EDITORIAL

Special Prostheses Enhance Rehabilitation

In the case of a child, conventional wisdom has held that success of prosthetic rehabilitation can be measured by the ability of the child to play, as play may be considered child's work. In the adult, ultimate success was evidenced by the patient's return to his former job or to some other gainful employment. Special acclaim and attention have been given to amputees like Pete Gray, who succeeded as a professional baseball player. Today another criterion can offer a more valid assessment of success. The ability of the patient, child or adult, to participate in life's activities is a better measure. This assessment should include sports and athletic activities, especially those activities formerly enjoyed in the case of an acquired amputee. Fortunately, today's prosthetic armamentarium includes special techniques, components and prostheses that make participation possible in a variety of activities. On the basis of the experience gained in treating more than 700 juvenile amputees, R.C. Hamilton[1] formulated the conclusions about their role in competitive sports as shown in Table 1. Most amputees are not interested in competition, but desire to engage in recreational athletic activities.

Beginning in Europe in the late 1940's, skiing was one of the first sports to be "adopted" for amputees. In the United States there has been a great interest in this activity, as manifested by the formation of the National Amputee Ski Association. Special ski boots and outriggers have been developed. The unilateral below-knee amputee can ski with or without a prosthesis. The bilateral below-knee uses the four track technique with two prostheses, two skis and outriggers. The unilateral above-knee usually must ski on the intact leg using the three track technique. The bilateral above-knee can use short prostheses without knee mechanisms. Cross-country skiing is recommended solely for the below knee amputee. According to Bernice Kegel, the average amputee can learn to ski intermediate and expert slopes in one fourth the time an abled-bodied skier needs, and with a far greater degree of proficiency.[2]

Swimming is an activity that can be enjoyed by amputees of all ages. If the swimmer is able to stay afloat safely without a prosthesis, opportunities are plentiful as swimming facilities are fairly common in our society. For the amputee who wishes to enjoy aquatic activities, several options are available:

A. Swimming without a prosthesis
B. Peg legs for use on the beach and possibly swimming
C. Sockets attached directly to swim fins
D. The utility or beach prosthesis used to ambulate on the beach but not for swimming
E. The swimming leg worn while in the water[2]

Water skiing is another activity that can be enjoyed by amputees.

Wheelchair sports have been organized for amputees, also. A rather detailed classification of degrees

Table I

Suggested Areas of Athletic Participation by Unimembral and/or Uncomplicated Amputees

	AK	BK	AE	BE
Football	0	+	±	+
Soccer	0	±	+	+
Fencing	±	+	+	+
Swimming	0	±	±	+
Gymnastics	±	±	±	±
Basketball	0	±	±	±
Wrestling	±	+	0	+
Track	0	0	+	+
Field	±	+	+	+
Golf	±	+	+	+
Tennis	±	+	+	+
Baseball	0	+	±	+

\+ Participation encouraged
± Participation equivocal
0 Participation difficult or impossible

of disability has been developed to maintain fairness in competition for men and women. Competition is now commonplace in wheelchair basketball, marathon races, bowling, field events, table tennis, and archery; there are even international events.

Special prosthetic adaptations have been developed for the lower extremity amputee who is interested in participating in the following activities.

A. Golfing—a rotor in the shank[3]

B. Flying—portable hand controls and a special SACH foot[4]

C. Boating[2]

D. Horseback riding[2]

In the upper extremity, special adaptations may be necessary for certain activities. The standard terminal device may be used for given activities, especially in the case of the unilateral amputee. For other activities the amputee may find it more convenient to remove the prosthesis completely. By and large the ability of the bilateral upper limb amputee is dependent upon the strength and mobility of the residual limbs. For the upper limb amputee, M.D. Robb[5] has grouped activities into those requiring closed or open skills. When the environment or activity is highly unpredictable and constantly changing, open skills are needed to adjust to and/or regulate the environment. Closed skills are those such as swimming, bowling, and golf activities which are performed in a comparatively stable environment. Among the recreational activities for which adaptive devices have been developed are:

A. Rein bar for horseback riding[6]

B. Special terminal device for fishing[7]

C. Terminal device for bowling[8]

D. Fletcher-Motis adapter for archery[9]

E. Universal joint terminal device for golf[9]

F. Additional devices adapted for hockey,[10] skiing,[11] and driving[12]

G. Baseball glove terminal device for the unilateral below elbow (this has always been a popular item among teenage boys in our clinic)[13]

Swimming can usually be accomplished without prostheses and special appliances. However, it may require minor adaptations of stroke techniques, kick modifications and a special breathing pattern.[13]

It should be apparent even to the casual observer that there are benefits to be derived from the use of secondary prostheses or adaptive devices by amputees. The physiological benefits will flow to the cardiopulmonary system as the result of the physical activity.

However, there is another even greater benefit—the psychological uplift—realized by the patient who achieves new heights of pleasure, pride, and increased self esteem by participation in physical recreation and/or competition. This aspect is so important to the total treatment and rehabilitation of the amputee patient that we must educate clinicians and third party carriers so that ordering such devices will become routine for all who have the ability and desire to use them. Furthermore, third party carriers should pay for them as routinely as the standard prostheses. In this manner we can give our patients the opportunity to participate in and enjoy life more fully—the essence of rehabilitation.

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William M. Brady, CP, has generously donated the $100 honorarium he was awarded for the Spring issue of *Clinical Prosthetics and Orthotics* to the AOPA Educational Fund. Mr. Brady received the honorarium for his article, "Post Operative Management of Lower Extremity Amputees Using Tubular Elastic Compression Bandaging."