ABSTRACTS

Amputees and Artificial Limbs.

Henry H. Kessler, M.D., Ph.D., Newark, N.J. In Journal of the American Medical Association, 142:3:176, January 21, 1950.

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Amputees react to their disability in a variety of ways. A small number adjust rapidly because of excellent medical care and prosthesis and favourable social, economic and vocational conditions. Others, overwhelmed by the severity of their disability (such as a high double above-knee amputation), or by the lack of satisfactory conditions of living, become completely helpless. The majority, however, struggle valiantly and patiently until the weight of circumstance tips the balance for or against them.

Rehabilitation is a concept of treatment which can facilitate and perfect a satisfactory adjustment. By rehabilitation is meant an integrated plan of treatment in which full restoration of the patient is the combined responsibility of the surgeon, limb maker, physical therapist and all ancillary personnel concerned with the preparation of the patient for gainful employment.

Rehabilitation of the amputee does not begin with his discharge from the hospital nor with the fitting of the prosthesis. Properly, rehabilitation begins when the patient is hurt. Faced with the triple threat of loss of an organic part of the body, severe emotional shock as a reaction to this experience and the social prejudice of the man of the street to the obviously crippled, the amputee is prey to a thousand anxieties and apprehensions.

One of the most common causes of poor fit of the prosthesis is an inadequate stump.

Immediately after amputation certain changes take place in the stump which make it, actually, a pathologic organ. These changes occur in all parts of the stump, skin, subcutaneous tissue, fascia, muscles, blood vessels and nerves.

There are three types of changes in the stump which influence the patient's ability to wear a prosthesis satisfactorily: atrophy, contractures and circulatory trouble.

Contractures are responsible for much poor adjustment to artificial limbs. Improper postoperative posture and muscle imbalance are the most common causes. The practice of placing pillows under the thigh or knee is a frequent practice which cannot be too strongly condemned. The improper position of the limb induced by these pillows or sandbags is usually unnoticed by the solicitous nurse or relative who placed them there. The cause of these contractures can be easily demonstrated by having the patient lie on his back, flex the sound hip on the abdomen with both hands and attempt to place the stump of his amputated leg on a table, in a flat position. Invariably, the stump will be elevated and flexed. Thus the flexed stump makes proper fitting of a prosthesis difficult, if not impossible. It is like fitting a round peg in a square hole.

These flexion contractures can be prevented by elimination of all pillows and sandbags from the patient's stump. The use of moleskin traction skin strips may also prevent the formation of these contractions. Once they have appeared, they must be vigorously treated by repeated and systematic manipulation and stretching — manually, by forced movements, resistive exercises or weights and pulleys.

Abduction contractures also frequently follow above-knee amputations, especially in the presence of short thigh stumps. Development of the adductors and the extensors of the hip by systematic exercise is necessary for proper control of the prosthesis as well as elimination of the contracture.

Other exercises also are necessary; the amputee who carries out systematic conditioning activities will find operation of his limb considerably facilitated. The amputee is not expected to become a professional athlete — merely to train like one! Certain other specific exercises are indispensable to good limb wearing. For example, the basis of good walking is balance. For the bilateral above-knee amputee, proper balance is impossible without good abdominal muscles. These men are most in need of adequate muscle conditioning, but all above-knee amputees require strong abdominal muscles as a basis for good balance.

Few amputees require simplicity more than does the man who has lost his upper extremity. Loss of a leg can easily be compensated for, and its function duplicated, by mechanical means, because weight bearing is easily reproduced. But when a man loses his hand or arm its functions of grasp and touch cannot be duplicated — they can only be imitated, and poorly at best. Thus so many arm amputees become discouraged with their prosthesis; they expect too much. It is therefore necessary that the patient's psychologic preparation include awareness of the limitations of his prosthesis. He will be saved many heartaches and prepared for a realistic attitude toward his own possibilities.

The amputee's ability to use his prosthesis and walk properly is affected by four important factors: a flexed or contracted stump, a poorly fitted or aligned prosthesis, fear of falling and improper balance.

The after-care of the stump and the fitting of the prosthesis has already been discussed. Unless the patient is given the necessary training, he will not conquer his fear of falling or overcome his improper balance. The artificial limb is a special instrument which demands some understanding of its use and application. To expect the amputee to walk well immediately after his limb has been fitted is to presume that he has the combined knowledge of the surgeon, engineer, limb maker, physical therapist and physiologist.

Although the period of training will vary with the nature of the amputation and the attitude of the patient, a standard period of training would be about one month. During the first week the patient learns to apply his prosthesis correctly. Exercises in balance are carried out in a gymnasium with hand rails or at home with two strong chairs about two and a half feet (76 cm.) apart. Practice should be done before a long mirror, and the eyes of the amputee should be on his reflection and not on his feet. With hands on supports, the patient slowly shifts his weight to the side of the normal leg until the foot is in line with the chin and

the weight is evenly distributed over the foot. This position is held for about three seconds. Next, the weight is slowly shifted to the artificial limb. Much of the weight will have to be taken by the hand supports. With time and practice the patient should be able to maintain correct balance with the hands resting lightly on the supports, until finally balance can be obtained without using the supports at all. Additional balancing exercises are carried out until the patient can stand, with correct posture, and place his foot in front, in back and to the side without losing balance. These first exercises are indispensable.

The second week is devoted to practicing level walking on various types of terrain, such as plaster, soft earth, glass and stone. Gait exercises are undertaken in zig-zag and side-to-side fashion and on fixed figures on the floor.

In the third week exercises include arm movements in a standing position, co-ordination of arm movements and walking, walking over obstacles such as mats and hurdles, walking down steps and endurance exercises for five minutes.

During the last week, complete freedom is allowed in walking and includes routine sports activities, such as bicycling, riding, dancing and hiking.

The double amputee receives special exercise consideration. During the first week he must become accustomed to his legs. The second week he learns balance. During the third week he begins to walk, preferably with the assistance of two canes or hand rails, and by the fourth week he is generally able to walk without any support or, at the most, with one cane. In the meanwhile, he performs general gymnastics with and without the prosthesis. Patients engage in a variety of sports, including swimming.

These exercises and training technics not only are applicable to new amputees but are of value in correcting faults of experienced wearers.

Recapitulation

The rehabilitation of the amputee is not a disorganised, fragmentary type of treatment but an integrated concept of medical care that sees the patient through from injury to employment. It begins in the hospital, where the patient is not allowed to waste time but begins at once with the development of his mind and body to the demands of daily living. By judicious care of his stump, the patient is prepared for the wearing of a prosthetic appliance. The fit of the appliance is given the greatest consideration. Finally, the patient receives the training which helps him realise fully the potentialities of his new limb. The artificial limb, good as many of them are, is only a substitute for the limb that has been lost, and it behooves the amputee to get all he can out of the prosthetic limb by training himself to become expert in its use.

Under existing laws, physically disabled persons of working age may receive physical restoration services, including artificial limbs, vocational training and placement services, to make them employable. The state and federal governments have learned that it is a good investment to train handicapped workers to fill useful jobs and lead productive lives. To be eligible for the state-federal services, the disabled person must be of working age, have a substantial job handicap because of physical or emotional disability and have a reasonably good chance of becoming employable through rehabilitation services.

Thus the surgeon, limb maker, physical therapist, social worker, rehabilitation counselor and the representatives of public and private agencies contribute their joint efforts to provide a full service to the civilian and military amputee. By availing himself of their services, he can become and remain a socially satisfied and economically independent citizen.

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Intermittent Treatment of Poliomyelitis with Progressive Resistance Exercise

Sedgwick Mead, M.D., St. Louis. In Journal of the American Medical Association, 144:6:458, October 7, 1950.

The first report on the use of progressive resistance exercise in poliomyelitis is that of De Lorme, Schwab, and Watkins in 1948. Every report since that time has been an enthusiastic confirmation of the value of this form of treatment, without a single dissent. As a result of my experience with the method since the early part of 1947, I believe that it is by far the most importannt contribution yet made to the treatment of this disease.

There has been sometimes justifiable criticism of the use of physical therapy in poliomyelitis and cerebral palsy. This criticism must be met by increasing use of quantitative measures of progress such as are provided by the technique of progressive resistance exercise. The manual muscle grades (Lovett) are inexact but must also be used until better measures are devised. Goniometric measurements are simple and obvious. It is the duty of the occupational therapist to test the patient against a checklist of daily living activities. She can also help the patient to recover co-ordination and skill.

Quantitative determinations not only reveal progress but show when it is lacking. When three or four determinations of the resistance maximum all give the same result, even the patient gets the point and is willing to discontinue treatment. The patient with an absolute limitation is thus given realistic insight into his disability and encouraged to learn how to live within it. Without such quantitative data it is possible for the unscrupulous or self-deluded physician to continue treatment of the patient for preposterous lengths of time, holding out vague promises of future cure.

It has been asserted that physical therapy in poliomyelitis is a useless luxury because the patient, by the physiologic demands of his home activities, will recover to the fullest possible extent without additional exercise. The final case report is pertinent to this objection.

The rehabilitation of the patient as a whole is presumed. Stabilisations, transplants, epiphyseal arrests, vocational testing, and training are as important as they ever were.

Summary

1. The use of progressive resistance exercise in convalescent poliomyelitis is described.

2. A few weeks of intensive daily exercise is alternated with three or four months of home activities until no further improvement occurs.

3. Advantages of this regimen over continuous treatment include economy of effort and means, more efficient use of equipment and personnel and better psychological adjustment. Most important is the quantitative measure of progress provided.