Hubungan disfungsi kognitif pascabedah jantung terbuka dengan nilai Near-Infrared Spectroscopy serta kandungan oksigen dan ekstraksi oksigen intrabedah = Association between Near-Infrared Spectroscopy Value, intraoperative arterial oxygen content and extraction with postoperative cognitive dysfunction after cardiac surgery

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Abstrak

Latar Belakang: Disfungsi kognitif pascabedah adalah salah satu komplikasi pembedahan jantung yang telah diketahui. Hipoperfusi jaringan otak diduga sebagai penyebabnya, terutama dihubungkan dengan penggunaan mesin pintas jantung-paru. Near-infrared spectroscopy muncul sebagai alat pemantauan saturasi oksigen otak. Penelitian ini bertujuan untuk mengetahui hubungan antara nilai NIRS dan kandungan oksigen intrabedah dengan kejadian disfungsi kognitif pascabedah jantung terbuka.
Metode: Penelitian ini merupakan kohort prospektif yang dilakukan di Rumah sakit Cipto Mangunkusumo, Indonesia. Sebanyak 60 pasien elektif yang akan menjalani bedah jantung terbuka dilakukan uji neurokognisi pada 1 hari sebelum pembedahan dan hari ke 5 pascabedah. Disfungsi kognitif pascabedah dinyatakan jika terdapat penurunan >20% dari nilai uji prabedah, pada 2 dari 3 ranah kognisi. Pemantauan saturasi oksigen regional (rSO2¬) menggunakan probe NIRS yang ditempel pada dahi subjek penelitian. Nilai rSO2¬ secara kontinu direkam sepanjang pembedahan. Desaturasi rSO2 adalah penurunan rSO2>20% nilai baseline, nilai terendah, durasi desaturasi rSO2, luas area under the curve rSO2 yang dihitung oleh INVOS 5100 dalam satuan min% dicatat pada berbagai fase pembedahan. Analisis bivariat variabel numerik menggunakan Independent T-test atau Mann-Whitney dengan SPSS 20.0. Variabel-variabel dengan nilai p<0.25 pada analisis bivariat selanjutnya dimasukkan dalam regresi logistik.
Hasil: Sebanyak 31 dari 60 pasien (51,6%) mengalami POCD. Durasi desaturasi rSO2>20% secara signifikan lebih lama pada kelompok POCD dibandingkan non-POCD, terutama pada fase intraCPB dan pascaCPB. Didapatkan desaturasi total rSO2 dan nilai AUC rSO2 yang lebih panjang pada kelompok POCD dibandingkan kelompok non-POCD (median 55 [0-245] vs 0 (0-140) menit, p= 0.007) dan (412 [0-4875] vs 0 [0-472], p= 0,003). Hasil analisis multivariat menunjukkan AUC rSO2 sebagai variabel yang paling berpengaruh terhadap POCD. Kualitas persamaan regresi logistik baik dengan AUC 83,5% (CI 95%; 72,8%-94,2%).
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Introduction. Cardiac surgery has been known to cause postoperative cognitive dysfunction (POCD). Cerebral hypoperfusion is suspected as the cause, mainly related to the use of cardiopulmonary bypass (CPB) machine. Near infrared spectroscopy had been introduced as a method to monitor cerebral oxygen saturation. This study aims to investigate the role of near infrared spectroscopy (NIRS) monitoring in preventing POCD after cardiac surgery.
Purpose: To evaluate association between intraoperative Near-Infrared Spectroscopy value and arterial oxygen content with POCD in open heart surgery
Methods. This prospective cohort study was conducted at Cipto Mangunkusumo Hospital, Indonesia. We included sixty adult patients scheduled for elective open-heart surgery and assessed their cognitive function

1 day before surgery and postoperative day 5. To measure regional oxygen saturation (rSO¬¬2), NIRS probe was placed on the subjects forehead, the values were recorded until the end of surgery. A decrease in rSO2 >20% of baseline value was considered as rSO2 desaturation. The lowest rSO2 value and duration of desaturation were recorded before, during, after CPB. Another variable of NIRS value was Area under the curve of rSO2; an output measured by INVOS 5100 labelled as AUC rSO2 in min%. Data were compared using Students t test or the Mann-Whitney U test with SPSS 20.0 software. Logistic regression was applied to variables with p-value above 0.25 on bivariate analysis.

Results: In this study 31 out of 60 patients (51.6%) developed POCD. Duration of rSO2 desaturation 20% baseline was significantly higher in POCD group, espescially during and after CPB phase. We observed a median of 55 (0-245) minutes of total desaturation time in POCD group, compared to the non-POCD group, who experienced a median desaturation time of 0 (0-140) minutes ($p = 0.007$). Quality of regression equity based on good discrimination with AUC was 83.5% (CI 95%; 72.8%-94.2%). From multivariate analysis, it was found that variables of NIRS AUC could affect logistic regression equity.