INTRODUCTION
Cerebral Palsy (CP) is the leading cause of childhood motor disability. Seventy percent of those with CP are able to ambulate and 23% require assistive devices. Spasticity associated with CP limits joint range of motion and negatively impacts ambulatory ability. Orthotic interventions are conventionally prescribed for persons with CP such as Ankle-Foot Orthoses (AFO), Floor-Reaction AFOs, Dynamic AFOs, and others.

Recently, a variety of Functional Electrical Stimulation (FES) devices have become increasingly prescribed as a treatment option in these cases. FES devices reportedly offer increased range of motion and muscular strength, and a more normal gait pattern. The WalkAide (Innovative Neurotronics) FES system electrically stimulates the common peroneal nerve promoting dorsiflexion in cases where plantar grade foot bias and/or contracture are present such as with CP. WalkAide has been studied in CP cases. These data are limited in that the information only addresses forward directed movement. Furthermore, FES impact on gait speed does not address gait quality or symmetry. Therefore, the purpose of this case study is to report the effects of the WalkAide on gait quality and quantity as well as in a multi-directional stability test in a child with CP.

METHOD
The subject was a 12yr-old male with spastic diplegic CP, comorbid right sided ocular palsy and epilepsy. He was diagnosed at 8 days of age and began walking at 4yrs old with the assistance of AFOs. He has a Level III classification (Gross Motor Function Classification System for Cerebral Palsy) indicating ability to ambulate with the aide of an assistive device. The subject has a long history of semweekly physical therapy, since 7mos of age, for numerous functional needs including therapeutic exercise, balance training, gait training, and others.

The subject has had many surgeries to multiple systems (e.g. oculomotor, GI & others) and most recently a hip reconstruction at age 11. He has a history of frequent falls resulting in injury.

Subject walks short distances throughout the day with bilateral thermoplastic AFOs, but uses a wheelchair for longer distances. His gait and multidirectional stepping ability was assessed with his AFOs prior to provision of bilateral WalkAide units. Once fitted with WalkAide’s, the subject was given a one week accommodation and retested.

Apparatus: Gaitrite Portable Walkway System, 4 Square Step Test, 2 minute walk test and Borg’s Rating of Perceived Exertion.

Data Analysis: SPSS software was used for statistical analysis and significance was set at $p<0.05$.

RESULTS
Use of the WalkAide increased step length and decreased step width. Gait speed increased however cadence was unchanged with the WalkAide. Distance covered in a 2 minute walk test increased and the time to complete the 4 square step test was also improved when using the WalkAide. No differences were statistically significant. Additionally, the level of ambulatory patient guarding was unchanged between devices.

<table>
<thead>
<tr>
<th></th>
<th>CONV AFO</th>
<th>WALKAIDE</th>
<th>% DIFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Velocity [m/s]</td>
<td>58.8 (8.5)</td>
<td>67.2 (7.1)</td>
<td>13%</td>
</tr>
<tr>
<td>Distance [m]</td>
<td>59.4m</td>
<td>89.5m</td>
<td>34%</td>
</tr>
<tr>
<td>4SST Durations</td>
<td>47.3s</td>
<td>36.8s</td>
<td>23%</td>
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</table>

Table 1. Key differences between WalKaid & Conventional AFOs.

DISCUSSION
This child’s providers anticipated improvements in gait quality and general mobility with WalkAide use. The team further anticipated a decrease in the level of support from the device. Improvements were observed in many gait parameters including velocity, and step length. The subject’s decreased base of support suggests a more secure feeling in gait with the WalkAide, which is substantiated with both increased gait speed and distance covered on the 2MWT however, the patient continued to require gait belt supervised walking with contact guarding regardless of device.

CONCLUSION
The WalkAide improved key gait and mobility parameters in this case of pediatric Cerebral Palsy after the short accommodation period.

REFERENCES

American Academy of Orthotists & Prosthetists
38th Academy Annual Meeting and Scientific Symposium
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