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# Complexity of gait in a child with spasticity

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This commentary is on the original article by van Campenhout et al. To view this paper visit <https://doi.org/10.1111/dmcn.14192>

The evaluation of the gait of a child with cerebral palsy is complex, often requiring three-dimensional motion analysis to completely evaluate the gait deviations caused by muscle contractures and rotation of lower extremity bones (lever arm disorder). The Gross Motor Functional Classification System (GMFCS) permits us to determine the level of ambulation and evaluate similar groups of patients. Add motor disorders such as spasticity, choreoathetosis, and dystonia, and the calculus gets even more complicated.

In their article, van Campenhout et al.<sup>1</sup> attempt to parse this complexity by analyzing similar groups of patients. One patient had a selective dorsal rhizotomy (SDR) alone, while another had an SDR combined with previously performed proximal femoral derotational osteotomies (FDO). The criteria for the SDR and the number of nerve roots cut was very precise and conservative. Their findings suggest that at 3- to 5-year follow-up, those children who had FDO before SDR had better gait outcomes.

On the positive side, this paper attempts to address a single aspect of gait, namely increased femoral anteversion. They had preoperative and postoperative gait studies with relatively long-term follow-up (although it could be argued that even 5-year follow-up in a 6-year-old child is not long-term follow-up). The criteria for the selection of their patients for SDR was appropriate and seemingly consistent across both groups.

There are several limitations to this study. First is the aforementioned complexity of the gait of these children. Second, there are few patients in each group (14 in one

group and 15 in the other). Third, the patient's GMFCS level was not specified. Lastly, there were no patient reported outcomes, so it is unclear as to the perceived changes of these two approaches. These limitations lead the reader to wonder about the generalizability of their conclusions.

The use of SDR as a permanent treatment for spasticity has a long and controversial history. When the appropriate patients with the appropriate indications are chosen, there have been positive results in terms of patient reported outcomes and improvement in function.<sup>2,3</sup> However, the indications have been stretched to many different patient populations including those with dystonia and dyskinesia, including non-ambulatory patients.<sup>4</sup> One of the post-SDR complications is weakness with increased pelvic tilt and Trendelenburg gait. But in van Campenhout et al.'s study,<sup>1</sup> all the patients reportedly met the standard inclusion criteria and the assumption is that they had decreased spasticity. The authors suggested that adding FDO before SDR improved their pelvic problems as well as extension at the knee.

One of the limitations of all studies that utilize motion analysis as the outcome measure is that they only look at one dimension of disability. According to the International Classification of Functioning, Disability and Health, motion analysis only analyzes body function and structure.<sup>5</sup> These studies do not address activities or participation, which are the goals of any intervention. SDR and FDO are both major surgeries in terms of pain, time of rehabilitation, and cost. Whereas this paper<sup>1</sup> and hundreds of others suggest these interventions may improve body function, there is little evidence that these changes lead to increased activity or participation. Does the technical outcome of decreasing pelvic tilt and increasing knee extension make any difference in a child's quality of life? This is a challenge to all of us who work in this field to address these dimensions of disability whenever we present our findings or discuss our plans for treatment with the family.

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