Evaluation de la FEVG dans l'état de choc: Contre

Un intérêt pour le remplissage vasculaire?

Des études en défaveur…

Intensive Care Med (2007) 33:1125–1132
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ORIGINAL

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Echocardiographic prediction of volume responsiveness in critically ill patients with spontaneously breathing activity

Objective
In hemodynamically unstable patients with spontaneous breathing activity, predicting volume responsiveness is a difficult challenge since the respiratory variation in arterial pressure cannot be used. Our objective was to test whether volume responsiveness can be predicted by the response of stroke volume measured with transthoracic echocardiography to passive leg raising in patients with spontaneous breathing activity. We also examined whether common echocardiographic indices of cardiac filling status are valuable to predict volume responsiveness in this category of patients.
Design and setting
Prospective study in the medical intensive care unit of a university hospital.
Patients
24 patients with spontaneously breathing activity considered for volume expansion.
Measurements
We measured the response of the echocardiographic stroke volume to passive leg raising and to saline infusion (500 ml over 15 min). The left ventricular end-diastolic area and the ratio of mitral inflow E wave velocity to early diastolic mitral annulus velocity (E/Ea) were also measured before and after saline infusion.
Results
A passive leg raising induced increase in stroke volume of 12.5% or more predicted an increase in stroke volume of 15% or more after volume expansion with a sensitivity of 77% and a specificity of 100%. Neither left ventricular end-diastolic area nor E/Ea predicted volume responsiveness.
Conclusions
In our critically ill patients with spontaneous breathing activity the response of echocardiographic stroke volume to passive leg raising was a good predictor of volume responsiveness. On the other hand, the common echocardiographic markers of cardiac filling status were not valuable for this purpose.

Crit Care Med. 2005 Dec;33(12):2757-62.

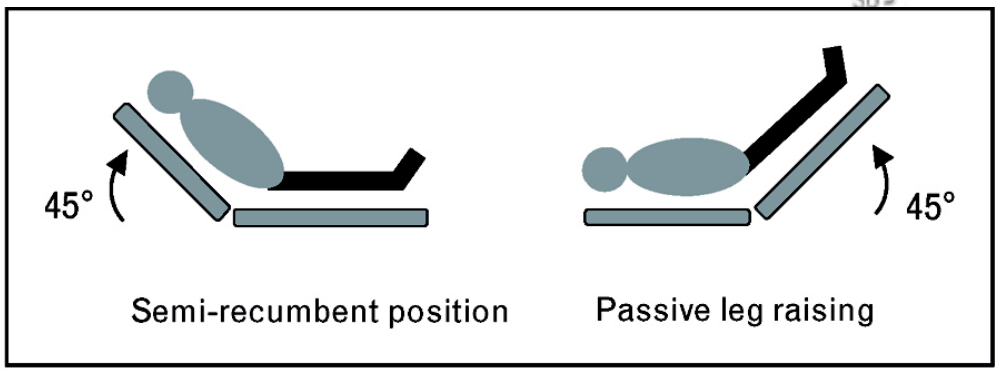
Fluid responsiveness in spontaneously breathing patients: a review of indexes used in intensive care.

Coudray A1, Romand JA, Treggiari M, Bendjelid K.

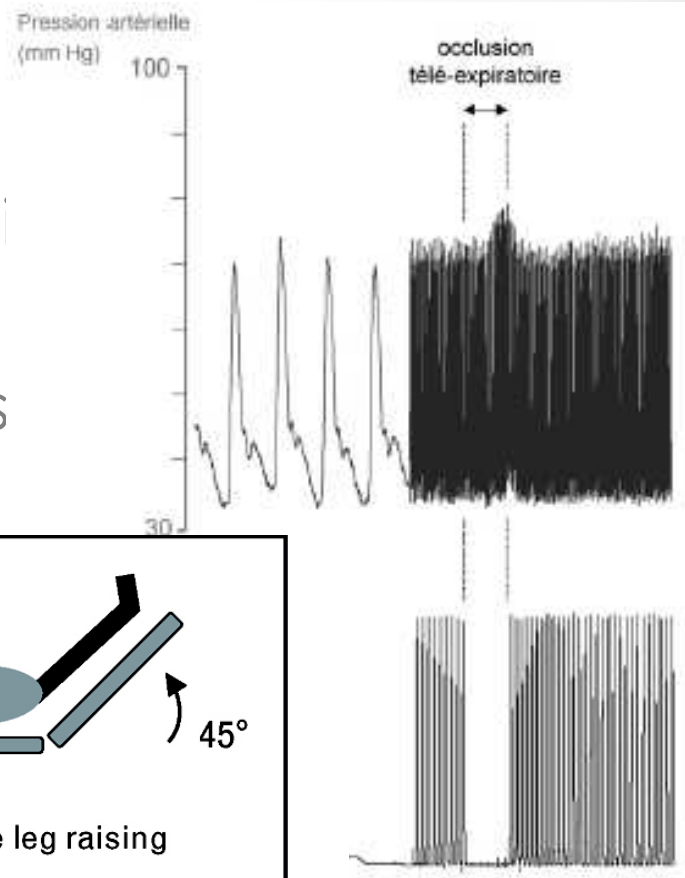
OBJECTIVE:
In spontaneously breathing patients, indexes predicting hemodynamic response to volume expansion are very much needed. The present review discusses the clinical utility and accuracy of indexes tested as bedside indicators of preload reserve and fluid responsiveness in hypotensive, spontaneously breathing patients.
DATA SOURCE:
We conducted a literature search of the MEDLINE database and the trial register of the Cochrane Group.
STUDY SELECTION:
Identification of reports investigating, prospectively, indexes of fluid responsiveness in spontaneously breathing critically ill patients. All the studies defined the response to fluid therapy after measuring cardiac output and stroke volume using the thermodilution technique. We did not score the methodological quality of the included studies before the data analysis.
DATA EXTRACTION:
A total of eight prospective clinical studies in critically ill patients were included. Only one publication evaluated cardiac output changes induced by fluid replacement in a selected population of spontaneously breathing critically ill patients.
DATA SYNTHESIS:
Based on this review, we can only conclude that static indexes are valuable tools to confirm that the fluid volume infused reaches the cardiac chambers, and therefore these indexes inform about changes in cardiac preload. However, respiratory variation in right atrial pressure, which represents a dynamic measurement, seems to identify hypotension related to a decrease in preload and to distinguish between responders and nonresponders to a fluid challenge.
CONCLUSIONS:
Further studies should address the question of the role of static indexes in predicting cardiac output improvement following fluid infusion in spontaneously breathing patients.

Des alternatives efficaces…

- 1/ Test de remplissage vascula
- 2/ Epreuve du lever de jambes
  - chez le patient en VS++
- 3/ Oc
- 4/ Var
-



The passive leg-raising test consists of measuring the hemodynamic effects of a leg elevation up to 45°. A simple way to perform the postural maneuver is to transfer the patient from the semi-recumbent posture to the passive leg-raising position by using the automatic motion of the bed.



lé-expiratoire chez un patient
que. Chez ce patient qui allait
un remplissage vasculaire, une
5 secondes avait entraîné une
pression artérielle pulsée.

ICM Cecconi 2014

–We recommend further hemodynamic assessment (such as assessing cardiac function) to determine the type of shock if the clinical examination does not lead to a clear diagnosis. *Ungraded best practice*

–We suggest that, when further hemodynamic assessment is needed, echocardiography is the preferred modality to initially evaluate the type of shock as opposed to more invasive technologies. Level 2; QoE moderate (B)

–In complex patients we suggest to additionally use pulmonary artery catheterization or transpulmonary thermodilution to determine the type of shock. Level 2;

–We do not recommend routine measurement of cardiac output for patients with shock responding to the initial

stroke volume to evaluate the response to fluids or inotropes in patients that are not responding to initial therapy. Level 1; QoE low (C)

during shock. Level 1; QoE low (C)

–Echocardiography can be used for the sequential evaluation of cardiac function in shock. *Statement of fact*

–We do not recommend the routine use of the pulmonary artery catheter for patients in shock. Level 1; QoE high (A)

–We suggest pulmonary artery catheterization in patients with refractory shock and right ventricular dysfunction. Level 2; QoE low (C)

–We suggest the use of transpulmonary thermodilution or pulmonary artery catheterization in patients with severe shock especially in the case of associated acute respiratory distress syndrome. Level 2; QoE low (C)

–We recommend that less invasive devices are used, instead of more invasive devices, only when they have been validated in the context of patients with shock. *Ungraded best practice*

Intérêt du monitorage de la fonction cardiaque

Intérêt pour l'aide au diagnostic du type de choc

- Choc hypovolémique
- Choc cardiogénique
- Choc obstructif
- Pas d'aide pour le choc distributif…

Interprétation prudente de la FEVG

- Dépend de la contractilité et de la post charge, précharge
- Variation rapide de post charge en cas de choc
- Tenir compte de la PAM!! Etude après introduction des vasopresseurs

Cas particulier du choc septique

Choc septique: hypovolémie relative, altération des fonctions cardiaques droite et gauche

- Hyperdébit à la phase initiale du sepsis: Débit cardiaque normal ou élevé
- Dépression myocardique possible

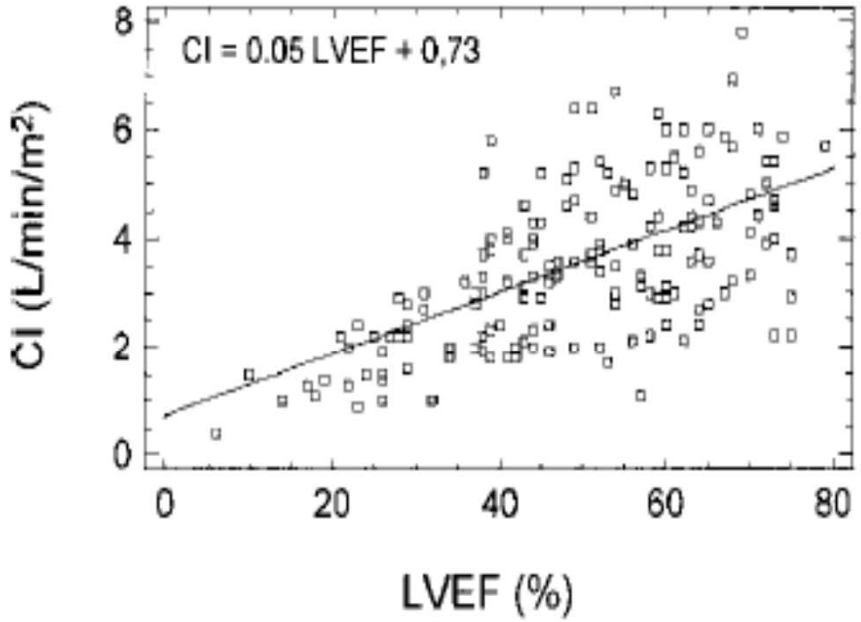


Figure 5. Simultaneous Doppler echocardiographic measurement of CI and LVEF in 183 patients with septic shock (pooled data from References 12–15). Note that the patients exhibiting a LVEF less than or equal to 35% also had a CI less than or equal to 3 L/minute/m^2.

Hemodynamic Instability in Sepsis. Antoine Vieillard-Baron, Sebastien Prin, Karim Chergui, Olivier Dubourg, and François Jardin. American Journal of Respiratory and Critical Care Medicine, Vol. 168, No. 11 (2003), pp. 1270-1276.

Initial resuscitation guided by the Surviving Sepsis Campaign recommendations and early echocardiographic assessment of hemodynamics in intensive care unit septic patients: A pilot study*

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Objective: To compare therapeutic interventions during initial resuscitation derived from echocardiographic assessment of hemodynamics and from the Surviving Sepsis Campaign guidelines in intensive care unit septic patients.

Design and Setting: Prospective, descriptive study in two intensive care units of teaching hospitals.

Methods: The number of ventilated patients with septic shock who were studied was 46. Transesophageal echocardiography was first performed (T1: 3 hrs after intensive care unit admission) to adapt therapy according to the following predefined hemodynamic profiles: fluid loading (index of collapsibility of the superior vena cava ≥36%), inotropic support (left ventricular fractional area change <45% without relevant index of collapsibility of the superior vena cava), or increased vasopressor support (right ventricular systolic dysfunction, unremarkable transesophageal echocardiography study consistent with sustained vasoplegia). Agreement for treatment decision between transesophageal echocardiography and Surviving Sepsis Campaign guidelines was evaluated. A second transesophageal echocardiography assessment (T2) was performed to validate the applied interventions.

Results: Although transesophageal echocardiography and Surviving Sepsis Campaign approaches were concordant to manage fluid loading in 32 of 46 patients (70%), echocardiography led to the absence of blood volume expansion in the remaining 14 patients who all had a central venous pressure <12mm Hg. Accordingly, the agreement was weak between transesophageal echocardiography and Surviving Sepsis Campaign for the decision of fluid loading (κ: 0.37 [0.16;0.59]). With a cut-off value <8 mm Hg for central venous pressure, κ was 0.33 [−0.03;0.69]. Inotropes were prescribed based on transesophageal echocardiography assessment in 14 patients but would have been decided in only four patients according to Surviving Sepsis Campaign guidelines. As a result, the agreement between the two approaches for the decision of inotropic support was weak (κ: 0.23 [−0.04;0.50]). No right ventricular dysfunction was observed. No patient had anemia and only three patients with transesophageal echocardiography documented left ventricular systolic dysfunction had a central venous oxygen saturation <70%.

Conclusions: A weak agreement was found in the prescription of fluid loading and inotropic support derived from early transesophageal echocardiography assessment of hemodynamics and Surviving Sepsis Campaign guidelines in patients presenting with septic shock.

Adéquation apports/besoin en O2?

++ Choc septique: altération de la microcirculation++

- Suivre les lactates
- Suivre la SV02
- Etude du delta de PC02

Cinétique des lactates

- Cut Off de 2 mEq/L
- Taux ≥ 1,5 mEq/L associé à une augmentation de la mortalité chez les patients en choc septique

Wacharasint P, Nakada TA, Boyd JH, Russell JA, Walley KR (2012)
Normal-range blood lactate concentration in septic shock is prognostic and predictive. Shock 38:4–10

- Meilleure valeur pronostic que la PAM
- Utilisation quel que soit le type de choc

Mesure de la SV02

- ScVo2 ≥ 70% , diminution de la mortalité

Delta PC02

- Différence de concentration en CO2 entre le sang artériel et veineux

- Taux ≥ 6 → bas débit même si ScV02 > 70%

Vallet B (2013) Resuscitation of patients with septic shock: please “mind the gap”! Intensive Care Med 39:1653–1655

Vallee F (2008) Central venous-to-arterial carbon dioxide difference: an additional target for goal-directed therapy in septic shock? Intensive Care Med 34:2218–2225

Intensive Care Med (2014) 40:1795–1815
DOI 10.1007/s00134-014-3525-z

CONFERENCE REPORTS AND EXPERT PANEL

Consensus on circulatory shock and hemodynamic monitoring. Task force of the European Society of Intensive Care Medicine

No.	Statement/recommendation	GRADE level of recommendation; quality of evidence	Type of statement
37.	We do not recommend routine measurement of cardiac output for patients with shock responding to the initial therapy	Level 1; QoE low (C)	Recommendation
38.	We recommend measurements of cardiac output and stroke volume to evaluate the response to fluids or inotropes in patients that are not responding to initial therapy	Level 1; QoE low (C)	Recommendation
39.	We suggest sequential evaluation of hemodynamic status during shock	Level 1; QoE low (C)	Recommendation
40.	Echocardiography can be used for the sequential evaluation of cardiac function in shock	Ungraded	Statement of fact
41.	We do not recommend the routine use of the pulmonary artery catheter for patients in shock	Level 1; QoE high (A)	Recommendation
42.	We suggest pulmonary artery catheterization in patients with refractory shock and right ventricular dysfunction	Level 2; QoE low (C)	Recommendation
43.	We suggest the use of transpulmonary thermodilution or pulmonary artery catheterization in patients with severe shock especially in the case of associated acute respiratory distress syndrome	Level 2; QoE low (C)	Recommendation
44.	We recommend that less invasive devices are used, instead of more invasive devices, only when they have been validated in the context of patients with shock	Ungraded	Best practice

evaluations are not always feasible. Hence, a combination of echocardiography with other technologies is often warranted. Advanced hemodynamic monitoring may not be needed in non-severe episodes of shock that rapidly respond to initial therapy based on clinical evaluation and echocardiography. In cases of severe shock and in complex conditions, advanced hemodynamic monitoring is useful for identifying the factor(s) which contribute(s) most to the hemodynamic disturbances and on which therapy should focus. Continuous or semi-contin-

Therapeutic interventions to improve perfusion

- We recommend early treatment, including hemodynamic stabilization (with fluid resuscitation and vasopressor treatment if needed) and treatment of the shock etiology. *Best practice.*
- We suggest that inotropic agents should be added when the altered cardiac function is accompanied by a low or inadequate cardiac output and signs of tissue hypoperfusion persist after preload optimization. *Recommendation*. Level 2; QoE low (C).
- We recommend not to give inotropes for isolated impaired cardiac function. *Recommendation*. Level 1; QoE moderate (B).
- We recommend not to target absolute values of oxygen delivery in patients with shock. *Recommendation.* Level 1; QoE high (A).