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Use of "surgeon assisted" neurophysiological monitoring system for pediatric spinal neurosurgery

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Introduction: Recent advances in technology and the refinement of neurophysiological methodologies have changed intraoperative neurophysiological monitoring (INM) of the spinal cord, which has evolved into an extremely useful and reliable adjunct for spinal procedures. This increased interest in intraoperative neurophysiology reflects the demand for safe and low-risk surgery. The limit, so far, has been difficult access to a neurophysiology service and and reliance on surgeons' experience. This study describes the use of a new surgeon-led neurophysiological monitoring system and its application to spinal paediatric neurosurgical procedures.

Methods*:* Since 2013, every child affected by a spinal dysraphism has been operated on with the aid of "surgeon assisted" neurophysiological monitoring. This system allows a free-running continuous EMG. Motor unit potentials and neurotonic discharges are the injury indicators in nerve roots of a damage caused by traction, compression, transection, or thermal injury. This system allows also a direct stimulation of nerve roots (range 0.5-4 mA).

Results: In 2013, we performed 21 surgical procedures for the treatment of spinal dysraphisms with the aid of "surgeon assisted" INM. Among the 21 patients, 9 were female and 12 were male. The age ranged between 25 days and 15 years (mean age 4 years). Thirteen children were operated on for spinal cord untethering, 6 for resection of lipomyelomeningocele and 2 for correction of diastematomyelia. Postoperatively, none of the patients presented a neurological deficit. The average time for the system set-up was 5 minutes.

Conclusion*:* "Surgeon-assisted" INM provides a wide and reliable system for intraoperative identification of neural structures and continuous monitoring of their functional integrity during dysraphisms' procedures. The set-up is easy and the software intuitive allowing to have a reliable INM without the necessity of a neurophysiologist in theatre.