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, as well as functional capacity measures such as gait speed post operatively.
- 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.
- 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. % ∆ in strides relative to expected GMFCS level
  3. Strides relative to expected GMFCS level

RESULTS

Sample:
- N = 49 youth
- 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 to 12 months (49) 18 to 24 mo (33)

Table 1. Mean Daily Stride Totals

<table>
<thead>
<tr>
<th></th>
<th>Baseline (n= 49)</th>
<th>6 month (n= 25)</th>
<th>12 month (n= 34)</th>
<th>24 month (n= 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low burden</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Total Daily Strides</td>
<td>3014 (1747)</td>
<td>3154 (1462)</td>
<td>3450 (1953)</td>
<td>4692* (2618)</td>
</tr>
<tr>
<td>High burden</td>
<td>Total Daily Strides</td>
<td>2866 (1049)</td>
<td>2248 (825)</td>
<td>2337 (1055)</td>
</tr>
</tbody>
</table>

* p < .05 baseline vs. follow-up

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