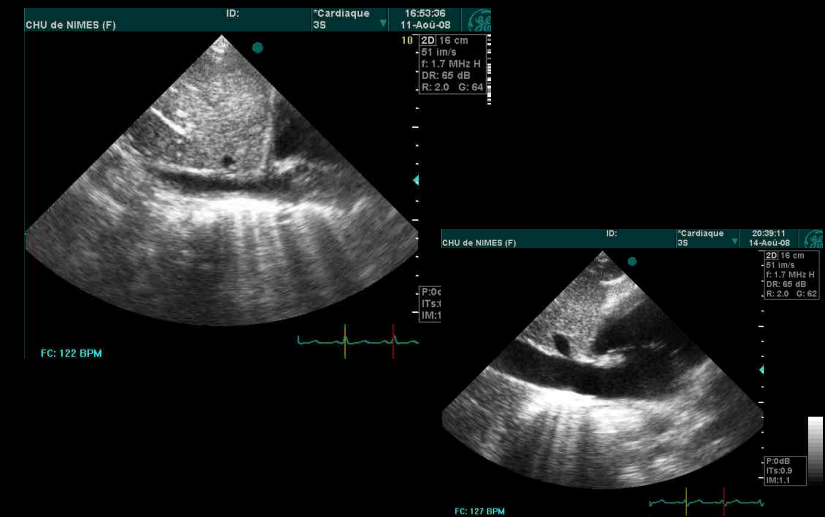


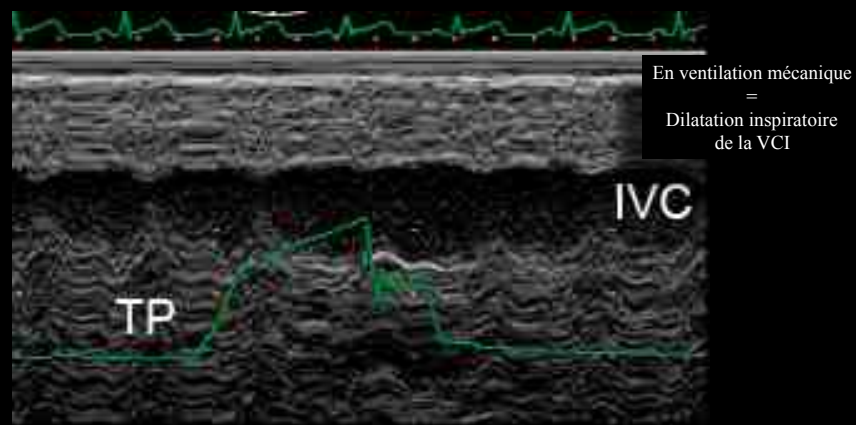
Secone étape étape – approche dynamique

Variations respiratoires de la VCI: *un faux ami ?*



Variations respiratoires de la VCI en ventilation contrôlée:

Distensibilité de la VCI : $\frac{\text{max} - \text{min}}{(\text{max} + \text{min}) / 2}$ seuil ol = 12 %

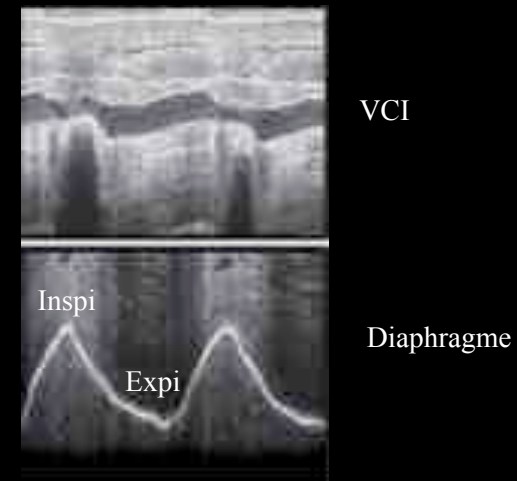


Distensibilité de la veine cave inf en VAC

Vieillard Baron et al ICM 2004

Variations respiratoires de la VCI en ventilation spontanée :

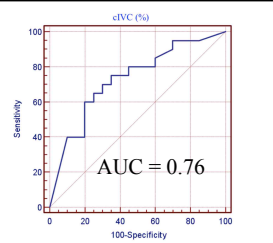
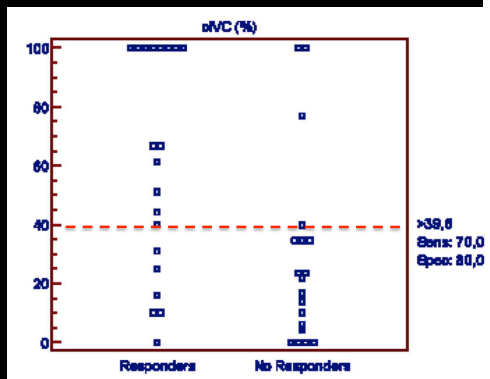
Un collapsus inspiratoire



Données personnelles

Variations respiratoires de la VCI en ventilation spontanée : utile que si $> 40\%$ (max-min/max)

Ici = collapsibilité =
compression en inspiration en VS

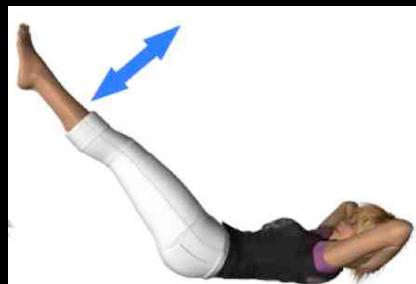


Muller et al Critical Care 2012

Variations respiratoires de la VCI : Résumé

- En ventilation mécanique contrôlée :
 - Dist. VCI $> 12\%$ (formule $\text{max-min}/(\text{max}+\text{min}/2)$) = hypovolémie
 - Dist. VCI $< 12\%$ = pas d'hypovolémie
- En ventilation spontanée :
 - Coll. VCI $> 40\%$ (formule $\text{max-min}/\text{max}$) = hypovolémie
 - Coll. VCI $< 40\%$ = impossible de conclure

Giving some fluids without fluid infusion ?



Fluid responsiveness: The passive leg rising test (PLR)

PLR = mimics a volume expansion of about 300 ml



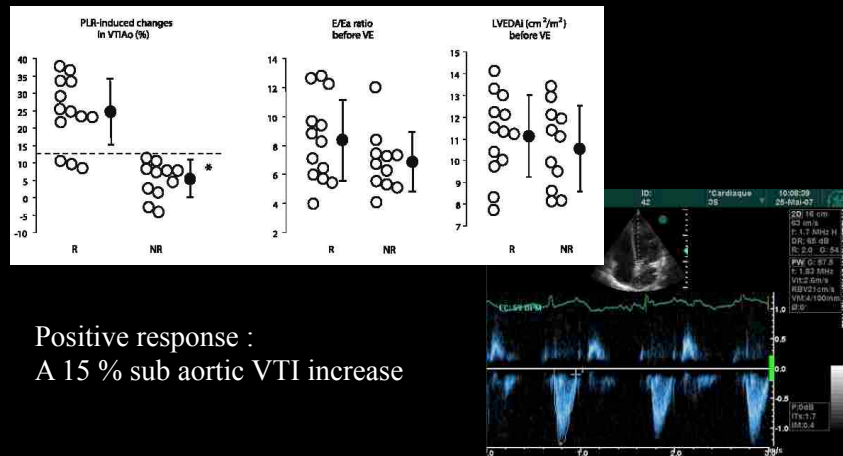
Valuable both in
spontaneous or
mechanical ventilation

Boulain et al Chest 2002
Monnet et al Critical Care Med 2006
Lafanechere et al Crit care 2006
Lamia et al Intensive Care Med 2007
Maizel et al Intensive Care Med 2007

Fluid responsiveness:

The passive leg rising test (PLR) assessed by TTE

Lever passif de jambes – PLR – expansion volémique virtuelle de 300 ml



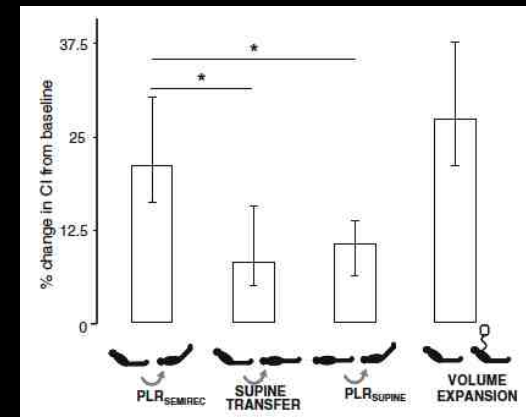
Positive response :
A 15 % sub aortic VTI increase

Lamia et al Intensive Care Med 2007

Lever passif de jambes :

La position compte...

Lever passif de jambes – PLR – expansion volémique virtuelle de 300 ml



Monnet et al Intensive Care Med 2009

Passive leg rising test :



The mini fluid concept

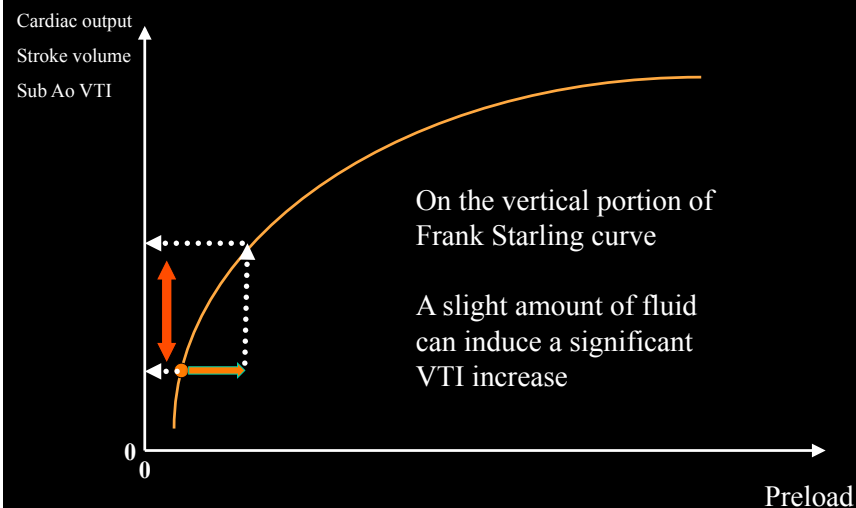


“Let’s Give Some Fluid and See What Happens” versus the “Mini-fluid Challenge”

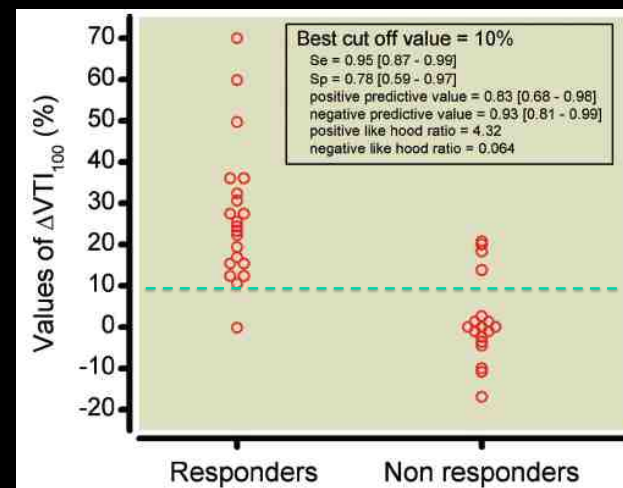
“The general concept is ... that the response to fluid challenge can be evaluated rapidly after a very limited amount of fluid . . .”

Vincent JL - Anesthesiology 2011

Mini fluid challenge : the basics



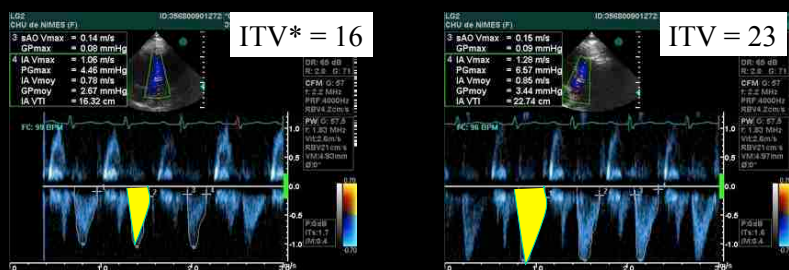
Mini fluid challenge



Muller et al Anesthesiology 2011

Exemple d'épreuve d'épreuve « mini fluid » positive

1 minute →



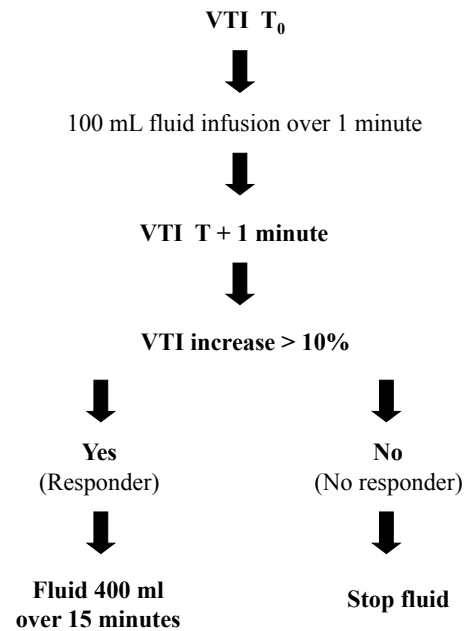
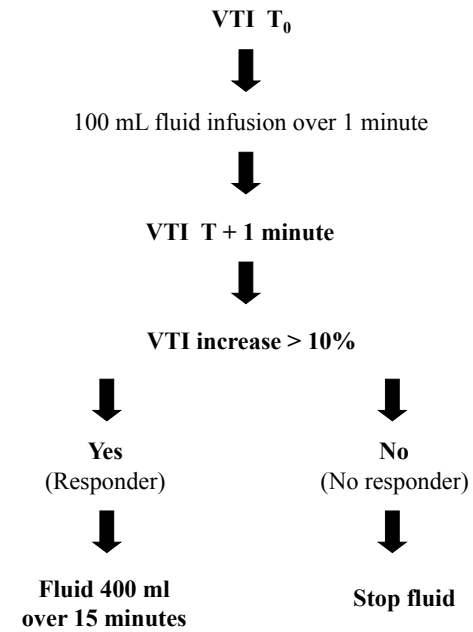
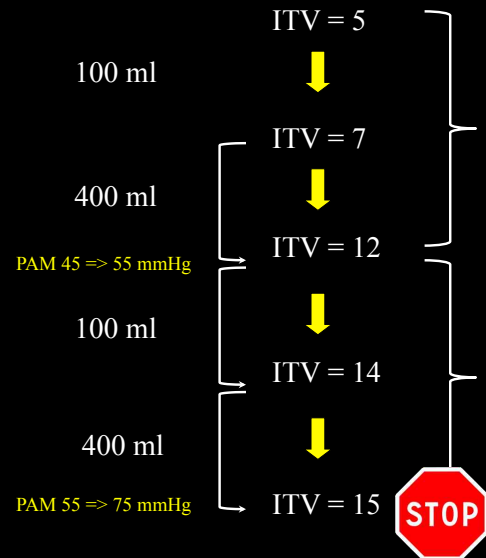
100 ml

*Variabilité inter et intra opérateur = 5 %

Mini Fluid challenge : exemple



Mini Fluid challenge : exemple

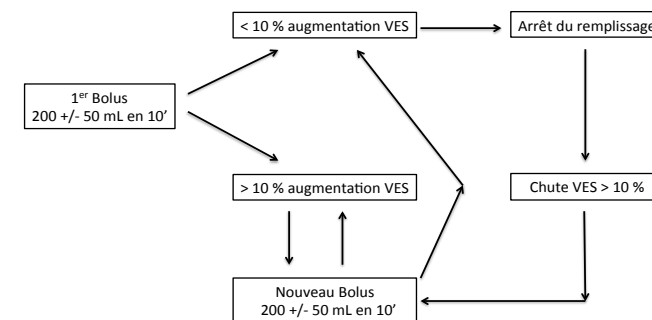


RECOMMANDATIONS FORMALISEES
D'EXPERTS



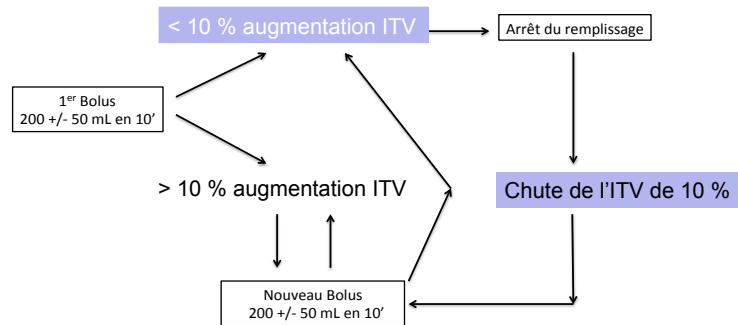
Stratégie du remplissage vasculaire périopératoire

Guidelines for perioperative haemodynamic optimization



Recommandations SFAR 2

Comment utiliser le débit cardiaque ?
...pour remplir et pour arrêter de remplir

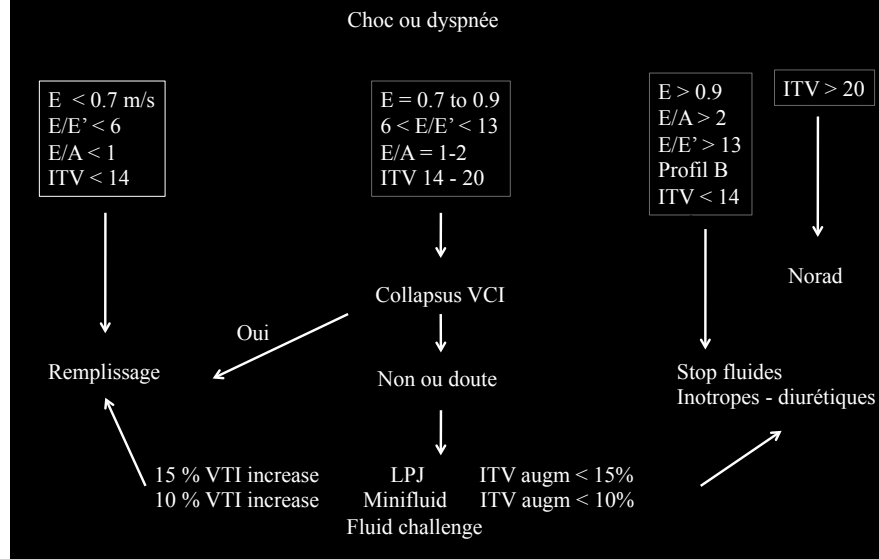


Recommandations SFAR 2012

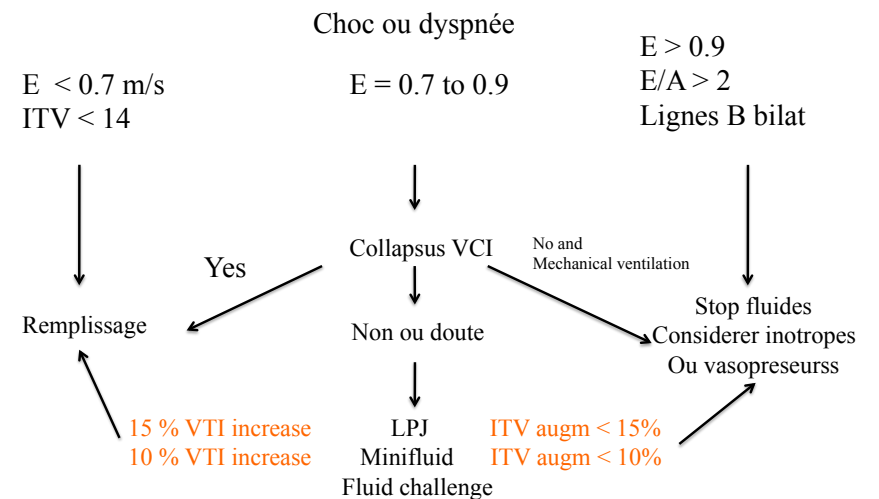
Utilisation du débit cardiaque : principe



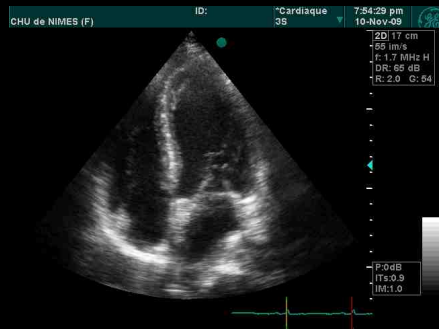
Evaluation de la volémie par échographie : Proposition d'algorithme



Evaluation de la volémie par échocardiographie : Proposition d'algorithme



Remplissage ou vasopresseurs ...raisonnement pratique?



+ Pression pulsée > 40 mmHg

+ diastolique basse

et / ou

ITV sous aortique > 20

= vasoplégie probable !

Avis personnel

Evaluation de la fonction VD
= Gros VD + septum paradoxal

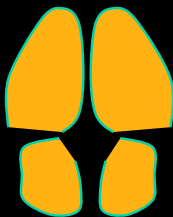
Dilatation du VD : quantification

Normal



$STDVD/STDVG < 0,6$

Dilatation modérée



$0,6 < STDVD/STDVG < 1$

Dilatation majeure



$STDVD/STDVG > 1$

Jardin et al Chest 1997

Dilatation du ventricule droit : évaluation qualitative ?

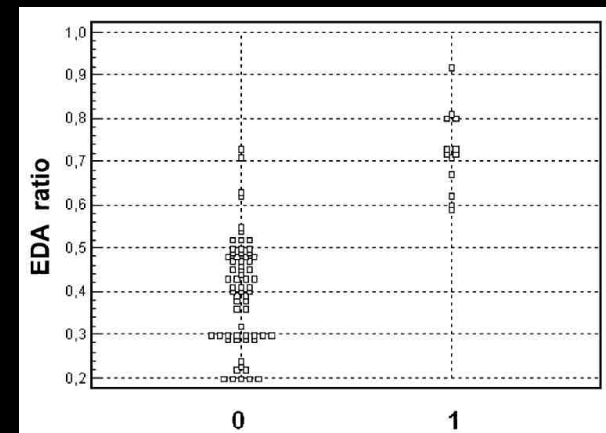
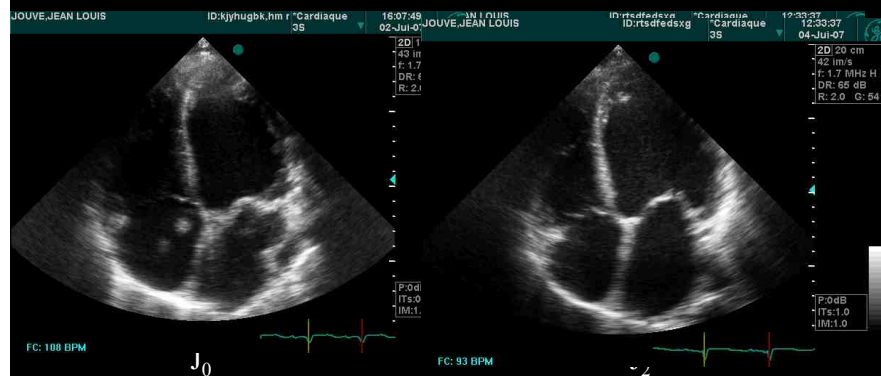


Fig. 3 Individual values of RV size, assessed on a long-axis view as the ratio of the end-diastolic area of the right ventricle over the end-diastolic area of the left ventricle (*EDA ratio*), in the two qualitative groups: *grade 0* normal RV size; *grade 1* moderately enlarged right ventricle

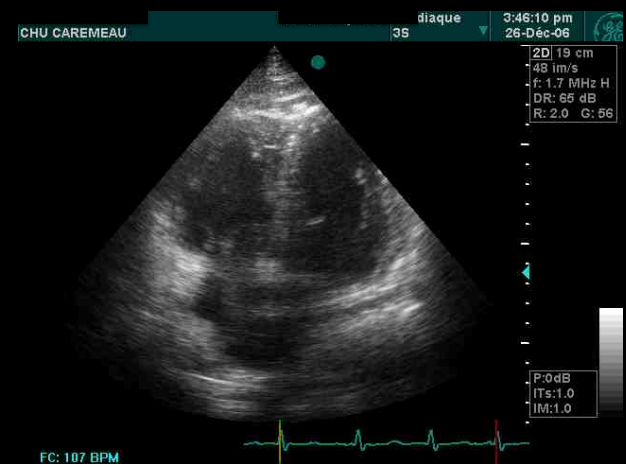
Vieillard Baron et al Intensive Care Med 2006

Dysfonction VD ??...



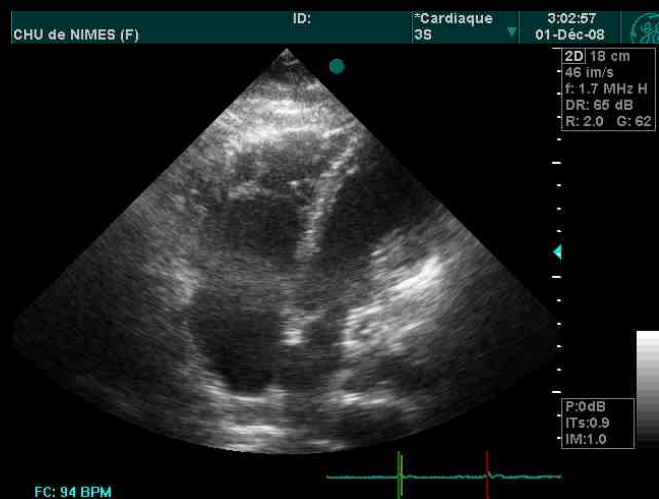
Patient de 45 ans, coronarien, ECG normal, choc et dyspnée

Dilatation aigue du ventricule droit



Patiente de 72 ans, dyspnée, crépitants, T° = 38°

Dilatation aigue du VD : état de choc, fracture bilatérale des fémurs



Septum paradoxal : « the D sign »

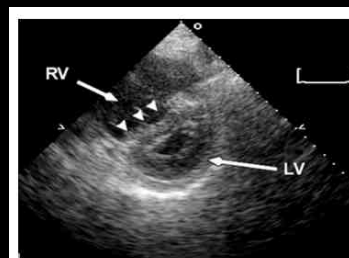
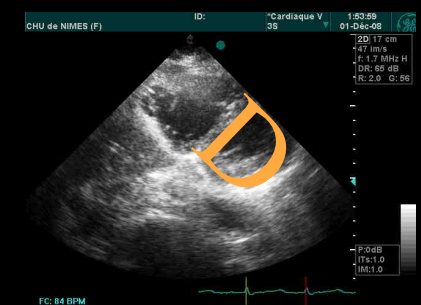
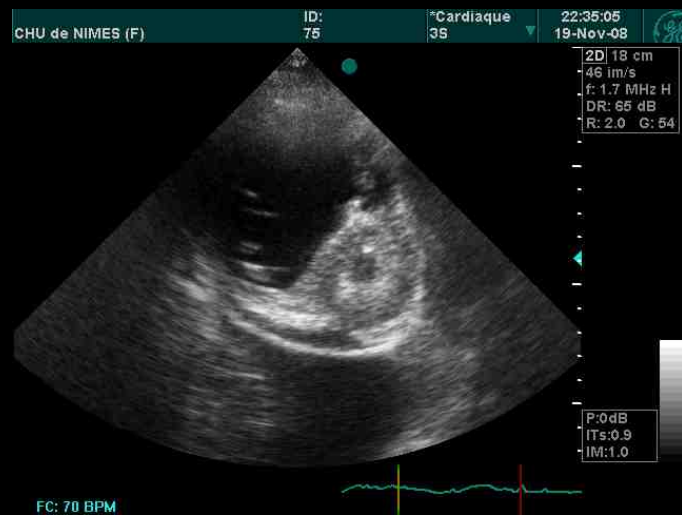


Figure 4. Note the "D" shape of the LV in the parasternal short-axis view manifested here by flattening of the interventricular septum.



Lodato et al Echocardiography 2008

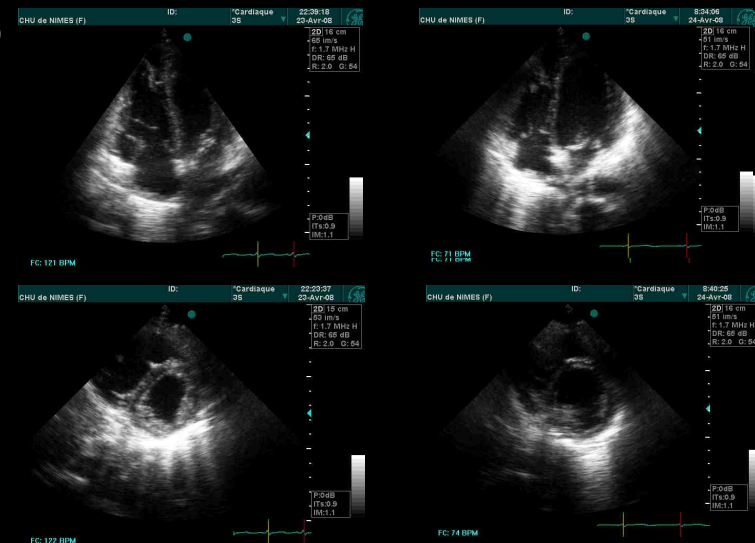
Septum paradoxal : « the D sign »



Coeur pulmonaire aigu :

patiente 40 ans péritonite, SDRA, PEP 12, Norad 2 mcg/Kg/min

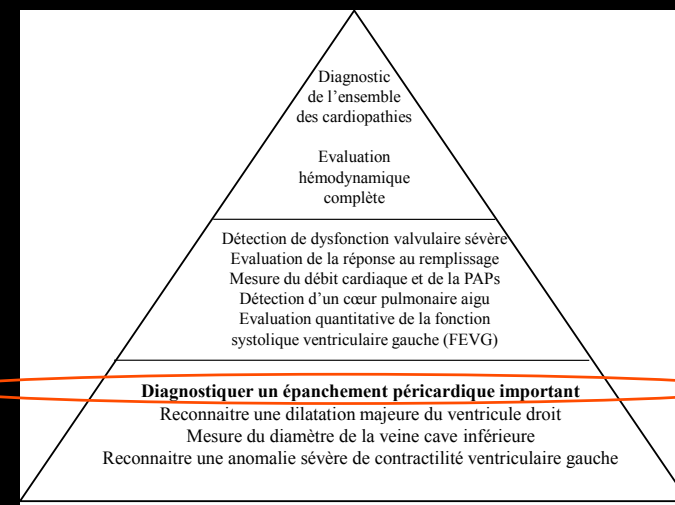
J0



J1

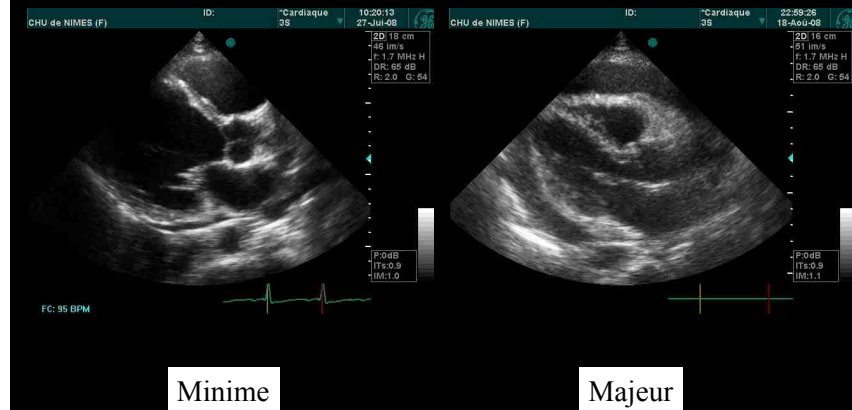
Péricarde

Echocardiographie en réanimation : pyramide des compétences



Cholley et al Intensive Care Med 2007

Epanchement péricardique

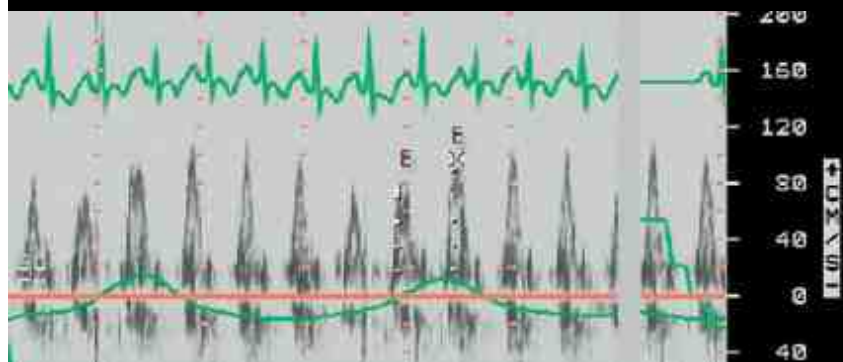


Tamponnade : principes du diagnostic échographique

Tamponnade =

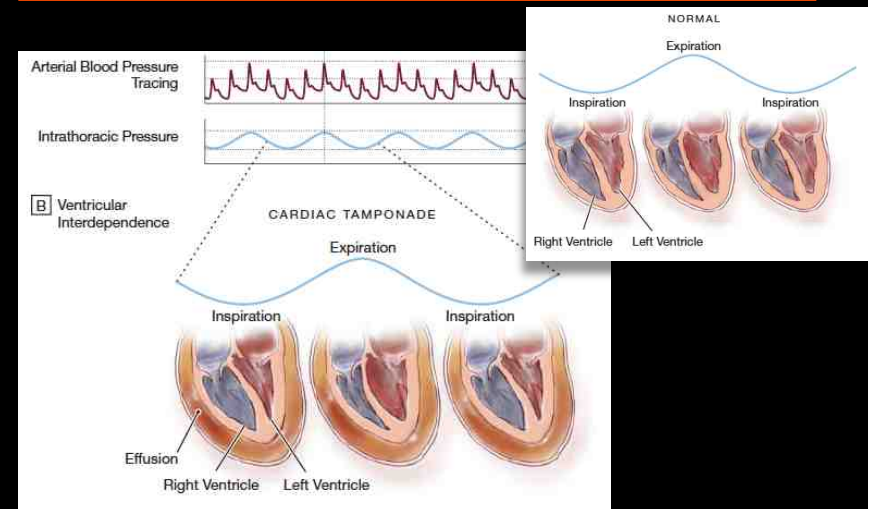
1. Epanchement péricardique
2. Associé à des signes de compression :
 - Pouls paradoxal échographique en VS
 - Compression OD, VD, plus rarement OG, VG
 - Dilatation majeure de la VCI
 - Septum paradoxal inspiratoire en VS
 - Swinging heart

Pouls paradoxal échographique (! VS !)



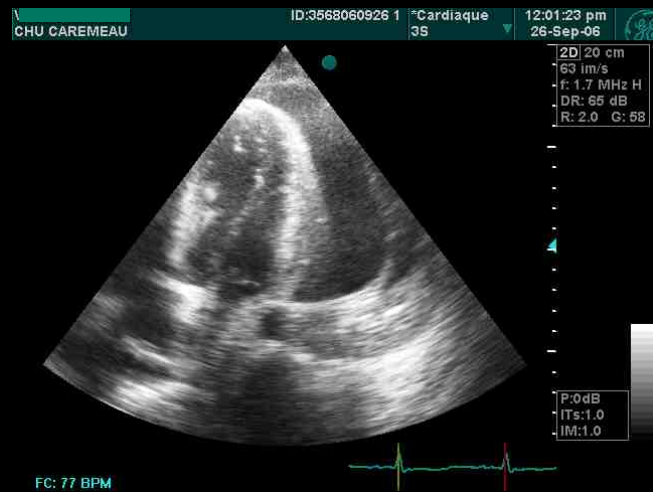
Wann et al JASE 2008

Tamponnade : septum paradoxal inspiratoire (! VS !)



Roy et al JAMA 2007

Tamponnade ?



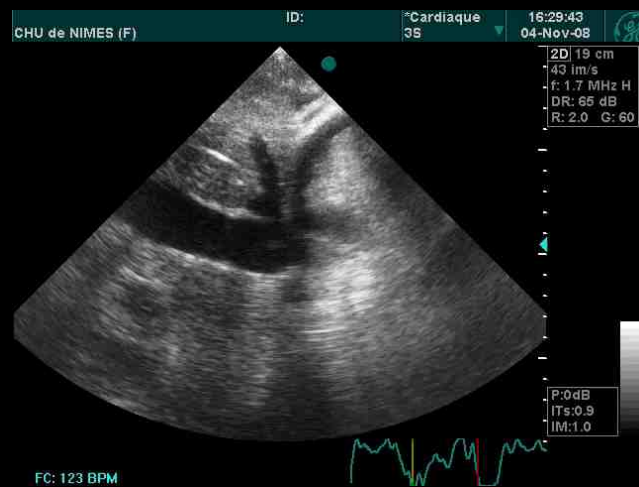
« Swinging Heart »

Une hépatite non cholestatique...

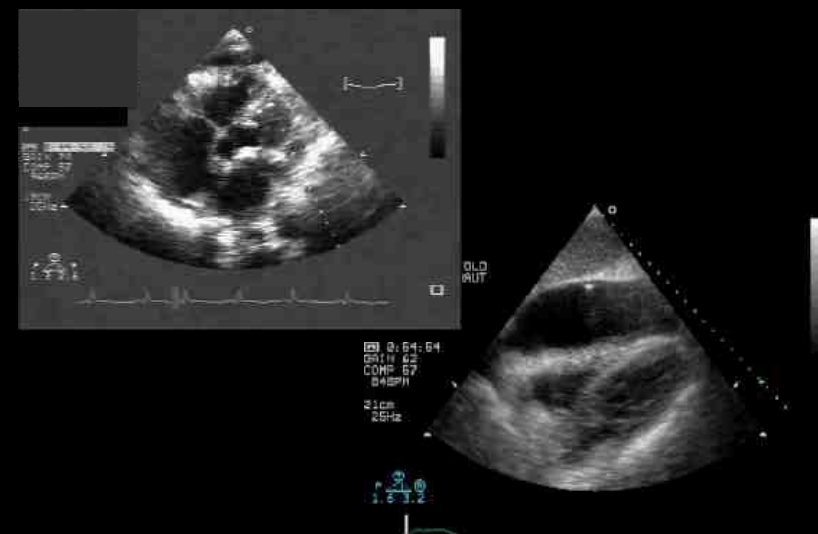


« Swinging Heart »

Tamponnade = VCI dilatée et non collapsible

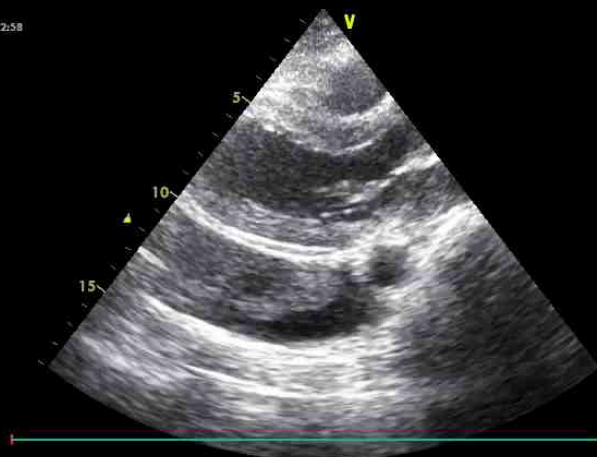


Tamponnade : collapsus des cavités droites



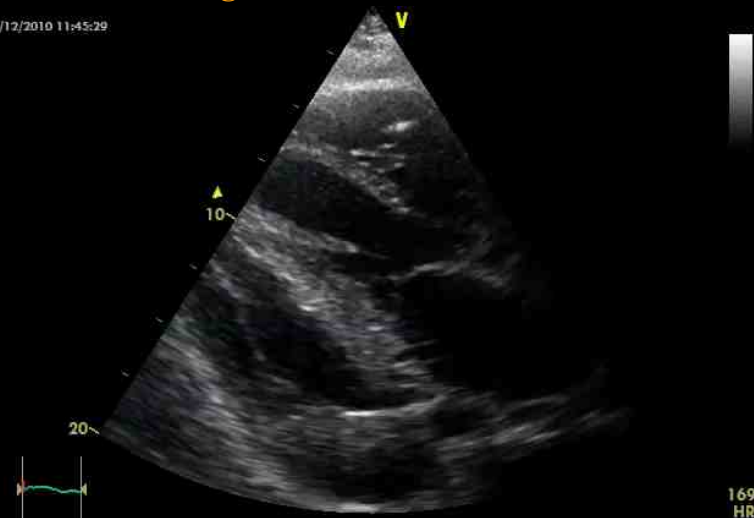
Quel est votre diagnostic ?

11:22:58
2



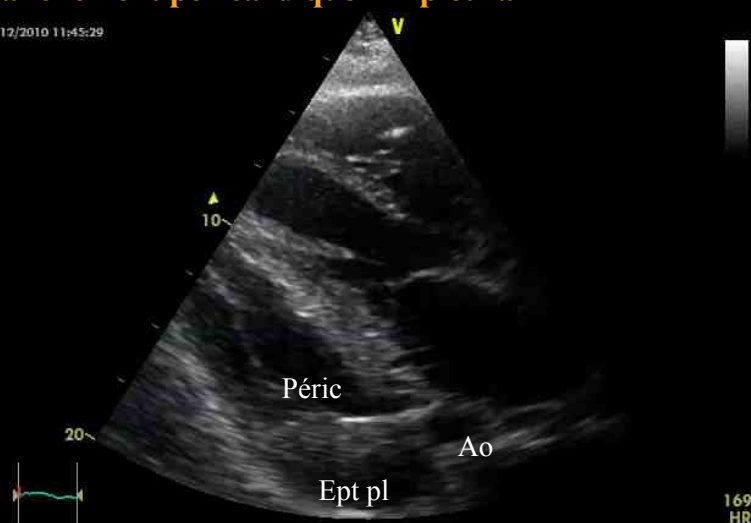
Quel est votre diagnostic ?

29/12/2010 11:45:29
6



Epanchement péricardique ET pleural

29/12/2010 11:45:29
6



Echocardiographie et états de choc : résumé

Etat de choc

objectifs : PAM > 65 mmHg, diurèse > 0,5 ml/Kg/h et lactates < 2 mmol/l

1. Tamponnade ? = Epanchement + Colla OD + VCI dilatée ou SWING
2. Hypovolémie ? = E < 0,7, colla VCI 100 %, delta ITV > 10
3. Dysfonction VG ? = FEVG < 40 %, ITV < 10, visuelle ou mesurée
4. Dysfonction VD ? = dilat VD + SP
5. Vasoplégie ? = PAM basse + ITV > 20
6. Valvulopathie aigue sévère ? = flux couleur massif avec zone de convergence

Echocardiographie et états de choc : résumé

Etat de choc

objectifs : PAM > 65 mmHg, diurèse > 0,5 ml/Kg/h et lactates < 2 mmol/l

1. Tamponnade ? => Drainage
2. Hypovolémie ? => Remplissage
3. Vasoplégie ? => Noradrénaline
4. Dysfonction VG ? => Inotropes +/- ECMO
5. Dysfonction VD ? => Réglage ventilateur, PEP, NO +/- ECMO ou fibrinolyse si Wells élevé
6. Valvulopathie aigue sévère ? => Chirurgie

Echocardiographie en réanimation : incontournable ?

POINTS OF VIEW

All intensivists need echocardiography skills in the 21st century

— Critical Care and Resuscitation • Volume 9 Number 3 • September 2007

Ian M Seppelt

For a patient whose condition becomes unstable at 03:00, it is reasonable to expect a focused echo examination to answer the following questions:

- Is the heart working?
- Is it really full or really empty?
- Is there an acute valve rupture with torrential regurgitation?
- Is there an acute cardiac rupture or ventricular septal defect?
- Is there a tamponade?

There are thus three levels of echocardiography training for intensive care practice:

- Level 1— the focused clinical examination, 24 hours per day, to answer immediate clinical questions.
- Level 2 — the trained echocardiographer, with more advanced knowledge and skills, and ongoing maintenance of skills and quality assurance. Ideally there will be at least one of these in every ICU.
- Level 3 — the program director or researcher in critical care echocardiography. Most intensive care trainees recognise and want this. The challenge for us now is to make it happen.

Focused = 1 question simple
1 réponse simple

Seppelt IM Crit Care Resusc 2007

Echocardiographie en réanimation

- Ne pas reproduire les erreurs de la Swan
- Pas de syndrome du « super héros »
- « Situations require cardiology consultation. These include prosthetic valve function, complex congenital heart disease, cardiac source of systemic embolism, and stress echocardiography ». ACCP SRLF recommendations Chest 2009
- Echo en réa = rigueur, humilité et collaboration !

