EVALUATION OF GAIT OUTCOMES FOLLOWING SINGLE-EVENT MULTI-LEVEL ORTHOPAEDIC SURGERY (SEMLS) FOR AMBULATORY CHILDREN WITH CEREBRAL PALSY, USING THE EDINBURGH VISUAL GAIT SCORE: DID WE MAKE A DIFFERENCE

Peace Amaraegbulam[1], Unni Narayanan [2]

[1]Department of Orthopaedic Surgery, Federal Medical Center, Umuahia Nigeria [2]Division of Orthopaedics, Hospital for Sick Children, Toronto Canada

peacify12@gmail.com

Introduction

- Children with ambulatory CP often undergo SEMLS to improve their gait. Gait analysis is often performed as part of the preoperative clinical evaluation and to measure outcomes.
- The gait lab is not readily available in LMICs but video-assisted gait analysis can be done using smart phones and simple software apps.
- The Edinburgh Visual Gait Score (EVGS) is a validated tool for observational (video-assisted) gait analysis.

Aim of study

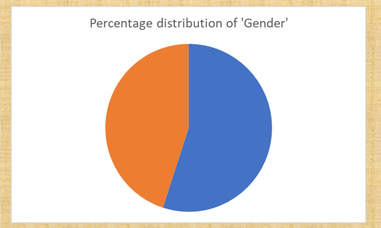
- To determine whether EVGS is sensitive to gait changes in ambulatory CP children following single event multilevel orthopaedic changes.

Methodology

Study nested within a pilot randomized trial comparing the use of 3-D gait analysis vs video analysis for surgical decision-making on outcomes of multi-level orthopaedic surgery for ambulatory children with CP. The video clips of the sample patients were analyzed using the EVGS. The mean scores were collated and descriptive statistics and mixed effect model applied to compare the preoperative values and those at 6, 12 and 24 months. The Effect Size was calculated between the baseline and 6-month values using the standardised response mean (Cohen's) method.

Results

- Age 5-17 years and mean 11.17 ± 2.53 years.
- 26 patients (43.3%) functioned on GMFCS II and 34 (56.7%) on GMFCS III.
- Confidence level 0.95.



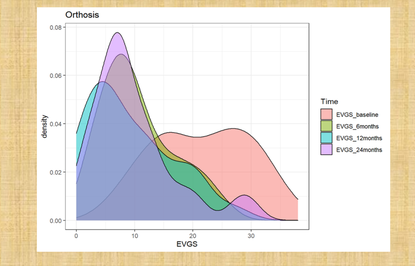


Table 4.2 EVGS scores of patients walking with orthotics

	EVGS_baseline (N=60)	EVGS_6 months (N=60)	EVGS_12 months (N=60)	EVGS_24 months (N=60)
EVGS				
Mean (SD)	21.6 (8.31)	10.6 (6.25)	9.32 (7.35)	9.65 (7.04)
Median [Min, Max]	22.0 [5.00, 38.0]	9.00 [1.00, 26.0]	7.00 [0, 28.0]	8.00 [0, 30.0]
Missing	3 (5.0%)	8 (13.3%)	7 (11.7%)	14 (23.3%)

Table 4.4: EVGS scores of the patients walking barefoot

	EVGS_base line (N=60)	EVGS_6 months (N=60)	EVGS_12 months (N=60)	EVGS_24 months (N=60)
EVGS				
Mean (SD)	26.1 (8.09)	12.4 (6.46)	12.6 (6.86)	12.1 (6.96)
Median [Min, Max]	26.5 [5.00, 44.0]	12.0 [1.00, 26.0]	13.0 [0, 28.0]	11.5 [1.00, 32.0]
Missing	6 (10.0%)	18 (30.0%)	12 (20.0%)	14 (23.3%)

Orthotics		P value
EVGS 6mo – EVGS baseline	-10.7 -21.7 = -11.0	<0.0001
EVGS 12mo – EVGS 6mo	-9.6 – 10.7 = -1.1	<0.6043
EVGS 24mo – EVGS 12mo	-9.7 – 9.6 = -0.1	<0.9997

Barefoot		P value
EVGS 6mo – EVGS baseline	13.2-26.2 = -13.0	<0.0001
EVGS 12mo – EVGS 6mo	12.4 – 13.2 = -0.8	0.8224
EVGS 24mo – EVGS 12mo	12.0 – 12.4 = -0.4	0.9594

Effect size calculated using the Cohen's d formula was 2.116 for orthotics and 2.647 for barefoot.

Analysis and recommendations

- Statistically significant difference[A)] in EVGS mean scores between baseline and 6months scores. ($p<0.0001$).
- Large effect sizes indicate clinically relevant changes following single-event multilevel orthopaedic surgeries.

Limitations and replications

1. This was a single center, single-surgeon study.
2. Smarts phones, readily available, can be used for video-assisted gait analysis.
3. This study can be easily replicated in LMICs.

Conclusion

- The EVGS is sensitive to detect changes in the gait parameters of ambulatory children with cerebral palsy who undergo single-event multilevel orthopaedic surgeries.
- EVGS can be replicated in LMICs and could be an effective alternative to 3D gait analysis.

References

Araújo, P., et al. (2009). "Validity and intra-and inter-rater reliability of the Observational Gait Scale for children with spastic cerebral palsy." Brazilian Journal of Physical Therapy **13**: 267-273.

Armand, S., et al. (2016). "Gait analysis in children with cerebral palsy." EFORT open reviews **1**(12): 448-460.

Balf, C. and T. Ingram (1955). "Problems in the classification of cerebral palsy in childhood." British Medical Journal **2**(4932): 163.
7
Baxter, P., et al. (2007). "The definition and classification of cerebral palsy." Dev Med Child Neurol **49**(s109): 1-44.

Bella, G. P., et al. (2012). "Correlation among the visual gait assessment scale, Edinburgh visual gait scale and observational gait scale in children with spastic diplegic cerebral palsy." Brazilian Journal of Physical Therapy **16**: 134-140.

Cioni, G. and P. B. Paolicelli (2010). Cerebral Palsy Detection: from John Little to the Present. The Spastic Forms of Cerebral Palsy, Springer**:** 3-15.

Bax, M., et al. (2005). "Proposed definition and classification of cerebral palsy, April 2005." Developmental medicine and child neurology **47**(8): 571-576.