Cerebral tissue oxygen saturation during switch from conventional mechanical ventilation to High Frequency Percussive Ventilation: an observational study.

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INTRODUCTION

High Frequency Percussive Ventilation (HFPV) is a respiratory rescue therapy in patients with acute respiratory failure, refractory to conventional mechanical ventilation. HFPV enhances CO₂ washout by convection. As its impact on cerebral perfusion is unknown, there is hesitation to use this ventilation strategy in patients with increased intracranial pressures.

AIM

This observational study investigated the influence of HFPV on cerebral tissue oxygen saturation (SctO₂), a surrogate parameter of cerebral perfusion in patients without increased intracranial pressure.

METHODS

- 12 patients (July 2015 - August 2016) who were refractory to conventional mechanical ventilation were transferred to HFPV using the VDR4. (Figure 1)
- SctO₂ was measured using Near-Infrared Spectroscopy (NIRS) technology (FORE-SIGHT ELITE, CASMED) (Figure 2)
- NIRS sensors were applied one hour before the switch to HFPV and remained in place for 24 hours.
- Blood gas analysis was performed before the switch and at hour 12 and 24.

CONCLUSIONS

This study shows that HFPV promotes CO₂ washout, which induced a concomitant mild drop in SctO₂. Nevertheless, SctO₂ remained above critical desaturation thresholds. This ventilation strategy appears tolerable for patients without increased intracranial pressure.

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RESULTS

Table 1. Hemodynamic data of all included patients

Variables	1H Before switch		1H After switch		P-value
	Median	range	Median	range	
SpO ₂	94.02	87.73 – 98.08	94.73	93.60 – 99.16	0.037
MAP	75.33	64.01 – 89.33	65.77	58.43 – 86.48	0.248
SctO ₂	68.28	65.76 – 73.63	63.7	60.86 – 71.40	0.034
PaCO ₂	42.40	35.38 – 48.68	32.55	27.55 – 37.33	0.010

Figure 1. VDR4 device

Figure 2. FORE-SIGHT ELITE device

Figure 3. Case of a patient suffering from a pneumonia