

## **Management Based on Multimodal Brain Monitoring May Improve Functional Connectivity and Post-operative Neurocognition in Elderly Patients Undergoing Spinal Surgery**

Yang S, Xiao W, Wu H, Liu Y, Feng S, Lu J, Wang T. M. *Front Aging Neurosci.* 2021 Jul 15;13:705287.

Perioperative neurocognitive disorder (PND) is a common condition in elderly patients undergoing surgery. Sedation, analgesia, regional cerebral oxygen saturation (rSO<sub>2</sub>), and body temperature are known to be associated with PND, but few studies have examined the contribution of these factors combined in detail. This prospective, randomized, controlled, double-blinded study investigated whether anesthesia management based on multimodal brain monitoring—an anesthesia management algorithm designed by our group—could improve the post-operative cognitive function and brain functional connectivity (FC) in elderly patients undergoing elective spinal surgery with general anesthesia. The patients (aged ≥65 years) were randomized into two groups [control (Group C), n = 12 and intervention (Group I), n = 14]. Patients in Group I were managed with multimodal brain monitoring (patient state index, spectral edge frequency, analgesia nociception index, rSO<sub>2</sub>, and temperature), and those in Group C were managed with routine anesthesia management. All patients were pre- and post-operatively evaluated (7 days after surgery) with the Montreal Cognitive Assessment (MoCA). Amplitude of low-frequency fluctuation (ALFF) and FC were analyzed after resting-state functional MRI. Serum C-reactive protein (CRP) and lipopolysaccharide levels were measured, and the correlation between FC and changes in inflammatory marker levels was analyzed. Mean post-operative MoCA score was higher in Group I (24.80 ± 2.09) than in Group C (22.56 ± 2.24) (p = 0.04), with no difference in PND incidence between groups (28.57 vs. 16.67%; p = 0.47). Group I also showed significantly increased ALFF values in several brain regions after surgery (p < 0.05), and FC between the left hippocampus and left orbital inferior frontal gyrus (FG), left middle FG, left superior temporal gyrus, and left precentral gyrus was enhanced (p < 0.05), which was negatively correlated with the change in serum CRP (pre vs. post-intervention) (R = -0.58, p = 0.01). These results suggest that management of elderly patients undergoing surgery by multimodal brain monitoring may improve post-operative neurocognition and FC by reducing systemic inflammation. Clinical Trial Registration: <http://www.chictr.org.cn/index.aspx>, identifier: ChiCTR1900028024.