Orthotics and Prosthetics, Vol. 30, No. 2, pp. 13–25, June 1976

THE SHOE AS A COMPONENT OF THE ORTHOSIS[1]

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A specific shoe prescription must be evolved on an individual basis for each type of lower-limb orthosis prescribed[6]. The shoe and the rest of the orthosis cannot be considered as separate entities, but must be evaluated as a total orthotic system since the shoe modifications needed in each individual case are dependent upon the pathologic problem and the manner in which the total system will function.

The pathology to be braced, the condition of the local tissues and foot, the characteristics of all parts of the orthosis, the gait characteristics, the cosmesis of the device, and the patient's wishes must all be considered when the prescription is developed by the Clinic Team. This presupposes that all of the members of the team, including the representative of the Shoe Laboratory are professionals. The shoe orthotist should be a specialist in last design as well as in shoe construction and shoe modifications, and not solely a "shoemaker" whose expertise does not extend beyond the ability to apply heels and soles to shoes. He should be able to work in close association with other orthotics services and be familiar with the needs of users of orthoses.

Nevertheless, it is possible to generalize within fairly narrow limits and designate the proper shoes, or shoe modifications, usually required as part of each orthotic system, and it is the purpose of this paper to do so. Discussion will be limited to the orthoses most often used at the VAPC, the shoes or shoe modifications which should be employed with such devices, and the reasons for each specific shoe prescription. Since the shoes and shoe modifications required for ankle-foot orthoses (AFO's) do not differ from those required for hip-knee-ankle-foot orthoses (HKA FO's) and knee-ankle-foot orthoses (KAFO's) under similiar circumstances, the discussion will center primarily on AFO orthotic systems to avoid unnecessary repetition.

Two types of commercially available shoes with special features will be referred to frequently throughout this presentation. It is therefore important to describe the pertinent special features of each. The Wilbur Coon Shoe[7] has a stiff ("hard") counter and 3/16-in. thick removable inlay of foam rubber covered by calf leather. The Ortho-Inlay, or Formo-Ped shoe[8], has a relatively flexible ("soft") counter, and an inlay which is 5/8-in. thick at the heel, 3/8-in. thick at the ball, and 1/4-in. at the toe. The inlay is fabricated of cork covered by kid leather with 1/8-in. thickness of Impresol sandwiched between the superior covering of leather and the cork. Both of these are technically "depth" shoes. For purposes of simplification, these shoes are referred to by their commercial names whenever it is convenient to do so; otherwise they are referred to as the depth shoe with thin inlay (Wilbur Coon), or the depth shoe with thick inlay (Ortho-Inlay).

SHOE CLASP ORTHOSIS (Fig. 1)

Modification: The shoe must have a stiff ("hard") counter (*1*). This combination of shoe

[1]The authors are all permanent members of the Veterans Administration Prosthetics Center Special Clinic Team. The team has been designated as "Special" since its primary function is to evaluate and prescribe for problem cases referred from elsewhere in the Veterans Administration. Other specialist members, such as clinical engineers, are called upon as needed.

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[6]Other than the KO's which do not extend to the shoe. The subject of FO's has been adequately covered elsewhere(1). Although varying somewhat in design and material used, FO's are basically arch supports. An exception is the long steel spring and rocker bar used for hallux rigidus which should be technically classified as an FO.

[7]Available from P. W. Minor and Son, Inc., Batavia, NY 14024.

[8]Available from Scholl, Inc., 213 W. Schiller St., Chicago, Ill. 60610.

Fig. 1. VAPC shoe clasp ankle-foot orthosis.

and the rest of the orthosis exemplifies the importance of the shoe as a component of the orthosis. It is not simply an extension of the shoe clasp device, but an essential part of it. A well constructed Blucher-type shoe with leather sole, strong shank, stiff ("hard") counter, and rubber heel should be employed. Under ordinary circumstances, in the absence of the need for a special last, a stock shoe will be adequate if it includes these characteristics.

Reason for Modification: The area of attachment of the shoe clasp to the counter is subject to continuous pressure. A flexible ("soft") counter will break down, become readily deformed, produce irritation of the posterior heel, and even cause blisters. It may occasionally be necessary to use a shoe which is one-half size larger than the shoe usually worn to provide adequate freedom from the possibility of posterior heel pressure. It is our custom to use the Wilbur Coon shoe and retain the inlay under these circumstances.

TEUFEL ORTHOLENE AFO

Modification: The material of the Teufel Ortholene AFO (Fig. 2) is thick, and when fitted unilaterally to ordinary commercial shoes can cause a cosmetic problem, since two significantly different shoe sizes are required. At the VAPC, we solve that problem by using the Ortho-Inlay shoe fabricated with a removable cork inlay (Fig. 3).

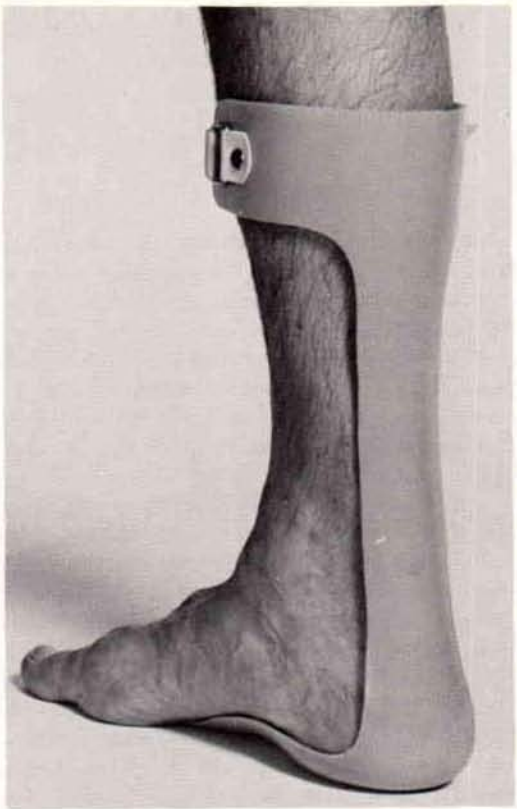

Fig. 2. Teufel Ortholene ankle-foot orthosis.

Fig. 3. The Ortho-Inlay shoe with a removable cork inlay.

Reason for Modification: This arrangement enables the orthotist to remove the inlay on the involved side only and replace it with the orthosis. As indicated earlier, the removable cork inlay of the Ortho-Inlay shoe is 5/8-in. thick at the heel, 3/8-in. thick at the ball and 1/4-in. thick at the toe.

POLYPROPYLENE AFO WHEN FABRICATED AS A POSTERIOR LEAF SPRING ORTHOSIS

Modification: At the VAPC we use a depth shoe, the Wilbur Coon, and remove the relatively thin innersole (3/16-in.) on the involved side (Fig. 4).

Reason for Modification: This arrangement permits a cosmetic fit (Fig. 5), since the space occupied by the 1/8-in. thick polypropylene is an adequate replacement for the innersole. When the patient has plantar foot problems requiring a modified innersole, the Ortho-Inlay shoe is used, and the innersole is placed over the plantar segment of the polypropylene orthosis. Plastazote may also be used to replace the inlay in this shoe. If necessary, a special shoe may be constructed to accommodate for special pathological conditions (Fig. 6). As indicated above and illustrated by Figure 5, the shoe corrections employed for a KAFO will not differ from those used for an AFO under similar circumstances.

POLYPROPYLENE AFO WHEN FABRICATED AS A SOLID ANKLE ORTHOSIS

Modification: The shoes should be modified so as to include a SACH type heel (Fig. 7), long steel spring (Fig. 8), and rocker bar (Fig. 9).

Fig. 4. The depth (Wilbur Coon) shoe with a thin insert.

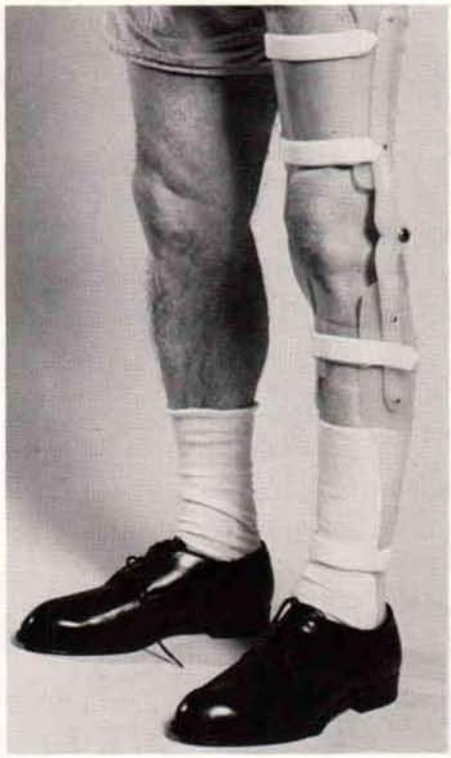

Fig. 5. Knee-ankle-foot orthosis molded of polypropylene over a positive model of the patient's limb. Because the polypropylene is quite thin the depth shoe shown in Figure 4 is used. Removal of the thin insert compensates for the thickness of the polypropylene in the foot section.

Fig. 6. A special insert and shoe designed to meet the needs of a special pathological condition.

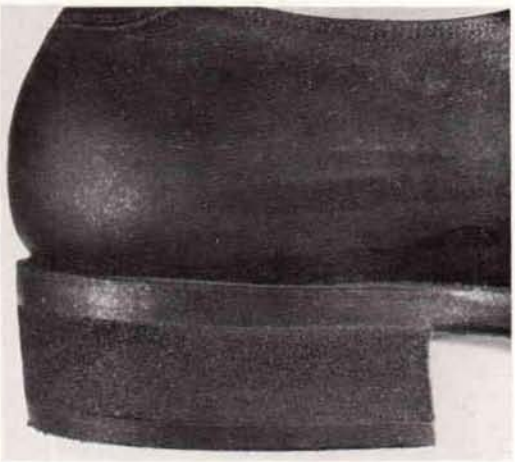

Fig. 7. "SACH-Type" cushion heel.

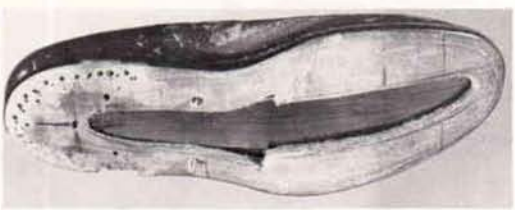

Fig. 8. Cut-away view of shoe showing addition of a longitudinal steel spring to provide additional strength and to provide some push-off.

Fig. 9. Rocker bar added to sole of shoe to permit roll-over and thereby make walking easier.

Reason for Modification: Because ankle motion is absent, the SACH heel is needed to permit a limited but relative equinus on heel strike; the rocker bar aids roll-over; and, because the limited ankle motion interferes with push-off, the long steel spring is introduced to assist that function and prevent deformation of the shoe at the distal border of the shank.

FUNCTIONAL ELECTRICAL STIMULATION (FES)

No shoe modification is required unless plantar foot problems necessitate a modified inlay, and then the Ortho-Inlay shoe is used with corrections included. The special very thin (switch) inlay of the FES may be placed on the inlay of the Ortho-Inlay shoe if necessary (Figs. 10 and 11).

Fig. 10. A functional electrical stimulator for correction of a drop-foot condition. Shoe modification is seldom required to accomodate this modern system.

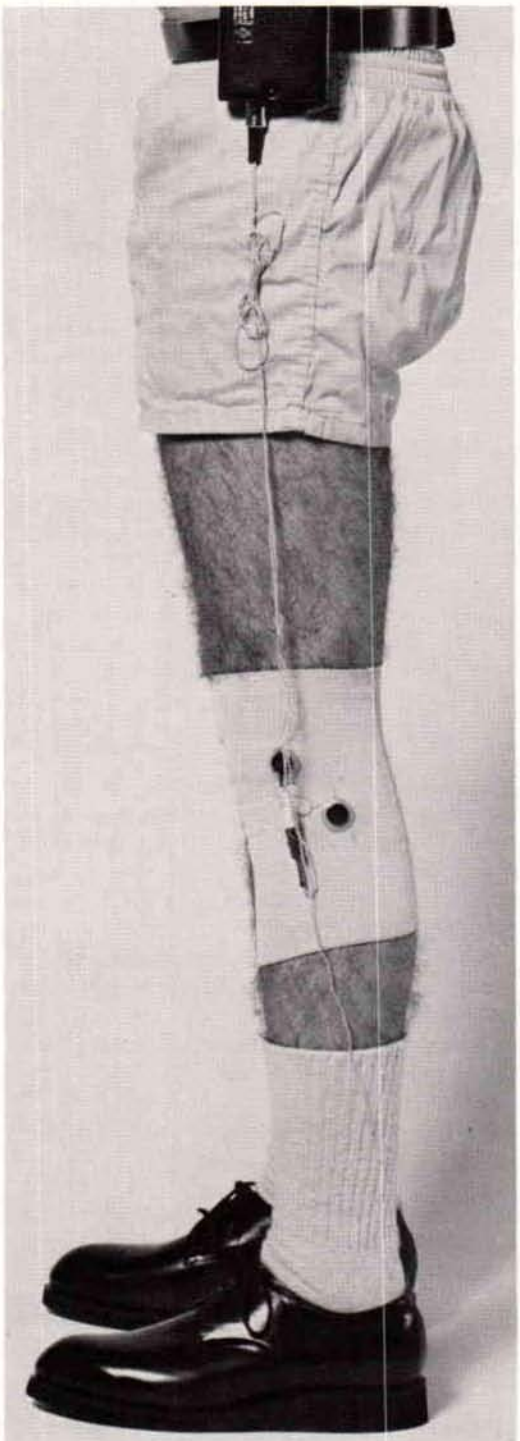

Fig. 11. Another view of the functional electrical stimulation system shown in Figure 10. The control unit and battery are carried on a waist belt.

VAPC PTB ORTHOSIS

The PTB orthosis (Fig. 12), as advocated by the designers, should be fabricated to permit no or very limited ankle motion to provide a high degree of unweighting. If, for example, the pathology has produced ankle pain on motion, a solid ankle should be used. If the pathology is at a higher level, then limited motion may be employed to lessen component stress. Some of the stresses will be dissipated by the limited motion, minimizing breakage. The forces transmitted from the floor to the cuff are greater with limited or absent motion (*2*).

Modification: The shoe should include a SACH heel, rocker bar, and long steel spring.

Reason for Modification: As previously indicated, with absent or limited ankle motion, substitution for plantarflexion is obtained by the use of a SACH-type heel. The rocker bar aids roll-over and the long steel spring assists push-off and prevents breakdown of the shoe at the distal section.

Fig. 12. The VAPC Patellar-Tendon-Bearing orthosis.

SINGLE- OR DOUBLE-BAR ORTHOSES WITH FREE MOTION ANKLE AND ALSO DORSIFLEXION ASSIST ORTHOSES

Modification: The only modification required for the conventional single- or double-bar orthosis is the attachment of a shoe stirrup (Figs. 13 and 14). The shoe should be a well constructed Blucher-type shoe with a leather sole, a rubber heel, and a strong shank.

Reason for Modification: This attachment makes the shoe a part of the orthosis. The strong shank is necessary because of the stresses placed on this area with the attachment of a shoe stirrup. The Blucher shoe permits easier entry of the foot and also more efficient adjustability of the vamp closure.

SINGLE- OR DOUBLE-BAR ORTHOSES WITH LIMITED OR ABSENT MOTION ("SOLID") ANKLE

Modification: SACH-type heel, rocker bar, and long steel spring are required.

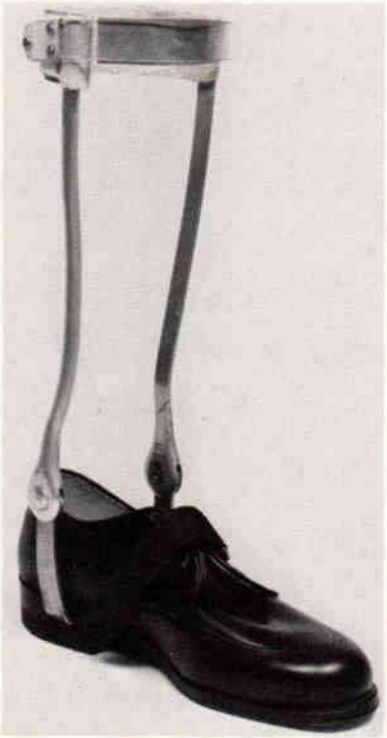

Fig. 13. Conventional double-bar ankle-foot orthosis.

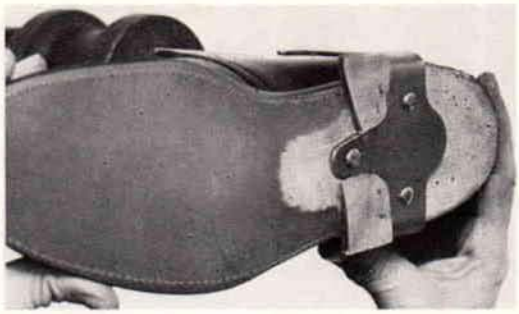

Fig. 14. View showing some details of installation of the stirrup necessary for proper function of the conventional double-bar ankle-foot orthosis (Fig. 13).

Reason for Modification: To reiterate: the SACH-type heel provides a substitute for plantarflexion, the rocker bar aids roll-over, and the long steel spring assists push-off and prevents breakdown of the distal portion of the shoe.

SINGLE- OR DOUBLE-BAR ORTHOSES WITH ANKLE JOINT WITH 90 DEG. PLANTARFLEXION STOP

Modification: This orthosis will usually be prescribed for patients with spasticity who do not have a normal stride. When a 90 deg. stop is prescribed for the patient who does have a nearly normal heel-and-toe gait, a SACH heel should be employed.

Reason for Modification: The SACH-type heel allows for limited relative plantarflexion of the shoe in relation to the floor. By eliminating this motion at the ankle the tendency toward triggering the spasticity is decreased.

SINGLE- OR DOUBLE-BAR ORTHOSES WITH DORSIFLEXION STOP

Modification: Rocker bar and long steel spring are required.

Reason for Modification: The rocker bar aids roll-over and the long steel spring assists push-off.

KNEE STABILIZING ANKLE-FOOT ORTHOSIS (Fig. 15) (*3*)

Modification: The shoe should be a depth shoe with inlay removed, and it should be modified to include a rocker bar and long steel spring (Fig. 15).

Reason for Modification: The rocker bar aids roll-over, and the long steel spring produces a long lever to aid knee extension.

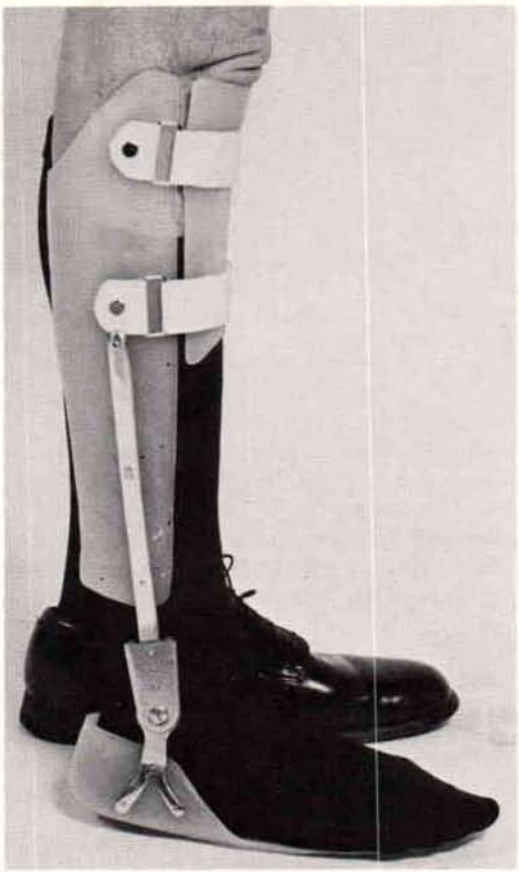

Fig. 15. A knee-stabilizing ankle-foot-orthosis developed at the Veterans Administration Prosthetics Center (*3*).

THE EQUINO-VARUS CORRECTION ANKLE-FOOT ORTHOSIS (DORSIFLEXION ASSIST PLUS SPRING-LOADED VARUS CORRECTION)

Modification: A posterior flat-caliper box (Fig. 16) should be used in the heel of a Blucher shoe. A removable transfixion pin placed through the caliper box from the upper aspect of the heel will hold the orthosis fixed. The heel should incorporate an outflare.

Reason for Modification: The caliper box with transfixion pin will prevent slippage and the outflare heel will act in conjunction with the spring-loaded varus control to correct a flexible varus deformation.

Fig. 16. The equino-varus correction ankle-foot-orthosis.

POLYPROPYLENE SHOE INSERT ORTHOSIS FOR SPASTIC FOOT (Figs. 17 and 18)

Modification: A special shoe with a vamp and tongue which can be laid back to expose the entire innersole is now available commercially.

Reason for Modification: It should be noted that the ability to lay open the entire upper of the shoe permits the patient to grasp the orthosis in one hand and place his foot into the orthosis and the shoe as a unit without making the effort of forcing his toes through the smaller opening of the throat of the shoe. This avoids the stimulus which will frequently result in increased spasticity and clawing of the toes. When spastic toe clawing occurs, entry of the foot into the shoe is made difficult. Because Velcro is used on both the shoe and the orthosis, closure can be carried out easily by use of the uninvolved hand. This type of shoe has been custom made by the VAPC Shoe Laboratory in the past, but they are now available from P. W. Minor[7].

The polypropylene shoe insert orthosis can be separated readily from the shoe (Fig. 19), thus enabling the patient to change shoes as desired. The orthosis is held firmly in the shoe by Velcro.

Fig. 17. A special shoe available and recommended for use with a molded polypropylene ankle-foot orthosis designed especially for patients with a spastic foot.

Fig. 18. Spastic foot being placed in the orthotic system consisting of a molded polypropylene ankle-foot orthosis and a shoe with a special tongue.

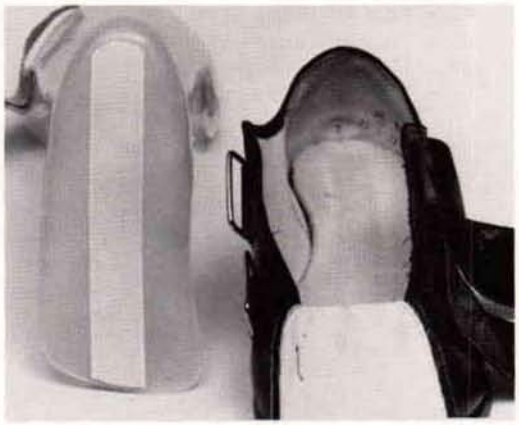

Fig. 19. The use of Velcro to stabilize the molded ankle-foot orthosis in the shoe.

Velfoam padding is glued to the innersole of the shoe and loop fabric Velcro is laminated to the Velfoam. Hook fabric Velcro is glued to the undersurface of the orthosis so that, when mated, these firmly attach the orthotic device to the innersole of the shoe, and yet permit removal as with any Velcro arrangement.

DOUBLE OR SINGLE BAR ORTHOSIS FOR SPASTIC FOOT

Modification: A shoe stirrup can be attached to the special Flap-Open shoe shown in Figures 17 and 18.

Reason for Modification: This patient can be independent, apply his shoe and orthosis without assistance and avoid the difficulties encountered when he attempts to push a spastic foot into a commercial shoe. Entry into the shoe-orthosis unit may be assisted by the use of a posterior opening calf cuff if this is necessary.

HIGH TOP SHOE WITH REINFORCING VERTICAL METAL STRUTS (Fig. 20)

Modification: Vertical reinforcing struts are incorporated into the medial or lateral aspects of the quarter of the shoe extending from the heel level to the top of the high quarter.

Reason for Modification: Occasionally a patient with a drop-foot deformity may have extensive scarring and tenderness at the level of the calf to such a degree that he cannot tolerate the pressure of a calf cuff. The orthotic system shown

Fig. 20. High-top shoe with reinforcing vertical metal struts.

here offers a solution to this problem. Although not as efficient as the usually prescribed dorsiflexion assist AFO, it is the most useful under the circumstances. This system may also be used where there are similar calf problems in the case of the patient who has ankle instability owing to lax or torn lateral ligaments.

DISCUSSION

Although the AFO total orthotic system has been the principle subject of this review, the HKAFO and KAFO total orthotic systems have similar features and should be considered in parallel fashion since they have the same type of shoe attachment as do the AFO's. This is true not only of such devices as the shoe insert orthosis (Fig. 5) and the double bar orthosis (Fig. 13), but also of the shoe clasp with polypropylene knee cage (Fig. 21).

Certain aspects of the shoe modifications will be determined by the patient's gait. A patient, for example, who has had a solid ankle orthosis prescribed, but does not have a heel-and-toe gait will not benefit from a SACH-type heel, rocker bar, and long steel spring. A basic outline of the VAPC approach to shoe prescriptions are related to AFO's is summarized in Table 1. When coupled with Table 2 (*4*), a more complete picture of the VAPC Clinic Team procedures is obtained. It should be emphasized, as pointed out initially, that each patient has an individual problem, and the chart can only present a basic approach to the solution of the problem. This may have to be varied when the requirements for the solution of the problem point to the necessity for such variations.

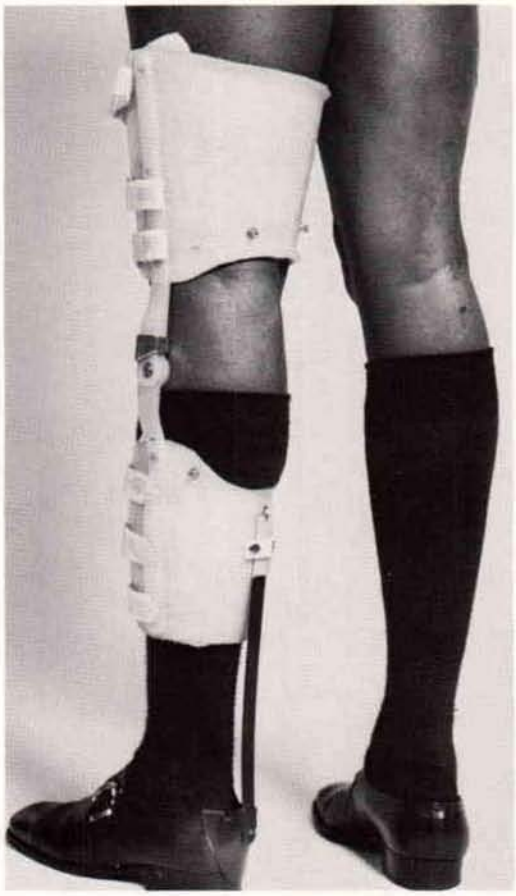

Fig. 21. The shoe clasp can be used to maintain a knee orthosis in proper position.

The authors wish to reiterate that this presentation is based on VAPC Clinic Team procedures, and for this reason ankle-foot orthoses in use elsewhere have not been included. There are many such orthoses that have been used only on occasion at our clinic. They fit into the broad grouping of either shoe insert or shoe attachment orthoses. Examples of these are the IRM Spiral AFO, the NYU Double Bar Shoe Insert AFO, the AMBRL Two-Rod Drop-Foot Brace and the AMBRL Posterior Bar Drop-Foot Brace (*5*).

The simple and effective wire drop-foot orthosis is still sometimes prescribed, invariably as a renewal of a similar orthosis for an older wearer who resists change.

TABLE I. LOWER LIMB SYSTEM

THE ANKLE-LEG COMPONENT		THE FOOT COMPONENT*
Type	AFO Designation	Shoe Modifications
Dorsiflexion Assist AFO	1- Shoe Clasp →	1- Hard counter; Blucher shoe*
	2- Polypropylene Posterior Leaf Spring →	2- Depth shoe** with thin inlay
	3- Ortholene Posterior Leaf Spring →	3- Depth shoe** with thick inlay
	4- Conventional →	4- Solid stirrup or caliper stirrup footplate and a very strong shank; Blucher shoe*
Dorsiflexion Assist plus spring-loaded varus control	Posterior Leaf Spring Orthosis with spring-loaded varus correction →	Posterior caliper stirrup footplate with Blucher shoe* and outflare heel
AFO with plantarflexion stop***	1- Polypropylene →	1- Depth shoe with thin inlay
	2- Conventional Double Bar →	2- Solid stirrup or caliper stirrup footplate; strong shank; Blucher shoe*
	3- Single Bar →	3- Solid stirrup or caliper stirrup footplate; strong shank; Blucher shoe*
AFO with dorsiflexion stop	Conventional Double Bar →	Solid stirrup or caliper stirrup footplate; rocker bar; long steel spring; Blucher shoe**
AFO with limited motion ankle	1- Conventional Double Bar →	1- Solid stirrup or caliper stirrup footplate, SACH heel; rocker bar long steel spring; Blucher shoe*
	2- PTB Orthosis →	2- Solid stirrup; SACH heel; rocker bar; long steel spring; Blucher shoe*

TABLE 1. (Continued)

AFO with absent motion ankle (solid ankle)	1- Conventional Double Bar →	1- Solid stirrup or caliper stirrup footplate, SACH heel; rocker bar; long steel spring; Blucher shoe*
	2- Solid Ankle Polypropylene →	2- Depth shoe with thick inlay (1/4" polypropylene used); SACH heel; rocker bar; long steel spring
	3- PTB Orthosis →	3- Solid stirrup; SACH heel; rocker bar; long steel spring; Blucher shoe*
AFO with dorsiflexion stop and adjustable equinus position	Knee Stabilizing AFO →	Depth shoe with thick inlay; rocker bar; long steel spring
Shoe-Orthosis with flap-open vamp for spastic foot	1- Shoe clasp (mild spasticity) →	1- Hard counter shoe with flap-open vamp; velcro closure
	2- Conventional Double Bar →	2- Stirrup or caliper stirrup footplate attachment; special shoe with flap-open vamp and velcro closure
	3- Single Bar →	3- As above
	4- Polypropylene Shoe Insert →	4- Depth shoe with either thin or thick inlay and with velcro closure
Shoe-orthosis for sensitive calf	Shoe-Strut AFO →	High top shoe incorporating vertical metal struts (See text)

* The preferred basic shoe should be the Blucher type with leather sole and rubber heel. If special needs are dictated by foot pathology, then indicated modifications should be made. FES does not require special shoe modifications. When depth shoes are prescribed for shoe insert orthoses, the inlay is removed on the side of the orthosis to provide room for insertion of the foot segment of the device. 1/8" thickness of polypropylene can be satisfactorily inserted into a Wilbur Coon shoe, and 1/4" thickness should be inserted into an Ortho Inlay shoe.

** The depth shoes should also be of the Blucher type, unless specifically indicated, as in the case of the shoes with flap-open vamp. The depth shoe with thin inlay is used for a 1/8" polypropylene shoe insert orthosis and the depth shoe with thick inlay for 1/4" polypropylene shoe insert orthosis.

*** If patients in this category demonstrate a heel and toe gait with near normal stride length, then a SACH heel should be added.

TABLE 2. LOWER LIMB SYSTEM

PRESCRIPTION PROCEDURES FOR AFO's

	ETIOLOGY	PATHOLOGY	MODIFYING FACTORS	DESIRED CONTROL	PRESCRIPTION
1	LOWER MOTOR NEURON DEFECT (PERONEAL N.)	FLACCID PES EQUINUS	STABLE*	Assist dorsiflexion of foot at ankle	SHOE CLASP (VAPC) AFO
			UNSTABLE* — MILD	Assist dorsiflexion and resist varus-valgus	POLYETHYLENE (TEUFEL)
			UNSTABLE* — MOD	Assist dorsiflexion and resist varus-valgus	POLYPROPYLENE
2	LOWER MOTOR NEURON DEFECT (SCIATIC N.)	FLACCID PES EQUINUS (WITH CALF MUSCLE CONTRACTURE**)	STABLE*	Assist dorsiflexion of foot at ankle	SHOE CLASP
			UNSTABLE* — MILD	Assist dorsiflexion and resist varus-valgus	POLYETHYLENE
			UNSTABLE* — MOD	Assist dorsiflexion and resist varus-valgus	POLYPROPYLENE
		FLACCID PES EQUINO-CALCANEUS (WITHOUT CALF MUSCLE CONTRACTURE)	STABILITY NOT A FACTOR SINCE CHOICE IS LIMITED TO STABLE ORTHOSES	Resist dorsiflexion and resist plantar flexion	SPIRAL ORTHOSIS (IRM). BUT IF BILATERAL INVOLVEMENT. THEN POLYETHELENE OR POLYPROPYLENE FABRICATED TO RESIST DORSIFLEXION AND PLANTAR-FLEXION
3	UPPER MOTOR NEURON DEFECT	SPASTIC PES EQUINUS	MILD***	Assist dorsiflexion	SHOE CLASP FES
			MOD***	Assist dorsiflexion and resist plantar flexion	POLYETHYLENE. IF NOT ADEQUATE.
			MOD***	Assist dorsiflexion and stop plantar flexion	THEN - POLYPROPYLENE
			SEVERE***	Stop dorsiflexion and plantar flexion	POLYPROPYLENE - IF NOT ADEQUATE. THEN -
			SEVERE***	(If foot deforms in brace)	DOUBLE BAR (SHOE ATTACHMENT) AFO
4	ANY OF THE ABOVE	ANY OF THE ABOVE	EDEMA OF FOOT-ANKLE AND OR IMPAIRED SENSATION**** AND OR VARUS OR VALGUS (REQUIRING T-STRAP)	Any of the above controls PLUS — Allow limited subtalar motion	SINGLE BAR (ROTATION) ORTHOSIS (VAPC) FOR FLACCID OR SINGLE BAR (NO ROTATION) FOR SPASTIC
				Any of the above controls PLUS — Hold subtalar motion	OR DOUBLE BAR AFO IF SUBJECT IS OVERWEIGHT OR VERY ACTIVE
5	PAINFUL DESTRUCTIVE DISEASE OF ANKLE	ARTHRITIS (POST-TRAUMATIC, INFECTIOUS, INFLAMMATORY, ETC.)	PAIN ON AP OR ML STRESS BUT NO PAIN ON WEIGHT-BEARING	Stop plantar-flexion, dorsiflexion, varus and valgus	POLYPROPYLENE ORTHOSIS MODIFIED TO RESTRICT DORSI-FLEXION AND PLANTAR FLEXION
6	a) STRUCTURAL IN-ADEQUACY DISTAL TO THE KNEE	a) NON-UNION OR DELAYED UNION OF TIBIA, CHARCOT'S DISEASE OF ANKLE/FOOT, ETC.	TISSUE BENEATH THE CUFF AREA MUST BE CAPABLE OF TOLER-ATING THE PRESSURES OF PARTIAL UNWEIGHTING. FOR EXAMPLE, SENSATION MUST BE INTACT	Partially unweight the leg, ankle, or foot	PTB WEIGHT-BEARING AFO
	b) PAIN DISTAL TO KNEE ON WEIGHT BEARING	b) DESTRUCTIVE DISEASE OF ANKLE, ETC.			

*Stability is: a. evaluated during trial of a stock brace (VAPC shoe clasp, Teufel, Polypropylene) on the patient by the Clinic Team, or, b. can be assumed by the nature of the terrain the subject may walk upon (fields, golf courses, etc.).

**Many patients with sciatic nerve injuries develop calf contractures sufficient to stabilize the ankle at about 90°, in the weight bearing position. These patients need only a correction for the flaccid pes equinus.

***During the clinic team evaluation of orthoses, the degree of spasticity is related to the "triggering" of spastic equinus (or equino-varus) by the stock braces tested directly on the patient as part of the evaluation procedure. For example, if the stock shoe clasp triggers the foot into spastic equinus, one must try the stock Teufel, or finally, the stock Polypropylene. If the foot deforms within the Polypropylene, external (shoe) attachment bracing is required. Very severe spasticity cannot be controlled by a brace.

****Most such patients will tolerate a properly fitted shoe insert brace, or a shoe clasp. Those who develop areas of irritation should be changed to external bracing with individualized shoe modifications, if indicated.

SUMMARY

The authors have outlined the shoe modifications customarily employed for the various lower-limb orthoses most frequently used in their facility. The shoe and the orthosis cannot be considered as casually related. The shoe modifications required for each orthosis are dependent upon the characteristics of the orthosis employed, the pathology to be treated, the condition of the local tissues and foot, the individual patient's gait pattern, and the response of the patient himself.

A basic approach to prescription of a total orthotic system for the lower limb has been presented, but each patient is an individual and the basic approach may have to be varied at times to solve unusual individual problems. That is the reason for the existence of the Clinic Team.

ACKNOWLEDGEMENT

The authors wish to extend their appreciation to Mr. Robert Towner, Clinic Team Coordinator, for his valuable assistance.

LITERATURE CITED

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