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Feasibility, safety and prognostic value of extended intraoperative monitoring during surgery for pediatric spinal dysraphism

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Introduction: Spinal dysraphism often warrants primary/secondary surgical intervention. Surgery is expected to cause no neurological deterioration. Neurophysiological intraoperative monitoring (IOM) is often used to reduce the risk of intraoperative injury. This study reviews changes in IOM metrics in children undergoing surgery for primary/secondary closed spinal dysraphism.

Methods: 41 patients (4.9±5.1 years) with spinal dysraphism and primary/secondary surgery were enrolled. IOM was used in all with motor-evoked potentials to quadriceps (qMEP), gastrocnemius (gMEP), anterior tibial (taMEP), plantar foot muscles (fMEP), external anal sphincter (sMEP) and tibial nerve somatosensory-evoked potentials (tSEP). Latencies and amplitudes at beginning and end of surgery were analyzed. Relative changes were determined by Wilcoxon signed rank test ($p<0.05$).

Results: Baseline SEP and MEP could not be obtained in all patients and all muscles (qMEP: n=23; gMEP: n=27; taMEP: n=29; fMEP: n=26; sMEP: n=20; tSEP: n=22). During surgery EP vanished in few cases (qMEP: n=2; gMEP: n=0; taMEP: n=2; fMEP: n=1; sMEP: n=3; tSEP: n=8). In more patients, however, EPs appeared at end of surgery despite absence at the beginning (qMEP: n=2; gMEP: n=3; taMEP: n=2; fMEP: n=3; sMEP: n=4; tSEP: n=2). A significant increase of EP amplitudes was found for gMEP, taMEP and fMEP. Concurrently, the latencies significantly decreased. Deterioration of function was present at time of discharge in one patient only.

Conclusion: IOM is feasible in spinal dysraphism surgery without age limit. It contributes to surgical safety with a peri-operative deterioration rate of <3% in this series. Furthermore, surgery improved motor-evoked potentials significantly. The exact predictive value of intra-operative EP deterioration remains unclear, since some patients lost MEP without post-operative deficits. IOM should be mandatory for spinal dysraphism procedures in pediatric cases of all age.