



講師：林素滿

主題：

cerebral oximeter

摘要：

Brain is the most important organ of the human being. Despite accounting for only 2% of body weight, the brain receives 15-20% of total cardiac output to maintain tissue homeostasis. Brain tissue viability strongly depends on consistent supply of oxygen and energy substrates, namely glucose, and cessation of cerebral blood flow (CBF) results in an interruption brain activity. As we know that the consciousness is lost between 4 and 10s of absent CBF, while the electroencephalogram (EEG) becomes isoelectric after 10-30s of asystole.

Brain injury is a major complication of cardiac surgery and significantly increases the likelihood of the need for long-term care. Perioperative stroke occurs in 2%-6% of all patients. More than 20% of patients aged >65 years and 33% of those aged >80 years experience postoperative delirium. The rate of postoperative cognitive dysfunction is estimated to exceed 80% at discharge, and the dysfunction persists in 25% of patients at 1 year. Brain injury also may trigger chronic or progressive dementia. Some previous studies showed that patients were susceptible to neurocognitive disorders from hypoperfusion and microemboli resulting in impaired cerebrovascular autoregulation during cardiac surgery undergoing cardiopulmonary bypass (CPB).



Near-infrared spectroscopy (NIRS) possesses the potential of non-invasively evaluating the oxygen supply/demand balance in frontal brain tissue and providing real-time regional cerebral oxygen saturation (rSO<sub>2</sub>) even during non-pulsatile perfusion, and intraoperative decreased rSO<sub>2</sub> may indicate a clinically

relevant association with cognitive dysfunction.

Two prospective randomized studies, including high-risk patients conducted by Lei et al. and Deschamps et al., found that NIRS-guided intervention could attenuate the decreases of rSO<sub>2</sub> in cardiac surgery but did not affect the incidence of POD. The available evidence in the meta-analysis suggests that cerebral oximetry monitoring-guided intraoperative interventions are correlated with a lower risk of postoperative cognitive dysfunction and a shorter ICU stay in adults undergoing cardiac surgery. These clinical benefits may be limited in patients with older age, diabetes status, high BMI, non-CHD, non-COPD, or a previous cardiovascular accident.

Based on the fact that an intraoperative intervention followed cerebral oxygenation may provide significant benefits in patients with a high-risk status, and further trials are needed to verify the effectiveness of cerebral oxygen saturation intervention threshold settings in improving cognitive function.