you can change knee joints, move bands up and down. The orthotist will be able to strap it onto the patient's shoe to determine the best bracing configuration for each individual. The orthotist will learn exactly where the pressure should be, what kind of knee joint is best, and all the angulations for that patient. This is the first adjustable test brace like this which really works. Up until now, patients relied on what their doctor and orthotist thought was the best brace for them. When this test brace becomes available, the patient will be able to go through the walking phases using it and the orthotist will be able to determine the best prescription for that individual. Braces in the future will be a lot lighter and more convenient.

Will Insurance Pay for It?

The manufacturers are trying to get the reimbursements on bracing up to the level as prosthetics which cost $8,000 - $50.000. Their goal is to make leg braces affordable and have patients eligible for insurance reimbursement. Currently, it is difficult to get reimbursement on a $3,000 leg brace.

Recommendations

People who wear braces should see their orthotist every six months for a check-up. This will ensure that the brace is working properly and the joints are

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functioning correctly. If the joints are not lubricated, they will wear out prematurely. The locks on a long leg brace will not work properly if they are out of alignment. During these check-ups the orthotist can also learn if the patient has any new problems and the patient can find out about any new products that have become available. Brace check-ups are complimentary for Damar Medical patients unless new parts are needed; there is no charge for consultations.

For further information contact:

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