

## INTISARI

**Latar Belakang:** *Cardiopulmonary bypass* (CPB) telah meningkatkan efektivitas operasi jantung secara signifikan dengan cara mengurangi hemodilusi dan respon inflamasi sistemik. *Goal directed perfusion* (GDP) merupakan intervensi dengan target individual untuk memperbaiki metabolisme jaringan dan pengiriman oksigen (DO<sub>2</sub>) sebagai determinan signifikan dari perfusi yang optimal. GDP diharapkan dapat memperbaiki perfusi jaringan, yang dapat dinilai evaluasi adekuasi kebutuhan dan suplai oksigen melalui saturasi oksigen vena sentral (SCVO<sub>2</sub>) dan gradien CO<sub>2</sub> arteri-vena (CO<sub>2</sub> gap).

**Tujuan:** Mengetahui pengaruh CPB dengan GDP dibandingkan konvensional dalam meningkatkan SCVO<sub>2</sub> dan menurunkan CO<sub>2</sub> gap.

**Metode:** Uji klinis acak tersamar ganda pada pasien pembedahan jantung non-darurat menggunakan CPB di RSUP Dr. Sardjito Yogyakarta. Variabel bebas adalah CPB metode GDP dan konvensional, variabel terikat adalah nilai SCVO<sub>2</sub> dan CO<sub>2</sub> gap. Kadar laktat digunakan sebagai luaran sekunder. Kelompok GDP diberlakukan *priming* sesuai target hemoglobin yang lebih tinggi, hipotermia yang lebih ringan, dan laju aliran yang lebih rendah dibandingkan metode konvensional. Analisis komparatif dilakukan dengan uji t-tidak berpasangan untuk mengetahui perbedaan antara kelompok. Nilai  $p < 0,05$  dianggap sebagai hasil yang signifikan.

**Hasil:** Sebanyak 52 subjek penelitian terlibat dan seluruhnya diinklusi dalam analisis final. Karakteristik perioperatif dari kedua kelompok ditemukan serupa. DO<sub>2</sub> pasien lebih tinggi daripada kebutuhan oksigen, memastikan keamanan metode CPB. SCVO<sub>2</sub> lebih tinggi pada kelompok GDP dibandingkan konvensional pada 0 jam ( $p < 0,001$ ), 4 jam ( $p < 0,001$ ), dan 8 jam ( $p < 0,001$ ) postoperasi. CO<sub>2</sub> gap rendah pada kelompok GDP dibandingkan konvensional pada 0 jam ( $p < 0,001$ ), 4 jam ( $p = 0,003$ ), dan 8 jam ( $p < 0,001$ ) postoperasi. Kadar laktat postoperasi ditemukan serupa diantara kedua kelompok ( $p > 0,05$ ).

**Kesimpulan:** CPB dengan GDP dapat meningkatkan SCVO<sub>2</sub> dan menurunkan CO<sub>2</sub> gap dibandingkan metode konvensional

**Kata kunci :** *cardiopulmonary bypass; goal directed perfusion; oxygen delivery; SCVO<sub>2</sub>, CO<sub>2</sub> gap, operasi jantung*

## ABSTRACT

**Background:** *Cardiopulmonary bypass (CPB) has significantly increased the effectiveness of cardiac surgery by reducing hemodilution and systemic inflammatory responses. Goal-directed perfusion (GDP) is an individualized-target intervention to improve tissue metabolism and oxygen delivery (DO<sub>2</sub>), which are determinants of optimal perfusion. GDP is expected to enhance tissue perfusion, which can be assessed by the adequacy of oxygen demand and supply through central venous oxygen saturation (SCVO<sub>2</sub>) and the arterio-venous CO<sub>2</sub> gradient (CO<sub>2</sub> gap).*

**Objective:** *Determine the effect of CPB with GDP compared to conventional methods in increasing SCVO<sub>2</sub> and reducing the CO<sub>2</sub> gap.*

**Methods:** *A double-blind randomized clinical trial on non-emergency cardiac surgery patients using CPB at Dr. Sardjito General Hospital, Yogyakarta. The independent variables were the GDP method and conventional CPB, while the dependent variables were SCVO<sub>2</sub> and CO<sub>2</sub> gap values. Lactate levels were used as secondary outcomes. The GDP group was treated with priming according to a higher hemoglobin target, milder hypothermia, and lower flow rates compared to the conventional method. Comparative analysis was performed using an independent t-test to determine differences between the groups. A p-value <0.05 was considered significant.*

**Results:** *A total of 52 research subjects were involved, and all were included in the final analysis. The perioperative characteristics of both groups were found to be similar. Patients' DO<sub>2</sub> was higher than their oxygen needs, ensuring the safety of the CPB method. SCVO<sub>2</sub> was higher in the GDP group compared to the conventional group at 0 hours (p<0.001), 4 hours (p<0.001), and 8 hours (p<0.001) postoperatively. The CO<sub>2</sub> gap was lower in the GDP group compared to the conventional group at 0 hours (p<0.001), 4 hours (p=0.003), and 8 hours (p<0.001) postoperatively. Postoperative lactate levels were found to be similar between both groups (p>0.05).*

**Conclusion:** *CPB with GDP can increase SCVO<sub>2</sub> and reduce the CO<sub>2</sub> gap compared to the conventional method.*

**Keyword:** *cardiopulmonary bypass; goal directed perfusion; oxygen delivery; SCVO<sub>2</sub>, CO<sub>2</sub> gap, heart surgery*