New Concepts in the Management of Lower-Extremity Amputees

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FOR MANY years the acceptable practice in management of lower-extremity amputation after wound closure consisted of the application of a reinforced gauze dressing and the confinement of the patient to bed until the wound was healed. Fitting of a prosthesis was seldom attempted until edema was reduced to a more or less stable point by means of elastic bandages which had to be removed and reapplied at regular intervals during the day. Elaborate precautions had to be taken so that muscle contractures would not occur. With this method of treatment it was rare for a patient to be fitted less than six weeks after surgery, most patients requiring a much longer period (*1*).

The reluctance to fit patients before the stump was "stabilized" was, in a large part, due to the need for one or more socket replacements shortly after the initial fitting. A number of physicians advocated the use of temporary prostheses usually consisting of a plaster-of-Paris socket and a peg leg to hasten stabilization of the stump, but this practice never became widespread, probably because no adequate documentation was made of the various series that were reported, and many physicians realized that it was extremely difficult to obtain adequate fit and alignment with the techniques existing then.

The introduction of the patellar-tendon-bearing socket, total-contact sockets, new stump-casting techniques, adjustable legs, and plastic-laminate sockets led the Department of Orthopaedic Surgery, Duke University, to embark on a study to determine the earliest practical time for fitting. The project has demonstrated clearly that successful application of prostheses can be made as soon as it is safe to remove the sutures.

In the late fifties Berlemont of France (*2*, *3*) began providing patients with leg prostheses immediately upon completion of surgery and initiating ambulation training the following day. Berlemont's technique was modified somewhat by Weiss of Poland (*5*), who brought it to the attention of Americans in a lecture given at the Sixth International Prosthetics Course in Copenhagen in July 1963. A tour of the United States by Weiss later that year, sponsored by the Vocational Rehabilitation Administration and the Committee on Prosthetics Research and Development, stimulated sufficient interest at the University of California, San Francisco, and the U.S. Naval Hospital, Oakland, for these groups to experiment with the concepts reported by Weiss.

Initial results led the Veterans Administration to support an experimental program proposed by the Prosthetics Research Study of Seattle, Washington. Other groups, notably Duke University, the University of Miami, Marquette University, and a group in New York City centered around the Hospital for Joint Diseases, became interested and embarked on modest experimental programs.

Because there was not available any written or visual material covering European experience, each group approached the problem along somewhat different lines. From time to time through the efforts of the Committee on Prosthetics Research and Development and the University Council on Orthotic-Prosthetic Education, these groups were brought together for the purpose of exchang-

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ing ideas and coordinating the efforts of all involved. Meanwhile, the Vocational Rehabilitation Administration made it possible for a number of the research teams to visit Weiss. Experience with more than 400 cases has now been accumulated.

At its meeting January 20, 1967, which was preceded by a conference of research teams involved in immediate postsurgical fitting, UCOPE decided to offer courses in the technique to qualified teams.

The basic technique consists of the application of a nonadherent silk mesh dressing and fluffed gauze over the wound and a sterile stump sock and plaster-of-Paris cast (which is also the socket for the prosthesis) over the stump (Fig. 1). To the socket is attached an adjustable pylon-type prosthesis suitable for the level of amputation. Provisions are made for easy removal and reattachment of the prosthetic unit to prevent the prosthesis from being wrapped in the bedclothes and causing undue stresses on the stump. A drain is usually used.

The patient is encouraged to stand *between parallel bars or with the aid of a "walker"* about 24 hours after surgery if there are no physical or medical contraindications. The amount of weight-bearing and ambulation is increased daily and the patient is graduated to crutches, to canes, and to unaided walking as his physical condition permits. The drain is removed 48 hours after surgery, and the cast-socket is kept in place until time for removal of the stitches—some 10 to 14 days after surgery.

A new cast-socket is applied immediately, and the pylon-type prosthesis is replaced. The second cast is removed 8 to 10 days later when it is generally possible to make a cast for fabrication of a plastic socket.

The advantages of treating patients in this manner are a reduction in the formation of edema, a reduction in the incidence of pain, elimination of the formation of contraction, decreased hospitalization time, and less time lost from work. The technique appears to permit improved wound healing, and a number of investigators feel that in cases of amputations because of vascular disorders many more knee joints may be preserved than when conventional methods of treatment are used. In one series of a hundred cases, the average time between surgery and delivery of the "permanent" prosthesis was 28 days. The shortest time was 17 days (*4*).

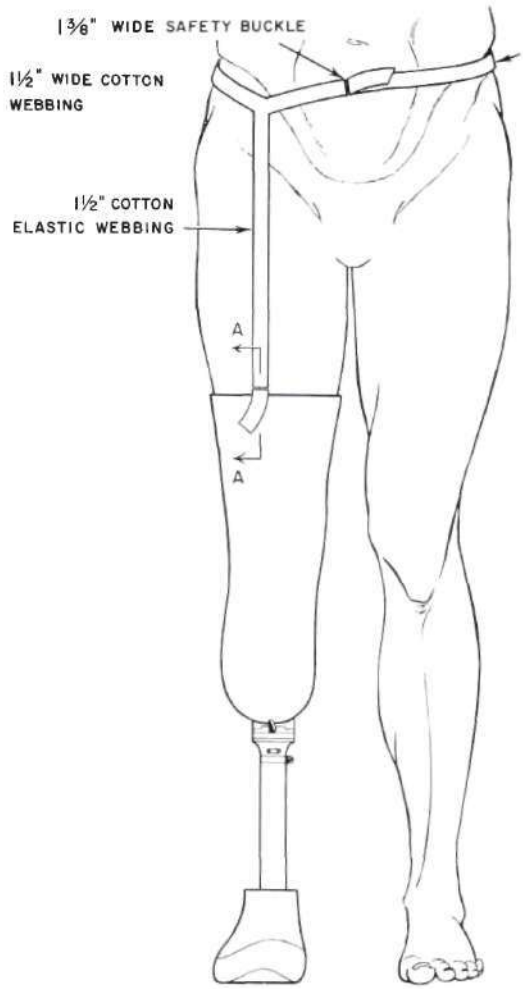

Fig. 1. An example of immediate postsurgical fitting of prosthesis to a below-knee amputee. Note the waist-belt suspension, the cast-socket carried above the knee, the pylon, and the foot. See also Figure 18 in *Limb Prosthetics—1967*, the preceding article in this issue.

Patients of all types and all ages have been treated successfully by fitting prostheses immediately after surgery. However, success depends upon many factors, and the technique should not be undertaken unless the team has a thorough understanding of proven methods. For this reason, courses are being offered at Northwestern University, the University of

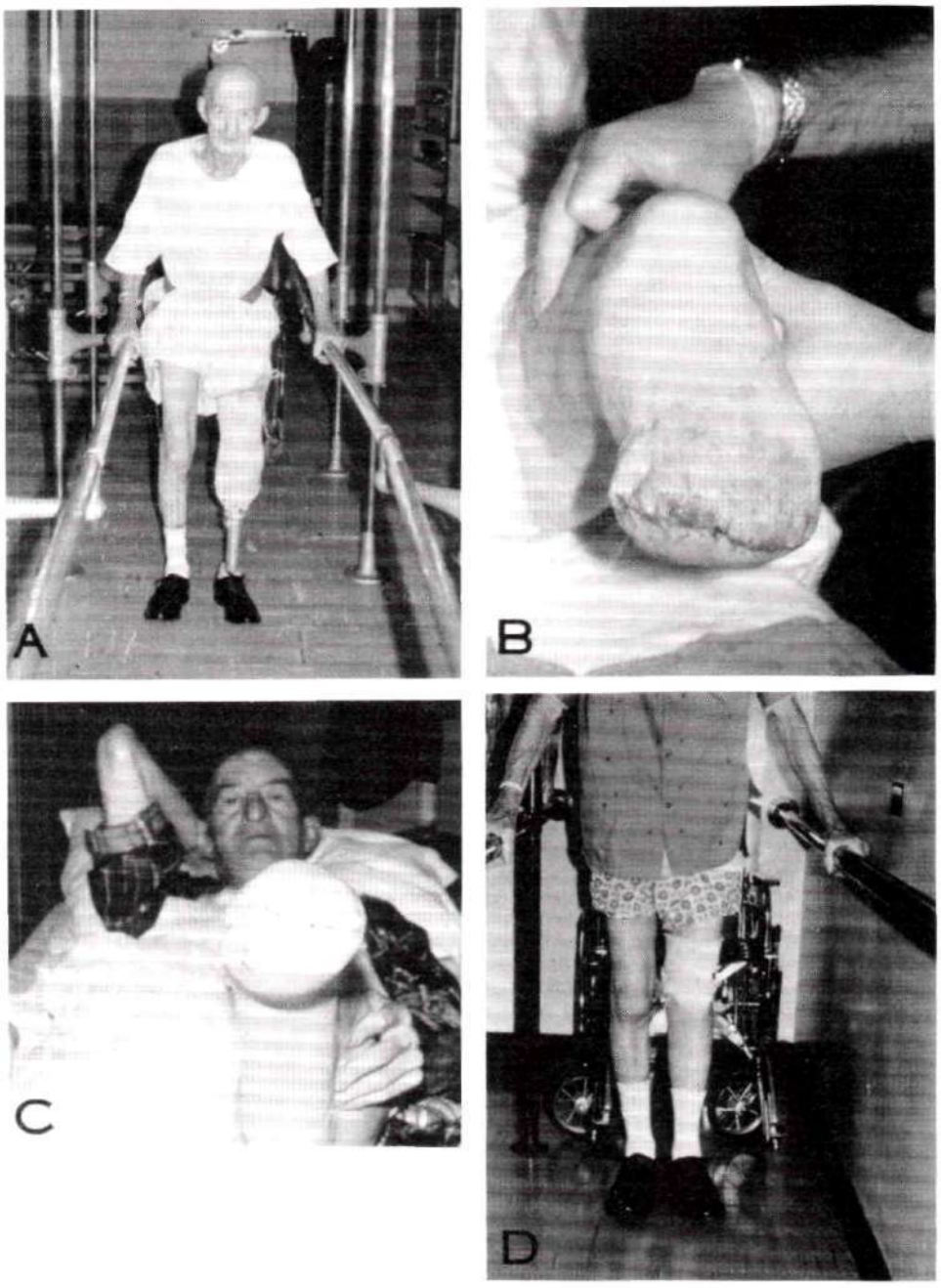

Fig. 2. Progress of 80-year-old patient whose leg was amputated because of vascular disease and diabetes. *A*, First day postoperative; *B*, seventh day postoperative; *C*, seventeenth day postoperative; *D*, twenty-sixth day postoperative.

California, Los Angeles, and New York University.

In spite of the success achieved by the research teams and others that have been trained by them, it is not clear why certain of the advantages accrue, and to what degree the various factors that enter into success are critical. Continued research is expected to answer these questions.

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