

TITLE : FACTORS INFLUENCING \bar{SVO}_2 IN CRITICALLY ILL PATIENTS
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INTRODUCTION :

It has been recently suggested that, in critically ill patients, \bar{SVO}_2 changes are inversely correlated with oxygen extraction ratio (OER)¹. However, both oxygen consumption ($\dot{V}O_2$) and oxygen delivery ($\dot{D}O_2$) were measured from the swan-ganz catheter and this could have biased the results. In this study we independently measured $\dot{V}O_2$, $\dot{D}O_2$ and \bar{SVO}_2 .

METHODS :

Thirteen critically ill patients with acute respiratory failure and/or circulatory shock were included in the study after informed consent and institutional approval had been obtained. In all patients an Opticath oximetry catheter had been inserted and all were mechanically ventilated using a $FI_{O_2} \leq 60\%$. $\dot{V}O_2$ was measured from inspired and expired gases using a Datex Deltatrac (TM) metabolic monitor (indirect calorimetry)². OER was calculated as the ratio of $\dot{V}O_2$ obtained from indirect calorimetry to $\dot{D}O_2$ obtained from the swan-ganz catheter ($CI \times CaO_2$). CI , \bar{SVO}_2 , $\dot{D}O_2$, $\dot{V}O_2$ were independently and simultaneously measured following therapeutic interventions including increase in FI_{O_2} , PEEP administration, intravenous sedation, fluid infusion, catecholamine adminis-

tration, application of G-suit. Linear regression analysis was used to compare changes in \bar{SVO}_2 with changes in CI , $\dot{V}O_2$ and OER.

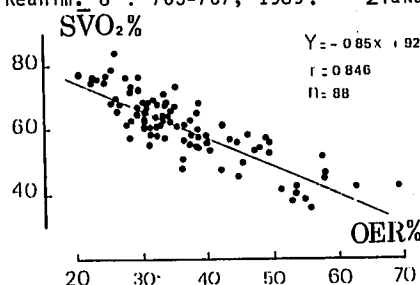
RESULTS :

Eighty eight data points were obtained in the 13 patients. No relationship between \bar{SVO}_2 and $\dot{V}O_2$ was found ($r = 0.133$). A significant but weak relationship was found between \bar{SVO}_2 and CI ($r = 0.51$). As shown in the figure a close and significant relationship was found between \bar{SVO}_2 and OER.

DISCUSSION :

This study demonstrates that in complex situations characterized by simultaneous changes in $\dot{V}O_2$, FI_{O_2} and CI , \bar{SVO}_2 remains closely related to OER. Any decrease in \bar{SVO}_2 is an early indication of a deterioration between oxygen supply and oxygen demand and requires further analysis to correct the factor involved in this deterioration.

REFERENCES : 1 J.J. Rouby et al. Ann. Fr. Anesth. Reanim. 8 : 703-707, 1989. 2 Takala et al. Crit. Care Med. 17 : 1041-1047, 1989.

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Title: USE OF UHFJV IN MANAGEMENT OF ARDS

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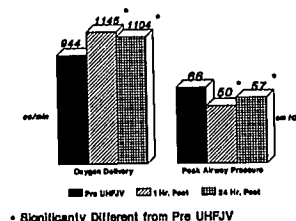
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Management of ARDS is associated with increase incidence of barotrauma and compromised hemodynamics. HFPPV at $<100 \text{ min}^{-1}$ does not significantly improve ventilation in ARDS. The APT 1010 is the first ultra high frequency Jet ventilator (UHFJV) that is a design hybrid incorporating the features of both high frequency jet and an oscillatory ventilators.

Methods: Informed consent was obtained from each patient. Hi Lo Jet^(R) (Mallinckrodt) endotracheal tubes were used for tracheal intubation (FDA and IRB approval). Hemodynamic and pulmonary profile were obtained on initiation of UHFJV, 1 hour after start of UHFJV, and every 4 hours or for any change in clinical status. Peak, mean, and minimum airway pressures were recorded. Complications were documented. The UHFJV was initially set to driving pressure = 32 psi, frequency = 5 Hz, and inspiratory time to 36% for $> 5 \text{ cm H}_2\text{O}$ PEEP; or up to or 42% for 15 to 20 $\text{cm H}_2\text{O}$ PEEP. Oxygen loading was adjusted by changes in inspiratory time. CO_2

elimination was controlled by varying frequency and/or driving pressure.

Results: 11 patients (8 males, 3 females, 19 to 70 years) were studied. Average PEEP was 15 $\text{cm H}_2\text{O}$. Pre UHFJV CO was $7.4 \pm 1.4 \text{ L/min}$, and P_{aO_2}/F_{iO_2} ratio was $125 \pm 67 \text{ torr}$. One hour post UHFJV, CO increased to $8.6 \pm 2.5 \text{ L/min}$ and P_{aO_2}/F_{iO_2} to $153 \pm 85 \text{ torr}$. Twenty-four hours post UHFJV, CO increased to $8.1 \pm 1.8 \text{ L/min}$, and P_{aO_2}/F_{iO_2} to $179 \pm 74 \text{ torr}$. One patient developed new pneumothorax. Figure shows O_2 delivery and PAP. Statistical significance established using paired t-test.



Conclusions: Results indicate UHFJV can reduce peak airway pressure and improve oxygen delivery. We believe this reduces incidence of barotrauma in patients with ARDS and when held at resonant frequencies of the lung, UHFJV provides a new and effective ventilation technique not previously applied to human lung ventilation.