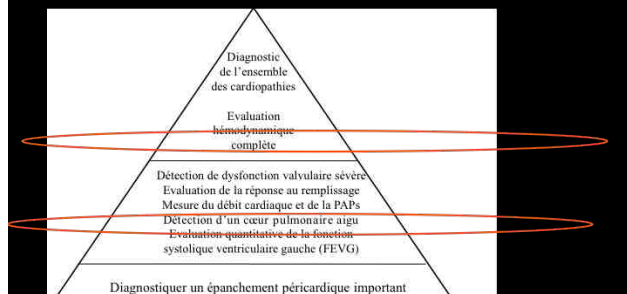


Echocardiographie en réanimation : pyramide des compétences



Cholley et al Intensive Care Med 2007

Dilatation du VD : quantification

Normal



$$\text{STDVD}/\text{STDVG} < 0,6$$

Dilatation modérée



$$0,6 < \text{STDVD}/\text{STDVG} < 1$$

Dilatation majeure



$$\text{STDVD}/\text{STDVG} > 1$$

Jardin et al Chest 1997

Dilatation du ventricule droit : évaluation qualitative

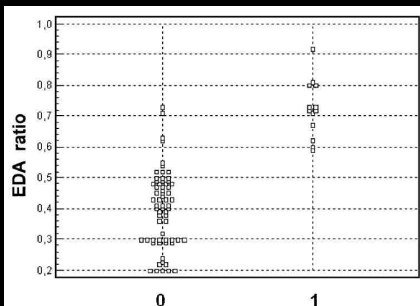
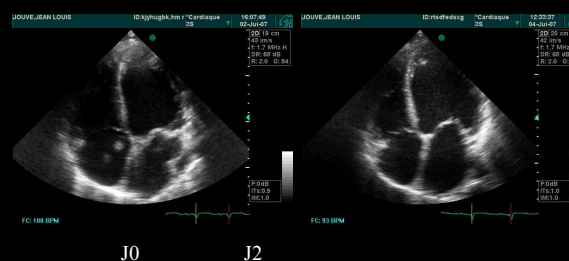


Fig. 3 Individual values of RV size, assessed on a long-axis view as the ratio of the end-diastolic area of the right ventricle over the end-diastolic area of the left ventricle (*EDA ratio*), in the two qualitative groups: grade 0 normal RV size; grade 1 moderately enlarged right ventricle

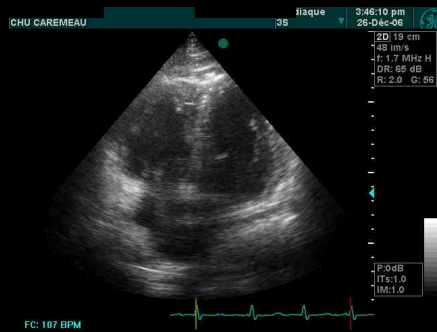
Vieillard Baron et al Intensive Care Med 2006

Dysfonction VD ??...



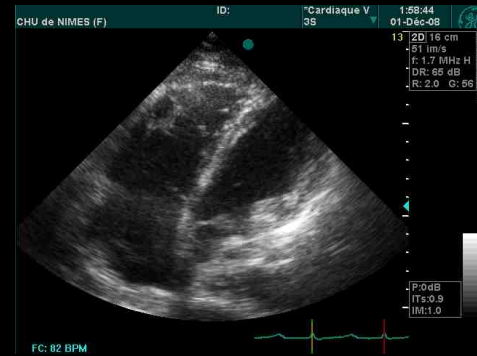
Patient de 45 ans, coronarien, ECG normal, choc et dyspnée

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 »

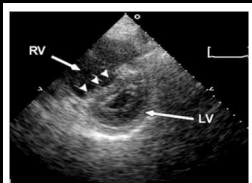
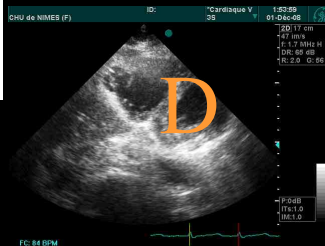
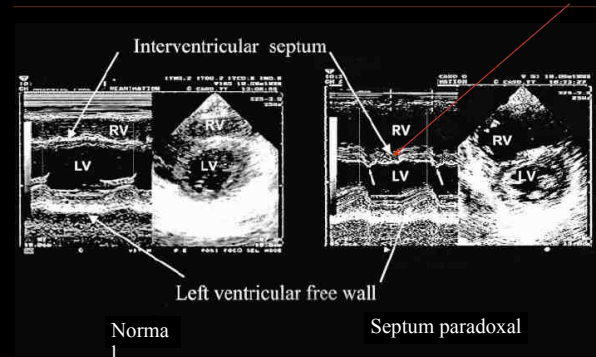


Figure 4. Note the 'D' shape of the LV in the parasternal short-axis view manifested here by flattening of the interventricular septum.



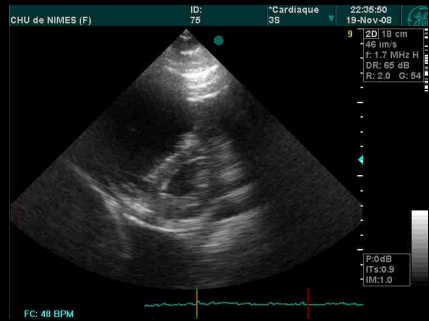
Lodato et al Echocardiography 2008

TM : bombement VD=>VG protodiastolique et télésystolique.

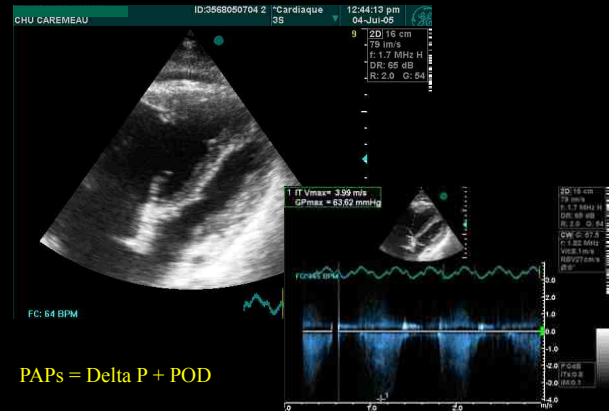


A. Vieillard – Baron Intensive Care Med 2001

Septum paradoxal : « the D sign »

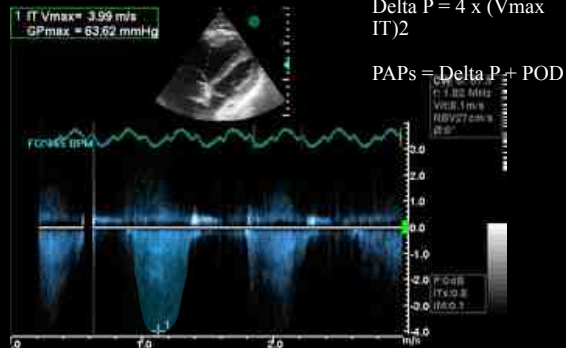


Cœur pulmonaire, mesure des pressions droites



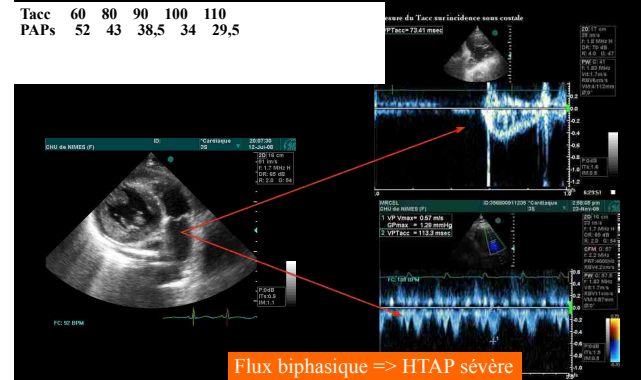
PAPs = Delta P + POD

Mesure du niveau d'HTAP : Vmax de la fuite tricuspiddienne

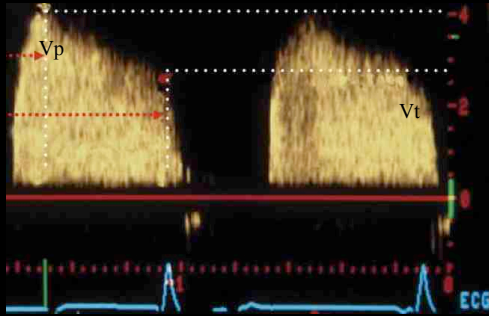


Mesure des pressions droites : flux d'éjection pulmonaire

Tace	60	80	90	100	110
PAPs	52	43	38,5	34	29,5

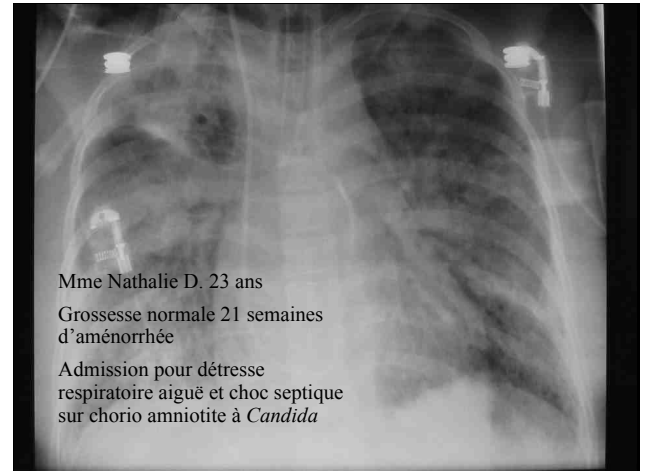


Mesure des pressions droites : flux de régurgitation pulmonaire



Vp = Vitesse protodiastolique
Vt = Vitesse telodiastolique

$PAPm = 4Vp^2 + PVC$
 $PAPd = 4Vt^2 + PVC$
 $PAPs = 3PAPm - 2PAPd$

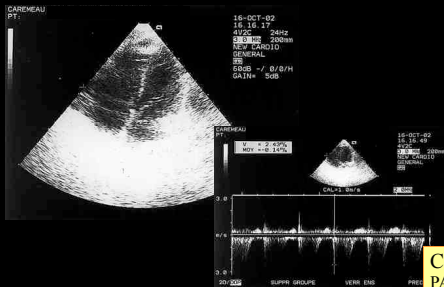


Mme Nathalie D. 23 ans

Grossesse normale 21 semaines
d'aménorrhée

Admission pour détresse
respiratoire aiguë et choc septique
sur chorio amnionite à *Candida*

Cœur pulmonaire aigu au cours du SDRA :

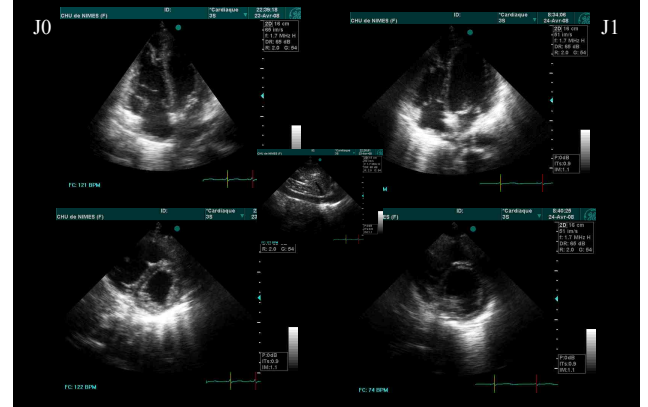


Cathétérisme droit :

PAM = 52
PAPs = 45
PAPO = 12
IC = 2,7
SvO2 = 62 %

=> NO et baisse PEP => Amélioration clinique

Cœur pulmonaire aigu : patiente 40 ans péritonite, SDRA, PEP 12, Norad 2 mcg/Kg/min



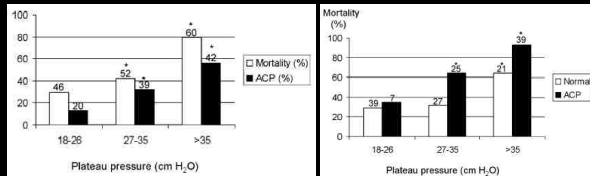
Défaillance ventriculaire droite et pressions de ventilation

Intensive Care Med (2007) 33:444–447
DOI 10.1007/s00134-007-0552-z

ORIGINAL

François Jardin
Antoine Vieillard-Baron

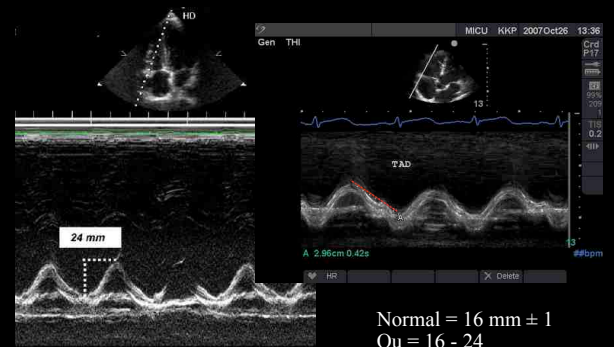
Is there a safe plateau pressure in ARDS? The right heart only knows



Vieillard Baron et al Intensive Care Med 2007

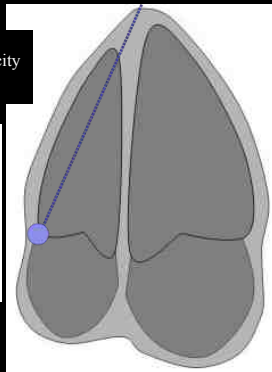
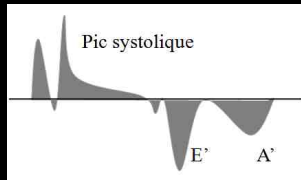
Fonction systolique ventriculaire droite : TAPSE

Tricuspid Annular Plane Systolic Excursion



Doppler tissulaire à l'anneau tricuspide

Tricuspid Annulus peak Systolic velocity
= TAPSV



Fonction systolique VD : Onde S Doppler tissulaire anneau mitral

Reference Values and Distribution of Conventional
Echocardiographic Doppler Measures and Longitudinal
Tissue Doppler Velocities in a Population Free From
Cardiovascular Disease

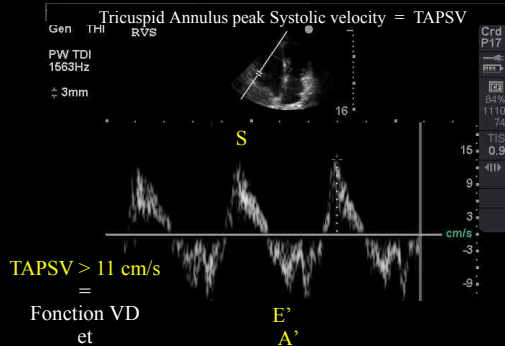
Table 3. Age- and Sex-Specific Mean Annular Velocities by pwTDI and cTDI

	LV (Mean of 4 Walls)				RV (Free Wall)		
	S' (pwTDI)	S' (cTDI)	e' (pwTDI)	a' (pwTDI)	S' (pwTDI)	e' (pwTDI)	a' (pwTDI)
Female sex							
Feasibility, no. (%)	652 (98%)	657 (99%)	652 (98%)	652 (98%)	648 (98%)	648 (98%)	648 (98%)
<40 y, cm/s	8.9±1.1	7.2±1.0	14.6±2.3	8.8±1.9	13.0±1.8	14.7±2.9	12.4±3.5
40-60 y, cm/s	8.1±1.2	6.5±1.0	11.3±2.4	10.0±1.9	12.4±1.9	13.1±2.9	15.0±3.5
>60 y, cm/s	7.2±1.2	5.7±1.1	8.2±3.2	10.6±1.9	11.8±2.0	11.0±2.3	16.1±3.1
All, cm/s	8.2±1.3	6.6±1.1	11.8±3.2	9.7±2.0	12.5±1.9	13.3±3.0	14.4±3.7
Male sex							
Feasibility, no. (%)	590 (98%)	601 (99%)	590 (98%)	590 (98%)	586 (97%)	586 (97%)	586 (97%)
<40 y, cm/s	9.4±1.4	7.6±1.2	14.1±2.7	8.1±1.7	13.2±2.0	14.5±2.9	12.3±3.5
40-60 y, cm/s	8.6±1.3	6.9±1.3	10.7±2.3	10.4±1.6	12.8±2.2	12.5±3.2	14.3±3.7
>60 y, cm/s	8.0±1.3	6.4±1.2	8.2±1.9	11.1±1.6	12.5±2.3	11.0±3.0	15.8±4.2
All, cm/s	8.6±1.4	6.9±1.3	10.8±3.0	10.3±1.7	12.8±2.2	12.5±3.3	14.2±3.9

Data are presented as mean±SD. Tissue Doppler velocities from 1,266 healthy individuals for the stratified age groups, unless otherwise indicated. Level of significance is specified in the Mitral Annular Velocities and Tricuspid Annular Velocities subsections of the Results section.

Dalen et al Circulation 2010

Fonction systolique ventriculaire droite : TAPSV



Saxena et al *Echocardiography* 2006

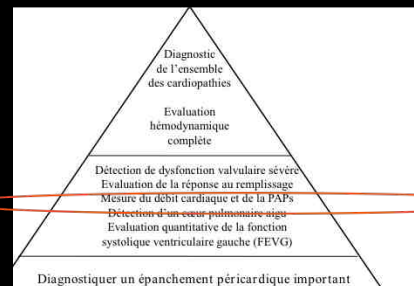
Fonction systolique ventriculaire droite : TAPSV



Saxena et al *Echocardiography* 2006

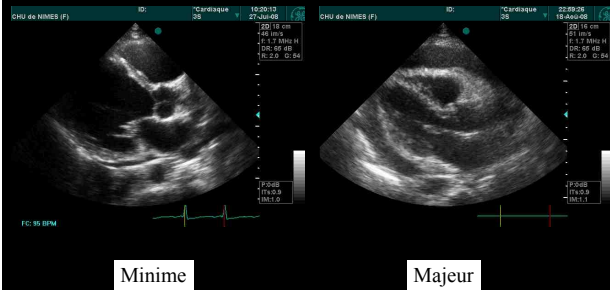
Péricarde

Echocardiographie en réanimation : pyramide des compétences



Cholley et al *Intensive Care Med* 2007

Epanchement péricardique



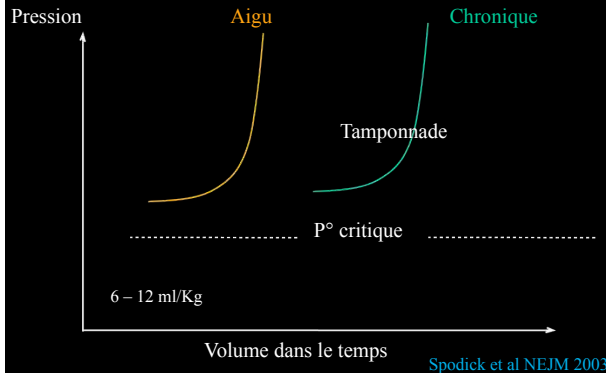
Epanchement péricardique : quantification

Tableau 3 : Quantification des épanchements péricardiques et signes de tamponnade

Evaluation semi quantitative en mode TM (PSGA)	Signes de tamponnade
- Décollement systolique avec cinétique du péricarde pariétal postérieur conservée. - Décollement systolique avec péricarde pariétal postérieur rectiligne. - Décollement systolo-diastolique < 10 mm en diastole et décollement antérieur. - Décollement systolo-diastolique > 10 mm en diastole et décollement antérieur.	- Compression OD, VD - Plus rarement compression OG, VG - Dilatation de la VCI avec absence de variations respiratoire du diamètre de cette dernière.

SFAR 2008

Tamponnade : importance de la vitesse de constitution



Tamponnade : principes du diagnostic échographique

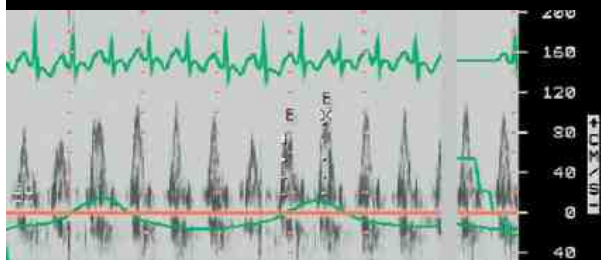
Tamponnade =

Epanchement péricardique

Associé à des signes de compression :

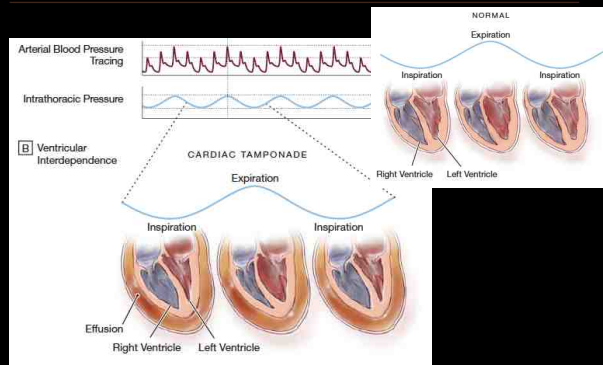
Pouls paradoxal échographique en VS
 Compression OD, VD, plus rarement OG, VG
 Dilatation majeure de la VCI
 Septum paradoxal inspiratoire en VS
 Swinging heart

Pouls paradoxal échographique (! VS !)



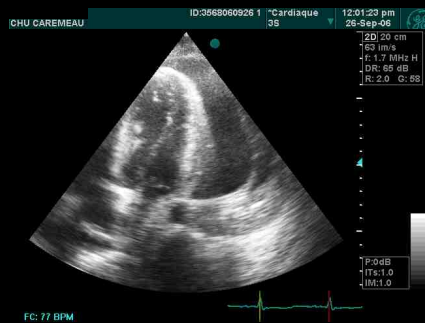
Wann et al JASE 2008

Tamponnade : septum paradoxal inspiratoire (! VS !)



Roy et al JAMA 2007

Epanchement péricardique



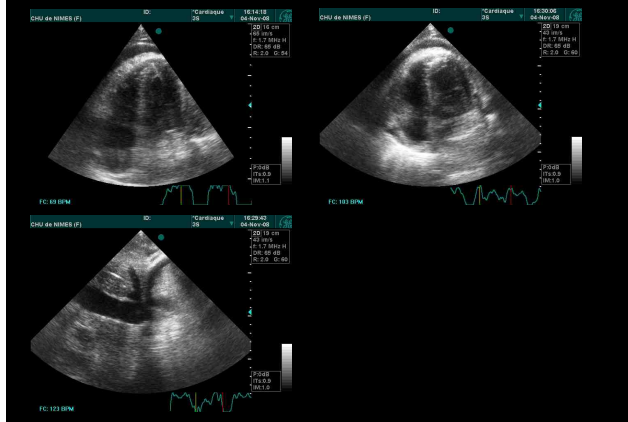
« Swinging Heart »

Une hépatite non cholestatique...

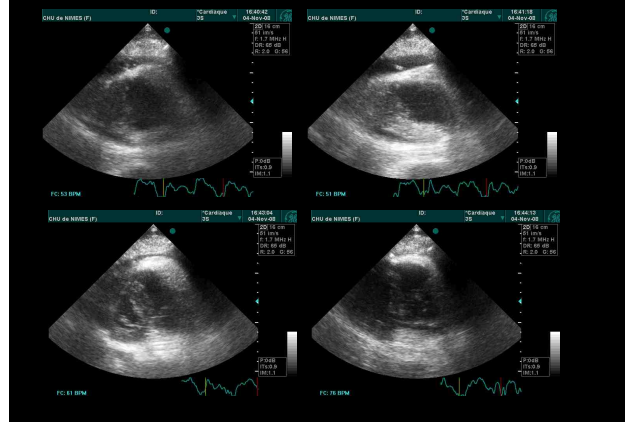


« Swinging Heart »

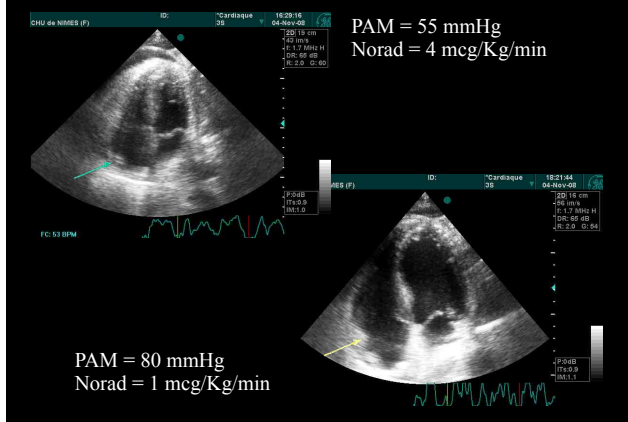
Epanchement péricardique : lymphome, choc septique



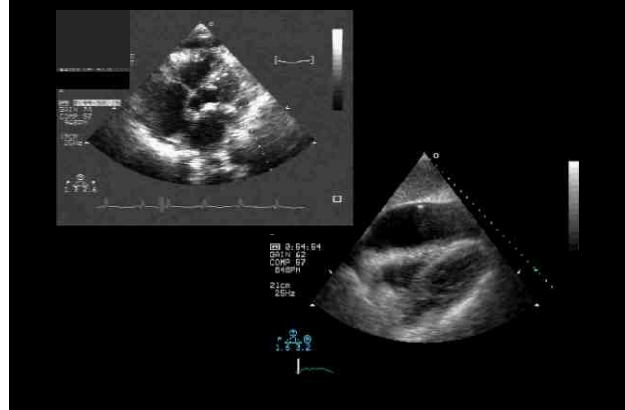
Epanchement péricardique : drainage



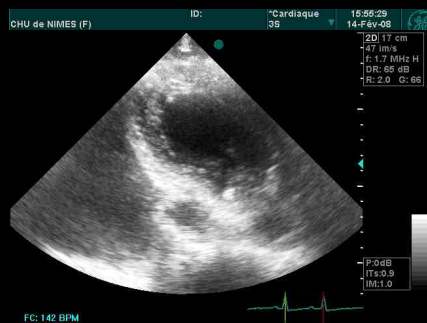
Epanchement péricardique : drainage



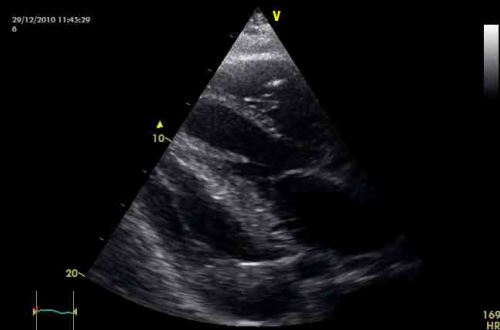
Tamponnade : collapsus des cavités droites



Epanchement péricardique ?



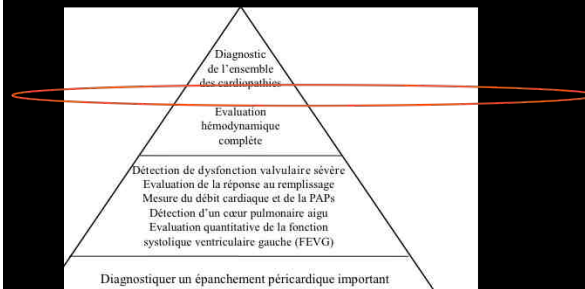
Quel est votre diagnostic ?

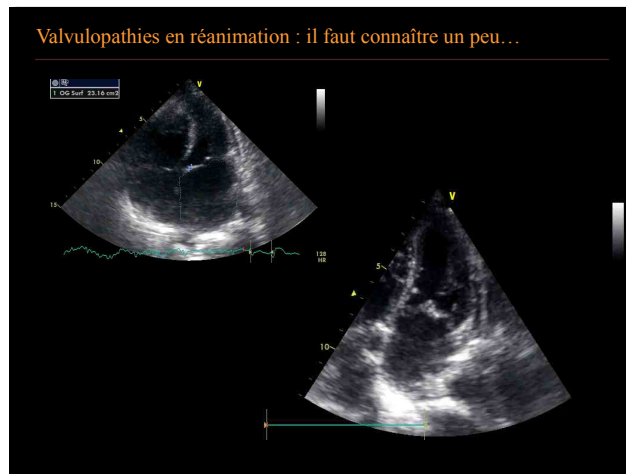
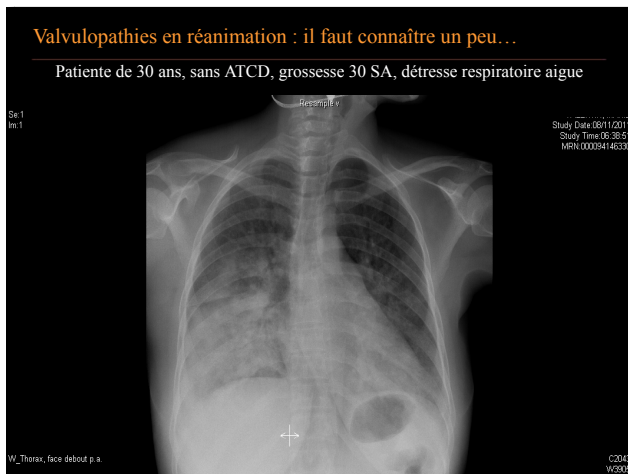
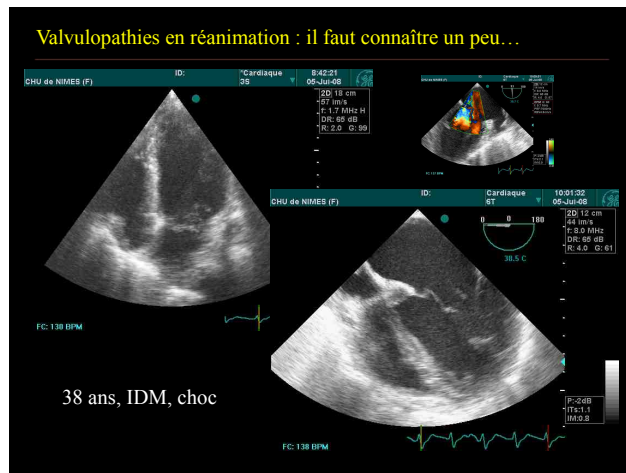
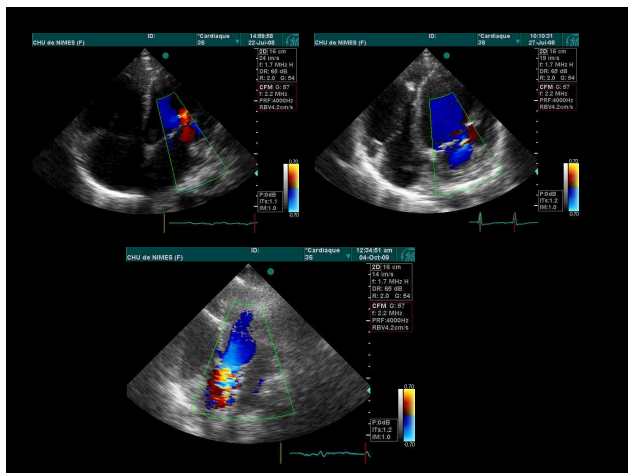


Epanchement péricardique ET pleural

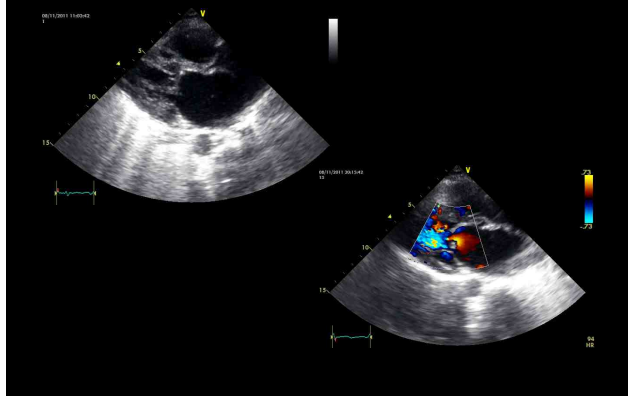


Echocardiographie en réanimation : pyramide des compétences

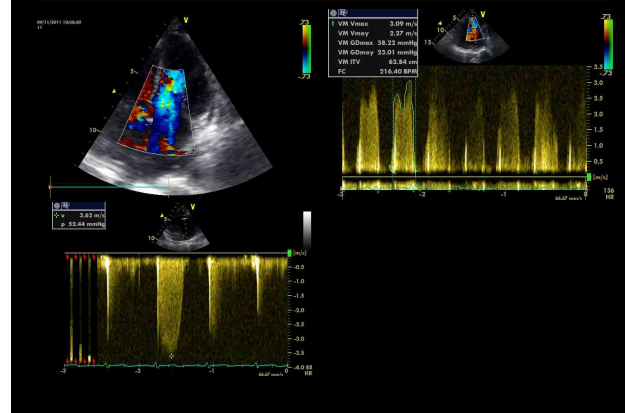




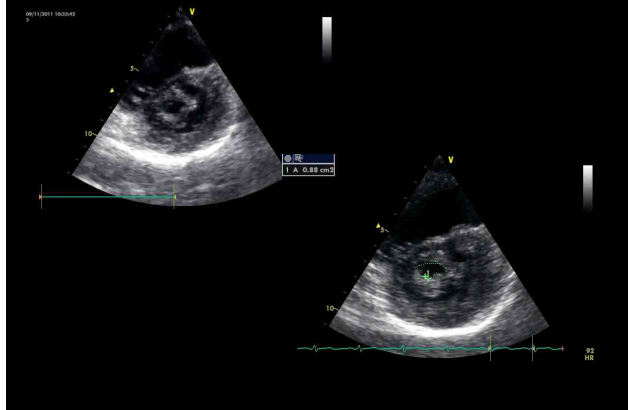
Valvulopathies en réanimation : il faut connaître un peu...



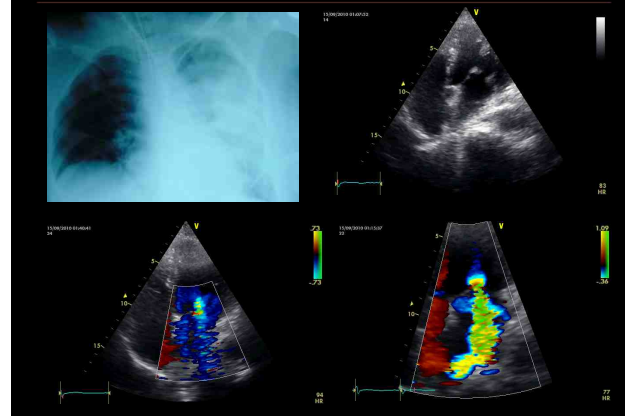
Valvulopathies en réanimation : il faut connaître un peu...



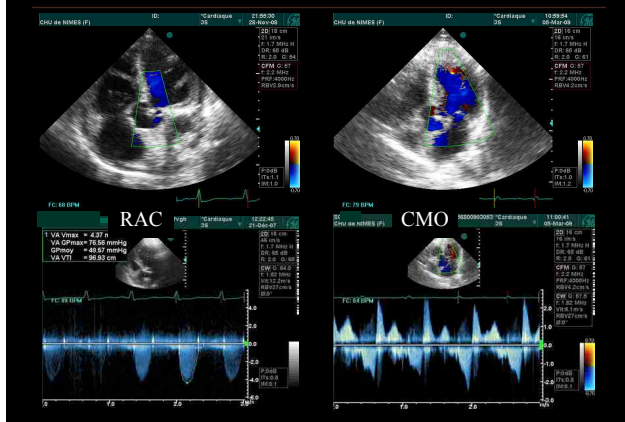
Valvulopathies en réanimation : il faut connaître un peu...



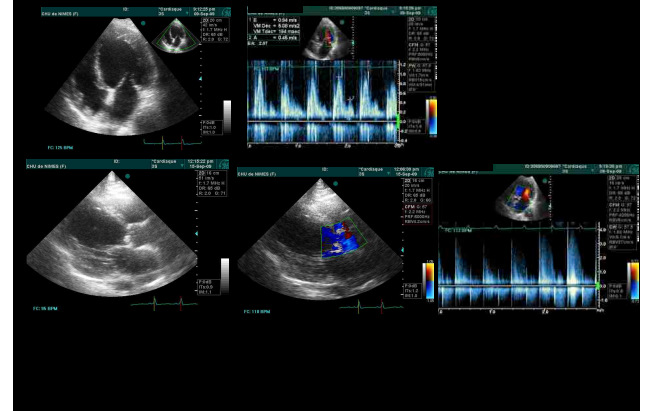
Une pneumopathie qui ne s'améliore pas



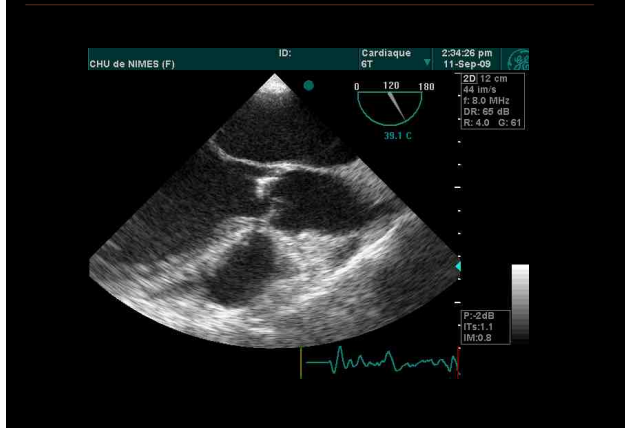
Valvulopathies en réanimation : il faut connaître un peu...



Patiente de 48 ans, détresse respiratoire aiguë fébrile, Hémiplégie gauche



Patiente de 48 ans, détresse respiratoire aiguë, Hémiplégie gauche



Echocardiographie et états de choc : résumé

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

Tamponnade ? => Drainage

2. Hypovolémie ? => Remplissage

3. Vasoplégie ? => Noradrénaline

4. Dysfonction VG ? => Inotropes +/- ECMO

5. Dysfonction VD ? => Réglage ventilateur, PEP, NO +/- ECMO

6. Valvulopathie aigue sévère ? => Chirurgie

Echocardiographie et états de choc : résumé

Etat de choc

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

Tamponnade ? = Epanchement + Colla OD + VCI dilatée

Hypovolémie ? = E < 0,7, E/E' < 7, colla VCI 100 %, delta ITV > 10

Dysfonction VG ? = FEVG < 40 %, visuelle ou mesurée

Dysfonction VD ? = dilat VD + SP

Valvoploégie ? = PAM basse + ITV > 20

Valvulopathie aigue sévère ? = flux couleur massif avec zone de convergence

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 2008

Echo en réa = rigueur, humilité et collaboration !

