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Dorsal rhizotomy for spasticity in diplegic children. Minimally invasive staged-interlaminar approach, clinical monitoring and intraoperative EMG topographical mapping and electrophysiological testing

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Introduction: The efficacy and safety of Dorsal Rhizotomies (DR) highly depend on the accuracy of topographic identification of the roots vector of the harmful tonicogenic circuits. The degree of invasiveness can be diminished by using interlaminar approach(es) (IL). The presentation describes the surgical technique based on a series of 27 children who underwent lumbosacral DR.

Materials and Methods: The roots to be targeted determine the level(s) staged interlaminar approach(es). Roots L2/L3/L4 can be exposed through interlaminar L1-L2 space, roots L5/S1/S2 through L4-L5 space. Spinous processes and interspinous ligaments are preserved. Each of the selected interlaminar spaces is enlarged by resection of the lower half of the upper lamina and upper half of the lower lamina. After dural and arachnoid opening on the midline topographical mapping is performed by stimulating the ventral roots (200 μ A, 2 Hz) and physiological testing for evaluation of the degree of diffusion of muscle responses by stimulating dorsal roots (1mA, 50 Hz). Muscle responses to stimulation are assessed clinically and by EMG of the lower limbs and the anal sphincter. After identifying the targeted roots, to be a third to four - fifths of the rootlets of the selected roots are divided.

Results:

1. Sparing posterior arch and interspinous ligaments allows early mobilization and reduces the risk of late instability and kyphosis.
2. Mapping by stimulation of roots allows anatomical identification of root levels and assessment of the excitability of dorsal roots and their segmental interspinal circuits, thus ensuring the selectivity and the quantification of the neurological effects of the Dorsal Rhizotomy. The GMFCS scale quantifies the functional results.

Conclusion: This modality allows DR to accurately enter in all relevant root levels, well differentiate ventral and dorsal roots and test the excitability of metameric circuits to assist in the quantification of root sectioning.