Birth Defect Bracing

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EDITOR'S NOTE: The following article was presented at the National Assembly of the American Orthotics and Prosthetics Association in Colorado Springs, Colorado, September 2, 1965.

In birth defect bracing, as in many other types of bracing such as polio, cerebral palsy, trauma, etc., the same problems plus a few new twists arise. The attempt here is not to give you a word to be followed explicitly, but to try to pass on a few problems that we have solved and a few still to be solved.

The problems are as mentioned in the article written by Dr. Robert Larrick in the December 1966 *Orthopedic and Prosthetic Appliance Journal*, pp. 294-297, peculiar and many. We are dealing with the combination of motor, trophic, sensory and mechanical aspects as well as a normal proportionate body, a normal mentality, and normal upper extremities. The first four factors gave us problems such as scoliosis, club feet, and hip dislocation. Rigidity and contractions are frequent and still give us some problems mainly because of the sensory problem of no feeling.

Let us take some of the problems, starting with the feet and working up the body framework.

In Figure 1 we have a typical club foot condition. This patient, however, is very flail with no rigidity at all. Figure 2 has rigidity in the left foot and plantar flexion tightness in the right foot. The patient in Figure 3 is quite flail in the right foot but has a dorsiflexion tightness in the left. To control the foot one must control the heel. The best way we have accomplished this is with over-instep strapping with heel and tongue padding. The shoe we have found best for this is the open-toe lace-to-toe shoe. However, most of our patients are from three months old to one year old when measured. In older children there may be a better shoe. The open-toe shoe also is good because it can be bought in a straight, pronator and regular lasts. The over-instep strap helps to lock the heel down in the shoe in as correct a position as possible. The padding merely helps to relieve any pressure sores that may develop.

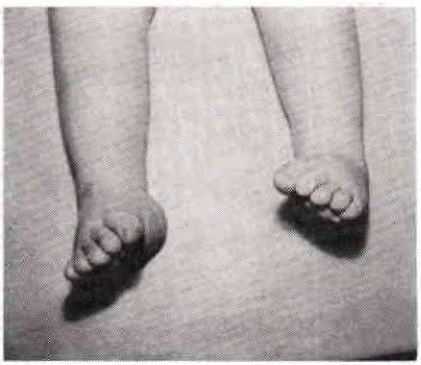

FIG. 1

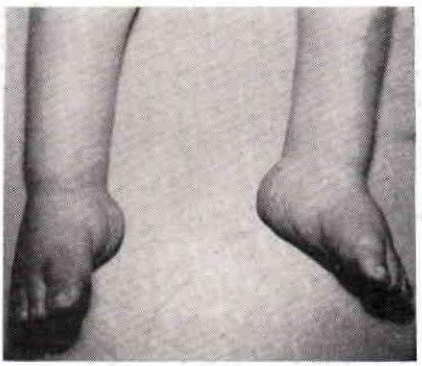

FIG. 2

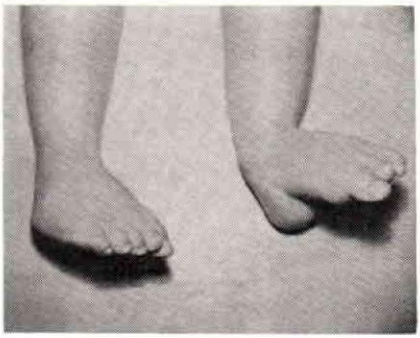

FIG. 3

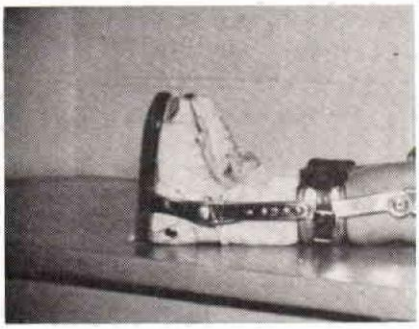

FIG. 4

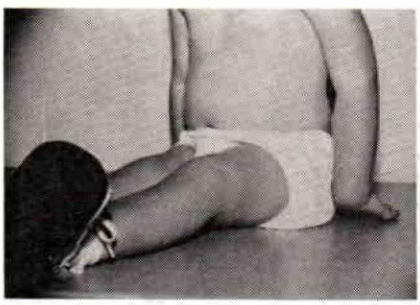

FIG. 5

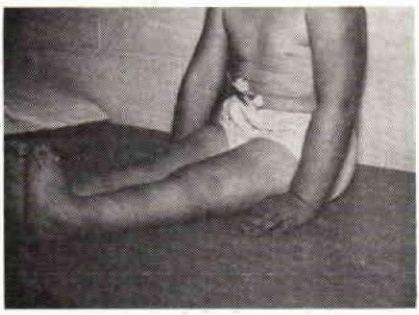

FIG. 6

The shoe attachments are always a problem. We have tried solid stirrups, split stirrups, and round caliper. The only thing we have noticed is that if no ankle motion is wanted, and the patient is very, very small, a solid stirrup works well. However, if you see that this patient is going to be ambulatory quickly, a round caliper with anterior and posterior stops is more feasible because of shoe wear and replacement. If only plantar flexion or dorsi-flexion stops are needed and the patient is growing to good size, a solid stirrup or split stirrup places the true ankle motion where it should be and the patient seems to walk better. (One word of advice: Keep shoe attachments as light in weight as possible.)

In covering a stirrup or socket we have found that a full sole of neoprene or leather, depending on which one the patient walks better with, is better than trying to put on a heel and make the shoe tread flat. (See Figure 4.)

Any control straps needed can be used, but we find if the heel is controlled and the braces are aligned correctly, very few control straps, T-straps, etc., are needed.

As we brace on up the leg we run into all sorts of problems with the knees.

In Figure 5 we have a patient with free working knee joints but very flail legs. In Figure 6 is a patient with very straight knees sitting, but practically no flexion at all. At the same time, however, this same patient has extreme recurvatum and genu-valgum weakness as seen in Figure 7. The patient in Figure 8 has fairly good flexion but contractures keep the knees from extending. This patient is flail with practically no muscle power at all.

With correct alignment and fitting of braces plus some control straps at the knees, these deformities can be controlled or corrected.

If the patient is small and very young (three months to 1 year) keep braces light and very small in proportion. No knee joints are necessary sometimes in the first set of braces, because all we are trying to do is get the patient in an upright standing position. This inflates their desire to walk and also increases growth and circulation factors. It also makes all body functions start working properly such as respiration, bowels, kidneys, etc.

This brings us to the hip region in our bracing. Of the cases we have seen almost all have needed hip locks to stand upright. This is mainly because although most of them have some hip flexors, none has little or any trace of hip extensors. This seems to be characteristic in the meningomyelocele patients. In Figures 9, 10, and 11 are shown three patients with damages at approximately the same level of the spinal cord. In Figure 9 the patient has very little hip flexors and no extensors. In Figure 10 a little more hip flexor strength but still no extensors. In Figure 11 a very strong set of hip flexors and knee extensors, but no hip extensors or knee flexors. The difference in these three patients' hips is just one of the many challenges there are in birth defect bracing.

The missing hip extensors in these patients were an easy problem for us because of a design in hip and buttocks padding we have used for about 15 years. Figures 12, 13, and 14 show three ways we use the pelvic buttocks sling. The sling works only if it is slung away from the pelvic and buttocks bands. All three braces in these figures are over two years old and still do not have pressure on the pelvic or buttocks bands. The sling pad gives a glove action on a gibbus or scar. By glove action we mean the pad moves with the patient, as a glove moves on one's hands.

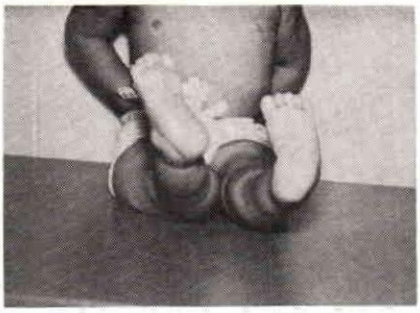

FIG. 7

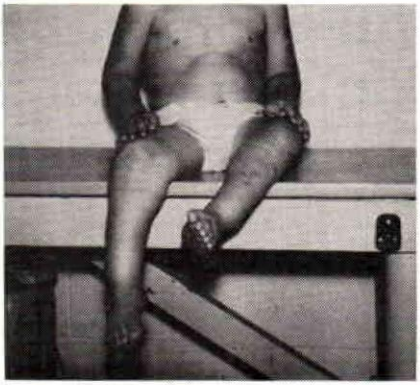

FIG. 8

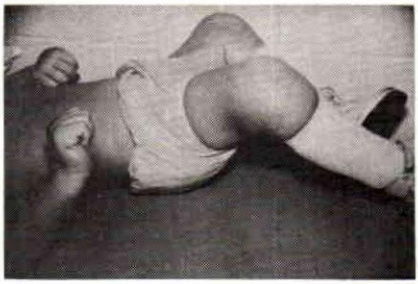

FIG. 9

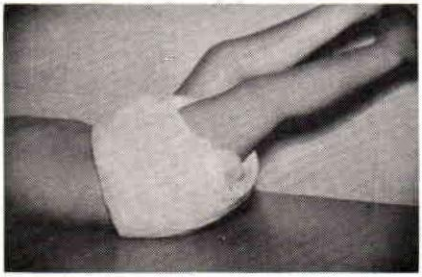

FIG. 10

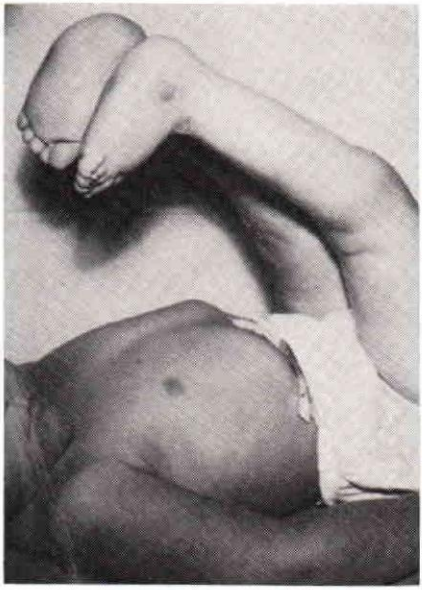

FIG. 11

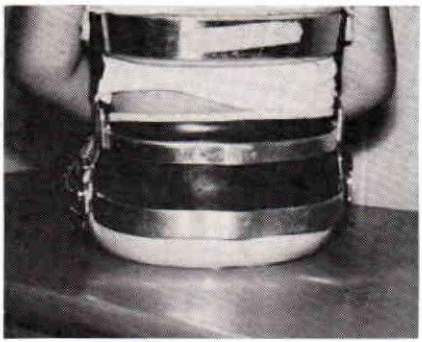

FIG. 12

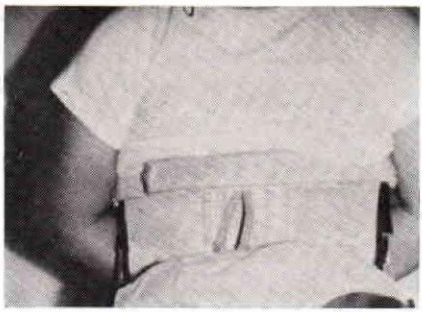

FIG. 12A

Figure 12 shows both pelvic and buttocks bands used with sling. This patient has some adductor tightness and also walks with a swing through gait which needs some extra strength, so we used both bands and pad. In Figure 13, the patient is a small girl with no tightness so we used a pelvic band only. We reinforced the pelvic buttocks pad in Figure 13 because the patient sat in a very soft chair and always leaned far back and caused the pad to wrinkle. Figure 14 patient is one with good thoracic strength, good hip flexion and good walking gait so we used only pelvic band and regular pelvic buttocks pad.

The big reason for this pad, in case most of you have not guessed, is to hold the hips in extension with a large area of pressure on as soft an area as possible; the gluteus. The best and only way we know of making a person stand erect is to tuck in the gluteus and force the patient to extend his hips. To help this even more we have also allowed a little hyperextension "slop" in hip locks so that the patient can hyperextend but cannot flex at hips. This allows the weight of the body to come into a more equal weight bearing line.

Figures 15 and 16 are closer views of the anterior posterior makings of the pelvic buttocks sling. With this sling we have cut pressure sores on the spine area almost 100% and our patients very rarely have any advancing tightness in hip flexor. They walk much better and develop good walking gaits.

From the hips we move up to the thoracic area. In a great number of Spina Bifida patients the thoracic area muscles are knocked out and we see

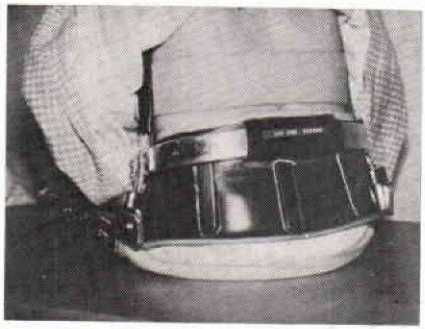

FIG. 13

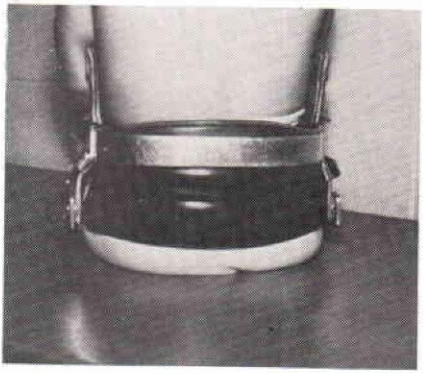

FIG. 14

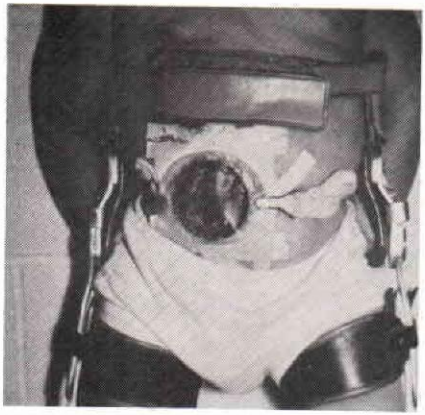

FIG. 14A

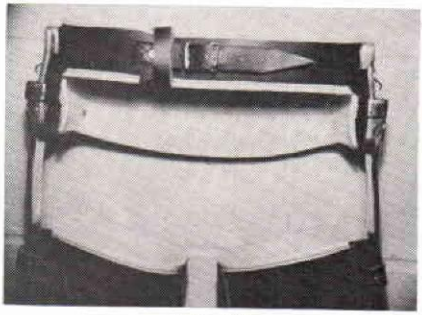

FIG. 15

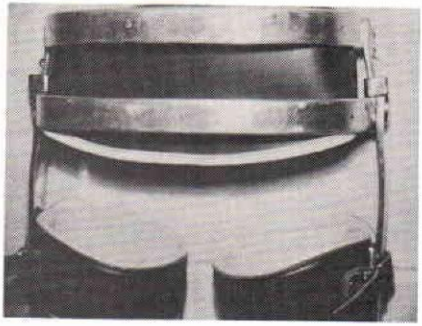

FIG. 16

FIG. 17

scoliosis and collapsing of the trunk. We then have to add a thoracic extension to the braces. In extreme weakness we add lateral extensions and a thoracic dorsal band plus an elastic abdominal front as in Figures 12 and 12-A. In Figure 13 we added lateral uprights with an elastic abdominal front but no thoracic band. We also added a 2" elastic high lumbar sling to help the patient from flexing at waist. The patient needed something just to touch this area to keep her straight. In Figures 14 and 14-A we added lateral uprights and a velcro chest strap just to clear an Ileostomy stoma.

Most of these children are going to walk with crutches, so be very careful when adding the thoracic extension that you allow enough room between top of band or uprights to the axillary area for crutches as in Figure 17. If they use lofstrand forearm crutches you have no worry; but most are too small and not strong enough for this type of crutch.

We feel we have done a fair job in solving some of the problems of birth defect bracing but we also feel we have just scratched the surface. Most of these patients are under 5 years of age. What are the problems in the future years of these patients? The statistics show 250,000 to 300,000 birth defect children are born each year. 150,000 to 200,000 are potential brace patients. With all the new surgery techniques and hospital care the life expectancy is much higher for these children. A much longer life-span is also expected and this means more bracing problems.

What can we do to improve their future in braces? The next five to ten years will be up to us in the field of Orthotics to get some answers and to solve many problems. The earlier we can get these answers the better their future will be.

There are listed in the 1966 Certified Facilities Roster 302 Orthopaedic Brace shops in the United States and Canada. If the 200,000 birth defect bracing patients were divided equally each facility would have approximately 65 to 70 per year now and a possibility of a greater number in the future.

Could your facility do a good job of bracing these patients?

CERTIFICATION EXAMINATION DATES ANNOUNCED

The American Board for Certification in Orthotics and Prosthetics, Inc., has announced that the 1966 Board Examinations will be held as follows:

August 30 to September 1, 1966

at

Elks Aidmore Hospital
2040 Ridgewood Drive, N.E.
Atlanta, Georgia

September 6 to September 8, 1966

at

Navy Prosthetic Research Center
8750 Mountain Boulevard
Oakland, California

The deadline for submission of applications is June 1, 1966.