Long-term outcome and adverse effects of selective dorsal rhizotomy in children with cerebral palsy: a systematic review

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CRD summary
The authors concluded that there was poor to moderate evidence that selective dorsal rhizotomy had a positive long-term effect on body structure and function. There was no evidence for activity or participation domains. The review had some methodological/reporting limitations but the authors’ cautious conclusions reflect the limited evidence and seem appropriate.

Authors’ objectives
To assess the long-term safety and efficacy of selective dorsal rhizotomy in children with spastic cerebral palsy.

Searching
Five electronic databases, including MEDLINE, EMBASE and The Cochrane Library, were searched for articles in English. Some search terms were reported. Search dates were not reported.

Study selection
Eligible studies assessed the safety and efficacy of selective dorsal rhizotomy (at the lumbar level) in children (<18 years old) with spastic cerebral palsy. Eligible studies had to have a follow-up period of at least five years. Study outcomes were classified according to the International Classification of Functioning, Disability and Health.

Included studies were published between 1998 and 2010. The age at which participants underwent selective dorsal rhizotomy ranged from two to 27 years. Various surgical procedures were performed, including selective dorsal rhizotomy, laminectomy or laminotomy (full or partial removal of the lamina). Some interventions included intensive physical therapy or in-patient rehabilitation. Where studies included a control group, these were age-matched healthy children or children with cerebral palsy who received normal intensity physical therapy. Numerous outcomes were measured using various methods.

Two reviewers independently screened studies and studies were included after consensus.

Assessment of study quality
Studies were assigned a level of evidence (I to V) based on study design. Study quality was assessed for studies assigned levels of evidence I to III according to seven criteria, including blinding, adherence and loss to follow-up. Studies were rated as strong quality (six or seven criteria met), moderate quality (four or five criteria met) or weak quality (three or less criteria met).

Two reviewers performed the quality assessment.

Data extraction
Data were extracted based on whether the outcomes involved body parts or function, functional activities or participation, or were in the context of society, physical barriers or family capacity. Adverse events were extracted.

It appeared that two reviewers may have been involved in the data extraction.

Methods of synthesis
Data were presented according to levels of evidence and reported as statistically significant or not significant based on p values.

Results of the review
Twenty-one studies (966 children; 945 children calculated from table 1) were included in the review. Three studies had a control group and were classed as level III evidence scoring 3, 4 or 5 out of 7 on the quality assessment. Eighteen
studies were classed as level IV evidence (uncontrolled case studies). Study follow-up ranged from five to 21.4 years. There was moderate evidence that selective dorsal rhizotomy had a positive effect on body function and body structure at five to 20 years follow-up (two level III studies with healthy controls). Five of six level IV evidence studies supported these findings. One level III evidence study showed no improvement in gross motor function after selective dorsal rhizotomy and eight level IV studies showed mixed findings. There were no statistically significant differences in function between children undergoing selective dorsal rhizotomy versus children treated with intensified physical therapy alone (one level III study). Further findings from level IV were presented in the review. Adverse events following selective dorsal rhizotomy were reported in six studies in between 2% and 56% of children and included scoliosis, kyphosis, lumbar lordosis, spondylolysis, grade I spondylolisthesis, back pain, spinal stenosis, disc protrusion and black discs.

Authors' conclusions
There was poor to moderate evidence that selective dorsal rhizotomy had a positive long-term effect on body structure and function. There was no evidence that this procedure had a positive long-term influence on activity or participation domains.

CRD commentary
The review question and supporting inclusion criteria were broadly stated. Search dates for the literature search were not reported and as the search was restricted by language, potentially relevant data may have been missed. Study quality was assessed and only studies considered to be more reliable were discussed in detail. However, these studies appeared to have their own limitations as they were very small and were not randomised. It appeared that each stage of the review was performed in duplicate, which reduced potential for reviewer error and bias. A narrative synthesis was appropriate given the differences between studies. However, the synthesis was somewhat limited and the magnitude of benefit in terms of outcomes was sometimes unclear. The authors acknowledged that the evidence was very poor and the conduct of the studies was weak to moderate. They also acknowledged small sample sizes and limitations of methods used to assess some outcomes. The review had some methodological/reporting limitations but the authors' cautious conclusions reflect the limited evidence and seem appropriate.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that further research was needed to assess the long-term effects of selective dorsal rhizotomy in children with spastic cerebral palsy, who should be compared to children who did not undergo surgery. Validated and reproducible standardised methods should be used to assess outcomes.

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