ACHIEVING COSMETIC VALUES IN ORTHOTIC APPLIANCES*

By THORKILD J. ENGEN, C.O.

Clinical Instructor—Orthotics, Department of Rehabilitation
Baylor University College of Medicine, Houston, Texas

In 1958 a medical team from our rehabilitation unit in Houston, Texas, visited more than 100 of our former respirator patients who were on home care programs *in their homes* for the purpose of evaluating their medical condition, the outcome of home placement, and the use and practicality of their physical assistive equipment and respiration. It was found that a number of these patients did not use their upper extremity orthotic devices to the *extent intended* at the time of discharge from the hospital. Also, it was concluded by this team that if the assistive equipment had been designed to provide useful functions rather than correcting deformities, it was used and highly valued by the patients.

A complaint often repeated was that the devices were too heavy and bulky and this tended to make some patients feel conspicuous. These findings prompted us to make a critical evaluation of the design and appearance of our orthotic equipment as it affected usage. If you analyze any orthotic equipment you will find it can have one or a combination of the following functions:

1) Support weak body members
2) Correct or prevent deformities
3) Assist weak muscle groups
4) Resist strong muscle groups

In addition, they should also have these desirable features:

1) They should be comfortable for the patient to use regardless of purpose: which means that the materials from which the device is made must be carefully selected to meet the functional requirements and design characteristics.
2) They should be cosmetically acceptable.

Exactly what does cosmetically acceptable mean? It is obvious that patients do not want to advertise their handicap, but if their neuromuscular condition does require some form of orthotic equipment it is very important that the basic requirements prescribed by the physician should be met and insofar as practical, they should be appealing to the eye in form, color, and material selected.

Comparatively speaking, the frames for eye glasses are often selected to suit the individual's taste and personality, because here the cosmetics are considered very important. Orthotic equipment, as well as eye glasses, often becomes a part of the individual and is therefore a good reason why beautifying and finishing touches should be added.

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When our practice is being taught to an apprentice it is too often said and demonstrated that when a piece of material (aluminum, leather, etc.) is to be rounded "the corners should be knocked off." Unfortunately, this is exactly what is done and the final result is a mediocre job. It does *not*, and I emphasize *not*, take any more time to eliminate undesirable hammer marks, uneven corners, and unfinished edges on any job once it becomes a part of normal working habits.

When an orthosis has been completed with the previously indicated desirable features, the orthotist develops a pride for his work that will benefit not only himself, but also the patient and the physician. Therefore, I think it is very important that the equipment prescribed by the physician for his patients must have a finished appearance with suitability of form, shape and function, and not just add up to the sum of the materials used.

On an experimental basis we have anodized the surface of the aluminum used for upper extremity devices. The patients like this new appearance of their equipment and in addition, anodizing eliminates the black stain on clothing. Furthermore, it is much more resistant to deterioration caused by perspiration, etc. The aluminum gets this resistance from the electronically applied oxide surface coating or film which is readily dyed in any desired color. Once the equipment for this process has been installed it is relatively easy and inexpensive to use.

Since the time does not permit me to describe these devices in detail, I would like to pass around some samples of the upper extremity orthotics we are currently using for our patients. You will notice on some of these devices that the anchoring straps have been eliminated so the patient can easily apply the orthosis himself. Also we are using a durable felt for cushioning and lining that is held in place by a good grade of rubber cement which eliminates riveting entirely.

The need for a standardized hand orthosis for functional as well as supportive purposes has often been a subject for discussion. In view of recent developments of externally applied power sources designed to obtain useful function of the flail extremity it is useful to develop a hand orthosis with the basic characteristics described that will be adaptable for mass production.

In our current research program we are attempting to solve this problem by casting a basic hand orthosis of moldable plastic material. These will be made available in a variety of sizes that can be adjusted easily by a simple heating process to meet the fitting requirements of the individual patient.

Some of the advantages of using this method are that the plastic orthosis firmly supports the volar arch of the hand without restricting the mobility of the fingers, and positions the thumb in opposition to the fingers so that a useful grasp or pinch can be obtained. If the orthosis is intended to keep the hand in a neutral position an aluminum wrist support can be added and deformity caused by muscle imbalance and gravity forces may be prevented.

If external power is to be applied to obtain flexion of the fingers channels for tendons can be imbedded in the plastic during the production stage. These are placed in a pattern similar to the tendons of the flexor sublimus muscle.

In this development we have attempted to bypass the mechanical "erector set" approach for various reasons:

1) Simplicity of fitting the orthosis by the orthotist
2) Ease of repeated application and use by the patient

3) Maintenance problems will be greatly minimized

At our Institute we are now in the process of studying patients who have been fitted with this plastic orthosis in order to determine the following:

1) Fitting problems
2) Skin reaction
3) Tolerance for prolonged usage, etc.

It is obvious there are several problems remaining to be solved in this development but we hope in the future that this line of research will prove to be fruitful.

Conclusion

We, in our Association, are trying to raise our standards. One way of doing this is to take a personal interest in the patient's disability and constantly strive to improve the design and appearance of the orthotic equipment prescribed. This in turn will raise our standards for professional performance and benefit the patient through increased natural acceptance and use of the devices we provide.

I should like to quote from Thomas Carlyle, who said: "A goal of yesterday will be the starting point of tomorrow."

A BRACE APPARATUS OF CAST-RESIN FOR A PARALYZED POINT-FOOT (TALIPES EQUINUS) CAUSED BY POLIOMYELITIS

By HELMUT KOGLIN

In Fa. Pfeuffer & Co., Nurnberg, Germany

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(Translation by Otto Rothman, Chief, Testing & Development Laboratory, VAPC)

"The foreshortening appliance worn till now by a patient was in the form of a leather shoe with a V-2A sole and a built-in spacer for height equalization. The prosthesis was worn out and had to be replaced.

The desire for the patient for a lighter and better looking construction led to the consideration of using cast resin.

After fabrication of an exact plaster model with elastic bandages and a Bofors test socket, a thin inner shell was cast. Care was taken to provide enough room for the toes. Then the 5⅛" high spacer (height equalizer) and the forefoot were made out of balsa wood. The imbedding was made so that a large part of the body load would be distributed to the forefoot. Also, for the location of the forefoot, the correct positioning for the roll-over had to be borne in mind. The inner socket was roughened and the wood parts glued on with cast resin. Over the whole was now drawn an elastic glass sock and several layers of cotton-and helanca-tricot. The sole was reinforced with a layer of fiberglass. This whole part was then cast by using the vacuum technique. The lacers can be made of leather, or if water tightness is desired, of Vulkolan. With the latter, the brace can be used for bathing.

As paralytic cases often tend to strong perspiration, several holes should be provided for aeration.

The construction proved to be light and durable and permitted the wearing of regular store shoes.

Weight comparison:

Old appliance—2.75 lb.

New appliance—1.32 lb."