



Module de formation continue: recherche et actualité aux soins intensifs

Les indices prédictifs de réponse

au remplissage vasculaire



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Introduction

CHOC HEMORRAGIQUE
AUX URGENCES

CHOC SEPTIQUE EN
PHASE INITIALE



STABILISE, A L'USI DEPUIS QUELQUES HEURES OU QUELQUES JOURS

Remplissage inadéquat

Fluid resuscitation in septic shock: A positive fluid balance and elevated central venous pressure are associated with increased mortality*

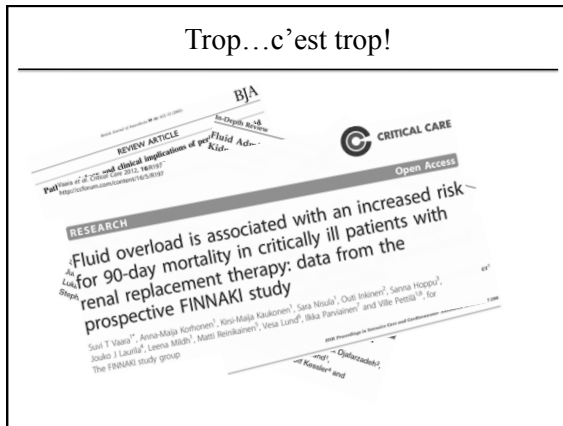
John H. Boyd, MD, FRCP(C); Jason Forbes, MD; Taka-aki Nakada, MD, PhD; Keith R. Walley, MD, FRCP(C); James A. Russell, MD, FRCP(C)

CVP Group	Net Fluid Balance		p
	Survivors	Nonsurvivors	
All Patients	3444 (1861-5984) mL	4429 (2537-6560) mL	<.001
CVP <8 mm Hg	3015 (1296-4987) mL	2281 (802-5711) mL	NS
CVP 8-12 mm Hg	2727 (1227-5491) mL	3112 (1559-4899) mL	NS
CVP >12 mm Hg	3975 (2387-6614) mL	5237 (3140-7773) mL	<.001

CVP, central venous pressure; NS, nonsignificant.
Volumes are expressed as median (25-75%).

Crit Care Med 2011; 39: 259-265

Trop...c'est trop!



Prédiction difficile...

Review Article

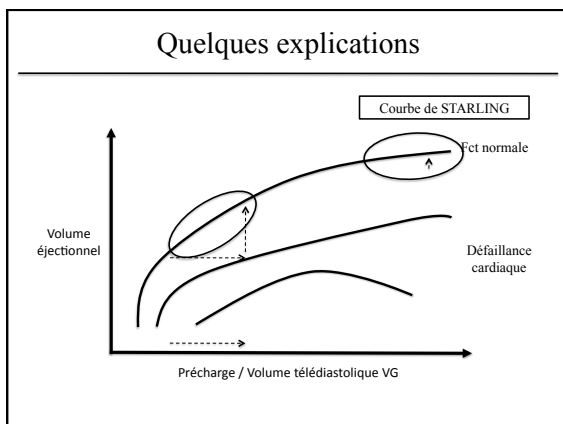
Dynamic changes in arterial waveform derived variables and fluid responsiveness in mechanically ventilated patients: A systematic review of the literature*

Paul E. Marik, MD, FCCM; Rodrigo Cavallazzi, MD; Tajender Vasu, MD; Amyn Hirani, MD

Overall, 56% of the patients included in this review responded to a fluid challenge.

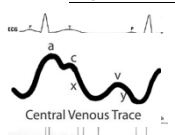
Crit Care Med 2009; 37: 2642-2647

Quelques explications



Pression veineuse centrale

PROBLEME METHODOLOGIQUE

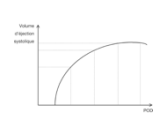


a = contraction auriculaire
 c = incursion tricuspidie
 x = relaxation auriculaire
 v = remplissage initial
 y = vidange atriale passive

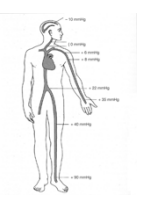
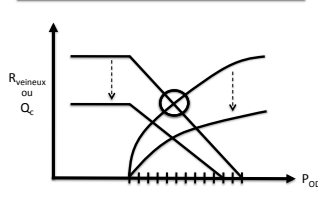


Pression veineuse centrale

PROBLEME PHYSIOLOGIQUE



Loi de Poiseuille

$$RV = \frac{\text{Pression systémique moyenne} - P_{ao}}{\text{Résistance au rebour veineux}}$$



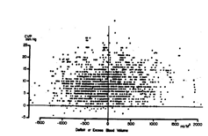
Pression veineuse centrale

CHEST Special Feature

Does Central Venous Pressure Predict Fluid Responsiveness?
A Systematic Review of the Literature and the Tale of Seven Marcs
Paul E. Marik, MD, FCCP, Michael Ronco, MD, FCCP, and Bahadur Vohra, MD

- Revue de 24 études soit 803 patients
- Patients adultes
- Bloc opératoire ou USI

- 1500 mesures simultanées de PVC et de volume sanguin circulant chez 188 patients
- Aucune corrélation

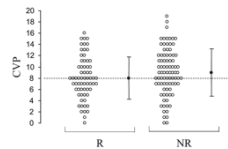


Conclusions: This systematic review demonstrated a very poor relationship between CVP and blood volume as well as the inability of CVP/ΔCVP to predict the hemodynamic response to a fluid challenge. CVP should not be used to make clinical decisions regarding fluid management.
(CHEST 2008; 134:172-178)
Chest 2008; 134: 172-178

Pression veineuse centrale

Cardiac filling pressures are not appropriate to predict hemodynamic response to volume challenge*

David Osman, MD; Christophe Ridel, MD; Patrick Ray, MD; Xavier Monnet, MD, PhD; Nadia Anguel, MD; Christian Richard, MD; Jean-Louis Teboul, MD, PhD



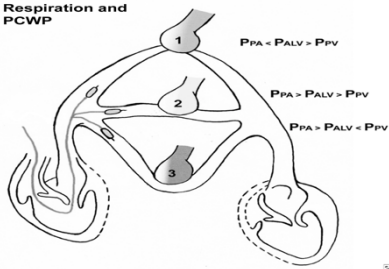
- Etude rétrospective
- 150 FC chez 96 patients en sepsis
- $PVC < 8$ mmHg est prédictif d'une réponse au remplissage que dans 47% des cas
- Même en cas de bas débit cardiaque avéré la VPP ne monte qu'à 61%

Conclusion: Our study demonstrates that cardiac filling pressures are poor predictors of fluid responsiveness in septic patients.

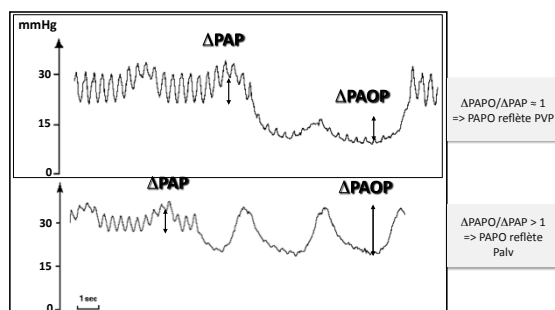
Crit Care Med 2007; 35: 64-8

Swan-Ganz et PAPO

Respiration and PCWP



Swan-Ganz et PAPO

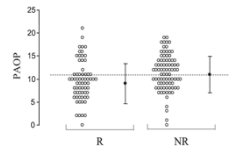


Swan-Ganz et PAPO

Cardiac filling pressures are not appropriate to predict hemodynamic response to volume challenge*

David Osman, MD; Christophe Ridel, MD; Patrick Ray, MD; Xavier Monnet, MD, PhD; Nadia Anguel, MD; Christian Richard, MD; Jean-Louis Teboul, MD, PhD

- Etude rétrospective
- 150 FC chez 96 patients en sepsis
- PAPO < 12 mmHg est prédictif d'une réponse au remplissage que dans 54% des cas
- Même en cas de bas débit cardiaque avéré la VPP ne monte qu'à 69%



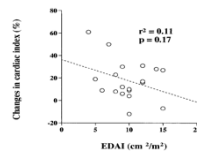
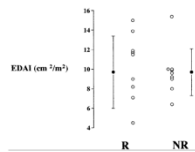
Conclusion: Our study demonstrates that cardiac filling pressures are poor predictors of fluid responsiveness in septic patients.

Crit Care Med 2007; 35: 64-8

Mesures échographiques

Respiratory Changes in Aortic Blood Velocity as an Indicator of Fluid Responsiveness in Ventilated Patients With Septic Shock*

Marc Feissel, MD; Frédéric Michard, MD; Isabelle Mangin, MD; Olivier Beyer, MD; Jean-Pierre Falier, MD; and Jean-Louis Teboul, MD, PhD



Chest 2001; 119: 867-873

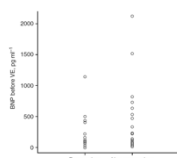
Mesures biologiques

British Journal of Anaesthesia 97 (6): 777-82 (2006)
doi:10.1093/bja/aek271 Advance Access publication October 17, 2006

BJA

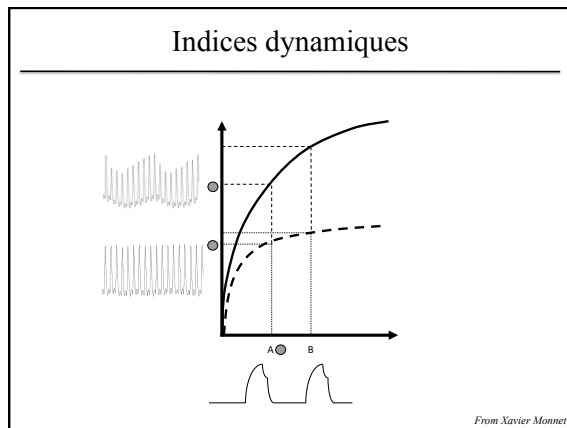
B-type natriuretic peptide to assess haemodynamic status after cardiac surgery

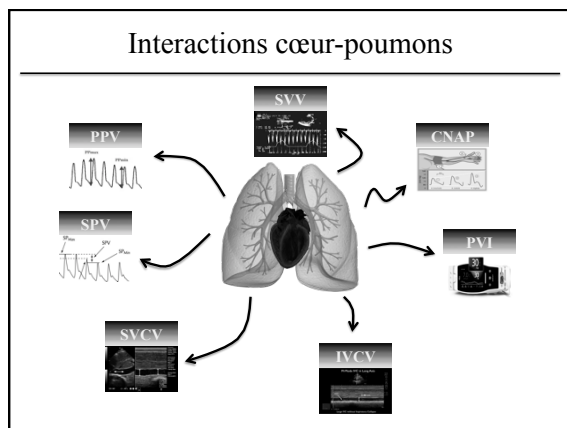
A. Mekontso-Dessap¹*, L. Tual², M. Kirsch³, G. D'Honneur², D. Loiseleur², L. Brochard¹ and J.-L. Teboul³

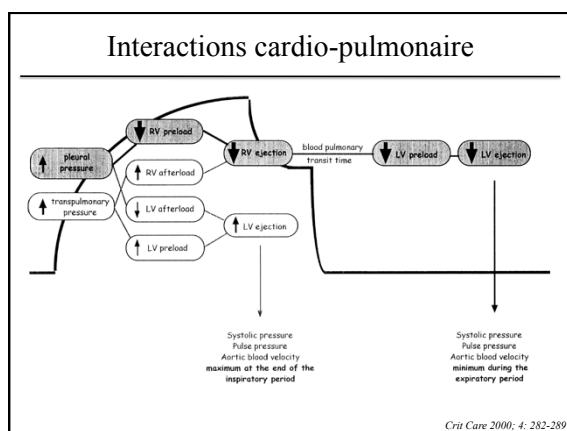


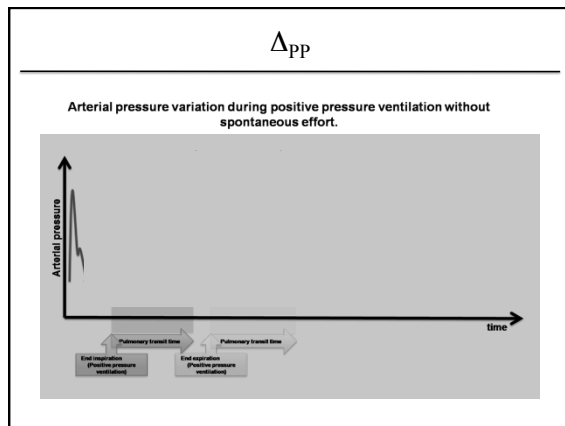
- Etude prospective
- 37 patients en choc circulatoire après chirurgie cardiaque
- 15 répondeurs au remplissage et 22 non-répondeurs
- Aucune corrélation entre la prédiction au remplissage et le taux de BNP

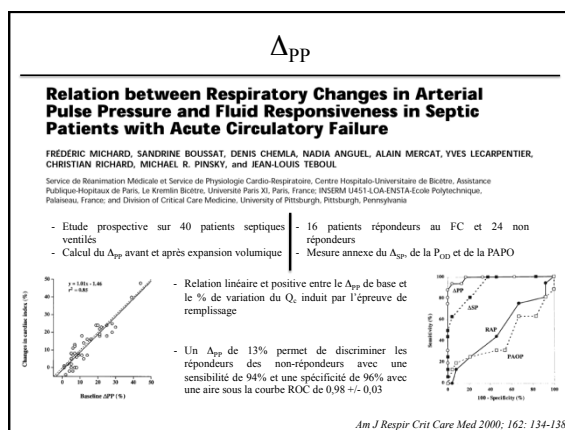
Br J Anaesth. 2006; 97: 777-82

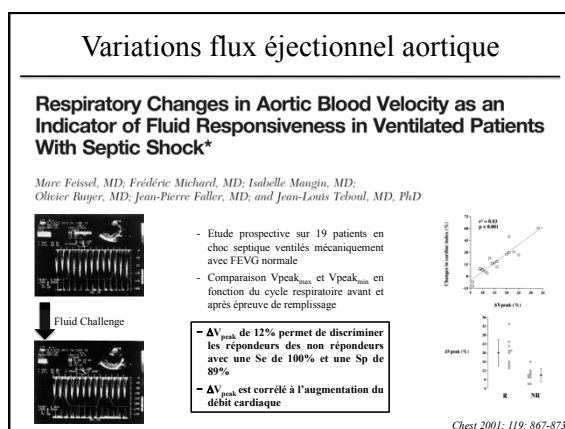












Limitations variations respiratoires



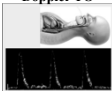
PiCCO



FloTrac/Vigileo



LidCO



Doppler TO

Rythme sinusal

Adapté au respirateur

Thorax fermé

Passive Leg Raising



45° 45°

Transfert gravitationnel de sang des MI vers le compartiment intrathoracique

Augmentation de la précharge du ventricule droit ET gauche

Augmentation du débit cardiaque

PLR



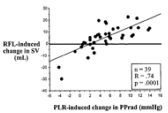
clinical investigations in critical care

Changes in BP Induced by Passive Leg Raising Predict Response to Fluid Loading in Critically Ill Patients*

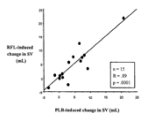
Thierry Boulain, MD, Jean-Michel Ichard, MD, Jean-Louis Echou, MD, Christian Richard, MD, Dominique Perronne, MD, and Guy Glines, MD

- Etude prospective sur 39 patients septiques ventilés
- Etude de l'effet du PLR pendant 4 min et d'un FC consécutif sur 20 min

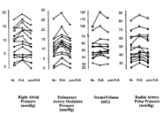
- PLR est corrélé avec une augmentation de la PP $P_{radiale}$, la P_{OD} et la PAPO
- PLR est corrélé avec l'augmentation du débit cardiaque



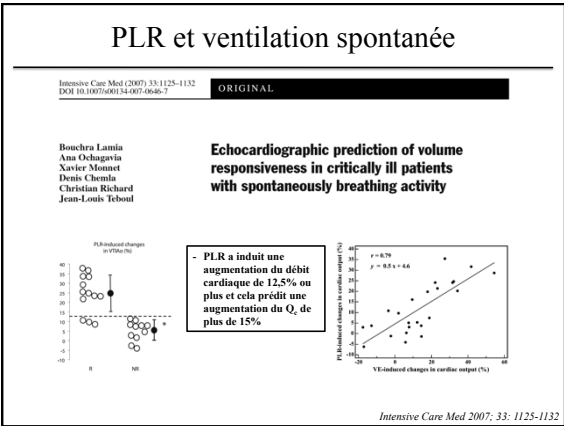
$r = 0.79$
 $P < .001$

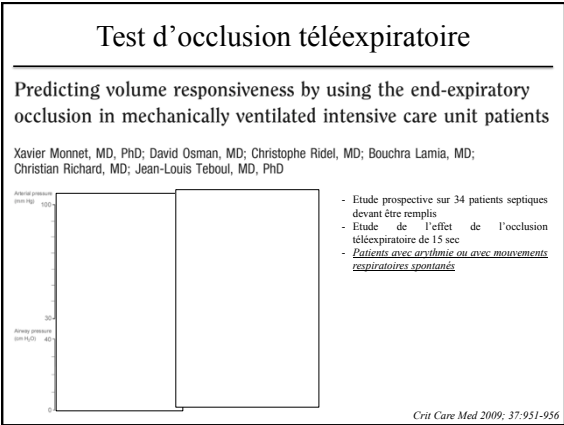


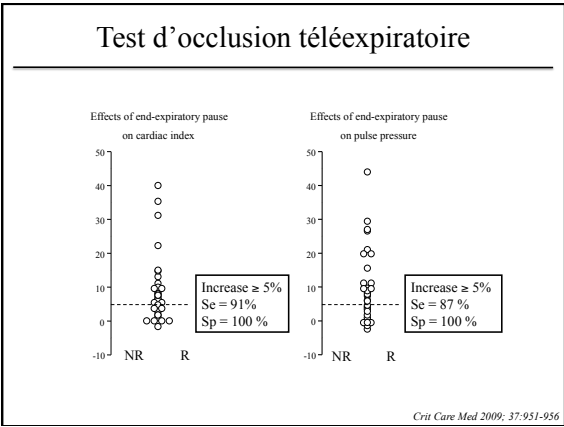
$r = 0.77$
 $P < .001$



Chest 2012; 121: 1245-1252







CONCLUSIONS

INDICES STATIQUES

PVC

E/E'

PAPO

BNP

EDAI

MONITORING DE
« SECURITE » DE
L'EPREUVE DE
REPLISSAGE

