Usefulness of carotid blood flow peak velocity (ΔVpeak) and velocity time integral (ΔVTI) respiratory variation for fluid responsiveness prediction in ICU shocked mechanically ventilated patients. Preliminary results

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Introduction:"Fluid management optimization" is the first step to obtain a good tissue oxygen delivery; to avoid under and over fluid challenge, the clinicians must be guided by dynamic parameters whit invasive or not invasive method. Pulsed Doppler on common carotid artery can be easy method for assessing fluid responsiveness.

Purpose: This study aimed to assess the relationship between carotid and aortic Doppler ultrasound-derived parameters (respiratory variation in carotid/aortic blood flow peak velocity (ΔVpeak) and in carotid/aortic velocity time integral (ΔVTI)) in mechanically patients in order to predict patient fluid responsiveness

Methods: After the approval by Ethics Committee, we studied 20 ICU shocked patients (SAP < 90 mmHg and/or HR > 90 bpm) during mechanical ventilation (mean tidal volume of 6-8 ml/kg) admitted a ICU. Carotid/aortic ΔVpeak and carotid/aortic ΔVTI were measured by two examiners before and after crystalloid fluid challenge (6-8 ml/kg).

The relationship between carotid and aortic parameters were assessed with a non-parametric correlation coefficient (Spearman's rho).

Results: Before fluid challenge the median carotid/aortic ΔVpeak was respectively 9,2 % (IQR2,8%-21,6%) and 16,7% (IQR7%-26,4%), while the median carotid/aortic ΔVTI was respectively 10,7% (IQR4,8%-15,4%) and 19,1% (IQR8,6%-32,4%).

After fluid challenge the median carotid/aortic ΔVpeak was respectively 6,2% (IQR3,9%-7,7%) and 4,3% (IQR2,8%-6,9%), while the median carotid and aortic ΔVTI was respectively 5,4% (IQR3,6%-8%) and 6,9% (IQR0-12,4%).

The Spearman's correlation coefficient, performed by considering before and after fluid challenge measurements (40), between carotid and aortic ΔVpeak showed a moderate positive correlation (rho-index 0,49, p-value<0,01); carotid and aortic ΔVTI has a strong positive correlation (rho-index 0.61,

p-value<0,01).

Conclusions: These preliminary results showed a positive correlation between carotid/aortic ultrasound Doppler measurements for fluid responsiveness prediction. The study will continue by completing the patient’s enrollment to assess the reliability of carotid measure as new and easier bedside method in many settings, from ICUs to emergency department and operating theatre.

Tab.1 Results of the 20 shocked patients admitted to ICU

	ΔVpeak aortic median % [Q1-Q3]	**ΔVpeak carotid median % [Q1-Q3]**	**Spearman's rho**	**P value**
Before fluid challenge	16,72 [6,98-26,35]	19,09 [2,79-21,59]	0,49	< 0,01
After fluid challenge	4,34 [2,84-6,94]	6,16 [3,90-7,71]		
	ΔVTI aortic median % [Q1-Q3]	**ΔVTI carotid median % [Q1-Q3]**	**Spearman's rho**	**P value**
Before fluid challenge	19,09 [8,55-32,41]	10,72 [4,82-15,38]	0,61	<0,01
After fluid challenge	9,93 [0,00-12,41]	5,41 [3,64-8,01]		