Intraoperative “Wake Up” Test in Neonatal Neurosurgery
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Introduction: In spite of remarkable advances in neurological monitoring, the “wake-up test” (WPT) still remains the most reliable intraoperative test during corrective surgery performed on the spinal cord. Being a technically demanding test to perform in adults and older children, there is no reported case in the literature of such test having been performed in a newborn. We present our experience in performing an intraoperative WPT in a newborn during surgical repair of a large myelomeningocele (MMC).

Results: A one-day-old male delivered at 37 weeks to a 27-year-old mother with a large lumbosacral MMC, intact thecal sac, bilateral weak quadriceps with no dorsal or plantar flexion of the ankle and no anal wink, was scheduled for repair. After discussing with neurosurgeon, informed consent was obtained from the mother for the WPT. Anesthesia was induced with IV thiopentone and mivacurium and maintained with oxygen, air and desflurane by orotracheal route. A BIS monitor was added to standard ASA monitoring. IV lidocaine infusion was setup at the rate of 1.5 mg kg-1 hr-1 after a bolus of 1.5mg kg-1 45 seconds before intubation. Continuous propofol infusion was started with a rate of 3mg kg-1 hr-1 and titrated according to HR and BP. An intraoperative nerve stimulator was used to identify the nerve roots originating from the placode. Skin and subcutaneous tissue were infiltrated with 0.125% bupivacaine prior to closure. After closure of the placode and before skin closure WPT was performed. Desflurane was discontinued and the propofol infusion was progressively reduced until movements were observed under the drapes. After confirming flexion and extension at the hip and knee levels, the results of the WPT were judged to be satisfactory. Anesthesia was deepened again for the remaining course of the surgery. The baby was extubated in the OR at the conclusion of the procedure.

Discussion: The possibility of damage to neural elements while being separated from skin and subcutaneous tissue and the possibility of excessive tension on the cord structures upon “water tight” closure have been documented by many pediatric neurosurgeons (1,2). The fact that associated prematurity with higher possibility of them being intubated in the immediate postoperative period and any new onset neurological deficit may not become apparent until after extubation, prompted us to consider ways of intraoperative neuromonitoring. While intraoperative WPT has not been advocated during neonatal MMC repair in the literature, Dr. McLone D.G., in his personal communication observed “This test is a new concept that merits further study and evaluation in a case series. If the “wake-up test” can demonstrate a reduction in motor function compared to the preoperative level, then that should be considered as a significant finding”. In our case we relied on mivacurium for intubation and the relaxant effect was allowed to wear off to permit the use of intraoperative nerve stimulator. The use of desflurane and propofol infusion allowed rapid titration of the anesthetic depth which, monitored by the trend in BIS monitor readings, (3) facilitated the intraoperative WPT. IV infusion of lidocaine during surgery, while improving ET tube tolerance during lighter planes of anesthesia, had a salutary effect on intracranial tension. Our methodology of management has permitted us not only to perform a delicate test safely but will allow us to repeat the “wake-up test” if needed during neonatal neurosurgery. This test could also be gainfully employed in infants and older children during spinal deformity surgery.

References: