IS A RIGID FOOTPLATE AS EFFECTIVE AS AN ARTICULATED AFO IN CONTROLLING IDIOPATHIC TOE WALKING?
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INTRODUCTION
Toe walking is a common gait deviation observed in as many as 24% of children (Accardo et al., 1992), most often due to cerebral palsy. However, it may also be observed in children without neurological disorders and is considered abnormal beyond the age of 2 years. Idiopathic toe walking (ITW) is a poorly understood diagnosis of exclusion in which children typically stand with a normal upright posture but adopt an equinus pattern during walking. The problem has important implications both for the present quality of gait and future orthopedic impairments. ITW gait is characterized by abnormal initial contact with an absence of the first rocker, a flattened second rocker and increased plantarflexion in the third rocker, followed by increased plantarflexion in initial and terminal swing. ITW can persist into adulthood, so early prevention is essential.

METHOD
Eight children with a diagnosis of ITW were seen in this study, aged 2-6. Following informed consent, each subject underwent instrumented gait analysis (Vicon, OMG, Oxford) and was randomly assigned to receive either an articulated ankle foot orthosis (AFO) with a plantarflexion stop or a carbon fiber footplate with an attached custom foot orthosis (FO). After one month of wear, subjects returned for gait analysis follow-up and were measured walking with and without the orthosis.

RESULTS
Both orthoses reduced the incidence of forefoot or flatfoot contact. AFOs were slightly more effective than FOs in control of initial contact (Fig. 1). Out of 292 recorded steps with AFOs, all displayed initial contact with the heel. Of 263 recorded FO steps, 241 showed heel contact.

However, the FOs were slightly more effective in the “acute carryover” test, measuring incidence of heel contact at follow-up when the orthosis was removed.

Orthosis type affected other aspects of gait as well. In general, subjects in the AFO group walked slightly faster at follow-up, but they did so with a significantly lower cadence (p=0.012) and a longer step length. Two subjects (one in each group) showed very large gains in normalized speed at follow-up.

DISCUSSION
Results are preliminary, as the study is active and additional subjects are being recruited. Nonetheless, the data presented were normally distributed.

Initial contact is one measure of toe walking. The data demonstrate that, at least based on this single measure, the orthoses in the study reduce toe walking. It appears that the AFOs are somewhat more effective, but that the carryover effect may be better with the FOs, possibly due to that design’s control over fewer joints.

The distinctive pattern in speed change for two subjects suggests that some children may be better candidates for orthotic intervention than others. Additional research is warranted.

CONCLUSION
Orthoses are effective in prevention of toe walking at initial contact in children with ITW. AFOs and FOs produce different effects on gait in these children and may have different implications for long-term carryover from treatment.

REFERENCES