

Some Useful Equipment in the Rehabilitation of Permanent Spinal Paraplegics.

By ALFRED ROTHBERG

Superintendent Physiotherapist, Rehabilitation Centre, W.N.L.A.—Hospital, Johannesburg.

(I.) A BALANCING AID.

The physical rehabilitation of permanent spinal paraplegics has to-day become an established item in the programme of adequately equipped Rehabilitation centres. It has become possible to teach them crutch walking with the aid of long corset-type calipers. Provided no untoward complications occur, this programme usually takes four to six months.

Occasionally, however, the physiotherapist entrusted with the re-ambulation of spinal paraplegics encounters a patient who is not progressing according to schedule. A patient who started very promisingly, seems to approach a standstill in his progress.

Sometimes it is a patient with a cauda equina lesion and resultant flaccid paralysis of his legs who has done very well during every stage of pre-ambulation exercises. He has developed an adequate shoulder girdle and strong arm and hand muscles. His back and abdominal muscles have been built up. He is even walking well with his calipers in the wheel-crutch. Yet when he changes to ordinary crutches he becomes disappointingly slow. He lacks just that little extra confidence which would give him that easy lift for the swing-through movement, that well extended back and braced shoulders before advancing the crutches, and that steady shifting of weight from side to side, all of which make the crutch-walking of some paraplegics, considering their grave disability, appear almost graceful.

Another type of flaccid paraplegic may be handicapped by genuinely weak back and abdominal muscles. In the wheel-crutch we find him resting heavily on the axillary pads, almost hanging between the uprights. He resents extension of his back, tends to drag his legs, and is not easily persuaded to use his strong arms to lift himself towards the straight position.

If given ordinary crutches he would either sag forward or try to maintain himself standing with his spine flexed at a marked angle. In either position he would appear glued to the ground and convinced that it was impossible for him to propel himself forward.

In the category of spastic paraplegics there is a fairly frequent type of mid-thoracic cord lesion, in which the patient eventually masters his abdominal spasm sufficiently to assume the erect position in the walking machine, and with the aid of calipers learns to propel himself in it. However, when promoted to crutches, his former control of spasticity seems lost. Adopting a posture of acute flexion at the hips, he can just maintain himself between the crutches. Every effort at relaxing his tense abdominals produces only a reflex action returning him to the initial flexed position.

All these types, with constant tuition, will eventually learn the art of crutch walking. Gradually their confidence will increase. They will trust a muscle even if it is somewhat below normal strength, and they will lose the apprehension of an impending fall. But whenever the rehabilitation therapist meets one of these difficult patients, much additional time will have to be devoted to such a patient, guiding him towards better balance.

A flaccid paralysis case once described to me his difficulty in balancing with calipers and crutches. He said his trunk felt like a sharpened pencil trying to stand with its point on a polished table. And, pointing to his pelvis, he added that the table was not steady either.

With this picture in mind it seemed worth trying whether stabilizing the "table" would facilitate and speed up the acquisition of balance in the erect position.

The simplest way appeared to be a fixation of the walking calipers to the ground. The patient could thus be freed from fear of falling and concentrate on the balance of his upper body.



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.

Figures 1 and 2 show the type of double leg brace which our works department assembled as a portable unit on a sturdy steel plate. It is so constructed that it comfortably anchors the patient in his walking calipers to the base-plate and straps him securely to the semi-cylindrical leg supports.

The success of this apparatus was gratifying. The very patient for whom I had designed it turned from a disinterested near-objector to an ardent collaborator who simply could not get enough of his daily work-out in the "Balancer." At first still hanging on with one hand to an overhead strap, he soon balanced without holding on, learned to swing back to good hyperextension and forward beyond the vertical. After only a couple of days he himself asked for his crutches which until then he had loathed. To lift the crutches alternately for a three-point support ceased to be a terrifying experience for him. Shifting of the body weight from side to side became easy, and within another few days he was independent with his crutches.

It was obvious that in his case weeks of arduous work had been saved. Since then many of our patients have quickly gained confidence through this simple appliance.

Fig. 3 shows a patient with a fracture of the lumbar spine and resultant flaccid paraplegia securely braced in the apparatus. He is concentrating on maintaining the erect position just after he has released his grip on the overhead strap next to him.

We did not limit the application of the apparatus to plain balancing exercises. In order to encourage a wider range of move-

ment, develop increasing confidence, and provide an incentive to longer practice periods, we branched out into the field of play and games in the upright position.

We introduced catching and throwing of tennis balls, leading to aiming at targets and throwing the ball through hoops.

The fairly substantial 8-inch rubber ball provided the next step in the progression (Fig. 4). Throwing it over high bars and into net-ball baskets added range and accuracy to the body swing.

Attached to a rope it was used as a slow punching ball (Fig. 5).

A few patients developed sufficient control and co-ordination to let them try their hand at dart throwing.

To encourage swift and sweeping arm movements we gave our patients table-tennis bats and showed them how to hit the ping-pong ball (Fig. 6).

This proved such an attraction that we rigged up an improvised ping-pong



FIG. 5.



FIG. 6.



FIG. 7.



FIG. 8.

now several years ago, we sometimes received at our Centre patients with fractured spines, who had already spent a long period in their local hospitals, and had developed large pressure sores on back and hips. A treatment programme for these sores was worked out in great detail in conjunction with the nursing staff. In this careful routine it was an important point to avoid friction and irritation of the affected areas when moving the patient from the ward to the rehabilitation department, and when helping him from the lying to the standing position for his walking exercises.

The overhead frame reduced the risk of such friction to a minimum. It is wide enough to allow a wheel-stretcher or even a hospital bed on wheels to fit between the upright poles.

The transfer from the lying to the standing position is divided into five stages:

- (i) The patient, ready with calipers and boots, lies flat on the stretcher. The head end of the stretcher is wheeled under the cross-bar of the frame.
- (ii) He is assisted at the shoulders so that he can grasp the bar with arms extended.
- (iii) Pulling himself up with bent elbows he is lifted clear off the stretcher (Fig. 9).
- (iv) The stretcher is slipped out.
- (v) The patient, still holding on to the bar, is gently lowered to the standing position. (Fig. 10).



FIG. 10.

table. Before long we organised the first "match" between two complete paraplegics supported in the leg-stabilizer. Figure 7 shows a set between an expert and a beginner, the latter still holding on to an overhead strap.

All these activities compensated us to some extent for our inability to introduce on an adequate scale the much admired wheel-chair sports and games developed by Dr. Guttman of Stoke-Mandeville, for which, unfortunately, our centre-of-city hospital has neither ample grounds nor facilities.

Other uses of the apparatus can be found in the rehabilitation of badly affected polio-patients. A suitably adapted smaller machine helped a badly paralysed polio-child of four years on to calipers and crutches, and a little boy suffering from cerebral palsy built up confidence to overcome eventually his tendency to fall to the ground. Both children enjoyed exercise and play with their legs firmly secured. In these cases again much time was saved.

In the Occupational Therapy Department the apparatus may be helpful to let patients carry out such wide-range movements as wood planing and sawing. The portability of the apparatus should increase its usefulness.

(II.) PORTABLE OVERHEAD FRAME. (Fig. 8).

This frame was designed at an early stage of our work with spinal paraplegics. At that time,



FIG. 9.

According to the stage of the patient's progress either the axillary pads of the wheel-crutch (walking machine) or his ordinary crutches are then placed right under his armpits. He changes his grip from the horizontal bar of the frame to the crutch handles, and is ready to commence standing and walking exercises.

At the end of these exercises, the lifting routine is reversed:

The patient finishes his walking exercises immediately under the frame. He releases his grip on the crutch handles, changes to a firm grip on the horizontal bar of the frame, pulls himself up and is lifted to the horizontal position. The stretcher or bed is then wheeled under, and the patient is gently lowered on to it.

Pressure sores, fortunately, no longer constitute a problem. Great strides have been made in their prevention, and patients with fractured spines are sent at an early stage to the Rehabilitation Centre.

But the routine of getting the patient from the lying to the standing position with the aid of the overhead frame we have retained. It has proved a safe, time-saving and, above all, satisfactory method to the patient who feels that he himself takes a very active part in it.

On warm days the frame is taken to the court-yard and the patient goes through his routine in the open air.

In the wards we have used the portable frame for various other purposes. Easily sliding over the beds, it is often employed when permanent overhead frames or Balkan frames are not immediately available or otherwise not indicated. Slings can easily

be hooked on to the cross-bar of the frame, allowing elevation of a limb or exercises in sling-suspension. With rope handles attached to the cross-bar, the frame provides purchase for early pulling-up exercises towards the sitting position. Steel bars with iron discs can be securely suspended above the patient's head, supplying him with weight-lifting equipment for shoulder, arm, and elbow exercises against resistance whilst lying on his back.

(III.) IMPROVISED SUSPENSION SLINGS

The importance of suspension exercises in rehabilitation work is well known. Many physiotherapy departments are equipped with proper Guthrie-Smith Suspension Apparatus. There are, however, still hospitals without this valuable equipment.

During the war years, when proper Guthrie-Smith apparatus was hardly obtainable in this country, we employed various improvisations.

A simple yet quite efficient substitute was found in the application of bicycle tyres of balloon size 26 x 2, which provide both support and elasticity.

Suspended from Balkan frames, swan necks (monkey chain holders), or similar overhead supports, these improvised slings enabled us to give a good deal of suspension therapy to our patients.

Although this is only an improvisation and far from the versatility of the genuine equipment, it is described here, because many visiting medical officers and physiotherapists were impressed by its simplicity and easy application.



FIG. 11.

Figure 11 shows a spastic paraplegic with flexion deformities at hips and knees comfortably slung up while concentrating on relaxation exercises.

SUMMARY.

Three types of equipment are described and illustrated:

- (1) A Trunk Balance Aid in the form of double leg braces, securing the patient to the ground in the standing position.
- (2) A Portable Overhead Frame which has been found useful in transferring the patient speedily and safely from the lying to the standing position. Other uses of the frame, especially in the ward, are also described.
- (3) Improvised Suspension Slings in the shape of bicycle tubes, as a stand-by in hospitals where proper suspension apparatus is not available.

PERSONAL

Miss Jean Blair left by plane on June 1st for London where she will spend a holiday. She will be back at the beginning of August.

Miss Gwen Wilson, physiotherapy lecturer on the staff of the University of the Witwatersrand, was married recently to Mr. K. Taylor.

Mrs. C. Levy (née Sack) gave birth to a son on May 1st.

Mr. A. A. Weil has left the staff of Baragwanath Hospital and is now in private practice.

Mrs. J. Braatvedt has left to go overseas for an indefinite period. She has been given leave of absence from the Central Executive Committee and her place as Secretary/Treasurer of the Southern Transvaal Branch has been filled jointly by Miss Sandra Säber and Miss Carol Baker.

The Johannesburg General Hospital welcomes to its staff Mrs. Wendy Browne (née Eybers), who has returned from England where she gained experience particularly in chest work at Harefield.

Mrs. Eilcen Gunter is doing valuable work for the Hospital as a remedial gymnast.

We are sorry to lose from the staff Miss Jean Scott-Russell who has gone to the Frere Hospital, East London, and Mrs. D. Courlander who has moved to Southern Rhodesia.

CHANGES OF ADDRESS

Mr. J. G. Koehorst to 608, U.B.S. Buildings, Bloemfontein.

Miss E. Kamptner to 6, Cordelvos Crescent, Iscor Township, Pretoria.

Miss U. Moffit to Physiotherapy Dept., Baragwanath Hospital, Johannesburg.

Mrs. E. B. Searcey to 13, Truborough Mansions, North Street, Illovo, Johannesburg.

Mr. A. R. W. Gabriel to c/o Umlamli Hospital, P.O., Sterkspruit, Herschel District, Cape Province.

Mr. P. A. C. Kelly and Mr. L. G. Holton to 287a, Skinner Street, Pretoria.

Mrs. G. Browne (nee Eybers) to 7 Tressry Place, Simmer Street, Germiston.

Mrs. L. L. Channock to 468, Musgrave Road, Durban.

Mrs. E. A. Cotter to Medical Centre, 23 Joubert Street, Vereeniging.

Mrs. G. Dell (nee Andrews) to 2, Mimosa Court, 342, Louis Botha Avenue, Orange Grove, Johannesburg.

Mrs. L. Levy (nee Loon) to 48, Westbury Road, Belleville, Cape.

Mrs. S. Lewis (nee Robinson) to 4, Alexia Court, 3rd Avenue, Peacehaven, Vereeniging.

Mrs. H. M. Sanders to Evelyn House, 114, High Street, Grahamstown, Cape Province.

Mrs. Uniacke to 23, The Drive, Durban North.

Mrs. M. Becker to Box 143, P.O. Westville, Natal.

Mrs. D. Courlander to P.O. Box 148, Bulawayo, Southern Rhodesia.