The Geriatric Amputee

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The problem of the older person was not really a "problem" until our life-span began to increase significantly at the turn of the century. The combination of technical improvements in housing and production, increased knowledge of nutrition and advances in medicine and surgery produced an outstanding addition to our years. Along with it, a whole host of new dilemmas arose and new areas of concern for medicine and society in general began to develop.

The special field of the amputee and prosthetics was slow to react and for many years prior to W.W. II all amputees suffered from the absence of any concerted attempt at improvement of prostheses. After the war it was the large number of amputee veterans that provoked a spurt in development in prosthetics and concomitantly, consideration was extended to the particular problems of geriatric amputees.

Up to that time prostheses and suspension mechanisms were relatively simple and largely unsatisfactory in many ways. For the younger amputee (often traumatic) in whom circulation was comparatively good, the problems of weight-bearing, strength, stability, etc., loomed less large. In the older person these problems were often devastating, especially when combined with the excessive energy requirements involved in using the limbs then available. For the geriatric amputee has, in addition, many medical and psychosocial complications which add an infinite complexity to the overall problem.

The general medical picture may present cardiac disease, diabetes, generalized arteriosclerosis, peripheral vascular disease, renal disease, hypertension, or chronic pulmonary disease. Any of these can reduce the physical capability of the patient to a point where use of a limb is precluded or made extremely difficult. In addition, there may be neurological problems which result in weakness or marked instability. Learning ability is frequently impaired.

Concomitantly, the social picture is not infrequently bleak. Faced with no place to live or the prospect of living alone, the patient's interest in a limb is certainly not improved. Financial worries often overshadow all

else and the psychological aspects of loneliness, rejection, financial insecurity, etc., depress a frequently already low level of motivation.

While the overall approach to pre-prosthetic and prosthetic management applies to both young and old, certain aspects are of much greater importance to the older amputee if successful prosthetic care is to be attained.

Pre-surgical physcial and psychological conditioning are important and the choice of amputation site (where a choice exists), i.e., above or below the knee, can mean success or failure in ability to use a limb. Post-surgical conditioning and training for the prosthesis should be started at once. The goals must be feasible. The staff must make every attempt to avoid "wishful thinking" in reaching a decision. When immediate post-surgical fitting is possible, this is today considered by many the method of choice. The benefits of rapid mobilization and the elimination of edema and contractures as complications have a salutary effect on the older patient. Confidence and security, comfort and stability are improved by early ambulation, not to mention the enormous benefit of early discharge and even return to work on occasion.

The considerations for the older amputee as described above are at present not being adequately met. Generally speaking, in the above-knee amputee, more especially in women, the stump is fleshy and does not show well-defined muscle groups. Therefore, a quadrilateral socket does not serve the geriatric amputee's purpose and its advantages are frequently lost with this type of patient. The plug-fit socket is not ideal either, in view of the poor distribution of weight-bearing areas, and the frequently thin, ill-nourished skin of the stump. A combination of the two types of socket appears to serve the purpose better than either. The total contact socket properly shaped for the best distribution of weight is an improvement in some cases. Suspension by means of a pelvic band and hip joint lends the most control and stability. Suction, on the other hand,

FIGURE 1—Geriatric amputee with temporary and permanent prosthesis.

FIGURE 2—Patient after successful gait training.

FIGURE 3—Evaluation team consisting of Chief, Residents, Prosthetists, Therapists and patient in action

requires more ability for control than the geriatric amputee has in most cases.

The single axis or a friciton-lock knee is most frequently used, especially when the hip extensors are weak. This may be indicated even though the friction-lock knee may be somewhat heavier.

The foot usually used is an articulated one or a S.A.C.H. foot. Plantar flexion must be readily and easily carried out to give the geriatric amputee the confidence of a foot flat on the ground, most especially in the earlier stages. The heel bumper or heel wedge must be soft to begin with and can be adjusted later.

Not infrequently the older amputee, even under the best conditions, may require an ambulation aid ranging from a cane to crutches. It is obvious that even with two axillary crutches, ambulation is preferable to a wheelchair existence. Many patients can be quite independent in this manner, but if the cardiac reserve is inadequate and the energy cost too high, a wheelchair may be the only possibility.

In the management of the geriatric amputee the use of either a pylon or temporary prosthesis plays a large part. This latter has a fairly well-fitted socket, knee, and foot, and good alignment, whereas the pylon has a socket (sometimes only a cast) that can be replaced as necessary, and a rigid extension to the ground.

Both permit early mobilization of the geriatric amputee. This prevents loss of confidence and security in the erect position that is a frequent result of prolonged immobilization. Other benefits of early standing are quicker and more efficient stump shrinkage, enhanced motivation, and a chance to assess the patient's potential for a prosthesis.

In view of the medical and psychosocial complications which add to the difficulty of management of the older amputee, prescription of a prosthesis must be given careful consideration.

There are few definitive contra-indications to a prosthesis: imminent loss of the remaining leg, cardiac disease classified IV E, cancer with poor prognosis, or marked instability can be definite reasons for denying a limb to a patient.

The level of a patient's capability is extremely difficult to judge accurately. However, guidelines such as stability, independence in ADL, crutch ambulation, etc., are useful. Assessment with a pylon or temporary pros-

thesis based on these guidelines is fairly indicative of what to expect from the amputee with a definitive prosthesis. It is also essential to bear in mind that energy costs of ambulation with or without a prosthesis may preclude anything other than wheelchair mobilization in older amputees.

With all these special problems in the medical and psychosocial spheres, it is obvious that special prostheses must be fabricated for the geriatric amputee. Why should we expect the young and old amputee to be able to function equally well with the same prostheses?

Whereas the younger amputee requires mobility and control above all, comfort, security and ease of use are paramount for the older person.

The geriatric amputee must develop confidence in his ability to control and use the limb. He must develop a sense of security when using it. These attributes can be developed by assuring the amputee of stability in the prosthesis.

Another aspect of this whole question of tailoring the prosthesis to the individual's needs is concerned with the ease of putting on and removing the limb. That this should be as simple as possible is self-evident. But, in addition, the limb should be so constructed that it can be put on in only one way (i.e., no possibility of applying it in external or internal rotation on the stump) to prevent ambulation with the limb on the stump in poor alignment.

New prostheses must be designed with imagination. Sensory feedback to the maximum degree possible would be an enormous boon to the amputee. His safety and security could be greatly enhanced by designs that would permit proprioceptive mechanisms to operate. A knee with automatic safety locking at a given point of flexion, as in stumbling, would be extremely important to the geriatric amputee. A socket that could vary according to stump volume changes and yet fit properly, permitting a wide distribution of weight-bearing pressure, would be a great step forward. The suspension should be efficient and comfortable, and yet, cause no interference with his mobility. The foot should duplicate normal plantar flexion and permit some degree of dorsiflexion (about 10°).

Clearly, lightness of material and components coupled with strength and durability are highly desirable. Furthermore, good cosmesis is a factor which must not be overlooked. While it is of small import to some older amputees, more particularly men, it is certainly essential to women.

Naturally, since age is not the sole definition of the geriatric amputee, but rather the aggregate of physiological decline, the requirements of geriatric amputees will differ in a rather wide range. An elderly man who goes out infrequently needs less mobility in his prosthesis than one who is still working. While requirements for mobility and degree of stability will therefore vary, the need for lightness, safety, comfort and ease of application is constant. It is with this in mind that the prosthesis for the geriatric amputee must be designed.