

FITTING AND FABRICATION OF A PROSTHESIS FOR A SEVERE FLEXION CONTRACTURE: CASE STUDY

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INTRODUCTION

A patient, sent from a VA hospital, was seen at the VAPC Special Clinic for evaluation and prescription. He was not considered a good candidate for a prosthesis, since his condition was beyond what is generally accepted as a "good risk." Normally, 30 deg. of flexion contracture is considered a maximum limit for fitting of below-knee amputees. This patient exceeds this maximum by almost 40 deg. However, his good spirits and desire to walk again induced the clinic team to try to develop a prosthesis he could tolerate. His background and followup from prescription to gait training follow:

CASE HISTORY

The patient is a male, 77 years old, with a right below-knee amputation, with a flexion contracture of 68 deg., and with auxiliary medical complications. He suffers from severe lymphedema bilaterally involving deep tissues, ligaments, and capsules of the knee joints. Progressive deterioration of the joint structures has limited the range of motion at the knee to 5–10 deg. of passive movement (Fig. 1). The following is a list of medical record entries illustrating loss of motion over a 2-year period:

1. August 1971—Motion from 15 deg. extended to 85 deg. flexed. A knee-bearing crutch-type support was prescribed by hospital physician.
2. November 1972—Stump has 45 deg. flexion contracture and a residual range of 10 deg. active motion. Hip has a 30-deg. flexion contracture and abduction is limited to 20 deg., possibly due to the knee-bearing crutch.
3. December 1972—Under close and careful measurements by Mr. Malcolm Dixon, R.P.T., VAPC Staff Therapist, a flexion contracture of 68 deg. and a range of motion limited to 5 deg. actively produced was found to be the present condition.



FIGURE 1

Regardless of these conditions, the patient was so eager and highly motivated that the consensus of the VAPC Clinic Team was to try fabricating a prosthesis the patient could tolerate.

PRESCRIPTION

Dr. Gustav Rubin, Chief of the VAPC Special Clinic Team, prescribed an ischial weight-bearing molded leather corset with Velcro strap closures, hard socket, SACH foot, knee extension aid, and waist belt.

PROCEDURE

A plaster cast was applied to the patient by the standard method of wrap without compression or distortion of stump tissues. The cast was smoothed only and covered with two five-ply stump socks. This was then laminated with no. 4110 (90-10 rigid) resin, one layer of Dacron felt material, and six nylon stockinets to achieve a strong, light, hard socket.

Tracings of the affected side were taken in both the anterior-posterior and medial-lateral views. The anterior-posterior view was used to determine trim lines of the socket, position of the joints, and the attitude

of the molded corset in relation to the thigh. The medial-lateral view was used to determine the initial socket-flexion angle and the joint-flexion angle. The setup was very routine, utilizing principles of bench alignment and the tracings to achieve a stable setup (Fig. 5) which stood, without support, in the anterior-posterior and medial-lateral planes. Except for the unusual socket-corset angle, the bench alignment required only a small linear change bringing the socket forward, which was the final choice of alignment.

The combination of 30 deg. of hip flexion and 68 deg. of knee flexion allows an alignment which, while unusual, is not totally outside the limits of prosthetic biomechanics (Fig. 2). The joint center is $2\frac{1}{2}$ in. forward of the breast of the heel. When worn, the standing position of the patient places the corset in slight flexion and the joints at the mid-point of their range of motion. This permits all the flexion and extension required for walking and sitting. When the patient is sitting, it is necessary for him to position the prosthesis about 8 in. ahead of his sound foot. This is solely due to the contracture and not to restrictive joint motion (Fig. 3).

The patient walks with a small but rapid gait, about one shoe length per step. He walks mostly from hip motion with the residual knee



FIGURE 2

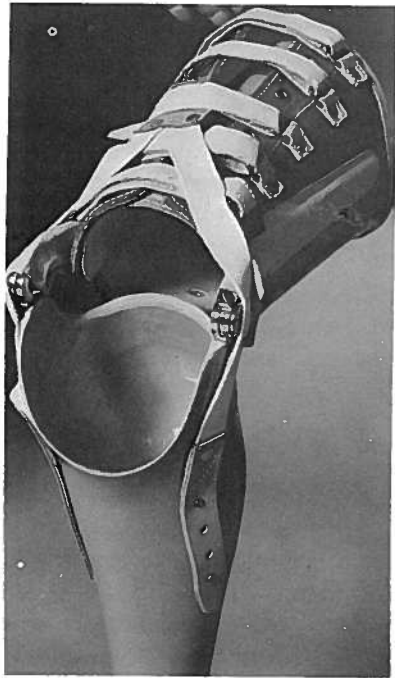


FIGURE 3

Titner: Prosthesis for Severe Flexion Contracture



FIGURE 4

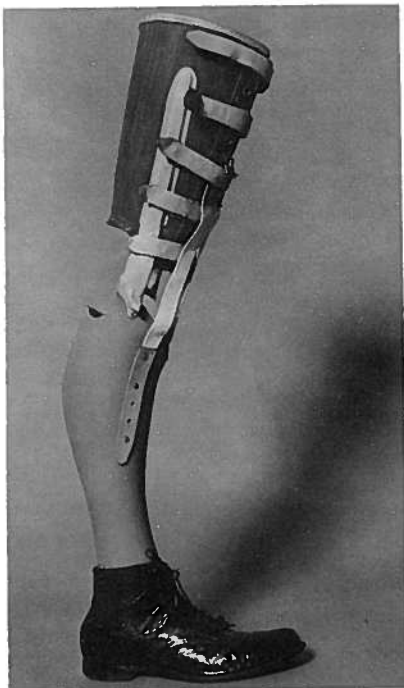


FIGURE 5

motion increased to 10 deg. by the weight of the prosthesis. A strong extension aid and the waist belt assist greatly in ambulation (Fig. 4). The final illustration (Fig. 5) shows the completed prosthesis at its full extension position, with socket-foot and joint center-foot relationship most readily observed.

CONCLUSION

The patient has now been in gait training for 6 weeks as of this writing and is progressing well. He wears his prosthesis daily for a considerable length of time. The prosthesis has not been returned to the VAPC for modification or relief since its delivery date in January 1973.

ACKNOWLEDGMENTS

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