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Case Study: Management of a Severely Involved Cerebral Palsy Patient

Lawrence R. Lange, C.P.O.

INTRODUCTION

D.S. was a four year old cerebral palsy victim. Prior to orthotic care, he exhibited the following physical characteristics (Figures 1 and 2):

1. Marked lumbosacral lordosis
2. Hip and knee flexion contractures
3. Achilles tendon tightness
4. Extensor synergy pattern during ambulation

While attempts were made, prior to seeing us, to reduce contractures, he was measured and found to have 10° to 15° flexion contractures bilaterally at the knees. He also had five to ten degree flexion contractures at the hips. The one promising aspect was the apparent lack of marked spasticity seen in this child.

A prescription was developed in conjunction with the patient's occupational therapist and physician for a molded plas-

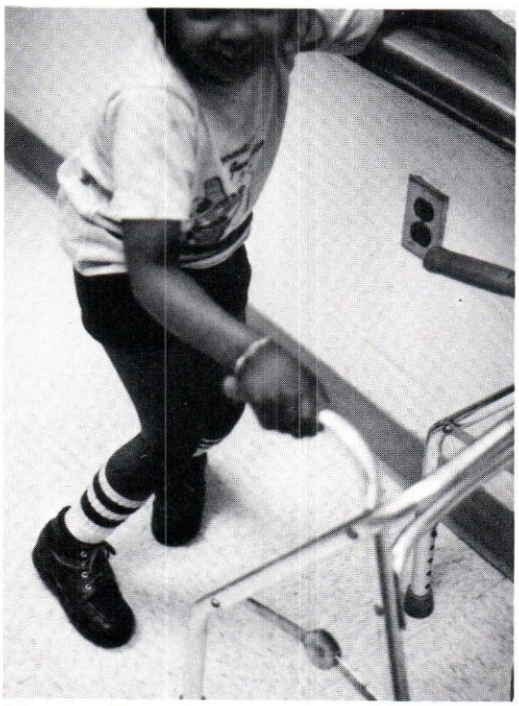

Figure 1. The patient ambulating prior to orthotic treatment viewed obliquely. Note the synergy pattern and lack of stability.

Figure 2. Lateral view of the patient prior to treatment.

tic TLSHKAFO with Becker lightweight aluminum dial lock knee joints.* The most difficult portion of the orthotic treatment revolved around the patient's physical therapy. In order to work on this patient's synergy pattern, it was necessary that there be no rigid hip control joints or band. This required a non-standard approach to his orthotic treatment.

MEASUREMENT

Casting of the KAFO's was done first with the patient in a supine position on the examination table. This was done to enable us to see the effects of locking the knees and ankles, and also to have the patient standing upright for the casting of the TLSO portion of the orthosis. The foot was cast first. It was positioned in slight inversion and as close to a neutral flexion angle as possible. The inversion allowed the feet to be flat on the ground when the thighs were held in the proper amount of abduction. The thigh was then cast, leaving a gap over the knee. The knee was molded last, so the joint could be extended by applying force posteriorly to the proximal and distal portions of the negative mold. We found that this technique reduces distortion to a minimum.

After both legs were molded and the negative models hardened, the patient was placed upright and cast in the traditional manner for the TLSO. It was noted at this time that once the legs were held in normal alignment, without knee and ankle flexion abnormalities, there was reduced hip flexion, and the patient was able to stand virtually upright with little assistance.

MODIFICATIONS AND FABRICATION

Build-ups were made over all bony prominences on the KAFO portions. Slight medial and lateral flattening was done on the thigh and calf areas. The standard

Figure 3. Anterior view of the TLSO component to the system. Note the elastic extension, abduction straps and the articulated posterior section.

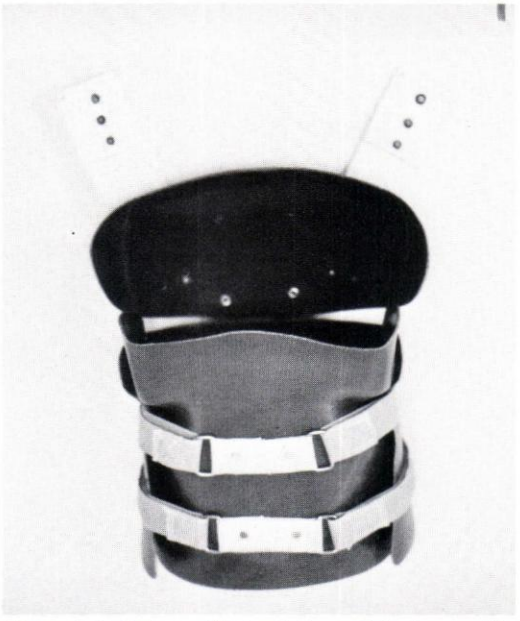

Figure 4. Anterior and lateral views of the knee ankle foot orthoses demonstrating suprapatellar portion and dial lock knee joints.

*Becker Orthopedic Appliance Company, 635 Executive Drive, Troy, Michigan 48083.

TLSO modifications were done on the positive model, with the exception of the lower posterior distal trimlines.

The orthoses were made of lightweight acrylic laminate. The TLSO was fabricated using techniques borrowed from J. Glancy, C.O.[1] The KAFO's were trimmed to allow as much support and comfort as possible (Figures 3 and 4). The latter point was important as the patient had a concurrent skin condition, and perspired very little except on the soles of his feet. All trimlines were adjusted with the patient present. The goal was to ease donning and doffing as well as to achieve all comfort requirements. Below-knee cuff suspension studs and elastic straps were placed in the distal posterior section of the TLSO. The purpose of these straps was to assist in hip extension and abduction by attachment to the thigh sections. As we had seen during measurement, once the knee and ankle portion of the extensor synergy pattern were locked out, the hips were mobile without any apparent spasticity. This allowed the elastic control straps to function and not aggravate the condition. Contoured suprapatellar trimlines assisted in limiting knee flexion and, once the TLSO was in place, lordosis was reduced. The combined effect of the total orthosis was the production of a more upright posture (Figures 5 and 6).

CONCLUSION

It was noted that once the orthoses were removed, the patient remained upright for several steps. The orthoses are designed to hinder any musculoskeletal deformity while also assisting to train the patient in

Figure 5. Oblique view of the patient following orthotic treatment demonstrating more upright posture.

Figure 6. Lateral view of patient following orthotic care.

more appropriate swing and stance phase gait. Perhaps, in the future, he will require little, if any, orthotic management as his condition appears to be one of delayed development as opposed to retarded development.

The important features of the orthosis are (Figures 3 and 4):

1. Lightweight, cosmetic construction
2. Control from level of xyphoid to foot
3. Control of hip joint without use of conventional metal hip joints and locks
4. Suprapatellar trimlines to control knee flexion contractures, along with usage of dial lock knee components

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AUTHOR

Lawrence R. Lange, C.P.O., is Director of the Orthotics/Prosthetics Department, Shriners Hospital for Crippled Children, 8400 Roosevelt Blvd., Philadelphia, Pennsylvania 19152.

REFERENCES

[1]Glancy, John, "A Dynamic Orthotic System to Assist Pelvic Extension: A Preliminary Report," *Orthotics and Prosthetics*, 29/1, 1975, pp. 3–9.