Abstract

Background: Individuals submitted to situations of deep sedation have a marked decrease in their ventilatory capacity. The provision of adequate ventilation and oxygenation in critically ill patients submitted to sedation in intensive therapy has been the subject of special care. In such cases, exposure to low inspired oxygen fractions (F I O 2 ) is a factor that can influence alveolar perfusion and respiratory performance. The aim of this study is to evaluate the effects of three inspired oxygen fractions (80%, 60% or 40%) on the cardiorespiratory dynamics of pigs submitted to mechanical ventilation by intermittent positive pressure in deep sedation with propofol-remifentanil. Material, Methods & Results: Twenty crossbred pigs weighing between 17 and 25 kg and aged between 60 and 90 days were used. Each animal was submitted to deep sedation for 2h in randomly assigned F I O 2 (80%, 60% or 40%). Scores such as heart and respiratory rate, blood pressure, respirometry (PaO 2 , P(A-a)O 2 , P IP , V min ), physiological dead space, pulmonary shunt and blood gas analysis (pH, PaO 2 , PaCO 2 , HCO 3 ) were observed, evaluated and compared. Patients were evaluated after sedation was induced with propofol (12 mg.kg -1 ) and remifentanil (1 mcg.kg -1 ). To maintain the level of sedation we used propofol (an average of 18 mg.kg -1 .h -1 ) and remifentanil (0.5 mcg.kg -1 .min -1 ). Intubation was preceded after the onset of sedation to mechanical ventilation - volume-cycled, intermittent positive pressure. Patients received a tidal volume of 10 mL.kg -1 and an I:E ratio of 1:2, positive end-expiratory pressure of 4 cmH 2 O with three inspired oxygen fractions. Patient's respiratory rate was adjusted so as to maintain end-tidal carbon dioxide pressure between 35 and 45 mmHg. Data were subjected to analysis of variance for repeated measures followed by a Tukey test. Patients receiving a 40% oxygen concentration showed an average heart rate higher than the others. Shunt levels presented by animals exposed to higher oxygen fractions were significantly higher than in animals that received lower concentrations. However, the 60% fraction presented shunt levels almost two times higher than F I O 2 0.4. We found statistical differences between blood pressure and alveolar oxygen, which resulted in the formation of pulmonary shunts in a greater frequency in F I O 2 0.8. Discussion: The alveolar oxygen pressure was calculated; one can see and understand how the deficiency in tissue perfusion and oxygenation happens, in conflict with high concentrations present in alveoli. Lower levels of oxygen in the alveoli are more effective in promoting the passage of the molecule into the bloodstream, reflecting optimal blood pressures. There are significant differences between inspired fractions, this proportion is not maintained in the difference of alveolar-arterial pressure, proving the inefficiency of the transport of oxygen by the alveolar-capillary barrier. The changes triggered by high fractions of oxygen will lead to the formation of shunts. This was the
case with patients exposed to an 80% oxygen fraction, in which shunt levels were supraphysiological. Analyzing the results we conclude and recommend the use of FIO2 0.4, which both optimizes gas exchange with less lung damage and seems to provide hemodynamic stability.

**Keywords**

Inspired oxygen fractions, mechanical ventilation, swine, propofol.