The most straightforward method of ascertaining arterial PO2, PCO2, and other components of blood gas is to measure them directly from a blood sample. In situations in which arterial puncture cannot be achieved or may be technically difficult, the venous blood sample can be used. Valizad Hassanloei et al (2018).

Abstract:

BACKGROUND: The most straightforward method of ascertaining arterial PO2, PCO2, and other components of blood gas is to measure them directly from a blood sample. In situations in which arterial puncture cannot be achieved or may be technically difficult, the venous blood sample can be used.

METHODS: In a prospective analytical study, 80 patients undergoing mechanical ventilation after open-heart surgery in the intensive care unit were evaluated. Simultaneous, matched arterial and central venous blood gas samples were taken from radial artery line and central vein, respectively, when the ABG (arterial blood gases) assessment was needed. Arterial and central venous blood samples were analyzed and data were expressed as mean and ± SD.

RESULTS: The Pearson correlation coefficient for pH, PCO2, HCO3, and SatO2 was 0.898, 0.940, 0.840, and 0.567, respectively. There was a significant correlation between arterial and central venous values of pH, PCO2, and HCO3 (P < 0.0001). The mean difference between arterial and central venous PCO2 was -2.44 ± 2.6 mmHg, and the mean venous pH value was only 0.021 ± 0.037 units lower than the mean arterial value. In addition, the calculated mean bicarbonate concentration in venous blood was only about 0.06 ± 1.5 mEq.L higher than the mean arterial value. CONCLUSIONS: The central venous PCO2, pH, and HCO3 measured during mechanical ventilation in the intensive care unit approximate arterial values closely enough to permit the estimation of the adequacy of ventilation and acid-base status. The central venous Sat O2 does not reliably parallel the arterial Sat O2. In conclusion, venous blood sampling can potentially reduce the requirement for ABG sampling in special situations.

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