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# Impact of ankle-foot orthoses on gait 1 year after lower limb surgery in children with bilateral cerebral palsy.

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## Abstract

**BACKGROUND:** Different types of ankle-foot orthoses are commonly used following lower limb surgery in children with bilateral spastic cerebral palsy. After three-dimensional gait analysis 1 year postoperatively, many children are recommended continued use of ankle-foot orthoses.

**OBJECTIVES:** Our aims were to quantify the impact of ankle-foot orthoses on gait 1 year postoperatively and evaluate predictors for clinically important improvement.

**STUDY DESIGN:** Prospective cohort study.

**METHODS:** A total of 34 ambulating children with bilateral cerebral palsy, with mean age 11 years (range 6-17), comprising 12 girls and 22 boys, were measured with three-dimensional gait analysis preoperatively (barefoot) and 1 year postoperatively (barefoot and with ankle-foot orthoses). Outcome was evaluated using gait profile score, key kinematic, kinetic and temporal-spatial variables in paired sample comparisons. Logistic regression was used to evaluate predictors for clinically important improvement with orthoses (⩾1.6° change in gait profile score).

**RESULTS:** Walking barefoot 1 year postoperatively, major improvements were seen in gait profile score and key variables. With ankle-foot orthoses, there were significantly improved step length and velocity, additional moderate reduction/improvement in gait profile score and knee moments and decreased stance ankle dorsiflexion compared to barefoot. Children using ground reaction ankle-foot orthoses ( n = 14) decreased stance knee flexion from 13.9° walking barefoot to 8.2° with orthoses. High gait profile score and more gait dysfunction preoperatively were significant predictors of clinically important improvement walking with orthoses.

**CONCLUSION:** The results indicate improved gait function walking with ankle-foot orthoses versus barefoot 1 year after lower limb surgery. Stronger impact of ankle-foot orthoses was found in children with more pronounced gait dysfunction preoperatively. Clinical relevance The 1-year postoperative three-dimensional gait analysis is a useful method to assess treatment outcome after lower limb surgery in children with bilateral cerebral palsy and could also guide clinicians whether further treatment with ankle-foot orthoses is indicated, using clinically important differences as thresholds to evaluate their impact on gait.

**KEYWORDS:** Gait analysis; ankle-foot orthoses; cerebral palsy; gait; lower limb orthotics; lower limb surgery; orthopaedic surgery; orthotics; postoperative

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