A PLASTER-PYLON TECHNIQUE FOR BELOW-KNEE AMPUTATION

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We reviewed 83 patients after below-knee amputation. In 56 with 69 amputations early management was by plaster-pylon. A plaster cast is applied in the operating room, and a pylon added one week later, after which full weight-bearing is allowed. We compared these patients with 27 who had soft bandaging.

The ‘healing’ time was reduced from 98 days to 40 days, and there were no major complications in the plaster-pylon group. The technique is simple and cheap and can be used by paramedical staff without specialised training or equipment.

Postoperative management of below-knee amputation varies widely. Pressure bandages do not always remain secure, tend to apply uneven pressure and may increase stump oedema by a tourniquet effect. Burgess and Romano (1968) recommended the use of rigid plaster dressings immediately after operation. This technique has been shown to have definite advantages, but there are concerns that it is technically demanding and may be impractical in hospitals lacking an experienced orthotist. Air-splints, Unna paste dressings and removable rigid dressings have therefore been recommended, but most of these also require skilled application, and are expensive; some do not allow either full weight-bearing or early ambulation.

Since 1977, we have used a rigid plaster dressing with a simple pylon designed to allow early walking, and we presented a preliminary report (Harrington, Esses and White 1984). We now report our continued experience with this technique, having found that it provides an effective and inexpensive rehabilitation programme.

PATIENTS AND METHODS

We have reviewed retrospectively 83 patients having below-knee amputation at the Toronto East General Hospital from 1977 to 1987.

In 56 patients (69 amputations) the pylon was used after operations performed for peripheral vascular disease (23) or diabetic gangrene (33; 16 non-insulin dependent, 17 insulin dependent). The average age of the patients was 63.2 years (19 to 87) and 20 were women. Thirteen patients had bilateral amputations, 10 at below-knee, and three at above- and below-knee levels.

Two patients had simultaneous bilateral below-knee amputation, both being fitted with bilateral pylons at seven days and then being able to walk using a walker or crutches (Fig. 1). Eight patients had bilateral below-knee amputations as separate procedures, each being able to walk with a pylon after the first amputation. After amputation of the second leg, these patients could walk either with bilateral pylons, or with the definitive prosthesis on one leg and a pylon on the other (Fig. 2).

During the same period 27 patients having below-knee amputations were treated with conventional soft dressings, elastic bandages and delayed weight-bearing. The average age of these patients was 66.4 years (35 to 81) with essentially the same indications for surgery and surgical technique.

Plaster technique. At the completion of the operation, a gauze dressing is covered with a single layer of web roll and a stockinette bandage. The stump of the limb is lifted from the table using the free end of the stockinette sleeve (Fig. 3). This is a simple but important step which prevents tension, shear stress and any direct pressure over the transected tibia. A rigid plaster dressing is then applied, extending to upper mid-thigh level. After
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Figure 1 - Bilateral below-knee amputee walking on his plaster-pylons. Figure 2 - Bilateral below-knee amputee using one prosthetic limb and a plaster-pylon for his most recent amputation.

Stockinette is used to support the stump while the plaster dressing is applied in the operating room.

The copper-tube pylon is added to the stump cast one week after amputation.

Operation the patient is allowed up in a chair, walker or with crutches depending on physical capability.

If there are no complications, the original plaster is removed one week later for wound inspection and a change of dressing. A new well-moulded cast is then applied and a copper-tube pylon is added (Fig. 4). The patient is then allowed to take partial or full weight as is tolerated, and is encouraged to continue to walk throughout his hospital stay.

The soft dressing group had daily compression stump bandaging, exercises to prevent flexion contractions of hip and knee, and where possible, walking on the unoperated leg using a walker.

RESULTS

The pylon was applied on average seven days after operation (range 4 to 42). The cast-pylon was changed weekly until the stump was ready for fitting with a temporary prosthesis. Not all amputees remained in hospital during this rehabilitation: 12 were discharged home after 11 days and were reviewed for plaster changes as out-patients, walking on their pylons.

The estimation of healing time varies from surgeon to surgeon, so we adopted the definition of Wu et al (1979) who recorded the interval between amputation and the ordering of a temporary prosthesis. Rehabilitation time is then defined as that between amputation and final discharge, walking with a temporary prosthesis. For the pylon group, average time for healing was 40.4 days and for rehabilitation was 108.4 days. For the soft bandage group, average healing time was 98.4 days and average rehabilitation time 200.1 days.

The three patients who had below-knee amputation
of one leg and above-knee amputation of the other tended to do poorly, despite attempts to fit them with bilateral pylons. Only one patient of the three could eventually be fitted with permanent bilateral prostheses; the other two had to use a wheelchair.

All the below-knee amputees, including bilateral cases, managed well and became fully ambulatory with artificial limbs. There were no significant flexion contractures in the plaster-pylon group, while three contractures of 10°, 15° and 20° were seen in the control group. No major complications could be directly attributed to use of the pylon.

DISCUSSION

Some surgeons still favour soft dressings and delayed weight-bearing after below-knee amputation; we find this method unreliable. Removable rigid dressings (Wu et al 1979; Mueller 1982) are reported to shorten rehabilitation while allowing frequent wound inspection, but they do not permit early ambulation. Our experience with inflatable splints (Sher 1974) is limited, but we found that an airbag apparatus holds no advantage over conventional dressings.

The plaster-pylon technique we describe offers most of the advantages of an immediate fit prosthesis, an inflatable splint device or a removable rigid dressing, and has the added benefit that it does not require the services of a prosthetist for application. Early postoperative ambulation with full weight-bearing is possible in most cases at one week. The full length of the cast prevents knee flexion contracture.

In addition, the fitting of a pylon, even if the patient cannot yet stand, is important in maintaining morale and encouraging efforts to walk. The pylon also allows easier transfer of patients from bed to chair and facilitates nursing care, particularly of older patients. Amputees can learn to balance and begin to walk long before an artificial leg is available. Early out-patient management frees expensive hospital beds. Stump healing and rehabilitation time appear to be improved with this method. The materials used for plaster-pylon application are cheap, readily available in any hospital, and can be used by paramedical staff without specialised training.

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REFERENCES


