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The ability of carbon dioxide–Derived indices to predict adverse outcome after cardiac surgery

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Objective: The objective of this study was to assess whether the central venous-to-arterial carbon dioxide partial-pressure difference (ΔPCO_2) and the ratio of the ΔPCO_2 to the arterial-venous difference in oxygen content ($\Delta\text{PCO}_2/\text{Ca-vO}_2$) predict postoperative complications (PC) after cardiac surgery.

Methods: Prospective, observational, noninterventional study, about 60 patients undergoing cardiac surgery with cardiopulmonary bypass.

The primary endpoint was the occurrence of PC. Data were first analyzed in two groups based on the occurrence of PC. Then, receiver operating characteristic curves of the ΔPCO_2 and the $\Delta\text{PCO}_2/\text{Ca-vO}_2$ ratio were analyzed for the prediction of PC.

Measurements and Main Results: Among the study participants, 22 (36.7%) experienced PC. The death rate was 18.3%. The present study found that the ΔPCO_2 and the $\Delta\text{PCO}_2/\text{Ca-vO}_2$ ratio predicted the occurrence of PC with areas under the curve of 0.702 and 0.666, respectively. The best thresholds of these markers were 8.3 mmHg for the ΔPCO_2 and 2.16 mmHg/mL for the $\Delta\text{PCO}_2/\text{Ca-vO}_2$ ratio. A significant difference was found for these indicators between the groups with and without PC. The ΔPCO_2 and the $\Delta\text{PCO}_2/\text{Ca-vO}_2$ ratio were significantly correlated to EuroSCORE II, duration of aortic clamping, majority of prognostic scores the first two days postoperatively and the lactate level. The $\Delta\text{PCO}_2/\text{Ca-vO}_2$ ratio is predictive of hyperlactatemia >2 mmol/L, with an area under the curve of 0.787.

Conclusion: The ΔPCO_2 and the $\Delta\text{PCO}_2/\text{Ca-vO}_2$ ratio predict the occurrence of complications in cardiac surgery. This was in occurrence with physiological knowledge(1) and other author's results(2). But, our results are not consistent with other studies that not found any correlation between ΔPCO_2 and the $\Delta\text{PCO}_2/\text{Ca-vO}_2$ ratio and prognostic indices(3,4).

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Biography

He is currently working at habib bourguiba university hospital, Tunisia.

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