Evaluation of the functional effects of Selective dorsal Rhizotomy in children with severe spastic cerebral palsy, GMFCS IV, at one year

Cawker, S., Chugh, D., Gordon, J., Wimalasundera, N., Carr, L., Aquillina, K.

Selective Dorsal Rhizotomy Team, Neurodisability Service, Great Ormond Street Hospital for Children NHS Foundation Trust, London UK

Background

Selective Dorsal Rhizotomy is recognised as an effective treatment for spasticity in carefully selected children with bilateral cerebral palsy where spasticity is the dominant movement disorder limiting function (4). Evidence supports SDR for treating ambulant children (GMFCS II – III) with good strength and selectivity of movement and minimal dystonia, with the objective of improving function. This is supported by NICE SDR recommendations (4). There is less evidence for treating children GMFCS IV with more complex movement problems and associated medical issues (1,5). And children with existing musculo-skeletal deformity and alignment problems do less well (3).

The current SDR procedure offered at GOSH of single level laminectomy approach with only 2 days of bed rest, offers early rehabilitation and has few reported complications which are relatively mild and transient (2).

Presenting problem

In the movement disorder service at GOSH we recognise a cohort of children GMFCS IV, who present with marked spasticity which impacts on their daily life, and is resistant to standard treatment options. Common features described by families/carers included problems with: handling and positioning, eating and drinking, poor bowel habits and micturition, sleep disturbance, behaviour issues and inattention considered to be related to pain or discomfort. Muscle/joint imbalances are common even in children >5 years. Children in this group are usually offered first line conservative treatments by their local team before referral to the tertiary service at GOSH (4).

Methods

Children attending the multidisciplinary assessment clinic who fitted the criteria for selection were offered SDR, with 3 week of post operative acute rehabilitation, according to our standard protocol. They had all previously tried other management options, including therapy, botulinum toxin injections, drug management, equipment and orthoses.

10 children, 9 male, median age 5.3 years at surgery (range 3.5 – 9.8), underwent SDR between 2013 and 2014. Objective goals were agreed with parents predominantly related to improved comfort and ease of care. They were cautioned that functional improvements were likely to be limited due to the complex nature of their movement problems which included, poor neural-motor drive, motor planning issues, reduced selectivity, balance and stability, and fatigue.

Post discharge physiotherapy rehabilitation was recommended, with families negotiating this provision with their the local NHS therapy services or accessed privately. At discharge advice was given regarding activities, equipment and return to school. Once their surgical site had healed they were encouraged to return to their usual programme of activities.

Baseline and outcome data were collected at 6 and 12 months postoperatively. Changes in spasticity, motor function and quality of life were tracked using Ashworth scores, GMFM 88 and 66 (Gross Motor Function Measure) and CPQoI. Vидео were taken to assess quality of postural alignment and stability of postures. Passive range of movement, strength and selectivity were routinely assessed but are not reported in this study.

Results

Spastic tone was abolished 100% (Ashworth 0) in all. Where dystonia was evident prior to surgery this persisted after SDR. This did not become more severe during this review period.

GMFM-88 (66) improved from baseline median of 44.7 to 57.3 (42.5 to 45.6) at 12 months post-SDR.

For the 88 most improvement occurred in the B (sitting) and C (crawling and kneeling) domains (63.3 to 81.7 and 52.4 to 66) respectively. We noted reduced function in D (standing) and E (walking, running and jumping) at 6 months but this recovered above baseline at 12 months.

All parents reported positive effects from SDR, in terms of ease of movement, comfort, tolerance of equipment and positioning.

Early evidence on CPQoI showed significant improvements in domains of ‘feelings of functioning’ and ‘Pain and impact of disability’.

There were no acute post-operative complications. All children reported some dysaesthesia in the immediate post operative period but this was not severe and all but one had improvement by discharge. Foot sensitivity to touch was noted during follow-up for 4/9, with the same child reporting itching and tickling sensations at 1 year.

Discussion

SDR has been shown to effectively reduce spasticity, without reducing function in the short term. Although this is a small carefully selected group the evidence supports the agreed pre-surgical treatment aims of comfort, improved posture and ease of care.

We suggest that SDR can be considered for children GMFCS IV where it has been established that spasticity is the dominant movement problem, and where alternative less invasive treatments have been tried or ruled out. Children and families should be considered able to cope with the surgery and post operative rehabilitation; an understanding of the aims appropriate to GMFCS IV is essential.

We plan to continue to follow the longer term trajectory of this group to ensure later deterioration is no more than would be expected, related to CP population norms for children in the GMFCS IV level.

Community support and access to on-going surveillance remains important in this population even where the aims are more limited than for children who are GMFCS II and III.

Parent reported improvements related to comfort, mood, and gut, bladder and bowel function, suggest further research is needed to capture more clarity for the ‘soft’ improvements felt to be highly significant for family life and participation. This would facilitate clearer outcome expectations when choosing treatment options with children and their families.

References