FACTORS DETERMINING THE FRACTION OF INSPIRED OXYGEN WHEN BREATHING THROUGH A NASAL CANNULA

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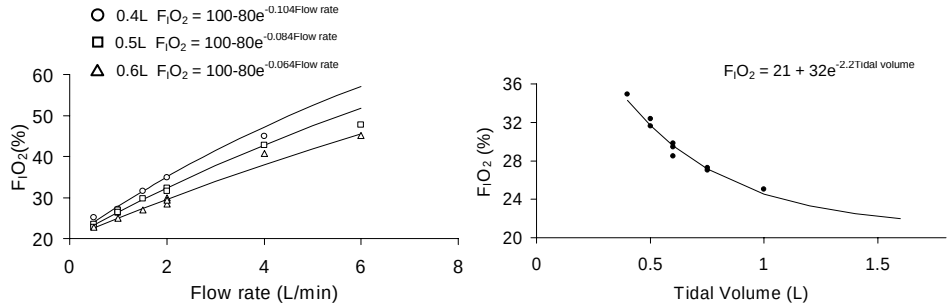
Knowledge of inspired oxygen concentration is important for estimation of the alveolar-arterial gradient. It is commonly assumed that inspired oxygen concentration (F_IO_2) is independent of tidal volume and breathing frequency. In the present study a non-physiological system was used to measure F_IO_2 at various oxygen flow rates, tidal volumes and breathing frequencies.

METHOD: Oxygen was delivered via nasal cannula which was placed on a model head connected to a mixing box and a three litre syringe. Tidal volumes between 0.4 and 1 litre and breathing frequencies between 8 and 20 bpm were applied manually. Ti:Ttot was maintained as 1:3 by use of a metronome. Inspired oxygen concentration was measured continuously using a mass spectrometer

RESULTS: F_IO_2 increases with increasing oxygen flow rate, decreases with increasing tidal volume and decreases with increasing breathing frequency. Graphs and equations of best fit are presented for flow rate and tidal volume.



DISCUSSION: F_IO_2 is critically dependent on tidal volume and breathing frequency. Using this non-physiological model, equations can be derived which allow more accurate estimation of F_IO_2.

KEY WORDS: F_IO_2, oxygen delivery, breathing pattern.

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