

The Evolution of the Georgia Warm Springs Foundation Feeder

ROBERT L. BENNETT, M.D.

Thirty years ago (March 1936) a young lady from Crawfordsville, Ga., was fitted at the Georgia Warm Springs Foundation with what was referred to in her medical record as "an

¹ Executive Director, Georgia Warm Springs Foundation, Warm Springs, Ga. 31830; member, Committee on Prosthetics Research and Development, National Academy of Sciences—National Research Council, Washington, D. C.

ingenious device" (Fig. 1). This apparatus was later called a "foot-operated feeder" because it required voluntary extension of her foot against a movable footboard on her wheelchair to bring about tilting of the seesaw cradle supporting her forearm. In this manner, she was able to feed herself. She used this device for twenty years and then returned to Warm Springs and was fitted with a far more efficient type with the imposing name "balanced forearm ortho-



Fig. 1. "An ingenious device" supplied in 1936 to a patient at Georgia Warm Springs Foundation; also known as a "foot-operated feeder "

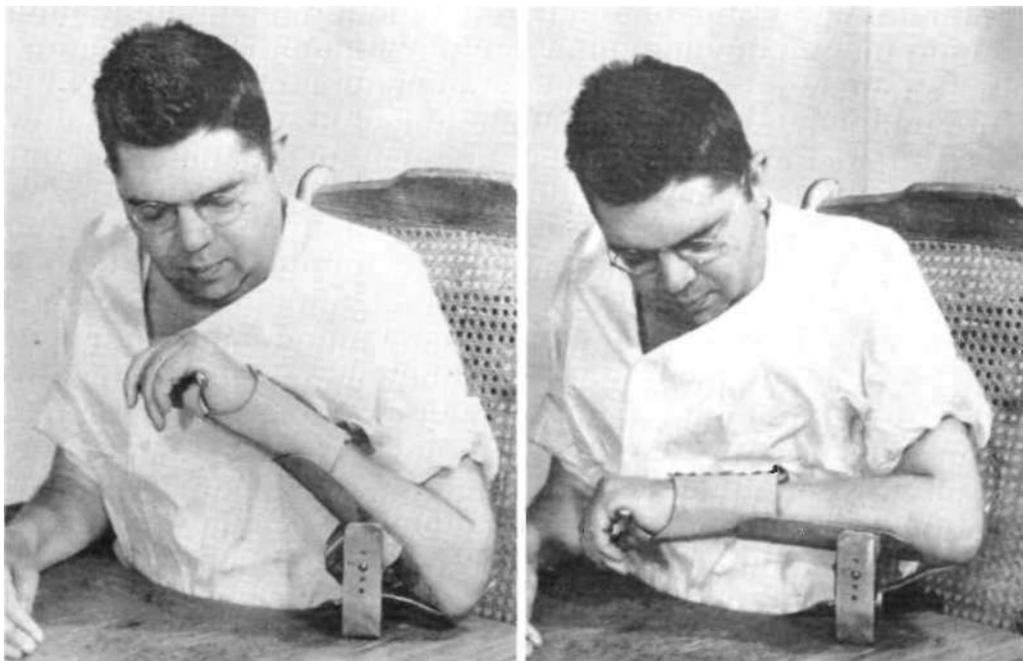


Fig. 2. Two views of the "Barker feeder" of June 1936. Perhaps the true ancestor of the present-day device, it required shoulder depression to bring the hand toward the head.

sis."² The "ingenious device" just mentioned appears to have been the first feeder ever used at Warm Springs, and perhaps the first ever used anywhere.³

² Dr. Bennett has a personal preference for the terms "orthesis" and "orthotics" (introduced by Dr. Bennett in an article entitled *Orthotics for Function* in the *Physical Therapy Review*, Vol. 36, No. 11, November 1956) rather than "orthosis" and "orthotics" (*Artificial Limbs*, Spring 1965). In 1959, at the request of CPRD, the American Orthotics and Prosthetics Association—then known as the Orthopedic Appliance and Limb Manufacturers Association—studied the question of "orthotics" vs. "orthotics," bringing together information from Greek scholars and lexicographers, as well as from members of CPRD, CPOE, and the fields of prosthetics and orthotics. At that time the terms "orthotics," "orthotist," and "orthosis" were adopted and have been generally used since.

³ In transmitting this article to *Artificial Limbs*, Dr. Bennett wrote: "Mrs. Hazel O'Connor, who should be given the major credit for the development of the modern Georgia Warm Springs Foundation feeder, is continuing to review the literature regarding similar devices and would be most appreciative of hearing from anyone with factual data, reprints, pictures, etc., of early feeders, particularly devices used before March 1936."

In June 1936 is found what appears to be the first feeder used at Warm Springs that required shoulder depression to bring the hands toward the head, and perhaps this feeder should be thought of as the true ancestor of our present-day device. As can be seen in Figure 2, the 1936 device consisted of a metal yoke bolted to the lapboard of a wheelchair but free to revolve horizontally. A metal forearm cradle fastened to the yoke by a wooden block moved vertically in a seesaw fashion. This was called a "Barker feeder," since Edward H. Barker was the first patient to use the device. Over the next few years, at least three patients were fitted with this type of feeder.

Reviewing the literature to determine the first feeder and then tracing the development of the feeder at Warm Springs has been an unexpectedly difficult and time-consuming job. It has been most difficult to separate mobile supportive devices used in the treatment of the paralyzed upper extremity from the functional seesaw devices used to assist the patient with a paralyzed biceps to flex his elbow.

Looking back over the years, one is rather amazed to find that it took so long to develop

the present-day balanced forearm orthosis. The excuse must be that the development of truly efficient orthetic devices comes only with persistent patient demands and long usage. Extensive patient demand for this type of apparatus did not come until the mid-1940's. Records indicate that perhaps as few as 20 feeders were made at Warm Springs between 1936 and 1946. It should be remembered that prior to the occurrence of large epidemics of poliomyelitis in the early 1940's there were



Fig. 3. The feeder of May 1943. The base of the "Barker feeder" has been replaced by a simple rod and collar. Several holes placed in the lapboard helped to determine the proper position for attaching the feeder.



Fig. 4. The stand feeder of March 1945. The aluminum base permitted the patient to move the feeder horizontally across the lapboard by body movements for best position.



Fig. 5. The "bird-cage feeder" of April 1946—so called because the trough was suspended in a yoke resembling the trapeze-like arrangement seen in many bird cages.



Fig. 6. Segmented-arm feeder used in December 1949.

really very few patients who survived the acute attack of poliomyelitis with massive involvement of upper extremities. As the incidence of acute poliomyelitis increased, the medical profession learned how to keep these patients alive. Rather suddenly, in the mid-1940's, Warm Springs was faced for the first time with the problem of large numbers of patients who had such weakness in their upper extremities that they could not bring their hands toward their head.

In May 1943 the bulky base of the "Barker feeder" was replaced by a simple rod and collar, the rod passing through a hole in the lapboard of the wheelchair and held in position by a simple collar (Fig. 3). Several holes were placed

in the lapboard to determine the proper position for attaching the feeder. In March 1945 the feeder was placed on a simple aluminum base (Fig. 4). This allowed the patient to move the feeder horizontally across the lapboard by body movements for best position.

The first real change in the design of feeders occurred in April 1946. The feeder was suspended from the upright of an overhead sling! Originally, it was called a "bird-cage feeder," simply because the trough was suspended in a yoke resembling the trapeze-like arrangement seen in many bird cages (Fig. 5). At this time, the Warm Springs treatment program dictated that no patient with severe upper-extremity involvement should use a feeder until late in the convalescent phase of care. Hence there was a natural transition from the use of overhead slings to protect the weakened shoulder girdle to the suspension feeder to develop functional capacity in the upper extremity. For the next ten years, there is record of 326 suspension feeders being fitted to a total of 197 patients. Only seven of this type were used after 1956, and none after 1961.

It was not until December 1949 that segmented feeder arms were used (Fig. 6). These arms were attached directly to the vertical tubing of the back of the wheelchair. Insofar as can be determined, hinged-spring control of the proximal link—seen in Figure 6—was used in



Fig. 7. C-clamp feeder developed in May 1950.



Fig. 8. Segmented-arm feeder of October 1952.



Fig. 9. Present-day Georgia Warm Springs Foundation feeder, the balanced forearm orthosis.

this instance only, and no further use of the mobile arms was made until October 1952.

The light and mobile C-clamp feeder that could be easily attached to the edge of a table, to the lapboard, or to a wheelchair arm rest was developed in the spring of 1950 (Fig. 7). Between 1950 and 1960, 61 were used on 45 patients.

In October 1952 the segmented-arm feeder was again used but without the spring hinge at the attachment of the proximal link to the back of the wheelchair. The proximal link was rigidly clamped to the upright (Fig. 8), allowing horizontal motion only. This feeder was followed in 1953 (Fig. 9) by one to which ball bearings had been added to the base and to the moving joints of the arms. The base could also



Fig. 10. Two views of a patient fitted with a corset-based feeder.

be tilted to assist movement of the proximal link. This was really the first of the present-day Georgia Warm Springs Foundation feeders. Between 1952 and 1964, 786 of these feeders were applied to 427 patients.

In September 1953 it was found that many patients with severe upper-extremity weakness had good musculature in the lower extremities and trunk; therefore, while they needed a feeder, they did not require a wheelchair. It was at this time that feeders were fitted directly to the trunk of the patient, either attached to a corset (Fig. 10) or to a belt. Between 1953 and 1961, 100 such feeders were fitted to a total of 53 individual patients.

During the years 1946 through 1964, for which the record is quite detailed and complete, a total of 1,334 feeders were applied to 773 patients. Some patients had several different

kinds of feeders, and so the latter number does not indicate that there were 773 different patients. In 1961 questionnaires were sent to 488 patients who had been fitted with feeders and who had returned to their homes with feeders. Two hundred nine replies were received; of this number, 139 (66.5 per cent) were still using their feeders.

The feeder, or balanced forearm orthosis, was developed primarily for patients with paralyzed upper extremities following acute anterior poliomyelitis; however, it is being used for many neuromuscular problems that result in lack of sufficient voluntary strength to bring the hand toward the head. More recently it has been used in conjunction with externally powered orthotic devices that activate elbow, forearm, and hand.