

# Some Problems in the Management of Upper-Extremity Amputees

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EXPERIENCE in the rehabilitation of upper-extremity amputees in recent years has highlighted the advantages of many concepts not previously considered or else heretofore noted only superficially. Not only has the development of prosthetic devices assured a greater degree of rehabilitation of many more amputees, but consideration of the amputee as a whole also has played a major role. It is now well recognized that, in times past, attention was too often directed only to the amputation stump. After the wound had healed, the patient was referred to a prosthetist without benefit of a physician's final evaluation. The development of the clinic-team approach (J) foreshadowed the end of such practices, and with the growth of the clinic team has come the all-important factor of considering the patient as a whole.

Implicit in such an approach is the concept that complete upper-extremity rehabilitation can rightly be expected only when the amputee has been afforded adequate training in efficient utilization of the prosthesis with which he has been fitted. Incomplete or unsystematic training is, at best, responsible for improper habits in prosthetic usage and hence for awkwardness and inefficiency. In the extreme case, it may lead to discard of the prosthesis entirely even though the components involved may themselves be of the greatest utility to an accomplished amputee wearer. The therapist has thus come to be looked upon as an important member of every prosthetics clinic team.

The importance of good health also has come to be realized. The patient who suffers

from complicating injuries or diseases may not be able to cooperate fully, and when cooperation is limited, interest and motivation die rapidly. For example, the obese patient will profit by guided weight reduction and proper weight stabilization, and the anemic and allergic will benefit by proper corrective measures. Dermatological problems frequently are a serious complication for the amputee, especially when involvement of the stump is threatened or when harnessing excoriates areas of existing dermatitis. Here proper therapeutic measures may permit continued use of the prosthesis or ensure only a temporary suspension of its use. If, however, such conditions are allowed to continue unchecked, they may result in a prolonged period of inactivity.

Equal in importance to good physical condition is a healthy mental attitude. Unless rehabilitation therapy includes consideration of the patient's mental outlook, the entire process of recovery may result in complete failure. Accordingly, some cases may require the assistance of specialists in psychiatry and related fields.

With respect to the patient's mental condition, an important factor relates to vocational and avocational pursuits. Whether an amputee can engage successfully in work and recreation to his own liking, and whether he has a taste for such activities as are possible to him, may together spell the difference between success and failure in any given case. Proper attention by a qualified occupational therapist is therefore essential.

Functional loss aside, a number of other problems arise from hand loss. In addition to the functions of grasp and tactile sense, the hand is used in many symbolic patterns—in benediction, in supplication, in the salute,

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in the handshake. These are ancient and time-honored functions denied the person who has suffered loss of the hand. In the rehabilitation of the upper-extremity amputee, too much stress often is laid upon the restoration of functional losses relating to prehension, often forgetting the extraprehensile activities essential to the amputee's existence.

In addition to these matters are the problems associated with the importance of early fitting and those involved in the special cases of multiple amputation. And finally, mention deserves to be made of the largely faulty but widespread notion that people are inherently right-handed or left-handed. In the rehabilitation of the upper-extremity amputee, the popular concept of hand dominance leads to one of the most difficult problems to be overcome.

Since each of these individual problems is closely interrelated with all the others, the order in which they are considered by the clinic team is of no particular significance. Of greatest importance is that they all *be* considered and that over-all evaluation of the amputee's status take into account all the individual factors that, together, constitute total rehabilitation.

## THE PROBLEM OF HAND DOMINANCE

Most people define handedness solely on the basis of whether the right or the left hand is used in writing, or in throwing a baseball, or the like. The less specific definition of a medical dictionary, which describes handedness as the preferential use of one hand over the other, is perhaps more acceptable, for handedness does not appear to be a flat case of one "necessary" and one "nice-to-have" hand but rather a case of two cooperating members either one of which could be trained as the leader. Nevertheless, the concept of dominance is so widely established that loss of the writing hand is considered by most compensation authorities to constitute severe disability, whereas loss of the other often is viewed lightly. Similarly, loss of one hand in the ambidexterous generally is considered to present no great rehabilitation problem.

How do we determine whether an individual is right- or left-handed? When the average

person is asked which is his dominant hand, he usually selects the writing hand. In the upper-extremity amputee, we seemingly are presented with a case of "dominance" or "sub-dominance." Simply to ask the patient whether he is, or was, right- or left-handed is, in most cases, a wholly inadequate method of determining the degree of dominant handedness. It produces premature evaluations of disability and of future rehabilitation problems, both of which may need complete revision before the patient is discharged from the care of the clinic team. The problem of handedness is of primary interest to those directly responsible for all phases of training the upper-extremity amputee. It is during the preprosthetic stage that the real aspects of dominance present themselves, for during this period the patient is a one-handed individual.

## THE DICTATES OF CONVENTION

Judging from the design of many of the articles we use daily, it appears that society already has dictated that ours shall be a colony of right-handed individuals. From the position of the knife and fork at the table to the placement of the gearshift lever on the modern automobile, we are reminded constantly that we are expected to use our right hand much more than our left. This decision of engineers and of authorities in etiquette causes no small concern to the parents of children who seem to use the left hand more than the right. Parents recall other left-handed individuals—individuals who always find themselves crowded when seated at the dinner table (Fig. 1), or whose bodies assume the position of an animated corkscrew when attempting to write at a desk. For these and other reasons, parents try subtly to encourage the use of the right hand in the young child, despite some of the beliefs of medical science. Even the garmentmakers have conspired against the man who uses his left hand for some tasks. Commonly, a button is placed over the left hip pocket, where it seems understood the wallet will be placed, while the right hip pocket is free for easy withdrawal of the handkerchief. The man who uses the left hip pocket for the handkerchief has no protection for the wallet when it is kept on the right.



Fig. 1. The southpaw at dinner. Convention dictates the norm; habits in conflict with the established pattern usually lead to trouble.

#### THE POPULAR FALLACY

These elementary observations indicate that hand usage is dictated by habit patterns, possibly as a means of conforming to the norms of the society in which we live (page 9). It is important, however, to consider whether or not truly right- or left-handed individuals exist and, if so, to consider what is meant by the terms. As has been noted, when the arm amputee first is questioned about handedness, writing is apt to be the first thing considered, and the answer is likely to be made on that basis. Additional questioning usually reveals that, although the patient may have used the right hand for writing, many other tasks requiring delicate, coordinated movements might have been done with the left hand, or vice versa.

Too many persons believe that the writing hand also is the only hand capable of performing all other smoothly coordinated tasks. As more probing questions are asked of the patient, it may be evident that the opposite hand also performs many functions. If the keys or small change are carried in the pocket opposite from the hand used in writing, bilaterality rather than simple dominance may well be indicated. Information in this connection can be elicited more readily with male patients by asking which pocket carries the handkerchief, which pocket holds the

wallet, which hand holds the pipe or cigarette, and which hand is used to strike a match.

It often is surprising to find that, with the exception of writing, almost all daily activities involve equal participation of both hands, one serving as a helper to the other with interchangeable ease. When loss of the use of a hand occurs, either temporarily or permanently, the most frequent problem stems not from the inability to write but rather from the inability to perform the tasks requiring use of both hands—tying shoes, buttoning clothes, cutting food, and so on. Hence, it is important that a prosthesis be designed to restore bilateral activity rather than dominance or the ability to write. When a patient loses a so-called "subdominant" hand, he soon expresses some degree of surprise at the number of jobs formerly done by the missing member. He also notes, with as much surprise, that many tasks are quite difficult for the remaining hand alone, even though it be the dominant or leading hand. But the amount of time required to relearn all these tasks, including writing, with some degree of agility is quite short. Except in bilateral cases, the patient soon becomes reasonably independent. If allowed to continue as a one-handed individual, the unilateral arm amputee soon learns short cuts that permit him to be more independent and ultimately to feel that he has no need for a functional replacement of the missing hand.

Such a patient gives the greatest cause for concern. Perhaps the inability of some to recognize the absence of a true dominance or to understand the rapidity with which a one-handed individual can adjust and become reasonably independent may, in some measure, account for a number of failures in upper-extremity rehabilitation. Certainly there are other causes—inadequate surgery, poor prosthetic replacement, inadequate training—contributing to these failures. But only when all of these factors are considered and eliminated can full utilization of the prosthesis be expected.

The patient who has learned to do reasonably well with one hand is the very patient most likely to be a failure when fitted with a prosthesis. His training will be most difficult and frustrating for all concerned simply

because he cannot recognize the need for a prosthesis. Training for such a patient comprises largely a program of unlearning all of the grotesque contortions to which he has become accustomed. Because here the individual, having been pleased with his one-handed accomplishments, must learn to be a two-handed person again somewhat against his "better judgment," frustration becomes an important consideration. The more complicated the prosthesis, the lower is the frustration tolerance of the patient because he cannot accept the need for a device which seems to complicate rather than to simplify his life.

#### A TWO-HANDED WORLD

One might now properly ask why so much concern should be shown for such a patient. Would it not be easier to permit his unilateral activities to continue and thereby eliminate all problems of fitting, training, and further care? Unfortunately, the solution is not so simple. We live in a two-handed world. To maintain our place in society, two hands are needed, or at least substitutes for them. One need only consider the obvious difficulties encountered by the one-handed individual when carrying a loaded cafeteria tray, serving himself at the table, or attempting to tie up a parcel (Fig. 2). In the effort to prevent similarly embarrassing situations, the one-handed person may gradually seek less and less public contact, social and vocational, and with this self-inflicted isolationism ultimate loss of his own security may develop. Despite all short cuts and self-helps, the amputee who remains without a prosthesis must still require a degree of additional assistance for many tasks. A functional prosthesis offers independence. An unfitted stump usually leads only to a gradual but ultimate deterioration of self-pride in all tasks, public or private.

#### PSYCHOLOGICAL PROBLEMS

When it appears that a patient has emotional complications that are not responding to treatment, he should be referred to other medical specialists. Such emotional problems may occur at any phase of the patient's course, and the use of proper specialists will, in many instances, permit the rehabilitation

team to continue its work while the patient receives the indicated treatment. Prompt recognition and treatment of such unfortunate situations often will salvage the patient, where otherwise he might drift aimlessly through prosthetic fitting and training until the symptoms are so pronounced as to be recognized by everyone on the street.

Initial interviews rarely, if ever, disclose an amputee's underlying feelings about his loss. As he advances through the rehabilitation processes, the amputee may feel that it is too late to open questions of fear and misgiving, in which case his feelings of insecurity are only perpetuated. Hence, it is wise for the physician to suggest possible questions and answers when the amputee is first interviewed. To focus attention upon likely questions may offer an opportunity for the patient to talk about his family's acceptance of his amputation, to discuss social problems resulting from his physical and mental condition, and to air any other problems peculiar to the individual. Unfortunately, no hard and fast rule can be applied; for no two amputees are alike, either in physical or mental make-up or in social and economic status. In any given case, each question should be answered as frankly as possible, and, if the answer is not known, every effort should be made to provide one as quickly as possible. Although left to themselves most amputees ultimately find the answers to their own questions, the answers thus obtained usually come only after many frustrations and sometimes after severe emotional stress (1).

#### MEDICAL PROBLEMS

The problems of pain, real and phantom, and of phantom sensation, sometimes are so difficult as to postpone actual fitting and training or even to suspend use of the prosthesis after it has been fitted. Recently, phantom pain and phantom sensation have been explored at length (5,6,9), and more complete concepts of etiology and treatment now are evident. When it is caused by thin or densely adherent scar tissue, neuromata, or bony spurs, stump pain is one of the most common causes for delayed initial fitting or for abandonment of the fitted prosthesis.

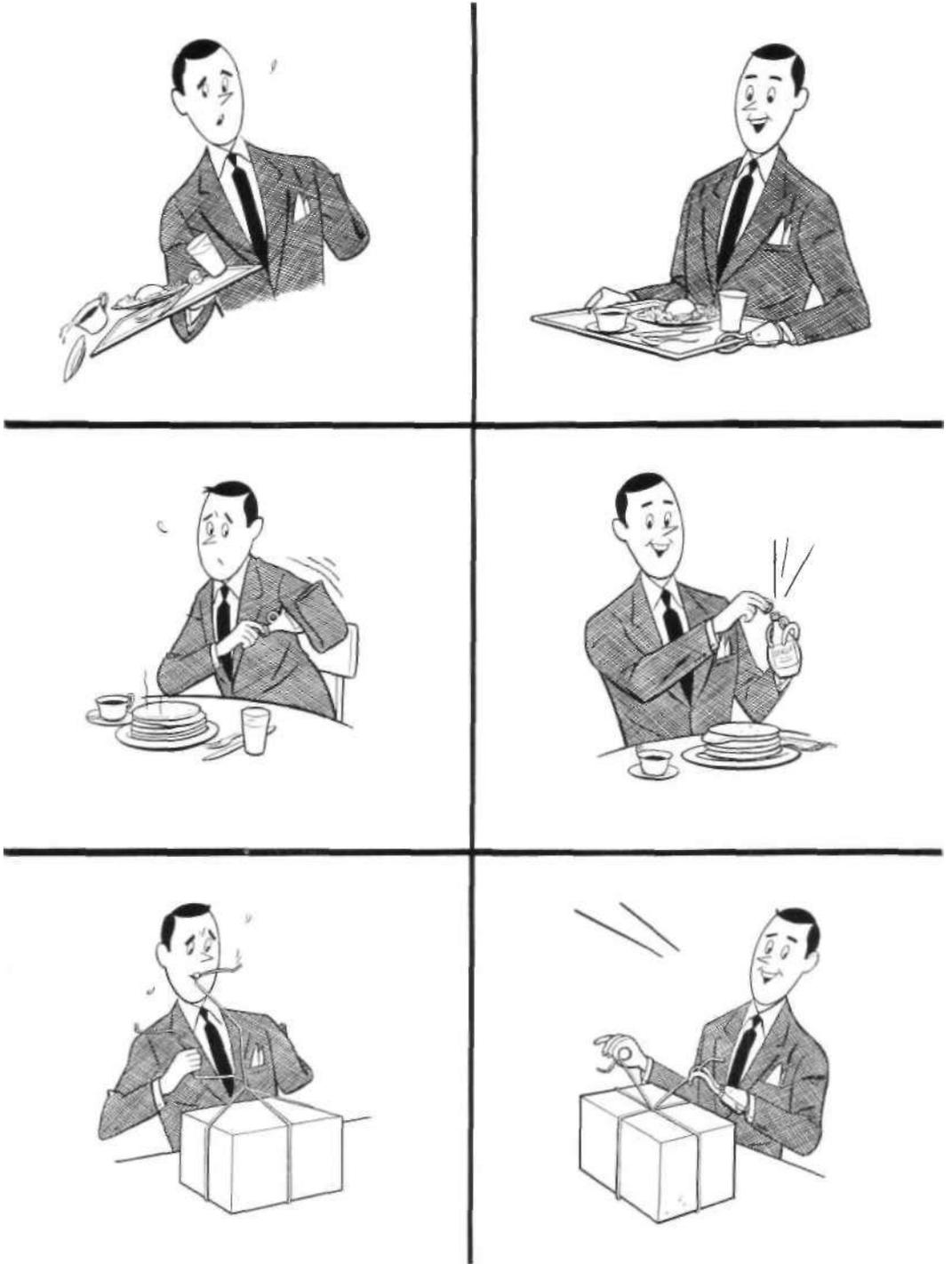


Fig. 2. The empty sleeve versus the upper-extremity prosthesis—some examples. Although the unilateral arm amputee may learn to perform well with the remaining sound hand many activities formerly conducted with the amputated member, and although the stump and other parts of the anatomy may be called upon to substitute in "two-handed" activities, a great many essential functions are carried out awkwardly, if at all, by the arm amputee who remains unfitted.

In such cases it is futile to delay treatment in the hope that actual fitting, continued use of the prosthesis, exercise, or physical therapy may render a neuroma painless or reduce a spur so that it no longer is troublesome. As time passes and the pain or tenderness persists, the patient is entirely justified in questioning whether or not he ever will be able to wear a prosthesis. Specific difficulties that do not respond to conservative measures should be corrected surgically and with the least possible delay. When it seems wise to attempt a conservative approach to minor stump difficulties, an explanation will ensure the patient's continued confidence in the physician. During such a period, the patient's progress must be evaluated regularly. When and if the conservative treatment fails, more radical measures are in order.

#### VOCATIONAL PROBLEMS

All amputees—those, like the housewife, engaged in the home as well as those employed in business and industry—have vocational problems at one time or another. Again, the patient requires much honest and factual reassurance. Although the trend in employment of the physically handicapped is much more gratifying now than it has been in

previous years, rose-colored pictures of industries seeking amputees for all types of employment lead only to false comfort and to eventual disillusionment of the patient. Although true vocational counseling has become a specialty in itself, the physician must never lose sight of the fact that the job of restoring the patient to useful function is his, the physician's, personal responsibility. Even though the patient may at some time be evaluated by a vocational counselor, the physician must regard the evaluation as a type of referral with continued follow-up to ascertain the progress being made.

Proper use of the social worker may prove invaluable in maintaining close liaison with the employer and the rehabilitation team (2,3). The employer should be encouraged not to discharge the amputee patient until the possibilities of further employment have been fully explored. To the new amputee still in the hospital, nothing can be more devastating than a notice to the effect that he has lost his employment as a result of his newly acquired handicap (Fig. 3). Assurance that there is a reasonable chance of continued employment, or that efforts are being made to place the patient in some similar position, will do much to speed his total recovery and to provide

motivation, the one factor without which there can be no genuine rehabilitation.

It is fortunate that current trends in aiding the physically handicapped are toward providing vocational training and placement rather than monetary compensation and the subsequent opportunity to sit in the park and collect the pitying, sideward glances of the passers-by. The amputee who formerly held a job requiring bilateral hand use very early recognizes the need for



Fig. 3. The pink slip versus the helpful proprietor. In total amputee rehabilitation, morale is important. Full cooperation of the employer is essential to the success of the prosthetics clinic team.

a prosthesis, accepts it readily, and receives training as quickly as possible. With the younger, inexperienced person, who perhaps has drifted aimlessly through several more or less unproductive jobs, the problem of prosthetic acceptance and use is more complicated. Such a person has yet to learn the true value of two hands.

Unfortunately, some of the veterans of World War II and of the Korean conflict have been victims of such an experience. These men, many coming directly from high school or from odd jobs, had no opportunity to learn vocations or skills requiring use of two hands. Consequently, many of them accept a prosthesis, cooperate halfheartedly in training and follow-up, and then discard the prosthesis to look the country over for a job they can do with one hand and sympathy. When an effort is made to offer these people vocational guidance, many indicate they are "going to school," apparently in the belief that one can get through school with one hand. But as a matter of fact the process of education more often than not demands bilaterality, and the inability to recognize the value of a prosthesis constitutes the principal reason why many amputees eventually withdraw from schools.

#### TRAINING PROBLEMS

Although there can now be no doubt of the value of prosthetics training, it is interesting to note that many amputees, usually those who have worn a prosthetic device for many years, indicate that they see no need for training. The patient and prosthesis become one, and little tricks of operation and short cuts, all of which lead to increased efficiency, become second nature. From such a peak of efficiency it is difficult to remember the basic training required to perfect every motion. In the past, moreover, training rarely was conducted as intensively as it is today. Simple instruction in the use of the terminal device, usually by the prosthetist, was about all the patient could expect, and he depended on trial and error and the passage of time for the remainder of his training.

A patient who has gone through such a procedure may scoff at the prolonged period of time now thought necessary to assure ade-

quate training in prosthetic control. But the time thus spent really is immeasurably short because it saves the patient much false motion and wasted effort and prepares him to resume his place in society more quickly than the patient with no training. Of course, training must not be confined to the period of prosthetic wear; rather, it must start as soon as the condition of the stump permits (7,8). Preprosthetic training includes maintenance of joint mobility and muscle strength as well as maintenance of cerebral patterns of motion.

#### THE PROBLEMS OF MULTIPLE AMPUTATION

The bilateral hand amputee presents both to the patient and to the medical staff a problem of the greatest difficulty. The patient who has lost both hands still possesses two stumps which afford some means of gross prehension. A pencil can be grasped for crude writing, an eating utensil can be held between the stumps for clumsy eating, and the stumps fill out the sleeves. But all delicate prehension, all discrete tactile senses, are lost. Initially, the bilateral amputee is apt to be deeply depressed, and he therefore usually responds poorly to the first rehabilitation contacts. He requires as rapid a fitting as possible, because otherwise he remains almost completely dependent for all necessities, not only economically but, more important, socially and in the home. The latter situation is the one usually most devastating and the one which unfortunately most often is brushed over when the patient first is met. He must have assistance not only in eating but in all toilet activities as well and finds himself relegated to a crude and almost infantile existence.

Prosthetic training is much more detailed and prolonged for the bilateral amputee than for the unilateral because the patient has no remaining natural hand for a prosthesis to assist. All acts of dexterity must be accomplished by one or the other terminal device. The therapist cannot consider training complete when the patient meets the requirements of the unilateral amputee but must, in addition, cover use of the prostheses in all acts of everyday life—feeding, toilet care, and dressing. It is fortunate that such activities are well within the realm of accomplishment for

the bilateral hand amputee, especially when the stumps are comparatively long and the natural elbows are intact.

An additional complication, usually resulting from trauma, involves amputation of part of a leg in addition to loss of an arm. In the light of present experience, neither amputation truly can be said to take priority over the other, and each case must be considered on an individual basis. In every case, body mechanics and sense of balance are impaired seriously. Gait training becomes more difficult when a part of an arm has been lost. Similarly, upper-extremity training is made more difficult without the use of both normal lower extremities. The patient is necessarily confined to bed or uses a wheel chair or crutches for support. If one of the arms is artificial, crutches are used only with difficulty and often in a manner potentially dangerous. The patient may find his arm prosthesis so attached to the crutch that, in the event of a fall, he is unable to free himself rapidly and to discard the crutch. There is thus always the possibility of damage to the stumps or other parts of the body. Considering these potentials, it would seem best to undertake gait training first. When it can be instituted safely, this practice seems to present fewer problems to all concerned.

#### THE PROBLEMS OF EARLY FITTING

Early fitting of the prosthesis has come to occupy a major place in present-day concepts of amputee management. To postpone fitting until maximum stump shrinkage has occurred often gives the patient those few extra weeks of one-handed experience that lead him to believe he does not need a prosthesis. Although there is no known criteria for determining exactly when a stump has stopped shrinking, it now appears that the greatest incentive to maximum shrinkage is actual wear and use of a prosthesis. Once the patient is shown that early fitting and constant practice are the shortest roads to recovery, he usually cooperates willingly.

With early fitting naturally comes the problem of continued stump shrinkage, which usually results in a loose socket. It is entirely possible that fabrication of a second socket

may be necessary before complete adjustment has taken place. The patient should be made aware of this possible complication, and, when it appears that a second socket may be required, the added cost might be included in the price of the prosthesis. In a patient's decision to abandon a device, repeated expenditures for prosthetic adjustments often play as important a role as does a loose socket. But if initially the patient is told the reasons for possible additional expenditures, more than likely he will accept the conditions without protest and without discouragement.

#### SOME SOLUTIONS

What can be done to solve some of the problems that are potential sources of failure in the proper utilization of an arm prosthesis? First, it must be realized by all concerned with the management of upper-extremity amputees that the present concept of dominance is a relative one. The person who loses the so-called subdominant hand is just as seriously disabled as is the one who loses the dominant hand, and he stands just as much chance of becoming a nonwearer. The remaining member often can be taught to perform many of the functions of the missing hand. If this situation is allowed to persist for long, the amputee begins to feel that prosthetic replacement is unnecessary.

#### THE EDUCATION OF THE PHYSICIAN

To the end that all upper-extremity amputees shall be properly fitted and trained, it is imperative that the education of all physicians and ancillary medical personnel be continued and expanded. Current knowledge and new techniques must be passed on not only to those physicians and technicians who, because they are specialists, see amputees regularly but also to all general practitioners, especially to the family doctors who usually are first to see the amputee. The general practitioner must be brought to realize that new skills and devices are available to help his patients, and he also must be made aware of the fact that the longer assistance is delayed the more unlikely is the amputee to wear and use a prosthesis. Education must be carried to every level, ideally down to the county medical society,

which in many instances is the only group in which the general practitioner can participate regularly. Information relating to amputee management should appear in *all* medical literature, for technical assistants also are responsible for extending any educational program devoted to the amputee. If complete success in total rehabilitation is to be expected, an amputee must be presented to the various specialized centers or clinics with the least possible delay after amputation.

#### THE EDUCATION OF THE AMPUTEE

Equal stress must be placed upon educating the amputee. If, for example, he has a short stump or some other problem requiring that he be fitted with a more complicated and hence less efficient device, the limitations of the prosthesis must be explained in detail. Too many patients are given the benefit of excellent surgery and fit but are not prepared for the shock that comes when they discover that the prosthesis is, at best, only a device to assist the remaining hand. Such a disappointment often produces discouraging results and sometimes complete failure. Many specialists and technicians are prone to be overenthusiastic about a particular prosthesis. What to them appears to be an excellent prosthesis well may be to the patient a hideous collection of bolts and ropes. As a result of some specialists' enthusiasm, many amputees envision a prosthetic device far more functional than actually is possible.

When a patient is counseled for the first time, therefore, every effort should be made to point out all the factors involved in total rehabilitation. The limitations of the prosthesis should be explained at once, so that no false concepts or hopes are allowed to exist or to be perpetuated. Even if nothing more than a photograph is available, the patient should be shown a prosthesis similar to the one he eventually will use, and the necessity for training must be outlined so that the patient realizes that wearing the prosthesis and using it efficiently are two distinct functions. Many patients are astonished to find that training is necessary, and many look upon it as just one more stumbling block in an already confused amputee existence. Each step in the program

must be explained fully, and the possible complications also must be outlined. Only in this way can the amputee be spared the bitter disappointments that often attend rehabilitation.

#### TRAINING AND CHECKOUT

Adequate checkout procedures should assure efficient mechanical function as well as correct fit (4). An inefficient cable system may, for example, render an otherwise satisfactory prosthesis so difficult or clumsy to operate that even the patient with a great desire to learn may find it impossible to use the device. The disinterested patient who does not appreciate the true value of prosthetic replacement may seize upon such a situation as the final excuse to give up training completely.

Prosthetic training and final checkout complete the patient's initial steps toward rehabilitation, but unfortunately training can be responsible for failure. Therapists must be sympathetic with the patient's initial efforts, but they also must be firm in developing adequate control before actual use of the prosthesis is attempted. The patient's first desire after receiving the prosthesis is "to do something with it," and time spent in learning control techniques may seem worthless to him. Here again explanation of the reasons for the training steps is essential.

If the patient is unable to demonstrate adequate control skill in a reasonable time, it often is wise to postpone or slow the training process rather than to provoke marked frustration in both patient and therapist. In such instances it is important that the therapist keep the prosthesis until sufficient basic skills are developed by the patient. If the amputee is permitted to wear the device immediately, he is likely to develop inefficient and sometimes weird methods of operation, thus negating all of the valuable time expended in fabrication and fitting. It is essential, however, that the patient understand the reasons for his sometimes difficult and slow progress in training and why it is necessary for the therapist to retain the prosthesis until basic skills are achieved.

In some clinics there are to be found a standard below-elbow and a standard above-

elbow prosthesis with split and laced sockets to permit adaptation to many different kinds of stumps. These so-called "standard" prostheses are used in early training to prepare the patient for efficient operation of his prescribed prosthesis. When used with proper care and reasonable patient selection, they serve a valuable purpose, but such a procedure may be unwise if the training arm cannot be adjusted readily to the individual patient or if it contains undesirable components. Attempts to use an ill-fitting training arm may be so difficult that the patient becomes discouraged and anticipates the permanent prosthesis with misgivings. Accordingly, training arms should be used only on the advice of the clinic team.

Too much training can be as harmful as too little. The higher the level of amputation the less functional usefulness can be derived even from the best prosthesis. Realization of this circumstance can prevent the hypertensive episodes that occur in patient and therapist alike when too much is demanded of the amputee-prosthesis combination. There is no personal defeat when, as is often the case, it must be admitted that the prosthesis can serve only as a "helper" hand. Under such circumstances, training, to be effective, must be guided appropriately. Overtraining only discourages the patient whose level of amputation is a basic factor in determining the degree of prosthetic function. Achievement tests should be used to measure and record the patient's progress and final skills, but such tests vary from level to level and from patient to patient and can serve only as a crude measuring stick, not as the final criterion as to whether or not a patient has achieved the maximum benefit of training. The answer to that broad question can come only with careful observation of the patient during activities of daily living and of vocational pursuits.

#### CONCLUSION

From these considerations, it is possible to formulate certain basic rules for the management of the upper-extremity amputee. It is important first to know as much as possible about the patient besides the fact that he is missing a hand. It is necessary to understand him and to understand his disability. Too much

faith must not be placed in the absence of either a so-called "dominant" or "subdominant" hand as the sole measure of disability. In addition, the patient must be made to understand what is in store for him. Above all, no questions about any phase of his problem should be left unanswered. In some instances the amputee is reluctant to discuss problems not relating directly to his amputation, and the physician should be certain that, aside from the amputation, there are no other physical or mental problems that may affect total rehabilitation.

For psychological as well as physical reasons, the patient should be fitted as rapidly as possible. Early fitting allows the amputee to realize the advantages and limitations of his prosthesis. Moreover, early fitting often eliminates the danger of the patient's coming to think that he can get along with one hand—a situation which can complicate and prolong total rehabilitation. Finally, because overtraining can be just as harmful as are all the other "don'ts" of amputee management, no attempt should be made to train the patient to do more things than the level of his amputation and the nature of his prosthesis permit.

When all of these individual problems are considered systematically by the respective members of the clinic team, over-all management of the upper-extremity amputee becomes a synthesis of cooperative effort. In no other way can so much success and satisfaction be afforded both the patient and those charged with his care.

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