

Non-Invasive Regional Cerebral Oxygen Saturation Intraoperative Monitoring during Spinal Neurosurgery and Postoperative Period Evaluation

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Introduction. Cerebral oximeters are non-invasive, continuous monitoring devices. Maintenance of adequate oxygenation of organs, especially the brain, is one of the objectives of an anaesthetic process.

Intraoperative regional cerebral oxygen saturation monitoring can prevent from complications like cognitive dysfunction, stroke as well as organ failure improving postoperative outcome.

Aim, Materials and Methods. The aim of the study is to determine whether prone position during spinal neurosurgery impacts cerebral oxygen saturation using near infrared spectroscopy (NIRS) devices intraoperatively and to evaluate postoperative period.

28 patients (mean age 56 years) underwent spinal neurosurgery (transpedicular fixation, microdiscectomy, removal of spinal tumours) in prone position. Regional cerebral oxygen saturation (rScO₂) was continuously monitored intraoperatively using INVOS 4100 NIRS device. NIBP, HR, EtCO₂, SpO₂ were also monitored. Intraoperative blood loss, postoperative complications like stroke, organ dysfunction, wound infection, days spent in ICU were also sources of evaluation. Anesthesia methods: induction with fentanyl 0.1–0.2 mg, propofol 1–2 mg/kg, atracurium 0.5 mg/kg; maintenance – fentanyl 0.03–0.06 µg/kg/min, atracurium 0.3–0.6 mg/kg/h, sevoflurane to MAC 0.7–1.0, FiO₂ 0.5.

Results. Significant changes in calculated mean rScO₂ values between supine and prone position during surgery were not observed. Although 11/28 patients showed a slight to significant decrease in rScO₂ values in prone position. Mean rScO₂ was 73 % for left side (L), 73 % for right side (R). Lying supine during induction L 71 %, R 72 %, in prone position L 74 %, R 74 %, returning back to spinal position L 73 %, R 73 %. The minimum rScO₂ value observed was rScO₂ 55 %. One patient with the 2nd degree adipositas showed a rScO₂ decrease by 26 % from baseline values in prone position (from rScO₂ 85 % supine to rScO₂ 58 % in prone position). One patient with stroke in anamnesis showed initial values 21 % lower than average (57 % compared to average rScO₂ 72 %). Average blood loss during the operation was 308 ml. Average duration of operation was 110 min. All patients were extubated in the operating room. No incidence of stroke, organ dysfunction was observed, no patients were admitted to ICU.

Conclusions. Cerebral oxygen saturation showed a mild to moderate decrease from baseline values in 39 % patients in prone position during spinal neurosurgery; however, severe postoperative complications were not observed.