

Oxygen Reserve Index and Arterial Partial Pressure of Oxygen: Relationship in Open Heart Surgery

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Background: Mild to moderate hyperoxia is potentially beneficial to patients undergoing open heart surgery. Oxygen Reserve Index (ORI) is a novel parameter that correlates to arterial oxygen tension (PaO₂) in the hyperoxic range. This prospective study aimed to assess whether the relationship between ORI and PaO₂ remains intact in the setting of open-heart surgery.

Methods: This study included patients undergoing valve, aortic arch and coronary artery bypass grafting (CABG) surgeries, on and off pump, between September 1st 2019 and August 31st 2021. Enrolled patients had arterial blood gas samples collected and analyzed after induction of anesthesia and increases in FiO₂ in steps of 0.08 with ORI being recorded at the time of sample collection for cross reference and analysis.

Results: ORI values showed a statistically significant correlation with PaO₂ values in the 100-200 mmHg range ($r = 0.8193$, $p < 0.001$). Additionally, there was a significant correlation between ORI and SpO₂ values in the range of 95% and 100% ($r = 0.529$, $p < 0.05$).

Conclusions: The preserved relationship between ORI and PaO₂ in the mild and moderate hyperoxic range can allow more precise titration of oxygen therapy to guide therapy targeting normoxia, mildly and moderately hyperoxia. Additionally, it could have a potential use as an early warning system for impending hypoxia.