Bilateral Shoulder Disarticulation: Equipment Used to Facilitate Independence

(amputees-upper extremity, occupational therapy, adapted equipment, activities of daily living, mouthstick activities)

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Equipment and methods used in treating a patient with a traumatic bilateral shoulder disarticulation in order to achieve independence in several daily living skills without the use of prostheses are described in this article. Dressing, bathing, toileting, communication, and hygiene skills are presented.

Independent daily living skills became of paramount importance for a 24-year-old male who acquired a bilateral shoulder disarticulation as the result of an industrial accident in December 1978. Before occupational therapy intervention, the patient, using his teeth and feet, was able to accomplish some simple tasks; however, he was still unable to carry out feeding, dressing, toileting, and bathing activities.

Using two battery-powered prostheses, feeding, communication, and some hygiene activities were possible. Unfortunately, limitations in the prostheses—specifically, range of motion restrictions—made them of little use in dressing, bathing, and toileting. The difficulties encountered in reaching various body parts can be better appreciated by understanding the design of the prostheses. The shoulder joint, which was passively controlled, could not achieve full range of motion in any direction. The elbow joint had active flexion and extension; the forearm, passive supination and pronation.

The equipment designed to help this man achieve independence in the areas in which the prostheses were not functional, that is, dressing, bathing, and toileting, are discussed in this article. Alternative methods in communication and hygiene skills, which were implemented during periods of skin breakdown and mechanical problems with the battery-powered arms, will also be discussed.

Dressing

Because the patient demonstrated a high level of motivation, good balance, and coordination, dressing skills were considered an attainable treatment goal. A conventional metal frame chair was chosen as a suitable base for attaching specially designed devices. Weights, added to each leg, were necessary to stabilize the chair (Figure 1).

A double hook clamped to the back of the chair assisted the patient in putting on his pants (Figure 2). Using his feet, he maneuvered the pants up to his thighs. He then stood and hooked a belt loop over the double hook to stabilize his pants as he wiggled into them. This hook device also enabled him to master zippers with the aid of a zipper ring and to fasten the Velcro® closure pants.

A sock aid attachment was designed and mounted with brackets to each front chair leg (Figure 1A). The patient was able to get his socks over the aid by using his toes. Vertical projections on the aid stabilized the adapted sock as he inserted his foot into it. After the foot was inserted, the patient used the projections to pull the sock up...
Figure 1 Dressing chair: (A) sock aid; (B) overhead bars; (C) button hook to his calf. Slip-on shoes were preferred for obvious reasons.

Upper extremity dressing was facilitated through the use of two overhead bars bracketed to the chair (Figure 1B). Using his teeth, the patient placed a pullover shirt over the bars. These bars held the shirt while he put his head through the neck opening. He then transferred the shirt from the bars onto his body. For front-buttoning shirts, mouth and body movements maneuvered the buttons into proximity of the button hook (Figure 1C). Again, mouth and body movements maneuvered the buttons into proximity of the button hook.

Bathing
Bathing required the use of special equipment installed on the shower wall: two long-handled sponges clamped with radiator hoses to each end of a grab bar. The bar was mounted vertically at the appropriate height. Wearing soap-on-a- rope around his neck, the patient lathered the sponges. Then, by moving his body along the sponges, he was able to wash himself. To shampoo his hair, the patient placed the container between his knees to squeeze the shampoo onto the top of his head. A hairbrush suctioned to the shower wall was used for scrubbing. Self-drying was accomplished by rubbing his body against the wall while wearing a bag-type robe. The patient was independent in application and removal of the robe with the chair.

Toileting
Perianal hygiene has been a long-standing problem for the high bilateral upper extremity amputee. Traditional methods, such as using the heel of the foot or the toilet seat, proved ineffective for this patient. Thus, a BeOK deluxe toilet aid (1) was attached to a conventional, removable toilet side rail to allow for independent cleansing (Figure 3). Insertion and removal of toilet paper were accomplished by the patient using his feet while he sat on the sink. An advantage of the BeOK system is that it is readily removable by family members.

Managing clothes for urination was accomplished independently at home with the dressing chair. To perform this function away from home, an additional piece of equipment was necessary. Suction cups and a double hook, similar to that used on the dressing chair (see Figure 2) were combined to provide a mobile aid that could be suctioned...
Flgure 4 Mouthpiece with interchangeable endpieces to most sinks. The patient could independently mount the device by placing it on top of the sink with his mouth and pressing down on it with his foot.

Communication
To aid the patient with communication skills, a single mouthpiece with several interchangeable endpieces was designed (Figure 4). These endpieces could be removed from the mouthpiece by holding them between the knees and removing the mouthpiece with his teeth. The patient could then place the mouthpiece over the appropriate attachment needed to type, write, turn pages, or dial a telephone. For convenience in telephoning, a goose-neck arrangement was used to hold the receiver.

Hygiene
Two goosenecks were used to solve the problems of brushing teeth, shaving, and combing hair. Mounted on one gooseneck were toothbrushes and an electric razor (Figure 5). The hairbrush was mounted on another. Head and body movements permitted the necessary contact with the toothbrush, razor and hairbrush. The patient could squeeze the toothpaste into his mouth with his knees; however, he was unable to apply shaving lotion.

Discussion
It is generally accepted that individuals with congenital bilateral shoulder disarticulations are able to develop good foot intrinsics and hip range of motion to accomplish many activities of daily living; however, persons with acquired amputations are usually unable to achieve this amount of lower extremity dexterity. Furthermore, the infrequency of this disability has limited the development of specialized equipment and/or methods to deal with it. Perhaps, the suggestions described above could benefit persons with acquired bilateral shoulder disarticulations or possibly even similarly disabled individuals.

Many factors entered into our choice of equipment. Replaceable, as well as readily attainable, attachments were thought to be of benefit. The deluxe toilet aide, long-handed sponges, tub grab bar, button hooks, and sock aid are commercially available. Mobility was considered to be highly advantageous. All of the equipment discussed can be used in any environment with minimal effort in relocation. The chair was chosen not only because it is portable, but also because its large surface area made it easy to attach several devices. In accordance with individual needs, attachments may be added or deleted. Moreover, minor modifications by individual therapists could make most of this equipment amenable to patients with various upper extremity deficits. Finally, it should be remembered that lower body agility may be a prerequisite for efficient use of this equipment.

Acknowledgments
The authors express appreciation to David Knighton, Prosthetic Technician at the University of Virginia Hospital, Charlottesville, Virginia, for assistance in constructing the equipment described.

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RELATED READINGS
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