

Pengaruh faktor-faktor intra dan pascabedah terhadap disfungsi kognitif pascabedah jantung terbuka: penelitian terhadap nilai nirs, kandungan dan ekstraksi oksigen perioperatif serta penanda serologis = Intra- and postoperative factors affecting POCD after open-heart surgery: analysis of cerebral saturation, oxygen content and extraction, and serologic marker

Yoshua Baktiar, author

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Abstrak

Latar Belakang: Disfungsi kognitif pascabedah (postoperative cognitive dysfunction/POCD) merupakan komplikasi pascabedah yang sering ditemui pada pasien yang menjalani bedah jantung terbuka yang mengganggu fungsi sosial dan ekonomi serta berkaitan dengan peningkatan mortalitas. Patofisiologi POCD belum diketahui secara jelas, namun diperkirakan melibatkan hipoksia serebral.

Penurunan kandungan oksigen dan penurunan ekstraksi oksigen perioperatif diperkirakan berkontribusi terhadap POCD. Penggunaan pemantauan nearinfrared spectroscopy (NIRS) memungkinkan pengukuran status oksigenasi pada jaringan otak. Protein S100B adalah penanda biologis kerusakan jaringan otak. Penelitian ini bertujuan meneliti pengaruh kandungan oksigen dan ekstraksi oksigen intra dan pascabedah, desaturasi serebral dan peningkatan kadar protein S100B terhadap kejadian POCD.

Metode: Rancangan penelitian ini adalah kohort prospektif di unit Pelayanan Jantung Terpadu RS dr. Cipto Mangunkusumo. Penelitian dimulai setelah mendapatkan persetujuan komite etik dan ijin lokasi. Kriteria penerimaan adalah pasien berusia 18 tahun yang dijadwalkan menjalani bedah jantung terbuka dengan menggunakan mesin cardiopulmonary bypass (CPB), sehat secara mental, dapat membaca dan berbahasa Indonesia. Pasien akan menjalani evaluasi kognitif menggunakan 6 tes psikometrik pada 1 hari prabedah dan diulang pada 5 hari pascabedah. POCD didefinisikan sebagai penurunan >20% skor kognitif pascabedah dibandingkan prabedah pada 2 atau lebih tes. Sampel darah arteri dan vena diambil untuk menilai kandungan dan ekstraksi oksigen pada 5 waktu: (1) sebelum induksi, (2) intra-CPB, (3) pasca-CPB, (4) enam jam pascabedah, dan (5) 24 jam pascabedah. Pemantauan saturasi serebral menggunakan NIRS dilakukan sepanjang pembedahan. Kadar protein S100B diukur pada 2 waktu: sebelum induksi dan 6 jam pascabedah. Data dianalisis dengan uji statistik yang sesuai menggunakan piranti lunak SPSS versi 20.

Hasil: Lima puluh lima subyek mengikuti penelitian ini. POCD ditemukan pada 31 (56,4%) subyek. Kandungan oksigen dan ekstraksi oksigen ditemukan tidak berbeda bermakna di antara kedua kelompok pada seluruh waktu. Desaturasi serebral ditemukan lebih lama (55 [0-324] vs. 6 [0-210], $p=0,03$) dan nilai AUC rScO₂ lebih tinggi (228 [0-4875] vs. 33 [0-1100], $p < 0,01$) pada pasien yang mengalami POCD dibandingkan yang tidak. Dengan

analisis ROC ditemukan nilai AUC rScO₂ >80 menit% berpengaruh terhadap kejadian POCD (RR 3,38, IK 95%: 1,68-6,79, p <0,01). Kadar protein S100B meningkat 1,5x lebih tinggi pada pasien POCD, namun tidak mencapai kemaknaan statistik.

Simpulan: Desaturasi serebral yang diukur menggunakan NIRS berpengaruh pada kejadian POCD.

.....Background: Postoperative cognitive dysfunction/POCD is commonly found postoperative complication after cardiac surgery with profound social and economic effect and also known correlated with mortality. The pathophysiology remains unclear and multifactorial, but hypoxia have been postulated as one of the mechanisms. Reduced arterial oxygen content (CaO₂) and reduced oxygen extraction perioperatively may contribute to POCD. Use of near-infrared spectroscopy (NIRS) monitoring may provide oxygenation status on brain tissue. S100B protein is known brain injury biological marker. This trial aims to investigate effects of perioperative oxygen content and extraction, cerebral oxygenation status and S100B protein level changes to POCD.

Methods: This prospective cohort study was conducted at Integrated Heart Service unit of RS dr. Cipto Mangunkusumo, a tertiary teaching hospital in Jakarta, Indonesia. This study was started after ethical approval obtained. Inclusion criteria was 18 years old or above patients scheduled for open-heart surgery using cardiopulmonary bypass machine, healthy mental status, and can speak/read Indonesian language. Subjects were undergone 6 psychometric evaluation on day prior to surgery and 5 days after surgery. POCD defined as decrease of >20% score from baseline on 2 or more tests. Arterial and venous blood samples were taken on 5 moments: (1) before induction of anesthesia, (2) during CPB, (3) After separation of CPB, (4) six hours after surgery, and (5) 24 hours after surgery. NIRS monitoring was applied continuously during surgery. S100B protein level was measured on before induction of anesthesia and 6 hours after surgery. Data was analyzed with appropriate statistical tests using SPSS 20 software.

Results: Fifty-five subjects were included in this study. POCD was found in 31 (56.4%) subjects. Oxygen contents and extractions were found not differ in both groups at all times. Cerebral desaturation was found more longer (55 [0-324] vs. 6 [0-210] mins, p = 0.03) and severe (AUC rScO₂ 228 [0-4875] vs. 33 [0-1100] min%, p <0,01) in subjects with POCD compared to non-POCD. Using ROC analysis, it is determined subjects with AUC rScO₂ >80 min% were exposed with higher risk of POCD (RR 3.38x, 95% CI: 1.68-6.79, p <0.01). S100B protein level increased higher in subjects with POCD but no statistical significant was found.

Conclusion: Cerebral desaturation measured by NIRS monitoring contributes to POCD.