Selective dorsal rhizotomy case series

A retrospective analysis was performed of all patients that underwent the selective dorsal rhizotomy from 2017 to 2019. The median follow-up was of 10 months. The following data have been collected: etiology of spasticity, age at SDR, number of sectioned lumbar rootlets L1-S2, intraoperative disappearance of the H-reflex, and intraoperative preservation of the bulbocavernosus reflex. The motor functions of all children have been classified by the Gross Motor Function Classification System (GMFCS) and Gross Motor Function Measure (GMFM-88). Twelve children underwent SDR, and the median age at surgery was 9.6 years (min 3.9-max 16 years).

A mean of 57.8% of dorsal rootlets L2-S1 have been cut, while at level L1 50% of the dorsal roots have been routinely sectioned. The median amount of S2 rootlets cut was 14.3%. Postoperatively, we observed a sudden decrease in muscle tone. In all patients, there was an improvement of the muscle tone and of the gait pattern. The GMFM improved from 187.8 to 208.3 after a follow-up of 6 months.

There was no complication in terms of wound healing, cerebrospinal fluid fistula, or neurological dysfunctions. Despite the relatively short follow-up, this early results confirm the efficacy of the SDR [1)].

2018

36 children (age 4-13 y) with spastic diplegia (gross motor classification system level I (n=14), II (n=15) and III (n=7) were included retrospectively from the database of the VU University Medical Center Amsterdam. Children underwent selective dorsal rhizotomy (SDR) between January 1999 and May 2011. Patients were included if they received clinical gait analysis before and five years post-SDR, age >4 years at time of SDR and if brain MRI-scan was available.

Overall gait quality was assessed with Edinburgh visual gait score (EVGS), before and five years after SDR. In addition, knee and ankle angles at initial contact and midstance were evaluated. To identify predictors for gait improvement, several factors were evaluated including: functional mobility level (GMFCS), presence of white matter abnormalities on brain-MRI, and selective motor control during gait (synergy analysis).

Overall gait quality improved after SDR, with a large variation between patients. Multiple linear regression analysis revealed that worse score on EVGS and better GMFCS were independently related to gait improvement. Gait improved more in children with GMFCS I & II compared to III. No differences were observed between children with or without white matter abnormalities on brain MRI. Selective motor control during gait was predictive for improvement of knee angle at initial contact and midstance, but not for EVGS.

Functional mobility level and baseline gait quality are both important factors to predict gait outcomes after SDR. If candidates are well selected, SDR can be a successful intervention to improve gait both in children with brain MRI abnormalities as well as other causes of spastic diplegia [2)].

2017

24 participants with SDR and 11 without SDR. Of these, 13 patients with SDR (five males, eight

females; median [IQR] age 17y 2mo [16y 8mo-17y 9mo]) and eight without SDR (three males, five females; median [IQR] age 19y 2mo [17y 3mo-21y 11mo]) completed baseline and follow-up gait analysis. Spasticity significantly decreased in those with SDR ($p<0.05$). Gait Deviation Index improved more in participants without SDR than those with SDR (Δnon-SDR =12.8 vs ΔSDR =9.1; $p=0.01$). Compared with the SDR group, participants without SDR underwent significantly more subsequent interventions ($p<0.05$). INTERPRETATION:

Patients in both the SDR and non-SDR groups showed improved gait quality more than 10 years after surgery. Participants without SDR had a larger improvement in gait pathology but underwent significantly more intervention. There were no differences between groups in survey measures. These results suggest differing treatment courses provide similar outcomes into early adulthood. WHAT THIS PAPER ADDS:

Selective dorsal rhizotomy (SDR) and non-SDR groups had significant improvement in gait pathology over time. The non-SDR group had significantly better gait compared with the SDR group at follow-up. The groups had similar levels of energy cost, pain, and quality of life. Non-SDR participants underwent significantly more orthopaedic surgery and antispasticity injections than SDR participants. Use of a clinically similar control group highlights that different treatment courses may result in similar outcomes into young adulthood [3].

2016

3 patients with bilateral spastic paresis, aged 12, 6, and 7 years at the time of surgery. The percentage of transected dorsal rootlets was around 40% at the L2-S1 levels. Sudden falls were reported with a frequency of several a day, continuing for years after SDR. The falls were often triggered by performing dual tasks as well as occurring in the transition from sitting to standing, during running, after strenuous exercise, or following a fright. Patients also had residual hyperesthesia and dysesthesia of the foot sole. The authors hypothesize that the sudden falls are caused by a muscle inhibition reflex of the muscles in the legs, as an abnormal reaction to a sensory stimulus that is perceived with increased intensity by a patient with hyperesthesia. A favorable effect of gabapentin medication supports this hypothesis [4].

Four children with CP underwent SPR. Eye movements were registered by infrared video-oculography before and after the surgery.

The analysis of SPEM showed the improvement of the correlation coefficient of the eye response to the stimulus after SPR in two subjects. Improvement of SPEM performance was largely due to suppression of spontaneous fixation nystagmus.

SPR may lead to the improvement of SPEM in children with CP. The influence of SPEM improvement on quality of life in a group of severely disabled nonambulant children with CP remains to be assessed [5].

1)
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