

Effects of Preoperative Gait Analysis on Costs and Amount of Surgery

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Background: The purpose of this study was to determine the effects of clinical gait analysis (GA) on the costs of care in ambulatory children with cerebral palsy (CP) and the amount of surgery these children undergo.

Methods: A retrospective review identified all ambulatory patients with CP who had undergone lower extremity orthopaedic surgery at our hospital from 1991 to 2005 with at least a 6-month follow-up. The patients were grouped into those who had undergone GA before their index surgery (GA group, N = 313) and those who had not (NGA group, N = 149). The groups were compared in terms of the number of procedures during index surgery and subsequent surgeries and the direct costs associated with these surgeries. Costs were calculated in US dollars by using a standardized protocol including fees for the surgeon, anesthesia, operating room, hospital stay, physical therapy, and GA.

Results: Patients in the GA group were significantly older and less functionally involved, had their first surgery in later years, and had a shorter follow-up than patients in the NGA group ($P < 0.001$). Adjusting for these differences, patients in the GA group had more procedures (GA: 5.8, NGA: 4.2; $P < 0.001$) and higher cost (GA: \$43,006, NGA: \$35,215; $P < 0.001$) during index surgery, but less subsequent surgery. A higher proportion of patients went on to additional surgery in the NGA group (NGA: 32%, GA: 11%; $P < 0.001$), with more additional surgeries per person-year (NGA: 0.3/person-year, GA: 0.1/person-year; $P < 0.001$) resulting in higher additional costs (NGA: \$3009/person-year, GA: \$916/person-year; $P < 0.001$). The total number of procedures (GA: 2.6/person-year, NGA: 2.3/person-year; $P = 0.22$) and cost (GA: \$20,448/person-year, NGA: \$19,535/person-year; $P = 0.58$) did not differ significantly between the 2 groups.

Conclusions: Clinical GA is associated with a lower incidence of additional surgery, resulting in lesser disruption to patients' lives. This finding has not been shown before and may assist patients, physicians, policy makers, and insurance companies

in assessing the role of GA in the care of ambulatory children with CP.

Level of Evidence: Level III, retrospective comparative study.

Key Words: cerebral palsy, cost analysis, efficacy, gait analysis

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Orthopaedic surgical intervention to correct gait problems has traditionally been performed in a staged manner, addressing one deformity at a time.¹ For many patients, this has resulted in having surgery every few years, a practice commonly referred to as the “birthday syndrome.”^{1,2} Repeated surgical interventions and the associated rehabilitation can be very disruptive to patients and their families, interfering with participation in school, work, and social activities. These disruptions are compounded by the direct physical and psychologic burden of undergoing and having to recover from multiple surgeries over a period of years.

Computerized gait analysis (CGA) has made possible an alternative approach in which multiple deformities are addressed simultaneously.^{3,4} By providing objective measurements of 3-dimensional kinematics and kinetics, and dynamic electromyography (EMG), CGA allows simultaneous assessment of multiple joints in multiple planes of motion. This has enabled orthopaedic surgeons to better identify the causes of gait problems and to intervene at multiple levels simultaneously (an approach called single event, multilevel surgery). The intent is to accurately identify a comprehensive surgical plan, to decrease the need for multiple, staged surgeries. CGA may also reduce the costs of care as commonly performed surgeries have much higher costs when performed in a staged manner compared with single event, multilevel surgery.⁵

It has been clearly documented that CGA alters surgical decision making and changes the treatment that patients receive.^{6–10} However, the implications of these changes in terms of cost and the amount of surgery performed have not been documented. Therefore, the purpose of this large retrospective study was to determine the effects of CGA on the costs of care in ambulatory children with cerebral palsy (CP) and the amount of surgery that these children undergo.

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