Increasing Upper Extremity Prosthetic Success Rates

Reprinted with permission - O & P Business World, Winter 1

Fifty percent of all upper extremity amputees fit with a prosthesis stop wearing it within one year. One contributor to this problem is the common protocol followed by most physicians and prosthetists which requires the initial use of a body-powered prosthesis before considering a myoelectric prosthesis. While the rugged design of a body-powered prosthesis serves many patients well, those whose needs are not met and did not receive alternative options from the onset of amputation frequently choose to discontinue use altogether.

Until recently, this conservative approach addressed three main challenges faced by amputees: 1) the frequent breakdown of first-generation electric prostheses required a more dependable body-powered backup prosthesis, 2) the intimate fit required to keep the electrodes in contact with the skin for a myoelectric prosthesis was problematic for new amputees undergoing residual limb volumetric fluctuation, and 3) many practitioners lacked experience with myoelectric technology and techniques. Fortunately, advancements in the field of upper extremity prosthetics now enable practitioners to exercise a more dynamic prescriptive approach.

More dependable and sophisticated second- and third-generation electronics eliminate the need for backup body-powered prostheses. This is an exciting time for prosthetists and amputees as many manufacturers of upper extremity components are releasing innovative products. For example, Liberty Technology has introduced a new microprocessor myoelectric system that uses

More dependable and sophisticated second- and third-generation electronics eliminate the need for backup body-powered prostheses. This is an exciting time for prosthetists and amputees as many manufacturers of upper extremity components are releasing innovative products. For example, Liberty Technology has introduced a new microprocessor myoelectric system that uses a personal computer to perform adjustments allowing for multiple control schemes using a single controller. The ability to transition patients from single site myoelectric control to dual site myoelectric control, and later, proportional control, by simply reprogramming the onboard microprocessor results in enhanced function and cost efficiency. This is especially useful as a child develops or as an adult progresses in his rehabilitation, as the same myoelectric controller can be used throughout the rehabilitation process.

Motion Control's new Utah Arm 2 features more reliable circuitry and a longer-life battery. The new battery charging system reduces charging time from 18 hours to a mere two and a half hours. Otto Bock has released the Sensor Electronic Hand that automatically detects and adjusts for slippage through tiny sensors mounted in the fingers, so the wearer no longer needs to concentrate on increasing grip force as an object becomes heavier or starts to slip from his grasp.

The greater function and reliability provided by state-of-the-art electronics are further supported by new materials and interface designs which increase comfort and longevity. Thermoplastic materials permit easy interface adjustments for residual limb volumetric fluctuation without the need to replace the inner socket. New flexible materials combined with advanced socket designs produce lighter weight prostheses that increase range of motion while enhancing comfort. Advanced socket designs perhaps are best demonstrated by the MicroFrame design of shoulder and interscapular thoracic level prostheses that reduce socket to skin surface area by as much as 65% from traditional interface designs, dramatically deminishing weight and heat buildup. Cosmetic restoration materials also have improved to resist staining while closely duplicating the contralateral limb. Several manufacturers, including Life Like Laboratories and Aesthetic Concerns, provide custom shaped and painted silicone materials which can now be applied to myoelectric prostheses. For the first time, one prosthesis can meet an amputee's functional and cosmetic requirements.

Exciting developments in technology and materials are only part of the equation in improving patient success rates; practitioner experience is equally as important. Until recently, obtaining experience was challenging because the average practitioner sees so few upper extremity patients per year. Furthermore, the limited availability of advanced practitioner training (often a prerequisite for the purchase of upper extremity components) required practitioners to leave their busy practices and sometimes their countries. Cutting-edge consultation services have emerged to address these needs. For example, Advanced Arm Dynamics, Inc., provides direct patient care, on-site practitioner training, manufacturer component certification, and insurance justification and authorization assistance worldwide. These services allow any facility in the world to provide state-of-the-art technology and techniques to its patients.

Now that the barriers to fitting a patient initially with a myoelectric prosthesis have been removed, patient success and satisfaction can be significantly improved by dispensing with the old lexicon (fitting an upper extremity patient with a bodypowered prosthesis first) and providing the most appropriate prosthesis from the very beginning. While not all amputees are candidates for a myoelectric prosthesis, new technology, techniques, and expert upper extremity prosthetic practitioner resources can increase the success rate of upper extremity amputees. Critical to this approach is a comprehensive initial patient assessment which focuses on the patient's goals, family life, return to work requirements, and the condition of the residual limb. With detailed information and the flexibility to apply it creatively, an experienced practitioner can expedite his patients' rehabilitation and enhance their quality of life.

John Miguelez, C.P., has recently launched a new company, Advanced Arm Dynamics, Inc. Previously he was Vice President and Senior Clinical Director for the National Upper Extremity Prosthetic Program at NovaCare, Inc. Contact him at Advanced Arm Dynamics, Inc., 50-B Peninsula Center Drive, Suite 172, Rolling Hills Estates, California 90274-3506 USA. Telephone: 310-378-5885; Fax: -310-378-8116; E-mail: jmiquelez@armdynamics.com; Web site: www.arrndynamics.com.

■