Introduction

Not only are children fit with myoelectric arms at a much earlier age than years before, but also they are now much more functional and successful with these devices. Advancements such as microprocessor-based controls, longer lasting batteries, improved socket design, and flexible socket materials have improved the functionality of children, especially those under the age of 5, with their prosthesis. Because the pediatric population is so small in our field, it is infrequent that the practitioner knows these advancements. Understanding these improvements and changes to fitting protocols not only helps the child with the device, but also strengthens the rehab team, including the O&P practitioner and OT, as well as strengthens the relationship with referrals and payors. Yet, most importantly, the entire rehab team becomes aware of these advances and can provide optimum care not seen even just a few years ago.

Having a child born without a limb is an emotional trying time for parents. Although many children develop a one-handed independence, parents do not want their child to struggle physically or psychologically. Our organization has found an increasing acceptance of myoelectric control for this young population, primarily from the results received in improved socket design and components. However, the three most important criteria for functionality at this age comes from 1) a team approach, 2) continual follow up, and 3) discussions by the parents, Certified Prosthetists, Occupational Therapists, manufacturers, and other referrals such as Case Managers.

Advancements

The most critical factor in any prosthesis is the socket. The socket must be comfortable, easy to don, provide adequate suspension with maximum ROM, and allow functional control of the terminal device. If there is any concern regarding function of a prosthesis, a full assessment of the socket must be performed.

As with any prosthesis, appropriate fit is the single most critical factor towards appropriate prosthetic usage. No matter the cosmetics nor advanced electronics, a true functional assessment can not be performed with a poor fitting prosthesis. An easy guideline is an anatomical shaped flexible socket that doesn’t allow for limb movement within the socket. As a side note, any true functional assessment must take into consideration that the child is wearing an appropriate device for the specified activity. Not only should we should be training the wearers appropriate activities, but also we should be providing appropriate devices for those activities. Just as it is illogical to assess a snow skier’s ability to snow ski while wearing water skis, it does not make sense to measure a child’s ability to hold onto an object requiring an increased grip force, such as a toy bow & arrow, with a TD that has an
inferior grip force. Different terminal devices are made for specific activities just as skis are made for specific types of skiing. Although they are both skis, they are meant for different activities.

The anatomically designed socket is not only heat moldable to accommodate for growth, but also made of plastics which are flexible allowing for an increased ROM and terminal device control. The socket must be anatomically correct and growth adjustable. In recent years the microprocessors controlling the terminal device have drastically improved, providing optimum control by the child. Not only can the gains be adjusted, but also thresholds, rate of contraction, and strategy of control. All adjustments are visually friendly on a computer or hand held PDA.

Our team of specialized clinicians have found an increase in functionality with children of very young age with myoelectrics using devices such as VASI’s SPM circuit that uses a standard computer to communicate with the prosthesis, and Animated Prosthetics Inc, which uses a wireless link with a PDA to perform similar communications, or OttoBock’s coding plug setup, which uses color specified plugs to change the strategy of control.

Manufacturers have switched to Li-Ion technology in the batteries, which allow for a longer lasting and quicker charging battery that can be placed inside the forearm, thus improving cosmetics. Additionally, electrodes are much smaller and can be placed inside the socket without much cosmetic concern. Newer smaller pediatric electrodes can be moved without the need of a new socket when adding a second site electrode.

Conclusion

These improvements in socket material and design, computer adjusted controls, smaller electrodes, parental involvement, and longer lasting batteries have provided a larger acceptance of myoelectric devices for young children.

References