

Comparison between Pleth Variability Index and Arterial Pulse Pressure Variation in the Neurosurgical Intensive Care Unit (ICU).

Bhismadev T.K., Riahi T., Bernard O., Sesay M., Maurette P., Nouette-Gaulain K., *Proceedings of the American Society of Anesthesiologists*, October 13, 2012. Washington DC. A908.

Introduction

Volemic optimization is one of the key options for effective management of neurosurgical ICU patients mainly in the prevention of cerebral vasospasm. However, response to fluid challenge is patient specific and should be guided by reliable tools. Pleth variability index (PVI) and pulse pressure variation (PPV) have been used in many clinical settings to detect and guide responsiveness to fluid challenge [1,2]. To our knowledge, their utility has not yet been validated in the neurosurgical ICU. The objectives of this study were to compare variations in PVI versus PP and to suggest a cut-off value of fluid responder in neurosurgical ICU patients.

Methods

Adult patients, admitted to the neurosurgical ICU within 72 hrs following neurosurgery or aneurysmal embolization, requiring fluid resuscitation, were included. Exclusion criteria were- arrhythmia, tidal volume < 8ml/kg, spontaneous breathing, Heart rate/respiratory rate ratio > 3.6, Perfusion Index < 1, hypo or hyperthermia, MAAS > 1. The following parameters were measured before and after infusion of 500 ml of isotonic saline over 30 min: Heart rate (HR), mean arterial pressure (MAP), manual and automatic PP variation (using Intellivue Phillips™, USA), PVI and aortic VTI (using transthoracic echocardiography). Patients who increased their VTI by $\geq 15\%$ were considered as responders. Results are expressed as means \pm SD and compared using Student-t test. ROC curves were constructed to determine the cut-off values as well as the sensitivity (Se) and specificity (Sp) and 95% CI of each value.

Results

Forty one consecutive patients (20 males and 21 females, mean age 52 yrs) were recruited. They presented with subarachnoid hemorrhage (n=7), intracranial tumors (n=19), intracerebral hematomas (n=17). Noradrenaline (<1microg/kg/min) was administered in 10 patients to maintain hemodynamic stability. The main results are shown in table 1. fig.1. The cut off values (95% CI) were as follows: PVI=15% [Se 78% (56-92), Sp 72 (46-90)]; PPV- manual=12% [Se91 (71-98), 94 (72-99)] and PPV- automatic =13% [Se 95% (78-99), Sp 94% (69-100).

Conclusion

Our study suggests that PVI can reliably predict fluid responsiveness in neurosurgical patients in the ICU. Further studies should be done to validate this hypothesis.

References:

1.Chest 2002;121;2000-2008 2. Ann Intensive Care 2011, 1;1

Parameter	Fluid infusion		Patients	
	Before	After	Responders	Non responder
PVI	15.7 ± 8.1	10.1 ± 4.7*	20.5 ± 8.0	11.8 ± 5.8**
PPV-manual	10.9 ± 4.7	6.4 ± 2.1*	14.7 ± 3.4	7.9 ± 3.0**
PPV-automatic	10.9 ± 4.3	6.4 ± 1.7*	15 ± 3.5	8.4 ± 1.7**

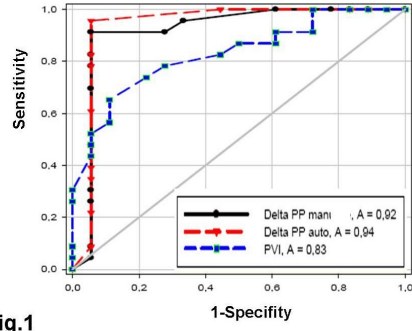


Fig.1