Surgical Burden and Recovery of Walking Performance in Youth with Cerebral Palsy

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INTRODUCTION

- Youth with cerebral palsy (CP) often undergo orthopedic surgery to correct gait with goals of improving or preserving ambulatory function.
- Studies of surgical outcomes in lab settings reveal improvements in impairment level measures such as kinematics and kinetics,[1] as well as functional capacity measures such as gait speed post operatively.[2]
- The recent validation of physical activity (PA) monitors for youth with CP allows measurement of performance level outcomes such as change in walking activity post surgery. [3]
- The aim of this project is to examine differences in the recovery of walking activity between groups with low and high surgical burdens.

METHODS

Design

- IRB approved, Retrospective, Cross-Sectional Cohort

Participants and Setting

- Surgical patients from a pediatric specialty hospital
- Diagnosis of CP
- GMFCS Classification Levels I, II, and III
- Age 4-18 years

Materials and Methods:

- Patients evaluated pre-op and during post-op recovery
- Step Watch ™ (SW) (Modus, Washington, DC)
- SW Protocol
  - Calibrated in the Gait Lab
  - 8 days of wear, ≥ 8 hrs per day
  - ≥ 3 weekdays and 1 weekend day
  - Returned by pre-paid mail
- Surgical episodes defined by burden
  - **Low** = soft tissue surgery and/or a single osteotomy
  - **High** = bilateral or multiple unilateral osteotomies
- Outcomes
  1. Mean total daily strides
  2. % Δ in strides - baseline to 6, 12, 24 months post-op
  3. Strides relative to expected GMFCS level [4]

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RESULTS

Sample:

- N = 49 youth 20 females, 29 males
- Low Burden (30), High Burden (19)
- Mean age low burden 10.7 and high burden 11.8 (SD 4.0)
- GMFCS levels: I (8), II (30), III (11) similar between groups
- # of visits

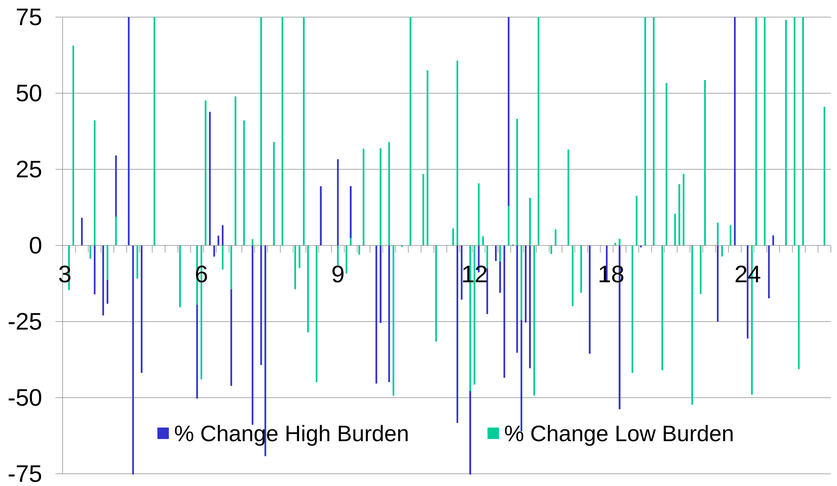
  3 to 6 months (43) 9 to12 months (49) 18 to 24 mo (33)

Table 1. Mean Daily Stride Totals

	Baseline (n= 49) Mean (SD)	6 month (n= 25) Mean (SD)	12 month (n= 34) Mean (SD)	24 month (n= 15) Mean (SD)
Low burden				
Total Daily Strides	**3014** (1747)	**3154** (1462)	**3450** (1953)	**4692*** (2618)
High burden				
Total Daily Strides	**2866** (1049)	**2248** (825)	**2337** (1055)	**3506** (2869)

* $p < .05$ baseline vs. follow-up

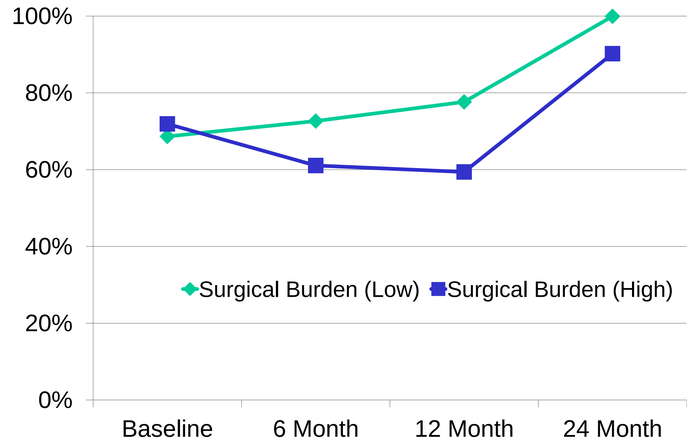
Figure 1. Percent Change in Daily Strides Post-Op (individuals)



% change from baseline was significantly different at 12 months post-op between the low (+31%) and high (-21%) burden groups ($p<.05$).

RESULTS

Figure 2. % Strides Relative to Expected Strides for GMFCS Level



Step Watch comparisons to Bjornson 2007 median daily strides: GMFCS I (5603) GMFCS II (4650) GMFCS III(2050) [4]

DISCUSSION

- Recovery of walking activity following orthopedic surgery is slower for youth with a high surgical burden.
- We found significant differences in recovery of walking activity at 1-yr post-op and final 2-yr outcome related to surgical burden.
- Relative to published stride data for GMFCS level, walking activity is 30% lower in pre-surgical patients and increases to 90-100% by 2 years post-op.

CONCLUSIONS

- Youth with CP who undergo multi-level surgery continue to make gains in walking activity for up to 2 years.
- Recovery is variable and close long term monitoring may facilitate optimal outcomes

REFERENCES

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