Temporary Prostheses

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There have been substantial changes in the amputee rehabilitation program during the last twenty years. Some of these changes are the result of prosthetics research and educational programs sponsored by the United States Government, but to a great extent they are brought about by the type of patients presented in amputee clinics today. Twenty-five years ago the majority of amputees were in the younger age groups, with the amputation being the result of trauma, either from industrial or vehicular accidents. Amputations today, however, are performed to an ever greater degree to overcome the consequences of impaired circulation.

What is considered a standard prosthesis today is not necessarily indicated for this group of amputees, because prescription requirements vary considerably from patient to patient. Following long hospitalization, the patient may be debilitated. The stump may be edematous or painful. Motivation may be impaired. It is therefore essential that the physician has the choice of prescription. All former criteria which determined the type of limb indicated are no longer valid for this type of patient. If a standard prosthesis is prescribed for such a patient, he may never be able to utilize its full potentials.

For this reason it is quite often necessary to provide a temporary prosthesis which may serve as a diagnostic tool in order to establish the feasibility of providing a permanent limb. Although such a temporary prosthesis need not have all the features of a permanent limb, it must be anatomically and biomechanically correct, which means that a socket has to be formed in a manner to properly accommodate all tissues of the stump. Weight must be distributed over pressure-tolerant areas, and all sensitive areas must be carefully avoided. Good alignment is essential. Alignment could be defined as the proper relationship of the component parts of the prosthesis to the body.

Any other type of prosthesis will not only be useless as a diagnostic tool but will probably do damage not only to the patient's stump but will also be detrimental to the patient's motivation and ability to attempt ambulation training.

Many so-called pylons as seen today consist of nothing but a negative plaster of Paris cast to which either part of a crutch or part of a brace is attached. If the negative cast is correctly formed such a pylon may be used to induce stump shrinkage by tissue compression. It might also be indicated where the procurement of a prosthesis would be delayed but, for medical reasons, it is essential to have the patient assume a standing position. Most prefabricated pylons are contra-indicated because stump conditions and alignment vary from patient to patient and can rarely be accommodated for in any pre-manufactured device.

Temporary prostheses have to be constructed to the individual patient's needs. A correctly modified socket is the basis for any temporary prosthesis for a below-knee amputation. If a stump is sufficiently atrophied to permit predominant weight-bearing over the patellar tendon and the slope of the tibial condyles, it may not be necessary to provide side joints and a thigh lacer. A supracondylar strap will, in many cases, be sufficient to suspend the prosthesis.

If a below-knee stump cannot tolerate weight-bearing shortly after surgery, a temporary leg might still be indicated, even if only to preserve the function of the remaining leg. In those cases, most of the weight is transferred to the thigh. The leg might even have to be provided with combination ischial gluteal bearing. Such a construction would benefit from a simple knee-locking device.

It has become more and more the practice to ambulate patients very early. Although the stump volume should be reduced by means of an elastic bandage or a stump shrinking sock, it has been found that weight-bearing on a prosthesis as soon after amputation as possible will offer many advantages. It will not only improve the stump tissues, but will also be helpful on an emotional basis.

It is, of course, necessary to adjust for changes in stump volume almost weekly in order to maintain a good fit. In the early stages of shrinkage it may be sufficient to add liners or paddings in the areas of shrinkage. This, however, is only a temporary procedure. The construction of a complete new socket often becomes necessary after a short time. If the socket has been constructed from relatively inexpensive materials, the cost of replacements can be kept to a minimum.

It is seldom indicated to provide a temporary prosthesis with a crutch tip such as is seen sometimes. A crutch tip will rarely allow the patient to transfer his weight properly since the area of contact with the floor is very small. A desirable heel-toe motion of the ankle cannot be achieved without

the provision of a standard foot. This might be of the SACH type or the single axis foot.

The greatest need for temporary prostheses, however, exists for patients with above-knee amputations. To obtain the greatest value from a temporary prosthesis it is again necessary to observe all biomechanical requirements. The primary pressure concentration should be below the tuberosity of the ischium. Lateral stability needs to be provided by diffused pressure at the lateral distal aspect of the stump. Pressure of the proximal rim of the socket in the peroneal area must be avoided; also over the adductor tendon.

In order to secure proper seating over the posterior rim of the socket, counter pressure needs to be provided by a fairly high anterior socket wall. These are the same requirements that apply to a permanent socket.

In order to control position of the distal part of the prosthesis it is always helpful to furnish a knee-shank-foot mechanism which allows at least limited alignment changes. These changes need not necessarily result from any original errors in the construction. They may be due to improvements in prosthetic control by the patient as a result of gait training.

In order to achieve the highest degree of function from the prosthesis it is essential that an above-knee amputee walks with a narrow base. The extension stop would have to be adjusted in such a manner that the knee flexes with only minimal effort by the amputee. These achievements are generally the result of rather concentrated ambulation training. In the beginning phase of training the patient will tend to abduct his stump and he will also require a maximum of knee stability. If, therefore, a permanent prosthesis is initially prescribed it is difficult to adjust such a prosthesis to benefit from improved function resulting from training.

The weight of the temporary prosthesis should be similar to the weight of the finished artificial leg.

Swing-phase control, which results from correctly adjusted extension assist and friction devices, should ideally be part of a temporary prosthesis.

Adjustable limbs which meet these requirements are presently commercially available. They also contain a locking mechanism which might be utilized in the beginning phase of ambulation or on a permanent basis where lack of muscular control contra-indicates a free-swinging knee.

From this short description, it would appear that financial advantages from a prescription of a temporary prosthesis are limited. If one considers, however, that the lower part of such a limb can be utilized repeatedly, and that the socket is made from nonpermanent material which can be replaced fairly rapidly when required by stump changes, one would feel that a temporary leg can be of considerable advantage and should be used more frequently.

Another factor which might be overlooked is the relatively easy adjustability of the temporary prosthesis compared to a permanent limb. It must be stressed, however, that a temporary limb is not just any "cheap" device which can be applied under all conditions by "just anybody" but requires the same skill and training, (possibly to an even higher degree), as is needed in the construction of a permanent prosthesis.