The impact of intraoperative neurophysiological monitoring in the surgical treatment of paediatric supratentorial and infratentorial tumors: single centre study [Abstract]

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PREDICTIVE VALUE OF INTRAOPERATIVE NEUROMONITORING DURING CLIPPING OF UNRUPTURED INTRACRANIAL ANEURYSMS.

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Intraoperative Neuromonitoring Parallel Session, September 25, 2023, 8:30 AM - 10:00 AM

Background: Ischemic complications after aneurysm clipping are a source of immense postoperative neurological morbidity. Intraoperative neuromonitoring (IOM) of motor/somatosensory evoked potentials is a well-established approach for reducing morbidity. This study aimed to determine the predictive validity of IOM for postoperative functional outcome and its perceived added value for intraoperative real-time feedback of functional impairment in the surgical treatment of unruptured intracranial aneurysms (UIAs).

Methods: Patients scheduled for elective microsurgical clipping of UIAs were prospectively included between 02/2019–02/2021. Transcranial motor evoked potentials (tcMEP) were used in all cases, a significant decline was defined as a loss of ≥50% in amplitude strength or a 50% increase in latency. Clinical data were analyzed and correlated to postoperative deficits. A surgeon's questionnaire, assessing the subjective perceived value while using IOM during clipping and the impact of IOM on the surgical outcome, was conceived.

Results: 47 patients were included, median age at surgery 57 years (range 26–76). IOM was successful in all cases. In 87.2%, IOM modalities were stable throughout surgery, although 1 patient (2.4%) of these demonstrated a permanent postoperative neurological deficit. All patients with an intraoperatively reversible decline of tcMEPs (12.7%) showed no surgery-related deficit, regardless of the duration of the decline, ranging from 0.5–40.0 minutes (mean: 13.8 min). Temporary clipping (TC) was performed in 12 cases (25.5%), a decline in amplitude was seen in 4 patients (8.5%). After removal of the clip, all amplitudes returned to baseline. IOM provided the surgeon with a higher sense of subjective security for the clipping procedure in 63.8 %.

Conclusions: IOM remains invaluable during elective microsurgical clipping, particularly during TC of MCA and AcomA aneurysms. It alerts the surgeon of impending ischemic injury and offers a way of maximizing the time frame for TC. Furthermore, it has highly increased surgeons' subjective feeling of security during the procedure.

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THE IMPACT OF INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING IN THE SURGICAL TREATMENT OF PAEDIATRIC SUPRATENTORIAL AND INFRATENTORIAL TUMORS : SINGLE CENTRE STUDY.

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Intraoperative Neuromonitoring Parallel Session, September 25, 2023, 8:30 AM - 10:00 AM

Background: This study seeks to evaluate the invaluable role and assistance of intraoperative neurophysiological monitoring (IONM) during surgical resection of supratentorial and infratentorial tumors in paediatric population.

Methods: A retrospective analysis of a consecutive cohort of surgical treated paediatric intracranial lesions between January 2021 and January 2023 was performed. Motor evoked potentials (mMEPs) and somatosensory evoked potentials (SSEPs) recorded were performed in all cases. IONM changes were analysed and correlated with the neurological outcome before and after surgery with a minimum follow up of 6 weeks.

Results: 24 children were identified (58% female and 42% male with a mean age of seven years). Lesions were located in the posterior fossa (67%) and the brain hemispheres (33%).

In 67% of cases there were temporary (38%) and permanent (29%) MEP decline of more than 50% or disappearance of MEPs respectively. In 38% of patients a temporary (13 %) or permanent (25%) paresis occurred after surgery. In 33% of the cases the MEPs were stable throughout the procedure and none of the children developed any new neurological deficits. In 63% of cases complete resection was achieved. We observed no case of intraoperative seizure

Conclusions: Intraoperative MEP monitoring in children is safe and provides a continuous assessment of the functional integrity of motor pathways with higher chance of early detecting a progressive mechanical or vascular injury. There is a correlation between the decline of MEPs >50 % and occurrence of new postoperative neurological deficit. Stable MEPs were correlated to stable outcome without neurological deficit. IONM is useful in paediatric tumor resection: Improving the neurological outcome while increasing Gross Total Resection rate (GTR).

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INTRAOPERATIVE MONITORING OF VISUOSPATIAL AND LINGUISTIC SKILLS: SCENARIO DESCRIPTION FOR A MORE STANDARDISED PRACTICE

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Background: Picture naming is the most commonly used task for intraoperative language mapping, yet it is only conditionally suitable for longer test periods during intraoperative monitoring. Moreover, due to its simplicity, it can hardly detect subtle language deficits such as syntax errors. In contrast, spontaneous speech (e.g., with biographical triggers) is difficult to monitor, which has a negative impact on sensitivity. In this pilot study, we designed and tested black-and-white scenario pictures to trigger controllable production of sentences.

Methods: 12 healthy subjects (6 m; 6 w) between 18-75 years were asked to describe black-and-white pictures in two conditions, single sentence description and unrestricted sentence description. The pictures, either black and white (line pictures) or grey-scale colored (fill pictures), were then rated in a Likert scale (1-10) on "familiarity", "recognizability", "describability" and "emotions". All sessions were performed via video-call. Groups were com-pared using Student's t-test.

Results: When comparing line and fill pictures, recognisability was rated higher for fill pictures. Line pictures showed a trend towards a higher number of produced words and speaking time in both conditions. In single sentence description, total word count and speaking time were higher in the first testing block than in the second ($p<0.001$), indicating a learning effect towards more concise wording. By contrast, in the unrestricted condition, total word count and speaking time were increased when presented in the second testing block ($p<0.001$), reflecting a more detailed description. The intraoperative pilot application of the scenario images in awake brain tumour operations confirms the feasibility and the very good acceptance by the patients.

Conclusions: Scenario description might nicely complement the awake surgery material, especially for the monitoring part. The usage of coloured pictures is favourable regarding recognisability. For unlimited sentence production, there is a positive effect of training on the test performance.

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POSTOPERATIVE MOTOR DEFICITS ASSESSMENT IN PERICENTRAL TUMORS TREATED WITH THE COMBINED USE OF PHASE REVERSAL TECHNIQUE WITH SUCTION MONOPOLAR PROBE

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Intraoperative Neuromonitoring Parallel Session, September 25, 2023, 8:30 AM - 10:00 AM

Background: The somatosensory evoked potentials phase reversal technique can support the surgeon's knowledge and decrease cortical stimulation time, especially when the brain-shift or tumor infiltration increases the distortion of pericentral anatomy. We assessed the functional results of patients undergoing surgery for pericentral tumors, by using the phase reversal technique combined with suction monopolar probe for subcortical stimulation mapping.

Methods: We prospectively enrolled in the last 9 months, patients with pericentral tumors. We stratified them in two Groups, A and B, respectively according to the absence and presence of preoperative motor deficits. In both groups were evaluated complications, extent of resection, trend of motor deficits, in short and