



The Bipedal Exchange
Official Organ of the AAOP Gait Society
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Table of Contents

1.	Letter from the Editor.....	2
2.	Gait Society Nominations.....	2
3.	Guest Lecturers Recruited by the Gait Society.....	2
4.	Gait Analysis in Research: Portable Gait Monitoring Devices.....	3
5.	Vocabulary Terms in Gait.....	3
6.	Literature Review.....	3
7.	Job Postings of Positions in Gait Analysis.....	5

Letter from the Editor



Dear Members,

I appreciate the opportunity to help revive the Bipedal Exchange. The founder of the Bipedal Exchange and the current Chairman of the Gait

Society, Ed Ayyappa MS, CPO, FAAOP, remains involved with this newsletter.

The purpose of this newsletter is to educate on gait analysis basics, inform about innovations in devices and research, and facilitate communication among Gait Society members. The list of Gait Society members is on the following webpage: <http://www.oandp.org/assets/upload/SocietyGait.html>.

If any of you have articles that support the purpose of Gait Society please send them my way for possible publication. Suggestions of topics to cover are also welcome. We need to know what type of information you want to see in the Bipedal Exchange. However, please note that the newsletter is produced by volunteers so suggestions that require funding may not be feasible. Also the views expressed in the Gait Society Newsletter are those of the authors and not necessarily those of the American Academy of Orthotists and Prosthetists.

I look forward to a successful year. We will be learning together.

Best Regards,

A handwritten signature in black ink that reads "Teri Chou". The signature is written in a cursive, flowing style.

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Gait Society Nominations

Officer Nominations Needed,

We need to fill the positions of **Vice Chairman and Secretary-Treasurer**. The officers in these positions will help me and the Chairman, Ed Ayyappa, decide the future direction for the Gait Society. The time commitment is minimal. The two goals for this year are this newsletter and the recruitment of guest lecturers for the 2008 AAOP Annual Meeting.

These positions could grow in responsibility if the officers and Gait Society members decide that they want the Gait Society to be more active. All officers have a two-year term. However, since Ed Ayyappa will be retiring as Chairman in July 2008, we will have another position to fill at that time.

This is a great opportunity to help promote awareness about gait related issues. To honor the selected officers, a plaque for their service will be given to each officer at the 2008 Academy Annual Meeting in Orlando, February 27-March 1. Please contact me soon if you are interested in being considered for a position or if you have a nomination.

Guest Lecturers Recruited by the Gait Society

A 1.5-hour mini-conference is being organized by the Gait Society for the 2008 Academy Annual Meeting in Orlando. We are recruiting the following world renowned experts in their respective areas, to each give a 25 minute presentation: Kenton Kaufman, PhD, Stefania Fatone, PhD, and Donald

Shurr, CPO, PT. Ed Ayyappa, MS, CPO, FAAOP will be the moderator. The general focus will be on instrumented gait methods in orthotics and prosthetics. Specifics of each talk will be defined in the coming months. Since each Society has an opportunity to apply for time at each Academy Annual Meeting, there are no guarantees that we will be rewarded with a 1.5-hour time slot. However, we want our members to be aware of the events being planned within the Gait Society.

Gait Analysis in Research: Portable Gait Monitoring Devices

While people recognize the value of gait analysis laboratories in measuring changes in gait, these laboratories can only measure how the patient moves during the trials at the gait lab. When additional information is needed about movement in the patient's own environment, portable activity monitors may be useful. While portable devices do not provide the same level of detail as some gait laboratories, a portable activity monitor can be used to record portions of the gait pattern that is of interest to the clinician, orthotist, prosthetist, or researcher. The two devices listed below could be used to monitor gait. Both have been validated for accuracy in peer-reviewed publications.

1) StepWatch Activity Monitor (SAM) (www.cymatech.com/) - This device records number of steps per time interval. It has been validated in people using lower-limb prostheses¹ as well as other patient populations.

2) Intelligent Device for Energy Expenditure and Activity (IDEEA) (www.minisun.com) - This device records duration, frequency, and intensity of various types of physical activity. It has been validated in able-bodied subjects.²

No compensation was received for mentioning these devices.

1. **Coleman, K. L.; Smith, D. G.; Boone, D. A.; Joseph, A. W.; and del Aguila, M. A.:** Step activity monitor: long-term, continuous recording of ambulatory function. *J Rehabil Res Dev*, 36(1): 8-18, 1999.
2. **Zhang, K.; Werner, P.; Sun, M.; Pi-Sunyer, F. X.; and Boozer, C. N.:** Measurement of human daily physical activity. *Obes Res*, 11(1): 33-40, 2003.

Selected Vocabulary Terms

From North American Society for Gait and Human Movement (1993) and the Academy's Gait Society (1994)

1. **Kinematics:** Those parameters that are used in the description of movement without consideration for the cause of movement abnormalities. These typically include parameters such as linear and angular displacements, velocities and accelerations.
2. **Kinetics:** General term given to the forces that cause movement. Both internal (muscle activity, ligaments or friction in muscles and joints) and external (ground or external loads) forces are included. The moment of force produced by muscles crossing a joint, the mechanical power flowing to and from those same muscles, and the energy changes of the body that result from this power flow are the most common kinetic parameters used.

Literature Review Summary

Article title: The role of gait analysis in the orthopaedic management of ambulatory cerebral palsy

Author(s): Unni G. Narayanan

Journal: Current Opinion in Pediatrics

Page (& volume) numbers: 19: 38-43

Month & year of publication: 2007

1. Problem Statement

Children with ambulatory cerebral palsy (CP) often undergo gait analysis to assist the clinicians in the treatment decision.

However, it is not clear if the influence of gait analysis on treatment decisions leads to improved functional outcomes.

2. Objectives

The objective was “to review the role of gait analysis in the orthopaedic management of children with ambulatory CP and to examine the current evidence to support these roles.”

3. Significance

By conducting a literature review to determine the collective evidence on gait analysis in treatment decisions, we will learn of the current limitations of gait analysis as well as the limitations of research studies used to evaluate gait analysis. Learning about the limitations of gait analysis is important since it helps direct the gait community on addressing these limitations so the usefulness of gait analysis can be expanded. In addition, the critical review of previous research studies helps direct new studies that could enhance our understanding of the current patient populations that may benefit from gait analysis.

4. Methodology/Research Plan

This was a review article. The author reported on research studies that supported gait analysis’s role in understanding pathologic gait, the effects of interventions on gait, and outcomes research. However, past literature displays the controversy about “its clinical utility in routine *decision making* for the surgical management of this population.”

5. Results/Discussion

If gait analysis enhances the surgical decision making process, then gait analysis should alter decisions made prior to gait

analysis. The literature supports that gait analysis alters surgical decision making for patients with CP. However, variability in gait data between laboratories may reduce the ability to achieve consistent results. Gorton et al. has made efforts to standardize the data collection process but significant differences remain. Since standardization of data collection is a technical issue, technical solutions will likely correct this source of variability.

Another source of variability that may be more difficult to standardize is in the interpretation of the gait data. Shaggs et al. found that agreement between clinicians on surgical recommendations based on the same gait data varied from poor to good (Kappa values: 0.14 - 0.64) with good agreement (Kappa = 0.64) only for the surgical recommendation of hamstring lengthening. Noonan et al. also found variation in treatment recommendations in 9 out of 11 patients with spastic CP that were analyzed at four different gait labs. The variations in treatments indicate that there are differences in opinion on the best method for treating specific gait problems. While there may be multiple solutions to gait disorders, future studies should attempt to determine which solutions are better for particular gait disorders. By reducing variability from interpretation and surgical recommendations, a stronger case can be built for using routine gait analysis in preoperative decision making.

In addition to the importance of recommendations based on gait analysis being reproducible, studies need to show that recommendations based on gait analysis lead to better functional outcomes than the recommendations made without it. The author cited six studies concluding that gait analysis for decision making improved functional outcomes. However, the author challenges this conclusion when considering the limitations of these studies. Some of the

limitations were small number of patients, absence of information on the comparability of the two groups at base line, the short follow-up, absence of functional outcome data (physical function), and absence of controls. Not all of these limitations applied to all the studies cited in this portion of the review article. However, there were enough limitations for the author to conclude that “the gait analysis community has ... not yet succeeded in establishing that it reliably leads to better decisions and the performance of the ‘correct’ interventions, which, in turn, leads to better patient outcomes, at a cost that society and healthcare resources can bear.” The author encourages “longitudinal comparative cohort studies and clinical trials to provide the evidence to resolve this controversy once and for all.”

6. Reviewers Comments

This article performed a critical review of gait analysis as a tool to aid in preoperative decisions of ambulatory cerebral palsy patients. Since the question of gait analysis’s usefulness for this purpose is unanswered, the author encourages the gait community to develop “longitudinal comparative cohort studies and clinical trials to provide the evidence to resolve this controversy once and for all.” While the author points out limitations of previous studies such as the absence of controls, I want to acknowledge the difficulty in obtaining control groups that do not undergo gait analysis. First, the investigator and the institutional review board (IRB) have to be convinced that the children in the control group are not at a disadvantage by not undergoing gait analysis. This may be difficult in a healthcare setting that already offers gait analysis as part of patient treatment. Second, obtaining adequate patient numbers with similar patient characteristics between the control and treatment groups may not be possible if time

to perform the study is limited to one to two years. Combining information from multiple centers may increase patient enrollment but may also introduce inconsistencies in functional outcomes when differences arise between surgical skill, postoperative rehabilitation, and other variables as correctly pointed out by the author. Therefore, there will not likely be one study that ultimately proves or disproves gait analysis’s role in preoperative decisions. Multiple studies are needed that attempt to overcome the limitations of previous studies. If we learn that gait analysis is not as effective as we would like, I do not feel that gait analysis should be abandoned but will need to be improved so that we can contribute to enhancing the functional outcomes of patients.

Reviewed By - Teri Rosenbaum Chou, Ph.D.
(4-24-07)

Job Positions in Gait Analysis

If you wish to advertise a job position among Gait Society members, please pass on a brief announcement to the Bipedal Exchange Editor, Teri Chou:
Teri.Rosenbaum@hsc.utah.edu.

Guidelines of posting job positions:

- 1) Academic positions can be posted. These can include faculty positions, technical personnel, and graduate assistantships.
- 2) Company positions can be posted. However, please do not include text that can be considered an advertisement for the company's products or services.
- 3) Recruiting firms cannot post in this newsletter.