



## "USE OF ADJUSTABLE DYNAMIC RESPONSE AFO BRACES TO ADDRESS COMMON GAIT ABNORMALITIES IN AN ADOLESCENT WITH DIPLEGIC CEREBRAL PALSY"

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### INTRODUCTION

This individual case study addresses improving common gait abnormalities such as achieving a heel strike as well as allowing for a proper push off in the terminal stance phase for a teenager with the diagnosis of Spastic Diplegic Cerebral Palsy (GMFCS level 3). The patient's history includes physical therapy twice a week, bilateral SMOs for orthotics, as well as heel cord and hamstring lengthening procedures due to tightness experienced from growth spurts. The changes in growth caused impaired balance, reduced ROM, and decreased strength. The above clinical concerns required a new pair of orthotics for ambulation.

Our clinic recommended braces that would provide LE stability, dynamic balance, alignment, and address gait abnormalities. The patient was fitted with Ultraflex Adjustable Dynamic Response™ (ADR™) AFOs. These braces have a tension-adjustable component that allowed incremental increases of controlled AROM in both dorsiflexion and plantarflexion throughout his gait cycle. The purpose of this case study was to examine the effectiveness of these new braces with functional mobility and gait pattern.

### METHOD

**Subjects:** One Sixteen year old male with the Diplegic Cerebral Palsy (GMFCS Level 3) (height = 167.64 cm; weight = 54.43 kg).

**Apparatus:** Patient was tested at baseline with bilateral SMO braces and then re-tested 8 weeks and one year later with bilateral ADR AFO braces. A standard camcorder was set up to capture his gait pattern during the six minute walk test as well as a stopwatch to measure time in the functional tests.

**Procedures:** The following tests were performed on the patient by two separate therapists: Passive Range of Motion, The Berg Balance Exam (Franjoine et al, 2003), The Six Minute Walk Test (Gorter et al, 2009), The GMFM Measurement Exam (Russell et al, 1993), The Timed Up and Go, and the Timed Up and Down (Zaino et al ,2004).

### DATA ANALYSIS and RESULTS

The results were maintained passive range of motion over a full year from the initial gains made from his

surgical procedure as well as improvements in every other test. Listed below are the specific results (Table 1).

|                              | BASELINE<br>SMO  | EIGHT<br>WEEKS<br>ADR AFO | ONE<br>YEAR<br>ADR AFO |
|------------------------------|------------------|---------------------------|------------------------|
| Berg<br>Balance              | 43 points        | 48 points                 | 51 points              |
| 6 Minute<br>Walk Test        | 225<br>Meters    | 252.3<br>Meters           | 340.1<br>Meters        |
| GMFM-<br>Standing<br>Walking | S- 82%<br>W- 75% | S- 82%<br>W- 75%          | S- 85%<br>W- 78%       |
| Timed Up<br>and Go           | 10<br>seconds    | 9.8<br>seconds            | 9.1<br>seconds         |
| Timed Up<br>and Down         | 64<br>seconds    | 61<br>seconds             | 55<br>seconds          |

Table 1- data comparison at baseline with eight weeks and one year follow up (no assistive device was used during the testing).

### DISCUSSION AND CONCLUSIONS

The use of the ADR™ AFO braces improved our patient's balance, gait pattern and speed, and functional mobility. The improvements in gait included achievement of heel strike, tibia advancement, and a proper push off phase in terminal stance with the ADR™ AFO braces.

The ADR AFO braces gave our patient the necessary support of a traditional AFO brace, but allowed active and controlled dorsiflexion and plantarflexion for an improved gait pattern. The advancements made in his gait pattern and with his functional skills were exceptional and are not usually seen in an adolescent with a chronic condition such as diplegic cerebral palsy.

### REFERENCES

- Franjoine MR et al. Ped PT 15, 114-120, 2003.
- Gorter H et al. Ped PT 21, 31-37, 2009.
- Russell D et al. Gross Motor Measure Group, 1993.
- Zaino CA et al. Ped PT 16, 90-97, 2004.