Abstract 4.

Carbon dioxide production and ventilatory inefficiency along a T-piece spontaneous breathing trial are associated with difficult weaning

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Abstract

Introduction: Ventilatory monitoring along a T-piece spontaneous breathing trial (SBT) is limited. Volumetric capnography (VC) provides variables that may be associated with difficult weaning, such as CO2 production (VCO2) and ventilatory inefficiency calculated from the slope between minute ventilation and VCO2 (VE/VCO2). We recently reported a good correlation between VE/VCO2 and physiological dead space in mechanically ventilated patients.

Objective: To evaluate if VCO2 and/or VE/VCO2 along a T-piece SBT are associated with difficult weaning.

Method: We prospectively performed a one-hour SBT with a CO2/flow sensor between the endotracheal tube and the T-piece. Data was continuously recorded on a personal computer connected to a VC monitor (NICO2, Wallinford, CT, USA). Mean VCO2 and VE/VCO2 slopes were calculated. Difficult weaning included 3 categories: SBT failure (SBT-F) defined as inability to complete the trial or to extubate upon its completion, post extubation respiratory failure (PERF) defined as the need of non-invasive ventilation within 48 hours after extubation and extubation failure (EF) defined as the need for reintubation within 48 hours after extubation. Associations between VC variables and weaning outcomes were explored with t-test and ROC curves.

Results: Twenty seven SBT were performed on 24 patients mechanically ventilated for 6 ± 5 days with an APACHE II of 17 ± 11 and a SOFA score 8 ± 3 points. 46% had sepsis/shock, 33% had acute respiratory failure and 21% were trauma/surgical. Sixteen trials presented difficult weaning; 5 with SBT-F, 7 with PERF and 4 with EF. Patients with difficult weaning had a higher mean VCO2 and VE/VCO2 slope (table 1). The AUC of the ROC curves of meanVCO2 and VE/VCO2 slope for difficult weaning were 0.73 [0.54-0.92] and 0.75 [0.55-0.94], respectively (figure 1). Patients with SBT-F only had a higher mean VCO2, while patients with PERF only had a higher VE/VCO2 slope (table 2).

Conclusions: Mean carbon dioxide production and ventilatory inefficiency are associated to difficult weaning; specifically a higher VCO2 is related to inability to tolerate a SBT and ventilatory inefficiency to the need for non-invasive ventilation after extubation.

Tabla 1.

		VCO2 (mL/min)	*p*	VE/VCO2 slope	*p*
Difficult weaning (n=16)	Yes	274 ±22	0,020	33 ±3	0,021
	No	212 ±12		25 ±2	

Figure 1.

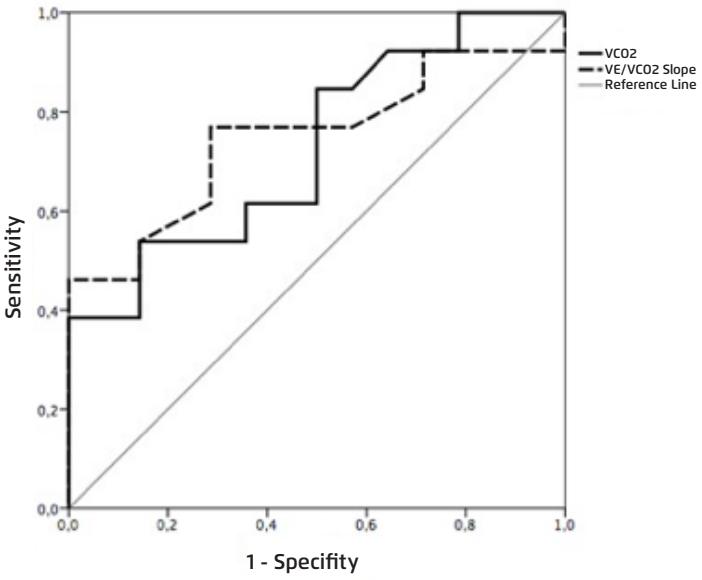

Tabla 2.

		VCO2 (mL/min)	*p*	VE/VCO2 slope	*p*
SBT-F (n=5)	Yes	303 ±35	0,030	32 ±7	*ns*
	No	228 ±13		28 ±7	
PERF (n=7)	Yes	235 ±21	*ns*	35 ±4	0,019
	No	212 ±13		25 ±2	
EF (n=4)	Yes	254 ±29	*ns*	34 ±7	*ns*
	No	211 ±12		27 ±2	