

# Bilateral Knee Disarticulation

## Immediate Post-Surgical Fitting: *An Unusual Case Study*

By William Susman

There are certain specific indications for utilizing immediate Post-Surgical Fitting (IPSF) in the post-operative management of the amputee. Clinical observations have substantiated that the constant even pressure provided by the immediate application of a rigid dressing to the residual limb helps control edema, supports circulation, and immobilizes tissue, subsequently minimizing the inflammatory process within the traumatized tissues, promoting wound healing, aiding good shaping of the limb and decreasing intrinsic pain and phantom sensations.

The attachment of a pylon and prosthetic foot to the rigid dressing either immediately after the residual limb is wrapped or within a short post-operative period has been shown to enhance the positive effects of the rigid dressing and provide additional functional and psychological benefits. The gentle compression of residual limb tissue provided by closely monitored weight-bearing promotes wound healing by further decreasing edema. Ambulation resumes with a prosthesis sooner than with more conventional post-operative management approaches. Hospital stay is shortened, resulting in a more rapid return to previous personal, social and vocational activities. The amputee experiences an almost immediate resumption of function and although he or she will most likely undergo mourning for the lost limb, the actual commencement of rehabilitation is also experienced. In addition, the patient may be told pre-surgically the sequence of post-operative events so that the immediate introduction of functional prosthetic restoration can be hopefully, although cautiously, anticipated.

It is readily acknowledged that IPSF is not appropriate for all circumstances. Cooperation among the rehabilitation team members from pros-

thetics, physical therapy, surgery, psychiatry, and nursing, and a shared understanding of the technical aspects and goals of treatment, as well as individual proficiency in treatment procedures are necessary. The patient's understanding of the treatment approach and a willingness to adhere to treatment protocol are also essential. Lowered standards in any one of these areas may lead to injury of residual limb tissue, pressure sores, wound infection, hematoma, or necrosis and ultimately failure of the procedure and a real physical and psychological set-back for the patient. In addition, such complications are more difficult to perceive since the wound cannot be directly observed without disruption of the rigid dressing.

### Patient History

With the above general review of the clinical advantages and precautions of IPSF in mind, it may be illustrative to present a case which is representative of these aspects of this treatment approach and yet extraordinary in view of the history and personal motivation for seeking treatment. The patient was a 28 year old woman who had contracted anterior poliomyelitis at the age of 16 months. She presented with stunted lower limbs, and muscle power at both hips was below functional levels except for the ability of the Sartorius muscle to withstand moderate resistance bilaterally. The knees and ankles were essentially flaccid. Sensation throughout the lower limbs was within normal limits. No contractures were evident and upper body strength was above normal.

The patient wore bilateral, conventional KAFO's with knee locks and both ankles set in plantarflexion. Her feet rested on approximately nine-inch cork lifts set inside the calf sec-

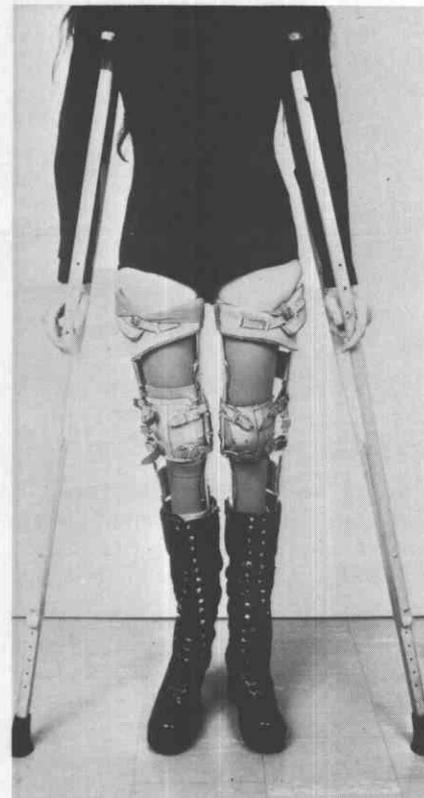


Fig. 1

tions of tall leather boots. (See Fig. 1) The patient related that as an adolescent she increased the lift height periodically to compensate for the lack of normal lower limb growth. She displayed excellent balance and body awareness, ambulated and climbed stairs and curbs independently with axillary crutches, and was able to negotiate sitting and rising from most types of seating. She led an active life as a college instructor and graduate student.

The patient had a history of multiple surgical procedures during her teen-age years including a spinal fusion for scoliosis, subtalar arthrodeses, transplantation of hamstring tendons to the quadriceps mechanisms, and Achille's tendon releases bilaterally. She also had a history of left patella

and right tibial fractures because of falls.

The patient had been interested in seeking elective amputation of her legs for some time. Her chief reasons were of both a physical and a psychological nature. Pain in her feet resulting from the prolonged standing teaching required, and concern over the vulnerability of her legs to fractures from falling were related. Nevertheless, her foremost concern was for her appearance. Due to the devices she used to provide height and function she always felt compelled to wear floor-length dresses and was unable to interchange footwear (see Fig. 1 & 3). She wanted greater freedom in dress and to be able to have her legs seen without embarrassment over their appearance. She also found the braces and boots cumbersome and loose on her legs. Therefore, the patient came to the clinic seeking amputation primarily for reasons of cosmesis and self-image.

### Pre-Surgical Management

The rehabilitation team's decision to recommend bilateral knee disarticulation amputations was based upon the less traumatic nature of the surgical procedure, the good weight-bearing tolerance that has been demon-

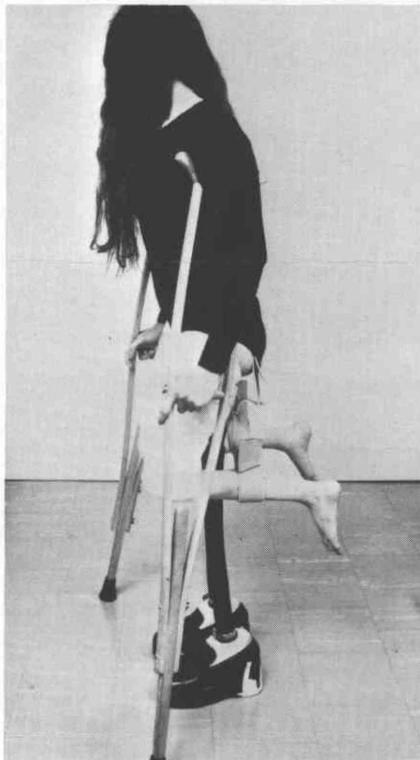


Fig. 2

strated at this level, and another factor unique to this case. Due to the diminished growth of the patient's femurs, knee disarticulations would leave the amputation level proportional in length to long above-knee amputations. This level would provide a long lever arm for prosthetic control, yet not disturb anthropometric placement of the prosthetic knee and, consequently, proportional thigh and shank length.

The IPSF approach was selected due to the patient's psychosocial background and to avoid the abrupt prolonged change in function that can result from bilateral surgery. With IPSF the patient would have a shorter period of disruption of her social and vocational success and her proud independence in activities of daily living. It would limit her experience as a wheelchair-dependent individual since two-legged function would never be completely interrupted.

To determine whether or not knee disarticulation prostheses would provide function comparable to her presenting situation, temporary prostheses were fabricated to simulate post-surgical restoration. Plaster quadrilateral sockets with polyvinyl chloride (PVC) thermoplastic pylons, SACH feet and shoes were used. A cut-out in the posterior wall of each socket allowed the patient's shanks to protrude in the flexed-knee position, thus mimicking knee-disarticulation amputations (see Fig. 2). A full functional evaluation showed no deficit in the patient's function from that previously demonstrated. Her ambulation pattern remained unchanged.

From a psychological standpoint the patient was instructed to seek psychiatric consultation to closely examine her motivations for electing this treatment and to investigate her feelings regarding the possible failure of adequate functional prosthetic restoration. In addition, the patient discussed at length with team members the pros and cons of her decision and the possible sequela of amputation surgery such as wound-healing difficulty, residual limb pain, phantom sensations, less than optimal function, and prosthetic maintenance.

### Post-Surgical Management

After closure of the amputation wounds and placement of drains,



Fig. 3

stump socks were applied over the surgical dressings on both limbs. A distal pad was held in place while a plaster wrap of each residual limb was done. Each plaster socket was hand-molded to provide a quadrilateral shape and ischial seat. Supracondylar purchase and belts over the iliac crests provided suspension. Pylons were not added at this time since the PVC tubing to be used requires heating before application.

On post-operative day (POD) #2 the surgical drains were removed. On POD #5, PVC pylons and SACH feet with shoes were applied. To control and monitor the degree of weight-bearing, a tilt table and two scales were used (see Fig. 4). Two five minute-periods at ten pounds of weight-bearing were allowed initially. On POD #6 the patient was seen twice during the day and stood on scales in the parallel bars (see Fig. 5). Two daily sessions were continued and weight-bearing was increased to 20 pounds on the right limb and 15 pounds on the left, being limited due to pain. Throughout this period the patient complained of phantom sensations and residual limb pain which increased markedly at night. The first cast change was done on POD #12 at

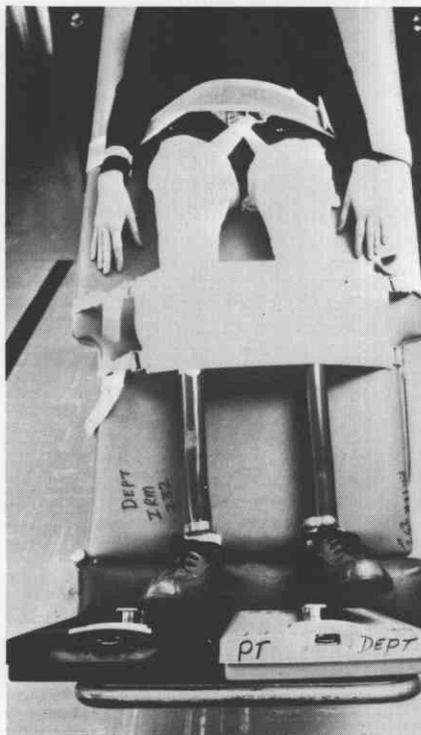


Fig. 4

which time the stitches were removed. The following day the patient began ambulation in the parallel bars with weight-bearing to tolerance. On POD #15 the patient was given a walker for bedside use and on the following day was able to ambulate independently outside the parallel bars with axillary crutches and a four-point gait, testimony to her long-standing adaptation to her physical deficits and her determination to succeed. At this time the patient was transferred from the acute care setting to an inpatient rehabilitation bed.

Four weeks after surgery the patient was casted for her definitive prostheses. At five weeks she was fitted with the sockets and locked knees and returned to the parallel bars for ambulation training. During the sixth

week, first one and then both prostheses had safety knees added. By the ninth post-operative week the patient had returned to the use of crutches and had received training in elevation activities and ambulation on different terrains.

The prostheses were delivered at the end of the ninth post-operative week and consisted of quadrilateral total contact sockets with semi-suction and supracondylar suspension. Windows were not cut in the sockets for donning but rather a soft insert was fabricated which was compressed during donning and re-expanded within the socket to grip the femoral condyles. The patient rejected the use of any suspension belts as unc cosmetic. Otto-Bock's modular endoskeletal safety knees and components, and SACH feet were used. (See Fig. 6).

### Follow-Up

The patient returned to her former daily interests and activities and maintained her ambulatory status. Having worn the prostheses for approximately a year and a half she returned for re-evaluation. Changes in residual limb shape due to shrinkage necessitated the fabrication of a second pair of prostheses which she currently uses.

### Summary

This case well illustrates the advantages and appropriate application of the IPSF approach to amputee management. The patient was able to have both limbs amputated at once and yet hasten the rehabilitation process. The physical debilitation and psychological shock associated with such a radical intervention was minimized by her youth, determination, and cooperation with the rehabilita-



Fig. 5

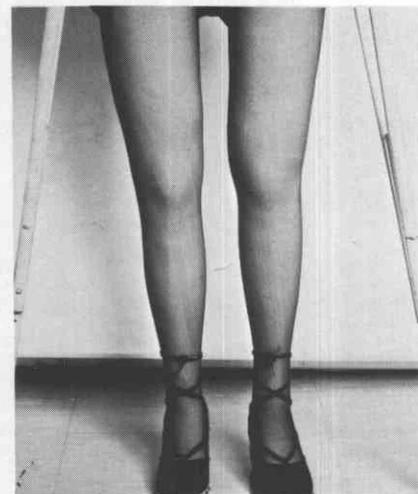


Fig. 6

tion team. A deeply felt desire to improve her quality of life was satisfied with minimal disruption of what was an already successful life style in the face of life-long physical difficulties.

## Newsletter Questionnaire

1) Do you feel checkout procedures are appropriate as presently practiced. Yes \_\_\_\_\_ No \_\_\_\_\_.

Send responses to: *Gary Fields*  
*Orthotics and Prosthetics*  
*Institute of Rehabilitation Medicine*  
*400 East 34th Street,*  
*New York, N.Y. 10016*

2) Do you feel the term "check out" should be maintained or should another term be used to represent this procedure.

e.g., "prosthetic functional evaluation," "prosthetic performance evaluation" (to complement pre-prosthetic evaluation.)

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