

# Prosthetic Prescription for the Geriatric Amputee \*

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Patients who are in a state of physiologic decline and who require major amputation or disarticulation as a result of disease affecting the circulation of or sensation in the limbs need special evaluation for prostheses. Geriatric amputees have usually had a major illness, are physically and mentally tired, and are usually suffering from cardiovascular disease or diabetes, as well as a variety of other diseases.

Each patient requires individual evaluation for most suitable rehabilitation. This is sometimes best accomplished by teaching the patient activities of daily living in a wheel chair. A prosthesis should not be prescribed merely because the patient thinks he wants one, especially if careful consideration indicates that he will not use it. Definite contraindications for fitting include angina decubitus, lack of sitting balance, dyspnea at rest, uncontrollable dependent edema, and the presence of other diseases, such as carcinosis or uremia with probable short life expectancy. Local considerations that preclude vary, but certain patients with severe flexion contractures are suitable neither for fitting nor for correction of the contractures. Patients with bilateral amputations above the knees are seldom good prosthetic candidates.

Vultee<sup>1</sup> has classified the functions of prostheses as follows:

1. Cosmesis alone.
2. Limited use in the home, where wheel chair is not practical.
3. More generalized use in and out of the home.
4. Use for return to vocation, as needed.

I do not prescribe purely cosmetic prostheses, although occasionally a patient may use his prosthesis for this purpose alone. For most geriatric patients, the prosthesis prescribed for limited use would differ little from that for return to work, since the work would not be arduous and would therefore not require unusual prosthetic consideration.

## Prosthesis

*Syme's amputation.* — For the occasional amputation at the ankle in geriatric patients, I prefer the leather socket prosthesis with metal reinforcements and the usual ankle-and-foot unit, rather than the plastic laminate Syme's prosthesis. The plastic laminate socket is sometimes difficult to use because of variation in size of stump as a result of edema of cardiac or renal origin, whereas the leather socket allows some adjustment for this by the amputee. The articulated foot is preferable to the Sach foot for these patients, since a slight jar associated with action of the ankle unit gives the amputee a clue regarding the position of his foot. This is particularly important if the patient becomes a bilateral amputee.

*Amputation below the knee.* — Amputation below the knee is, of course, preferable to one at a higher level. The usual length of the stump is from

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4½ to 5½ inches below the medial tibial joint line, and the fibula is seldom resected. In most patients, postoperative splinting and exercises prevent knee flexion contractures, and the stumps present no particular prosthetic problems. Although some patients have been successfully fitted with patellar tendon-bearing or total-contact, below-knee prostheses without knee joints and thigh lacers, they usually get along better with a conventional type of below-knee prosthesis with a wooden socket and thigh lacer. Lack of lateral stability, from absence of the knee joint, is sometimes disconcerting.

Although I formerly prescribed high thigh lacers routinely in an attempt to obtain partial ischial or gluteal weight-bearing, I have abandoned this practice, since some patients complained a great deal of the discomfort of the high thigh lacers when they sat down. The duration of their prosthetic use and the level of their activity does not seem to produce complications because of adductor rolls of fat developing at the top of the thigh lacers. I therefore now usually prescribe a thigh lacer of standard length. I have had little experience with padded, soft, or slip sockets but routinely ask the prosthetist to fit the patient initially with a thick wool sock, even though the fitting takes place as early as six to eight weeks after amputation. The additional protection of the thick wool sock has reduced the time lost from the prosthetic training program as a result of minor pressure sores and abrasions around the stump, although liners must be used much earlier.

Stump choking or tension on scars from excessive pistonaction can usually be corrected by applying a partial end-bearing hammock, additional suspension around the trunk, or a supra-patellar strap. Occasionally, a patient with a short stump and knee flexion contracture can benefit from the use of a bent knee prosthesis, and some of these do better with a drop lock.

Although the Sach foot has been successfully used, my preference for a foot-and-ankle unit is the conventional articulated two-way ankle because it allows easier adjustment of motion of the ankle and provides the geriatric amputee with auditory or kinetic clues from its action.

*Knee-joint disarticulation.* — Knee-joint disarticulation, like Syme's amputation, is uncommon in geriatric patients. I prefer a conventional end-bearing knee disarticulation prosthesis with a leather socket laced in front and suspended by means of either a silesian bandage or a hip control belt, with the usual two-way foot and ankle.

*Supracondylar amputation.* — Supracondylar amputations can be fitted successfully in several ways. My preference is for the leather thigh-lacer, above-knee prosthesis with side-joint kneehinges and provisions for as much end-bearing as can be tolerated. These stumps can be fitted with wooden ischial-bearing sockets of either quadrilateral, triangular, or plug shape, or can be fitted with total-contact sockets. Because of changes in weight and in size of the stump in the debilitated patient, I prefer the leather socket, which can be adjusted, affords greater sitting comfort, and requires less training. An articulated two-way ankle and conventional foot is usually prescribed.

*Amputation above the knee.* — Most amputations through the shaft of the femur, which is too proximal to provide a good end-bearing stump, are at or below midthigh and can be fitted with a quadrilateral socket, with suitable allowance for any uncorrectable hip flexion contracture. The anterior brim in these patients should be slightly lower than usual for sitting comfort, and the ischial seat should be somewhat thinner. Total contact can be used in these patients, but weight changes may cause problems.

For patients who have had vascular operations and have tender scars in Scarpa's triangle, a triangular or oval socket is most suitable. In certain

patients with short stumps and hip flexion contractures, a plug fit has been found satisfactory when other sockets have been unsuccessful.

Suction suspension is generally inadvisable in geriatric amputees, since the difficulty of learning to apply the prosthesis and the accompanying fatigue is often insurmountable. Most patients can use a hip control belt, whereas others find a corset suspension with medial and lateral rollers satisfactory<sup>2</sup>. Patients who cannot tolerate any pressure around the abdomen should use shoulder harness suspension.

Geriatric patients derive little advantage from a variable friction type of knee joint or from hydraulic units which do not incorporate stance phase control. Since these patients are rarely vigorous walkers, terminal impact is not a problem. In some patients, use of a Hydracadence unit, with its stance phase stability, toe pickup and ability of the patient to put the foot in plantar flexion during sitting seems worthwhile.

When the Hydracadence unit is contra-indicated, the conventional two-way foot and ankle has been the most satisfactory prescription. Except with the Hydracadence unit, considerable alignment or geometric stability should be achieved by initial socket flexion, posterior positioning of the knee joint, and relative firmness of the instep bumper in the foot. The abnormalities of gait that may result are, of course, preferable to no gait at all.

The friction-locking knee unit is seldom used in our subtropical climate, since change in humidity and temperature causes problems. I prescribe a manually operated knee lock when the patient is unusually feeble or poorly coordinated.

*Hip disarticulation.* — For the occasional geriatric patient with disarticulation at the hip, the Canadian hip disarticulation prosthesis seems best. Unless contraindicated a Hydracadence unit is prescribed.

### **Extraprosthesis aids**

During prosthetic training of the patient, the original objective of the fitting should be remembered, and efforts should not be made to achieve the impossible. The best function possible should be sought but results obtained in juvenile or young adult amputees should not be anticipated. Extraprosthesis aids, such as one or two canes or crutches, may be useful in some patients. Although the clinical team should be optimistic, some failures which can neither be predicted nor prevented are inevitable in this group of physiologically deteriorating patients. These should not prevent intelligent attempts at maximum rehabilitation in the geriatric amputee.

### **REFERENCES**

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2. E. T. Haslam and E. G. Scott, Jr.: Experience with a Corset Suspension for Above Knee Amputees. *Orthopedic and Prosthetic Appliance J.*, Dec. 1964, 18, 288-291.

