SELECTED CASE REPORTS FROM THE CHILD AMPUTEE PROSTHETICS PROJECT, UNIVERSITY OF CALIFORNIA, LOS ANGELES

By ROBERT MAZET, JR., M.D. and HARRY CAMPBELL, C.P.

III

Editor's Note: This is the second in a series of case reports from the Child Amputee Prosthetics Project, University of California, Los Angeles. The first such report, Cases I and II, appeared in the September 1959 Journal, Pages 44-50.

A six-year-old boy with congenital left very short below-elbow amputation was first fitted in December 1955. His mother rejected the incomplete child at birth. He lived with his paternal grandmother, but had good relationship with father, who brought him in. He was a bright child; his father was anxious for him to have help. He appeared to be a good candidate for prosthesis. He was fitted with a step-up hinge and 99x hook (Fig. 1).

It was quickly noted that, with the split socket, he lacked the necessary strength to obtain full elbow flexion. For this reason, a forearm lift assist [1] was added to the prosthesis. This, in turn, created a demand for greater excursion of cable to open the T.D. at full flexion. Following this modification, he became a very competent user. He wore the device all his waking hours.

During the ensuing year, his parents were divorced and he was placed in a foster home. His father became a Deputy Sheriff. The boy made a good adjustment to these conditions. He outgrew the prosthesis and a new one was made.

He continued to be a good user, and outgrew two more prostheses. In September 1958, the fourth artificial arm with No. 88 hook was delivered. The father was then a federal prison guard. He is an unstable person who never stays long in any job. At that time it was noted that though this boy was undoubtedly a constant wearer, he was not a good user as he should be in view of his intelligence and the encouragement he has had from his father. The psychological trauma incident to the divorce, living in a foster home, and pathetically striving for some normal relationship with a somewhat unstable father, whose work sometimes keeps him away from home for several days, undoubtedly contribute to the substandard performance.

The addition of a very simple device, the forearm lift assist, resulted in a significant improvement in performance.

The relatively poor performance level here appears to be due to the absence of a feeling of real need for the prosthesis. He wears it to please his father.

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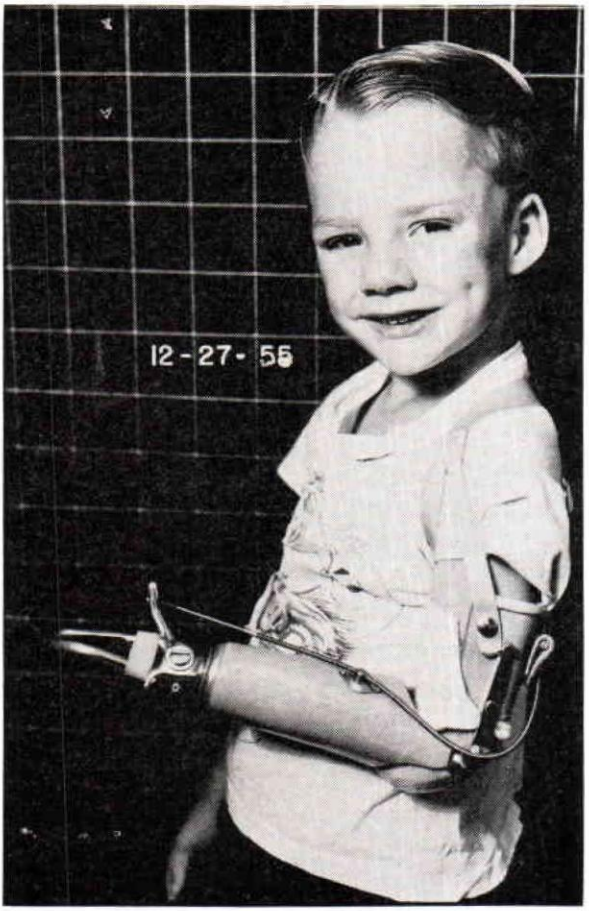
[1] Dual Control System for Split Socket Prosthesis, page 166 of the Manual of Upper Extremity Prosthetics, Dept. of Engineering, Univ. of Calif., Los Angeles, 1958.



Case No. III

IV — D. H.

An 8-year-old colored boy was first seen in November 1953, fifteen months after a right forequarter amputation by a freight car. (Fig. 1). A secondary scoliosis had developed. He lives 90 miles from UCLA. Prescription in the face of the handicaps of distance, membership in an underprivileged group, questionable parent cooperation, no available local training facilities, and a deformity severe enough to prohibit very great function, was considered justified because of the magnitude of the challenge to an investigative program.

A forequarter amputation prosthesis with axilla loop, straight shoulder plates, nudge elbow lock control, passive friction wrist rotation union, and Dorrance No. 88 hook was furnished in March 1954. The rib cage of this boy was too straight up and down to keep this shoulder cap in place without additional support. For this reason an over-the-shoulder clip was riveted to the prosthesis to keep it from slipping downward. Transportation and family difficulties made adequate training unfeasible. Consequently he became a wearer but not a user. The scoliosis was corrected.

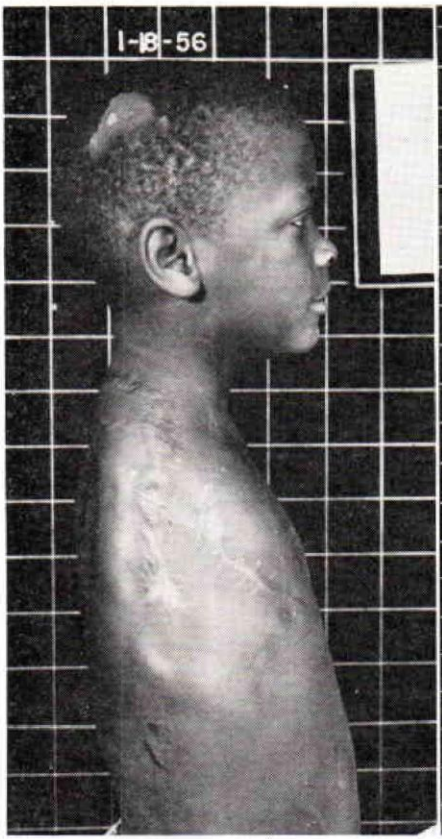


Figure 1—Showing right forequarter amputation

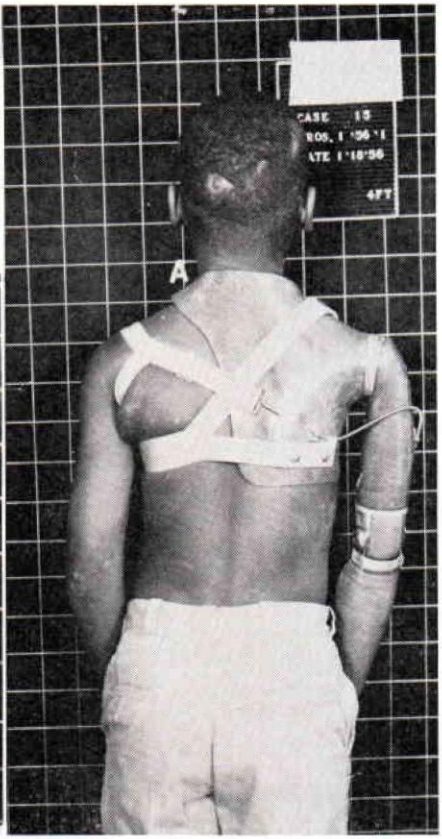


Figure 2—"A" shows the over-the-shoulder clip incorporated into the socket to keep the prosthesis in place.

Approximately two years after fabrication of original prosthesis, he had outgrown the device and a second one was made. In the second prosthesis, the over-the-shoulder clip was incorporated into the socket.[1] (Fig. 2). Canted shoulder plates permitting simultaneous flexion and abduction of arm were used.[2] The nudge control of elbow lock was replaced by a strap running from the region of the right nipple to top of left trousers anteriorly. A twist of trunk activated the lock. (Fig. 3). During the ensuing weeks of training, he exhibited good understanding of the controls, and, considering his severe disability, became a fair performer.

Upon his return home, there was no one to encourage and guide him in prosthetic use. He quickly reverted to intermittent wearing. His non-use was due partly to inadequacy of this type of prosthesis to provide any very great function. He could, when directed, open the TD in the range between full extension and 90 degrees elbow flexion, but not beyond this. In this small child, with only one scapula, cable excursion is restricted even more than it would be in a larger person, or one with both scapulae.

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[1] Manual of Upper Extremity Prosthetics 2nd Ed. Dept. of Engineering, UCLA, 1958, p. 297.

[2] IBID, p. 137.

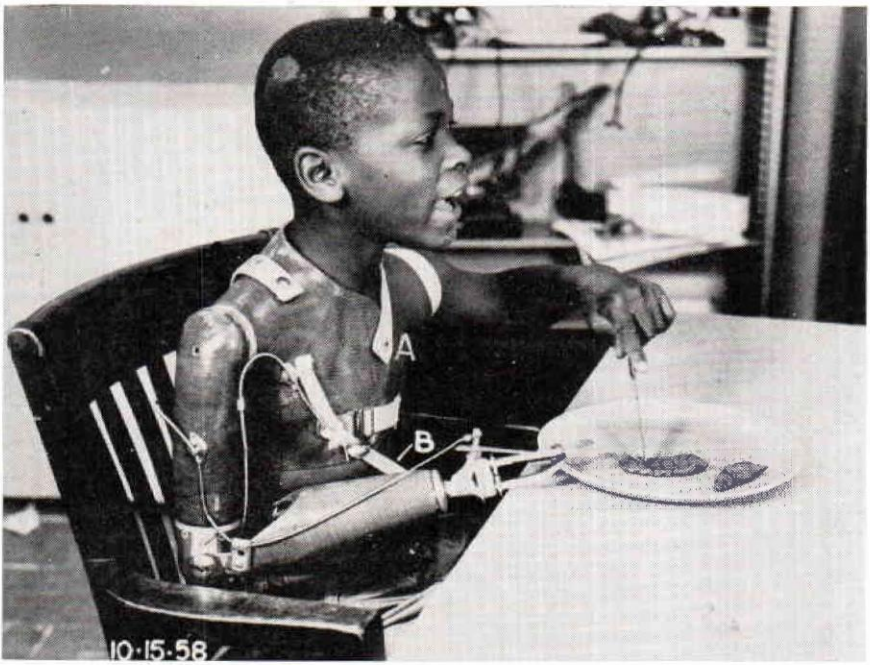

Figure 3—In his present prosthesis, over-the-shoulder clip has been replaced by a strap A. Elbow lock control is by a strap running to the belt on the opposite side B.

Efforts to initiate training in his community were not completed until four months after he received his second arm. He was persuaded to wear the device while in school, where he used it for some holding activities. There was no outside school use. Numerous adjustments of shoulder cap, harness, placement of control straps, cables, etc. had to be made from time to time. (It would have been financially impossible for a private shop to invest the time his problems demanded).

He again outgrew the prosthesis and a third one was given him in September 1957, almost four years after his initial visit. In the third device, a strap replaced the over-the-shoulder clip (Fig. 3) as his thorax had developed a sufficiently trapezoidal contour to hold the socket on.

He still performed at a relatively low functional level. This was due partly to the limitations imposed by the equipment, *i.e.* functional efficiency of prosthesis, and partly to lack of motivation. He could perform some simple tasks, such as button his cuff, carry a tray with both hands, sharpen a pencil, and hold a nail for the hammer.

For five months following delivery of the third prosthesis, there was no local training. When last seen in December 1958, he did not use the prosthesis except during training sessions, after a four-and-a-half year trial. His mother is only superficially interested in the problem. The scoliosis, which had developed post trauma, was corrected by the weight of the prosthesis.

The severity of his handicap and the impossibility of providing use stimulus or training in his home environment contributed to a rather unsatisfactory functional result here. The limited motor power (single scapular

motions) available for harnessing in this child, and the technical limitations inherent in the devices prescribed, all militated against a high performance level. These emphasize the desirability of development of a source of external power to operate prosthesis in the extremely handicapped amputee. A weighted shoulder cap alone would have corrected the scoliosis.

AN IMPROVED METHOD FOR SHAPING LIMBS

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The modern prosthetist is as truly an artist as any brush-wielding Rembrandt or Picasso. Each piece of his work bears some characteristic touch, which is the stamp of his personal talent. Just as surely as a fine canvas reveals, through stroke or color tone, the identity of its creator, a production in the field of prosthetics can be identified by those who know the products, with complete assurance: "This is the work of ————————; that was done by ————————."

Such artistic achievement is a source of very great pride, not only to prosthetists themselves, but also to those in all other branches of medicine who have occasion to work with these aids or their wearers. Sometimes, however, the naturalness or suitability of the appliance for the particular patient is sacrificed to artistic effect. This problem has been minimized, if not solved, by a new approach to the shaping of artificial limbs.

The technique described below was devised and used in the Child Amputee Prosthetics Project at the University of California Medical Center in Los Angeles, under the direction of Dr. Milo Brooks. It has been largely the work of Mr. Harry Campbell, C.P., with the cooperation of Mr. Lee Wilson, C.P., of the University of California at Berkeley. The method yields especially good results in wooden appliances.

Materials needed are: a Polaroid camera, projection film type 46, a grid background of one-inch squares, tracing paper, measuring tape, scissors, a band saw, and a sander.

The procedure is as follows:

1. Front and profile photographs are taken of the good limb (using a Polaroid camera and projection film, type 46) against grid paper.

2. The two slides are then reversed, or turned over, to give the outline of the opposite limb.

3. These can be used in the plastic mounts furnished for a 4x4 projector, or trimmed to fit 2x2 glass mounts. The latter size is correct for a standard-type 2x2 or 35 mm slide projector.

4. Next, they are projected to correct size, onto template or pattern paper. Careful measurements are made at this point (as shown in the figure), to insure the accuracy of the one-inch squares on the grid.