08h45 – 09h00 : Accueil des participants

09h00 – 09h30 : Concept des pressions de remplissage du ventricule gauche

09h30 – 10h30 : Le Ventricule Droit

10h30 – 11h00 : Pause

11h00 – 12h00 : Ateliers pratiques

12h00 – 13h00 : Pause repas

13h00 – 14h00 : Détresse respiratoire

14h00 – 15h00 : Etat de choc

15h00 – 16h00 : Ateliers pratiques

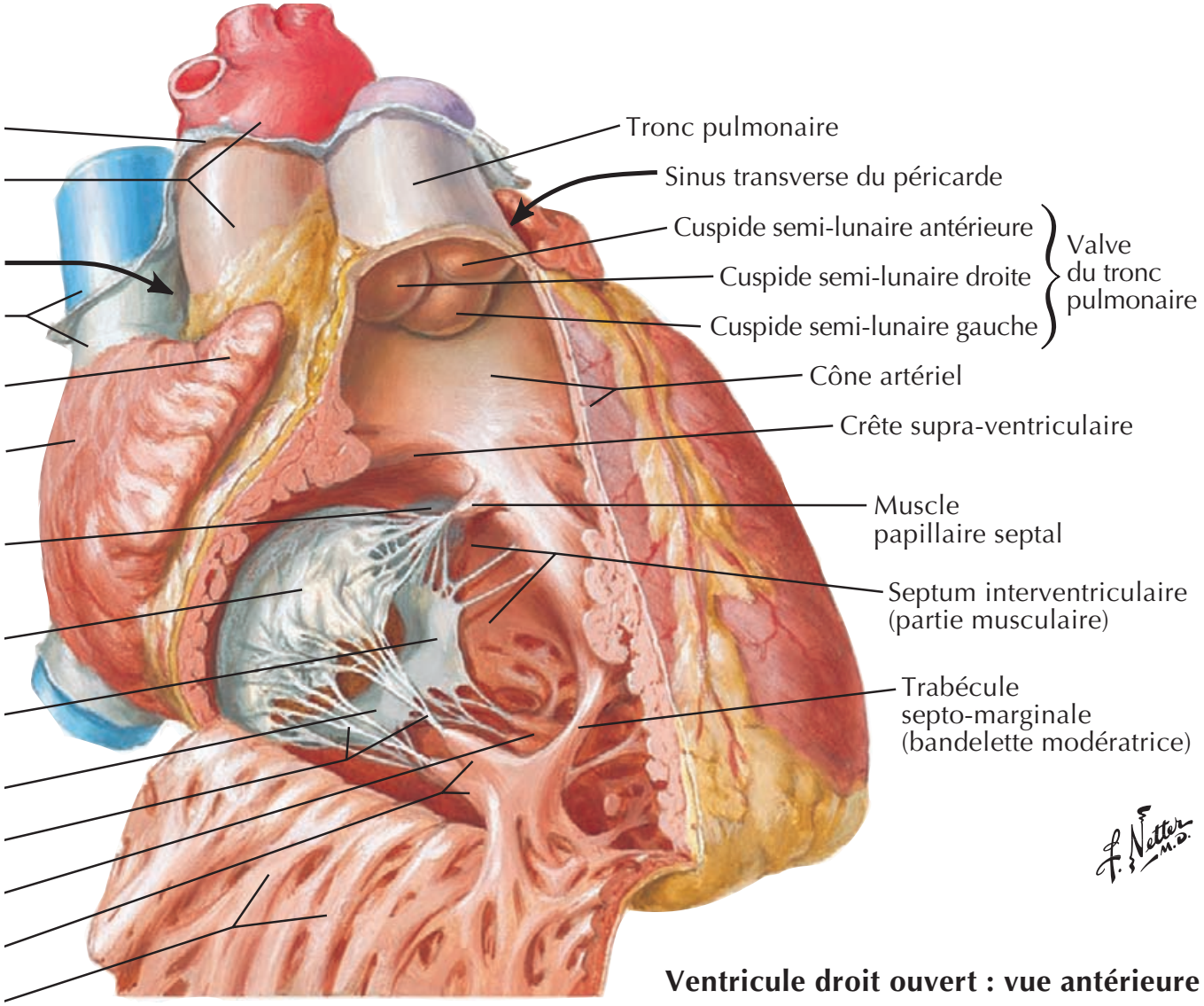
16h00 – 17h00 : Quizz interactif

Echographie cardiaque et hémodynamique avancée

Ventricule Droit

Dr Thibaut MARKARIAN
Médecin Urgentiste
AP-HM Hôpital La Timone Adultes
Marseille

Anatomie cardiaque

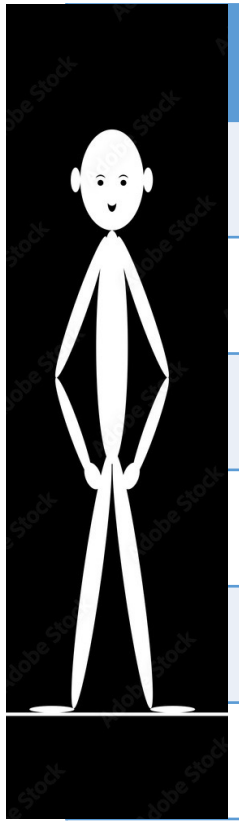


Ventricule droit ouvert : vue antérieure

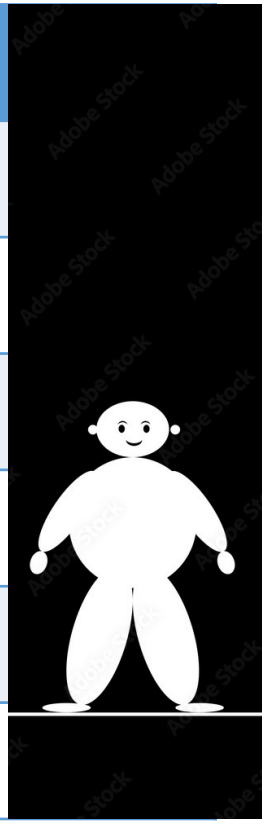
Ventricule Droit

- pyramide tronquée
- enroulée en croissant autour du VG
- 2 chambres fonctionnelles
  - corps = **chambre d'admission**
  - infundibulum = **chambre de chasse**

Physiopathologie

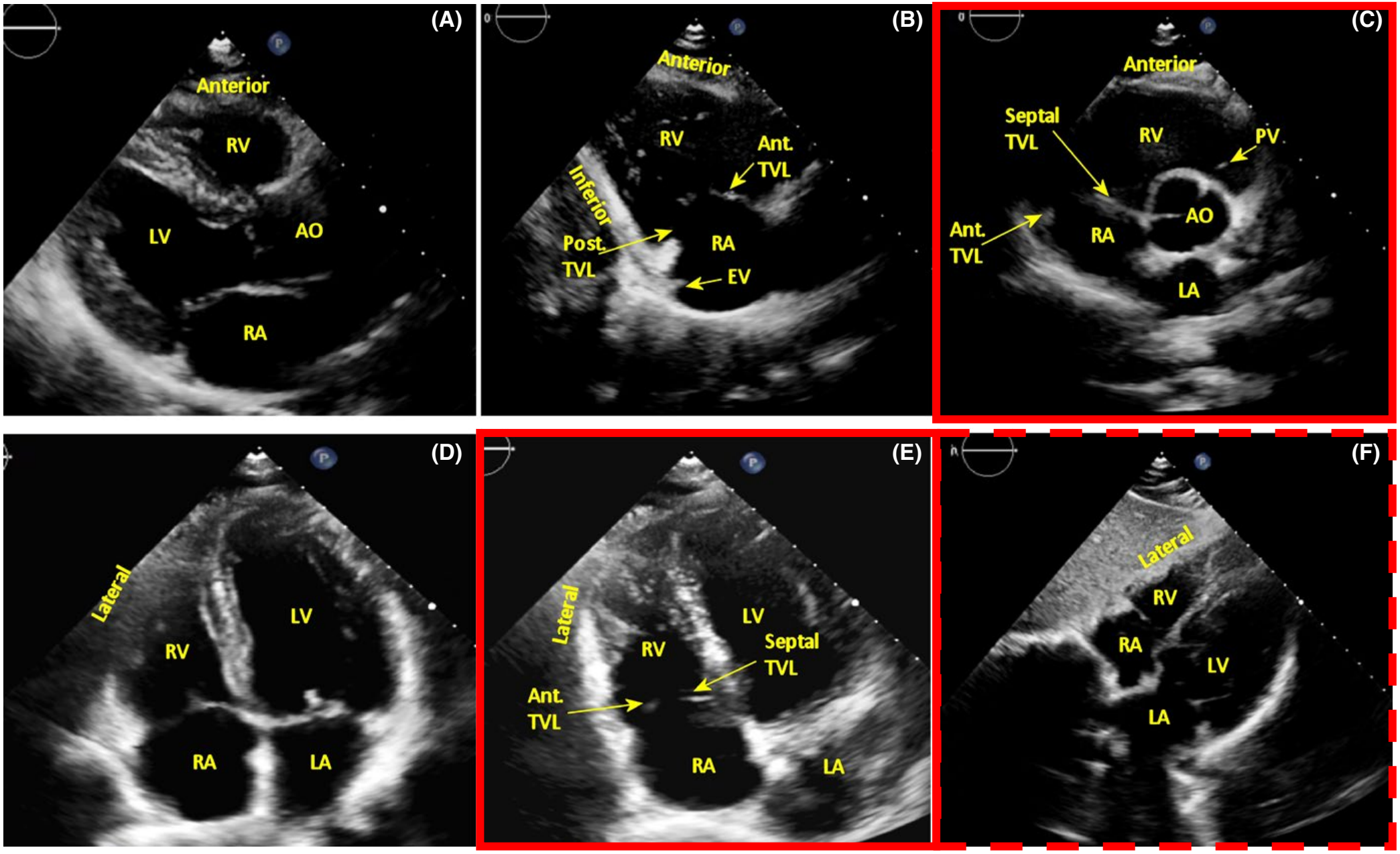


VENTRICULE DROIT	VENTRICULE GAUCHE
VTDVD : 75 ± 13 mL/m^2	VTDVG : 66 ± 12 mL/m^2
Paroi mince : 2 – 5 mm	Paroi épaisse : 7 – 11 mm
Fraction éjection : > 45%	Fraction éjection > 55%
Système à basse pression	**Système à haute pression**
PAP moyenne = 10 à 18 mmHg	P° Aorte moy = 90 à 100 mmHg
Post charge sensible	**Post charge tolérante**

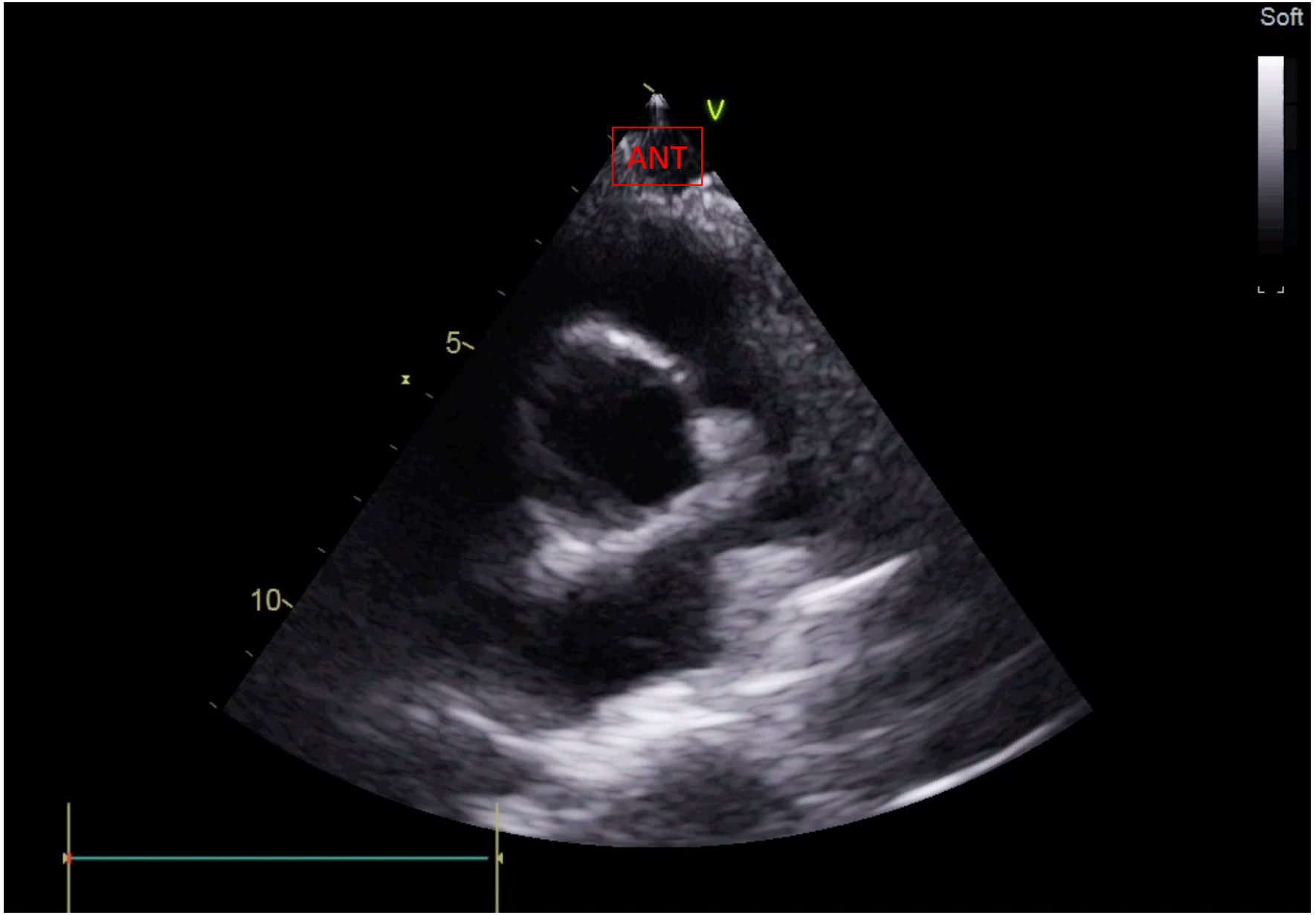


Venkatachalam et al. Echocardiography 2017

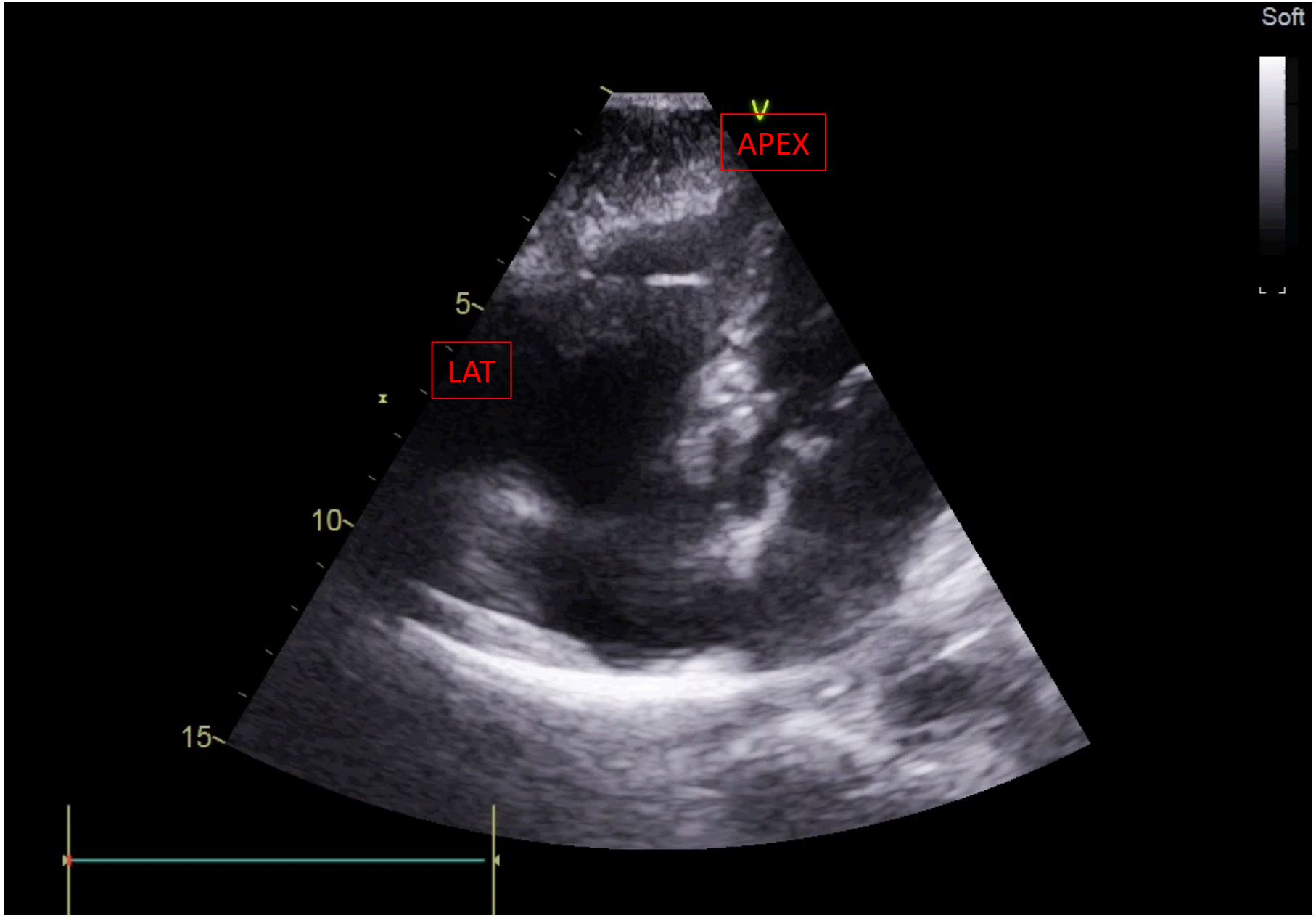
Coupes échographiques



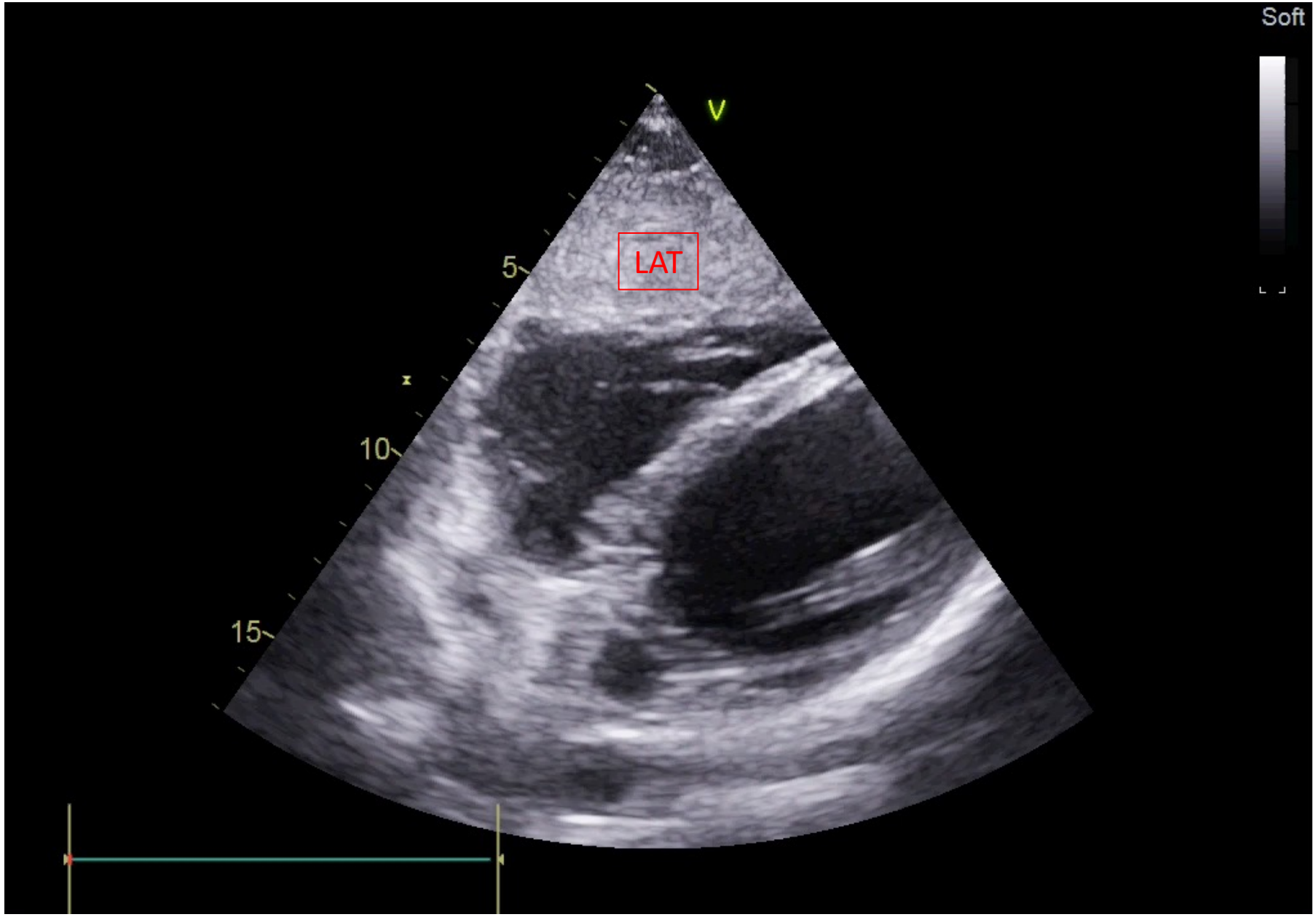
Coupes échographiques : PSPA centrée sur VAo



Coupes échographiques : C4C centrée sur VD

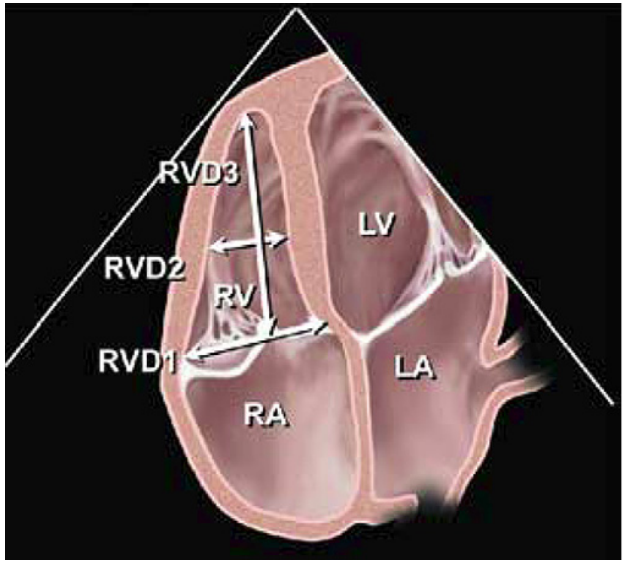


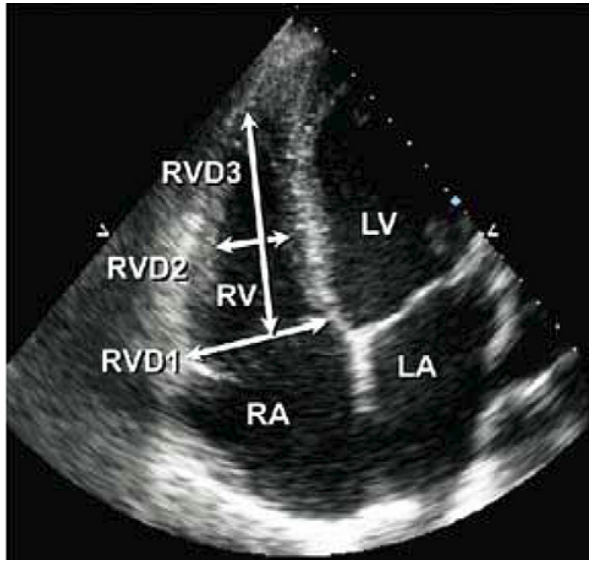
Coupes échographiques : CSC

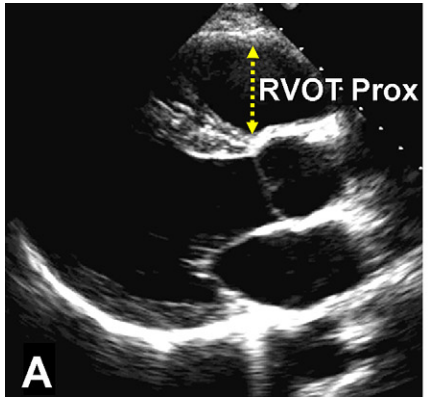


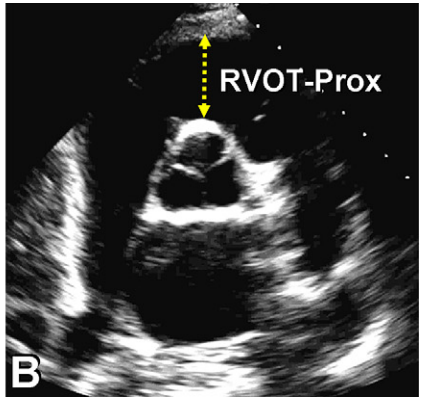
Analyse Morphologique

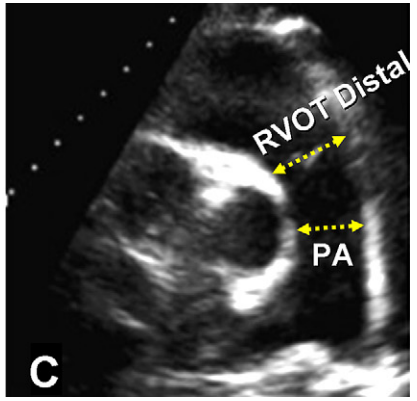
Analyse morphologique : dimensions







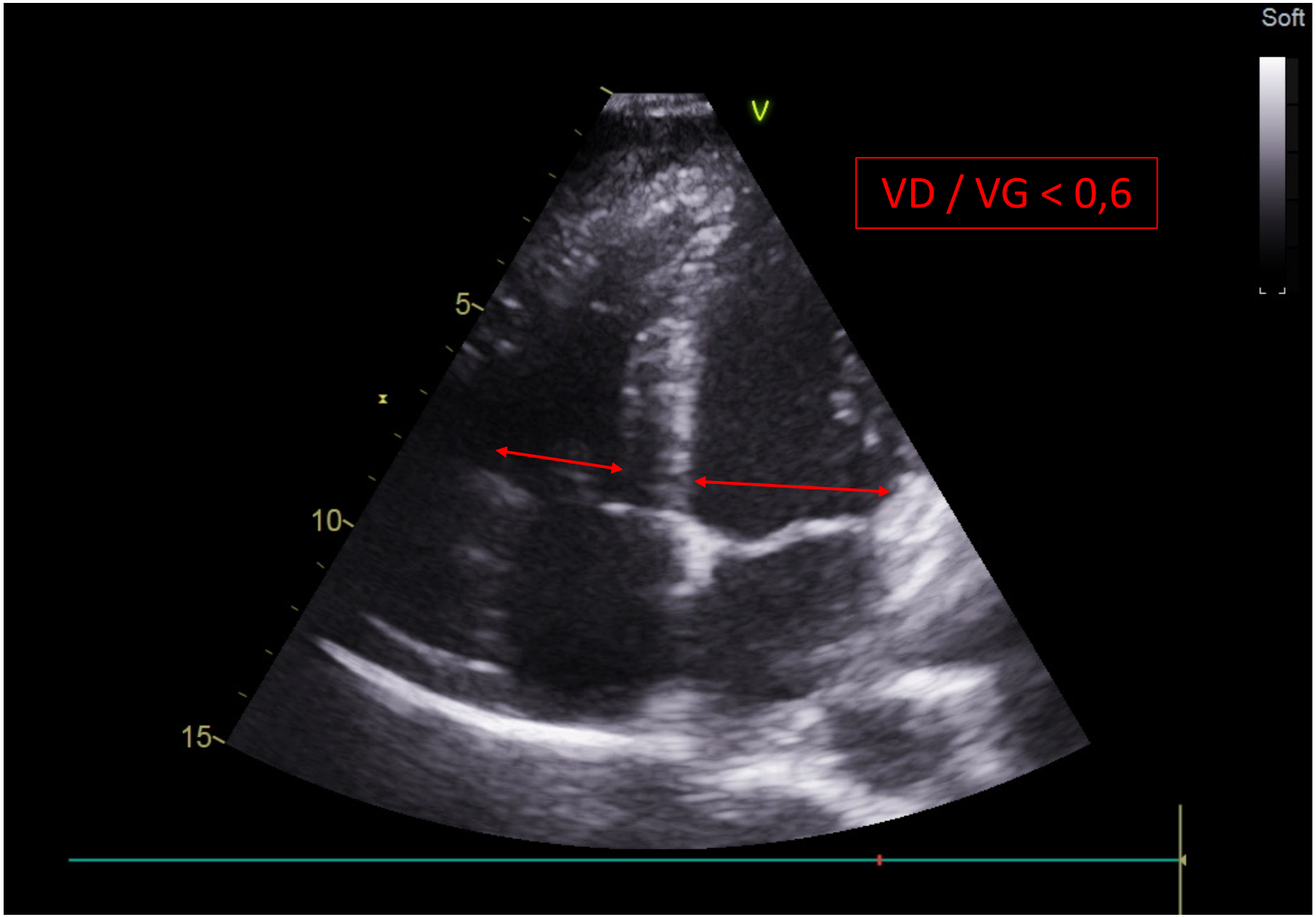




Paramètres	Moyenne ± sd	Rang normal
Diam basal VD (mm)	33 ± 4	25 – 41
Diam médial VD (mm)	27 ± 4	19 – 35
Diam longitudinal VD (mm)	71 ± 6	59 – 83
Épaisseur paroi VD (mm)	3 ± 1	1 - 5

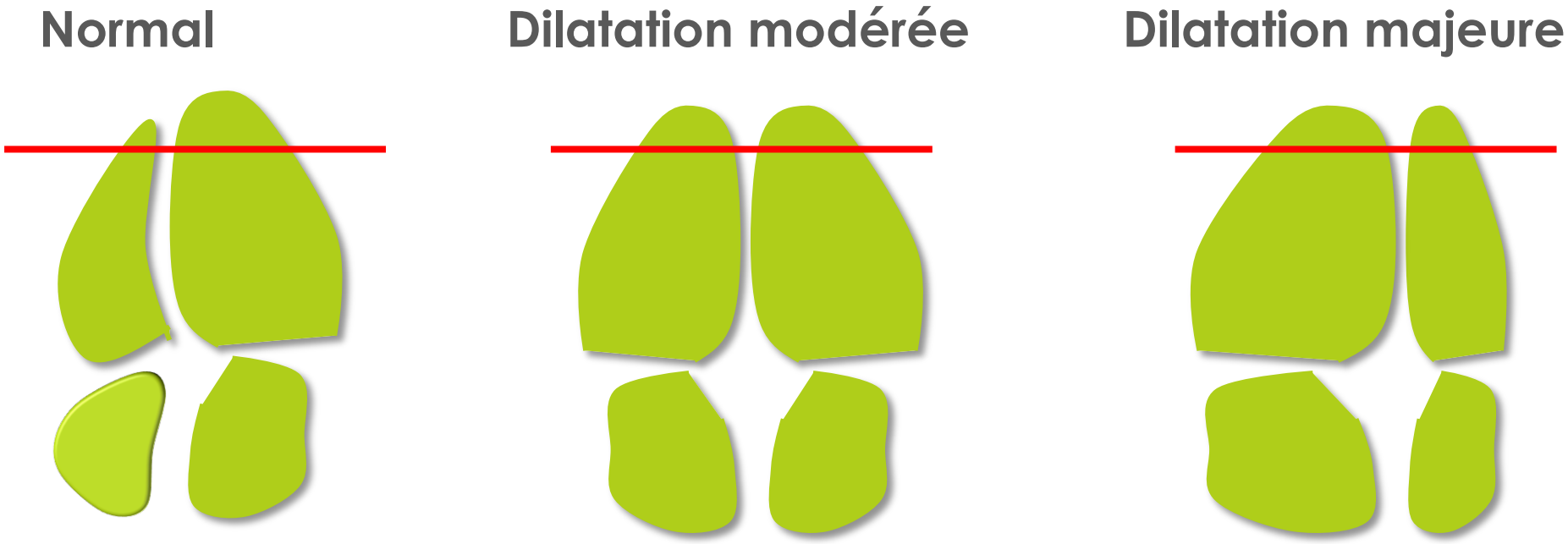
Rudski et al. JASE 2010

Analyse morphologique



- **Fin de diastole**
- **VD < ou = 2/3 VG**
- **Apex cœur = VG**

Diastolic overload : dilatation ventriculaire



D'après L. Muller

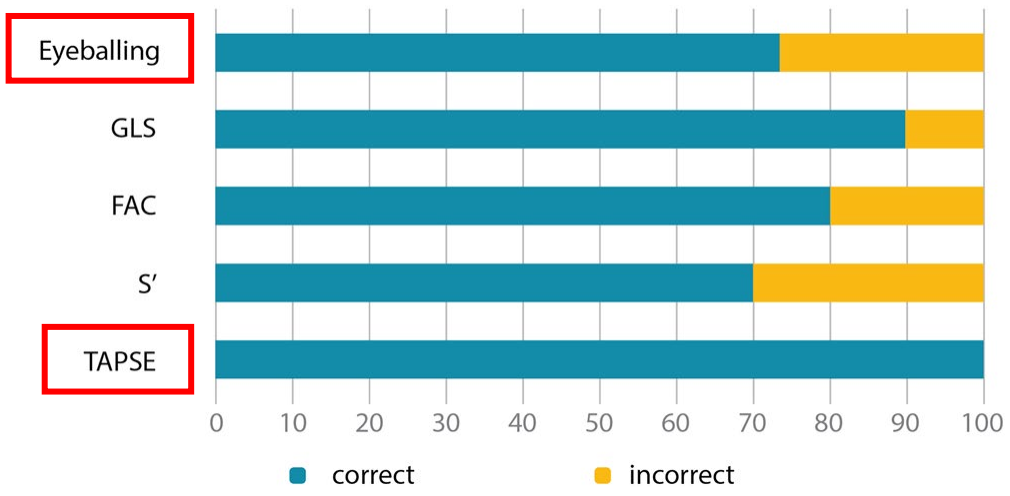
Jardin et al. Chest 1997

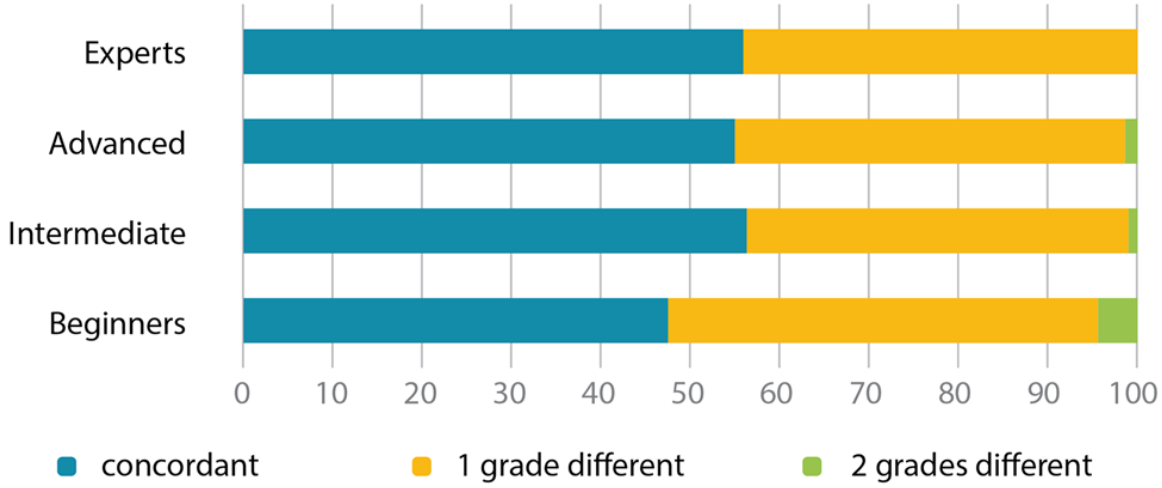
Prada et al. NEJM 2022

Fonction systolique VD

Evaluation de la fonction systolique VD

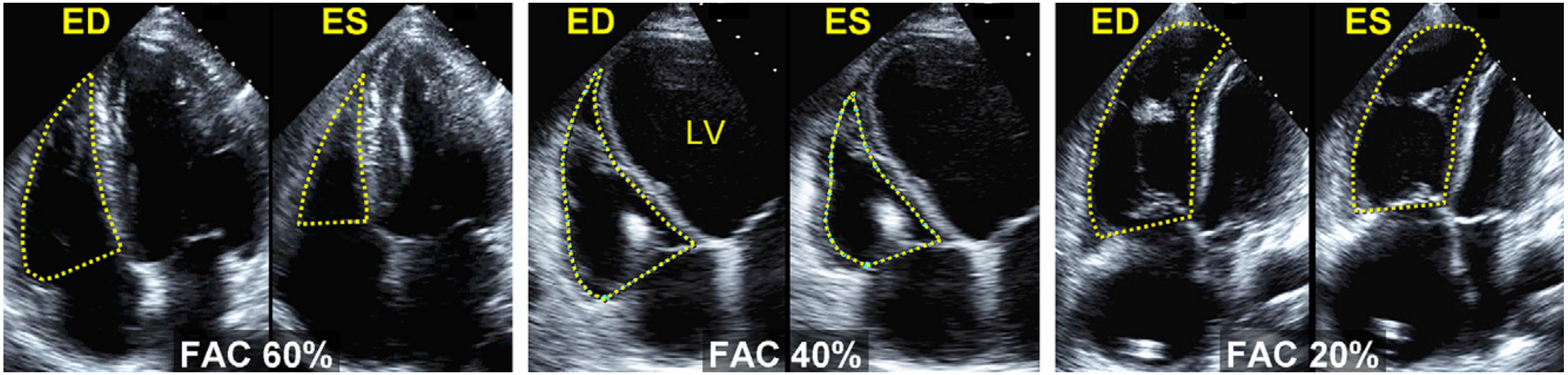
	Sensitivity (95% CI)	Specificity (95% CI)	PPV	NPV	Accuracy
Beginner	95.8 (94.1–97)	42.5 (39.1–46)	62.5 (61–63.9)	90.9 (87.7–93.4)	69.1 (66.8–71.4)
Intermediate	96.5 (95.6–97.3)	54.6 (52.4–56.7)	68 (66.9–69)	94 (92.6–95.2)	75.5 (74.2–76.8)
Advanced	96.8 (95.7–97.7)	52.8 (50–55.5)	67.2 (65.9–68.5)	94.3 (92.5–95.8)	74.8 (73.1–76.5)
Experts	97.1 (94.5–98.6)	55.7 (50–61.4)	68.7 (65.9–71.4)	95 (90.8–97.3)	76.4 (72.8–79.7)





Schneider et al. Int J Cardiovasc Imaging 2019

Evaluation de la fonction VD – Fraction de raccourcissement



Fraction de raccourcissement de surface

- évaluation de la fonction VD « globale »
- dysfonction VD si FR < 35%
- évaluation subjective
- néglige 25 à 30% du volume VD (CC)

$$FRVD = \frac{STDVD - STSVD}{STDVD} \times 100$$

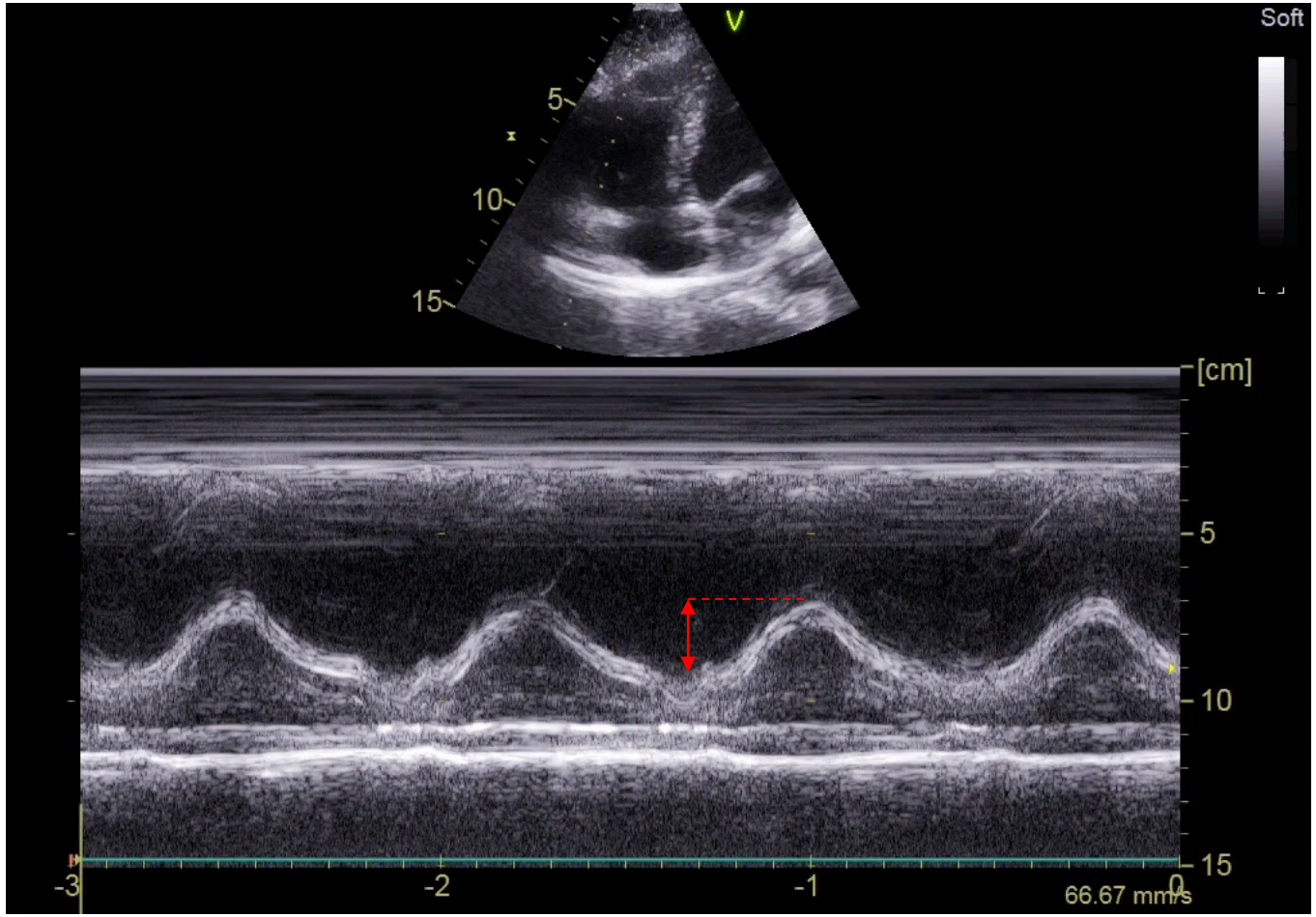
Rudski et al. JASE 2010

Evaluation de la fonction VD - TAPSE

Prada et al. NEJM 2022

Evaluation de la fonction VD - TAPSE

Excursion systolique du plan de l'anneau tricuspide

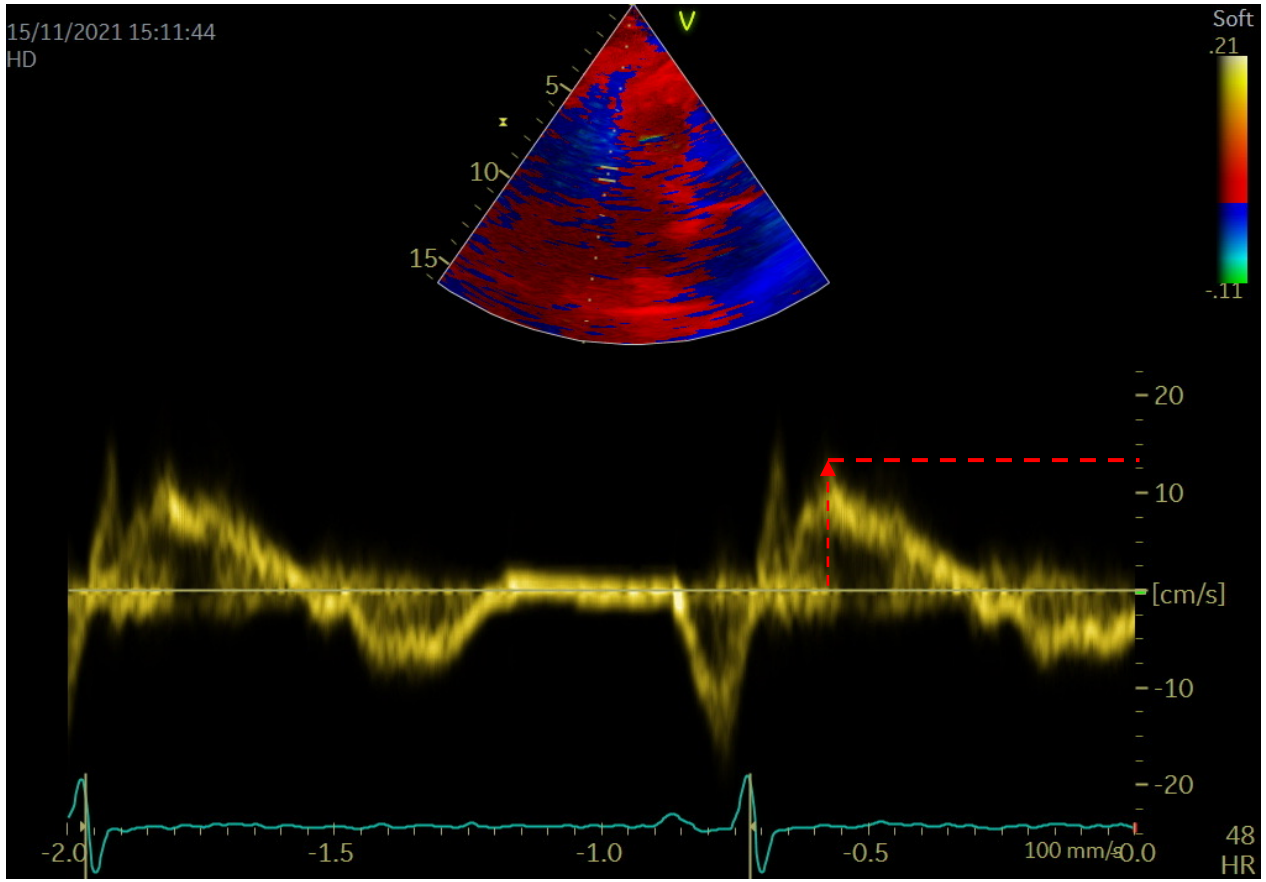


TAPSE

- indice de contraction longitudinale
- **dysfonction VD si TAPSE < 16 mm**
- avantages : simple et reproductible
- limite : angle-dépendant
- intérêt pronostic ++

Kaul et al. Am Heart J 1984

Evaluation de la fonction VD – onde S'

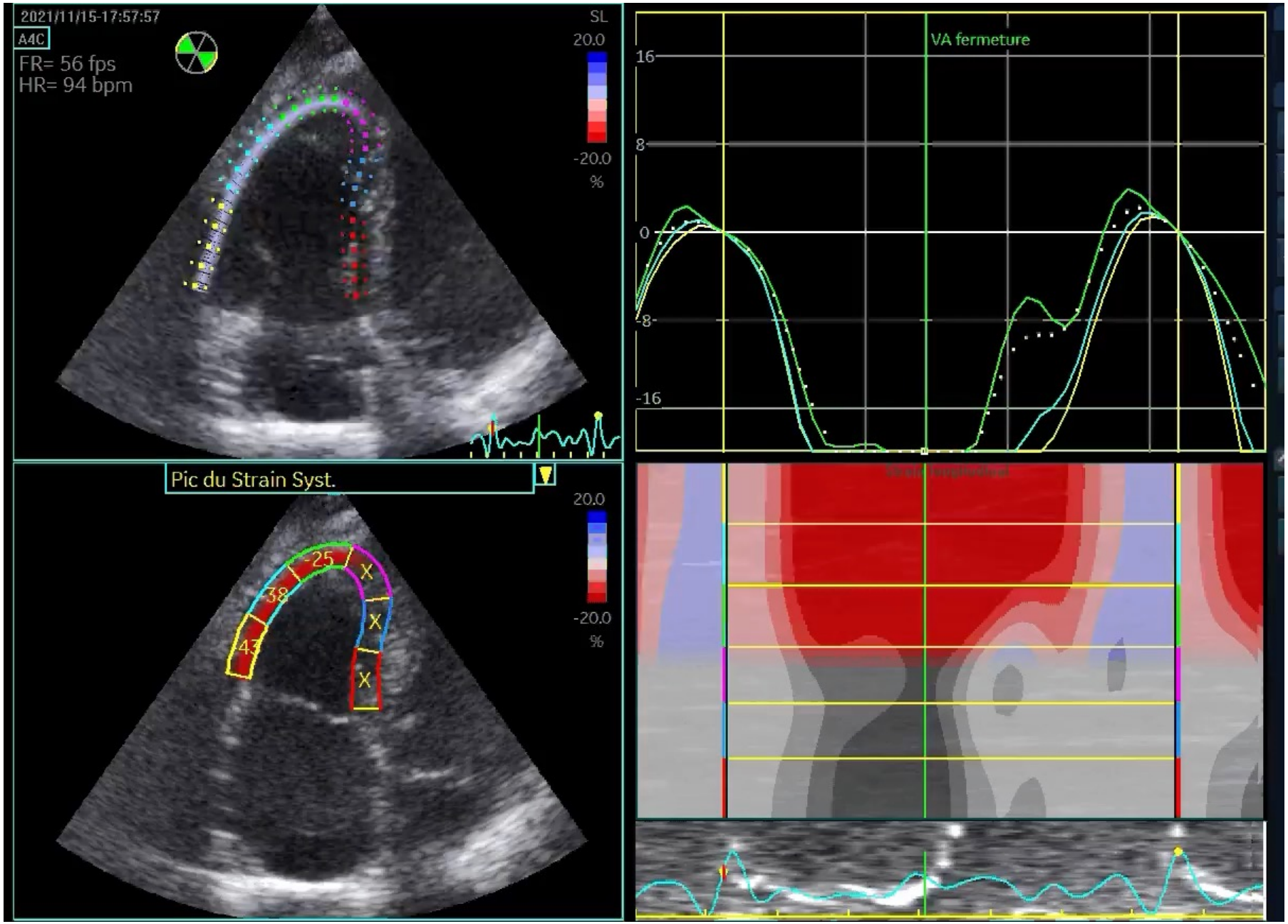


DTI de l'anneau tricuspidien : onde S

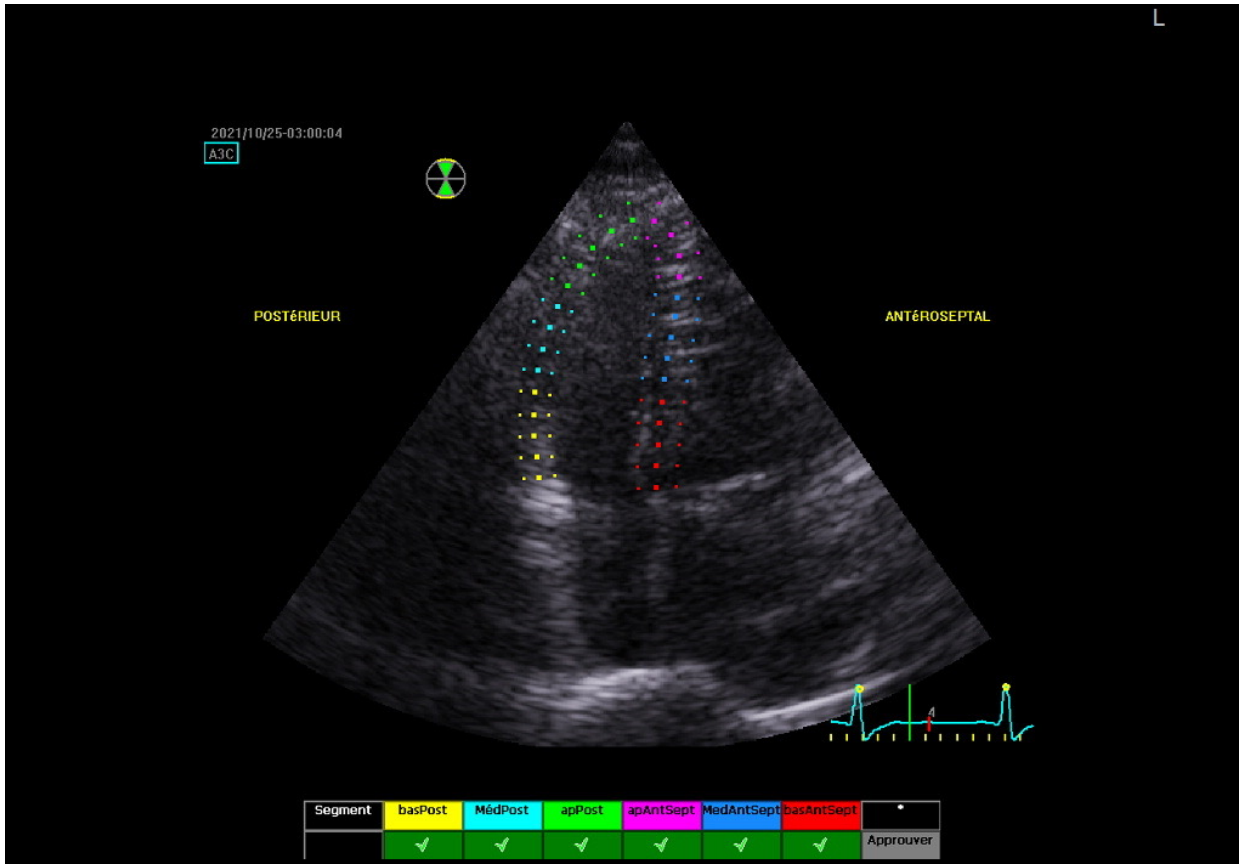
- indice de contraction longitudinale
- dysfonction VD si onde S < 10 cm/s
- avantages : simple et reproductible
- limites : angle-dépendant et personnes âgées

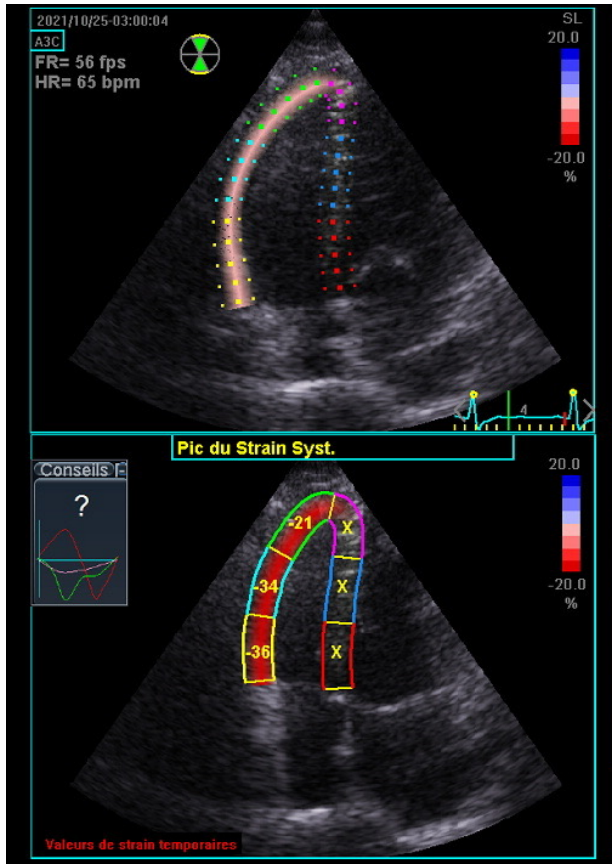
Lindqvist et al. Echocardiography 2005

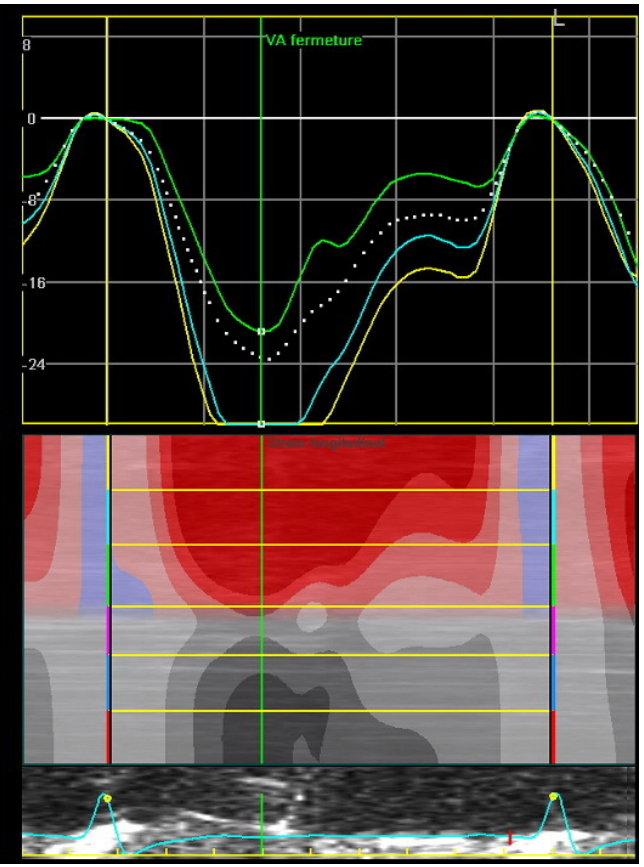
Evaluation de la fonction VD – Strain VD



Evaluation de la fonction VD – Strain VD

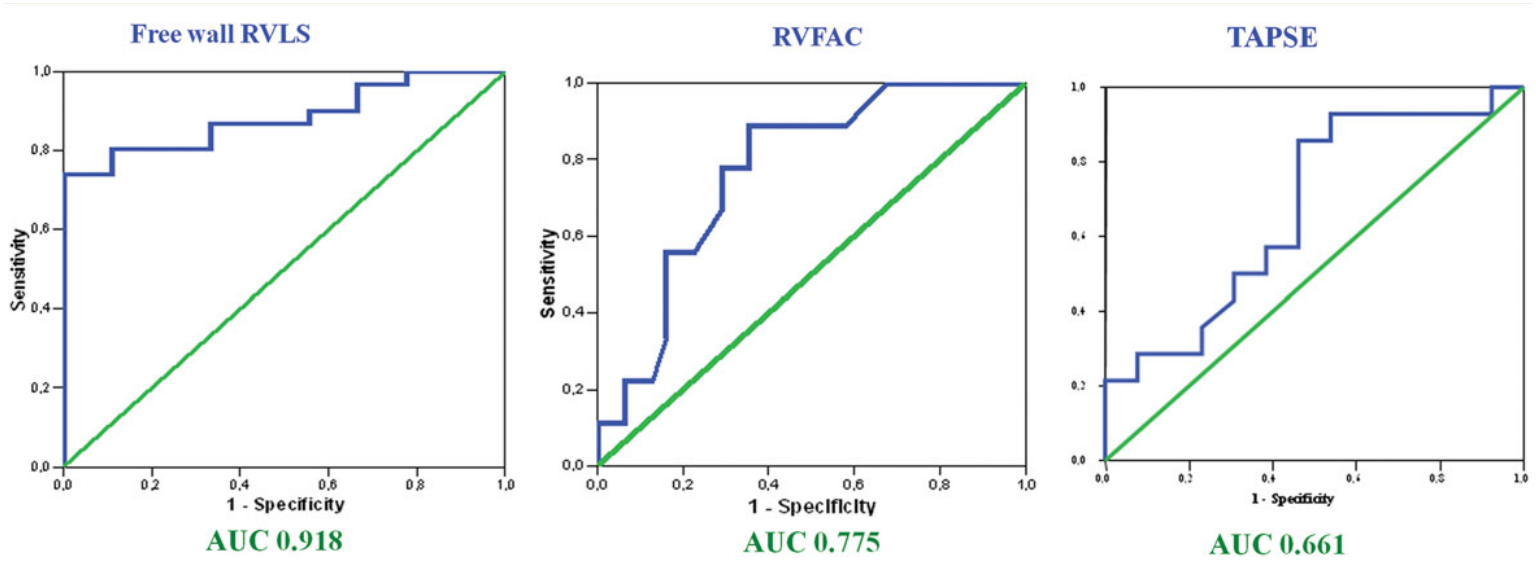






Lang et al. JASE 2015

Evaluation de la fonction VD – Strain VD



STRAIN de la paroi libre du VD

- dysfonction VD si pic 2D strain paroi libre > - 20 %
- avantages : simple avec nouveaux outils d'intelligence artificielle
- limites : post-charge dépendant ; seuil fonction âge et machine

Focardi et al. European Heart Journal 2015

Evaluation de la fonction VD

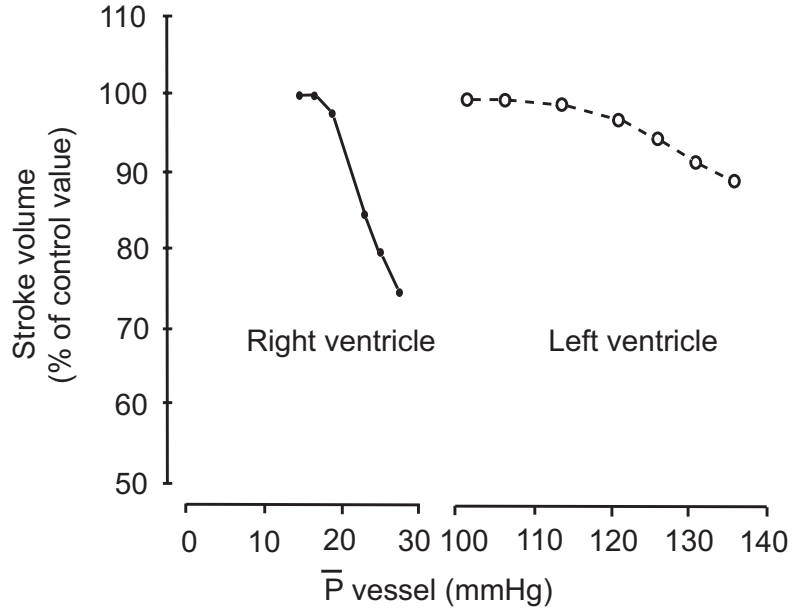
❖ <u>Problématique</u> : outils d'évaluation de la fonction VD dépendant des conditions de charge

❖ Post charge VD

- ➢ PRVG
- ➢ Résistances Pulmonaires (pressions pulmonaires)

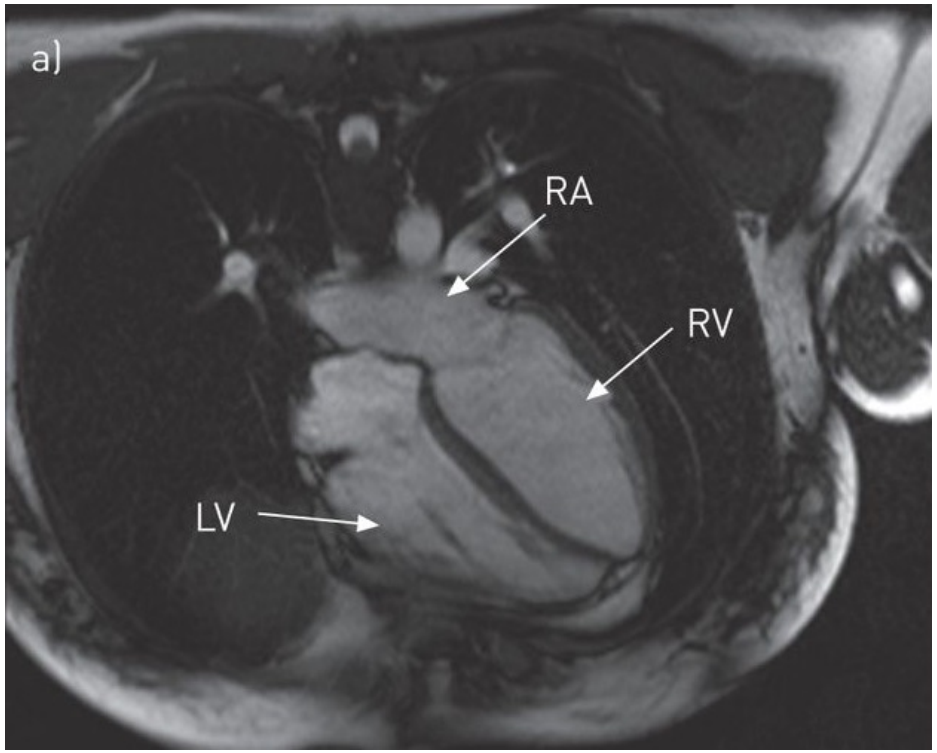
❖ **Approche multiparamétrique indispensable**

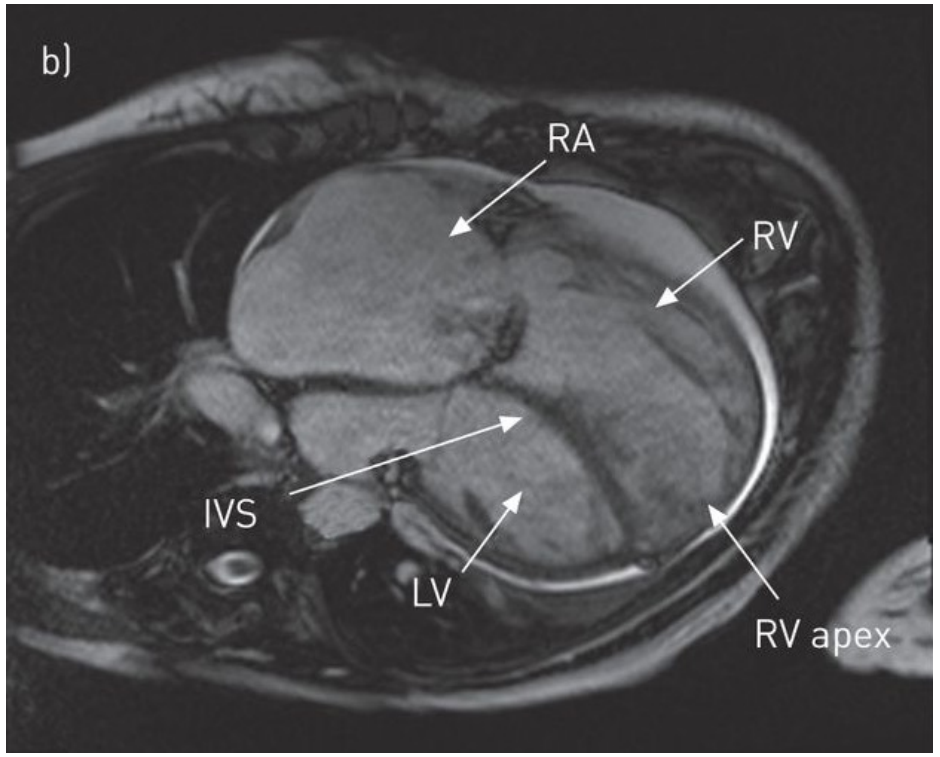
- ➢ Au moins 2 paramètres
- ➢ Si post-charge normale = dysfonction VD intrinsèque probable
- ➢ Si post-charge élevée = fonction VD intrinsèque probablement normale



Haddad et al. Circulation 2008

Evaluation de la fonction VD - IRM





IRM Cardiaque = Gold Standard

Peacock et al. Eur Respir Rev 2013

Fonction systolique VD

- ❑ **Evaluation visuelle ++**
- ❑ **Fraction de raccourcissement**
- ❑ **TAPSE ++ (pronostic)**
- ❑ **Strain VD**

Hémodynamique VD et CPA

Embolie Pulmonaire

Hémodynamique VD

AUGMENTATION POST CHARGE = HYPERTENSION PULMOAIRE

VENTRICULE DROIT

- **DILATATION** ventriculaire droite
- Dilatation **rapide** et **réversible**
- **Déplacement vers la gauche du SIV**
- Chute du volume d'éjection systolique

VENTRICULE GAUCHE

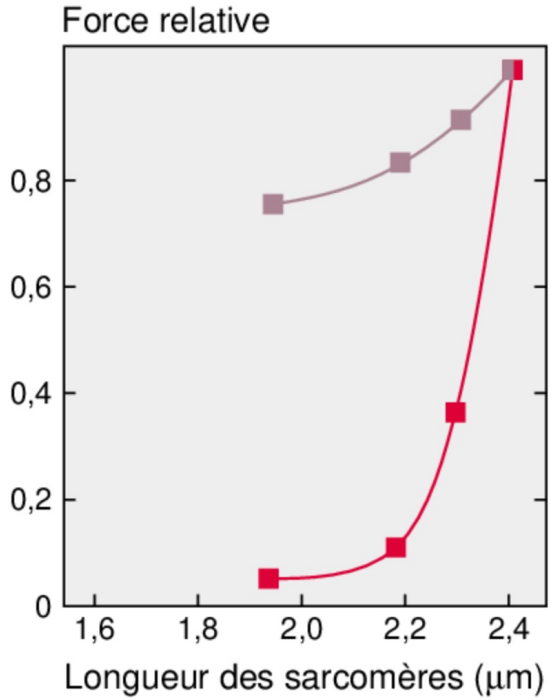
- Tendance à l' **HYPERTROPHIE**
- Phénomène lent et irréversible
- Maintien du volume d'éjection

Lang et al. J Am Soc Echocardiogr 2005

1. **Effet Franck-Starling**

Adaptation hétérométrique : Relation longueur – force

➢ Etirement des myocytes + prolongation du temps de contraction VD

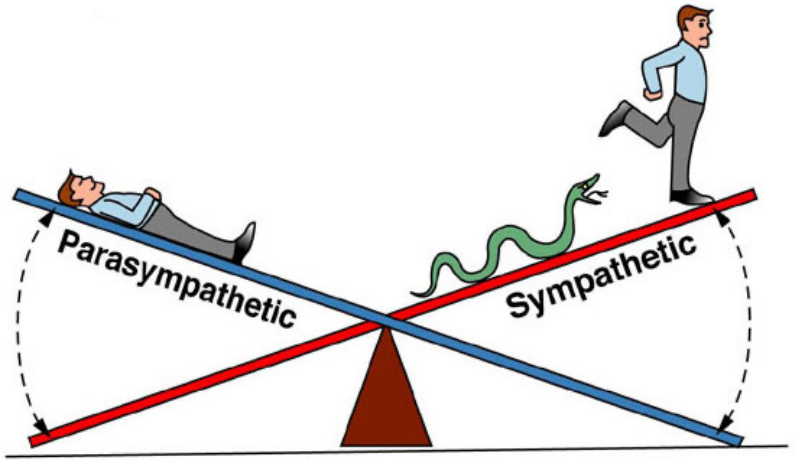


2. **Activation neuro-hormonale** et effet Anrep

Système sympathique et rénine-angiotensine-aldostérone

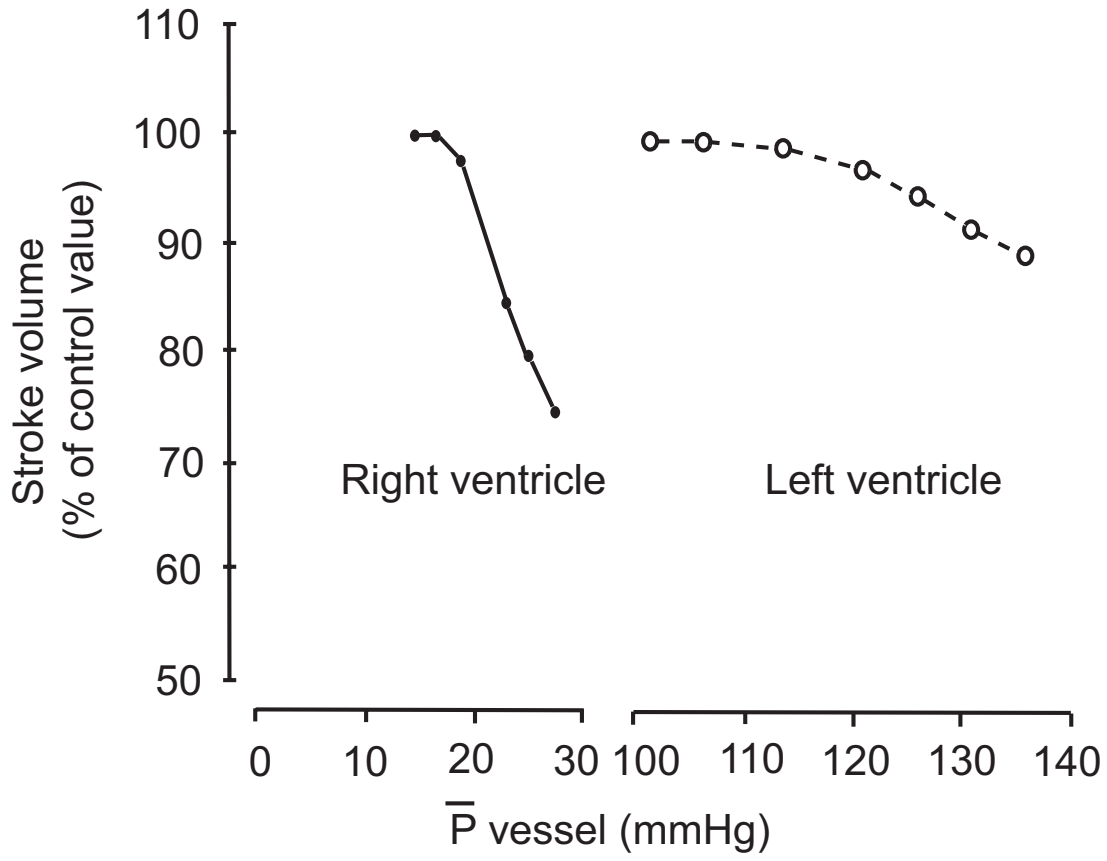
➢ Stimulation inotrope et chronotrope

3. **Vasoconstriction systémique**



Haddad et al. Circulation 2008

- Augmentation des pressions artérielles pulmonaires
- Amélioration du débit dans le lit vasculaire pulmonaire obstrué
- Stabilisation temporaire de la pression artérielle



PAP moyenne > 40 mmHg

MacNee et al. Am J Respir Crit Care Med 1994

Diagnostics en cas d'hypertension pulmonaire aiguë ?

- **HTP post-capillaire** = cœur gauche +++ (50%)
- Embolie Pulmonaire
- Pneumopathie hypoxémiante
- Syndrome de Détresse Respiratoire Aigue
- Ventilation mécanique

} Cœur Pulmonaire Aigu

Hémodynamique VD

Augmentation brutale et importante de la post-charge VD

Cœur Pulmonaire Aigu

1. diastolic overload =
   dilatation ventriculaire droite

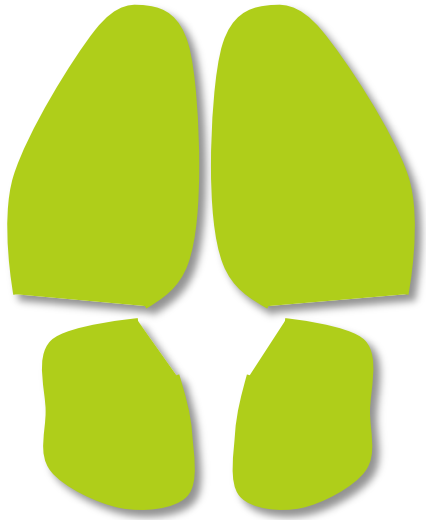
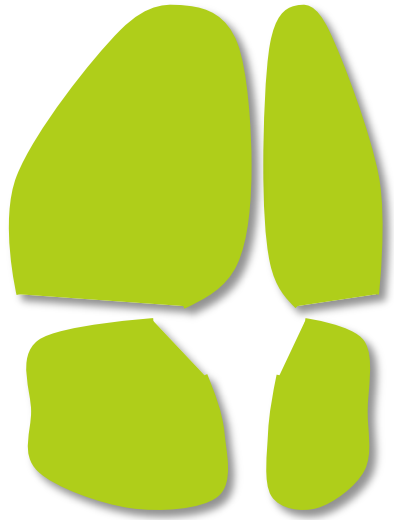
2. systolic overload =
   dyskinésie septale = septum paradoxal

Conséquence possible

- Insuffisance Circulatoire Aigue

Vieillard-Baron et al. Am J Respir Crit Care Med 2002

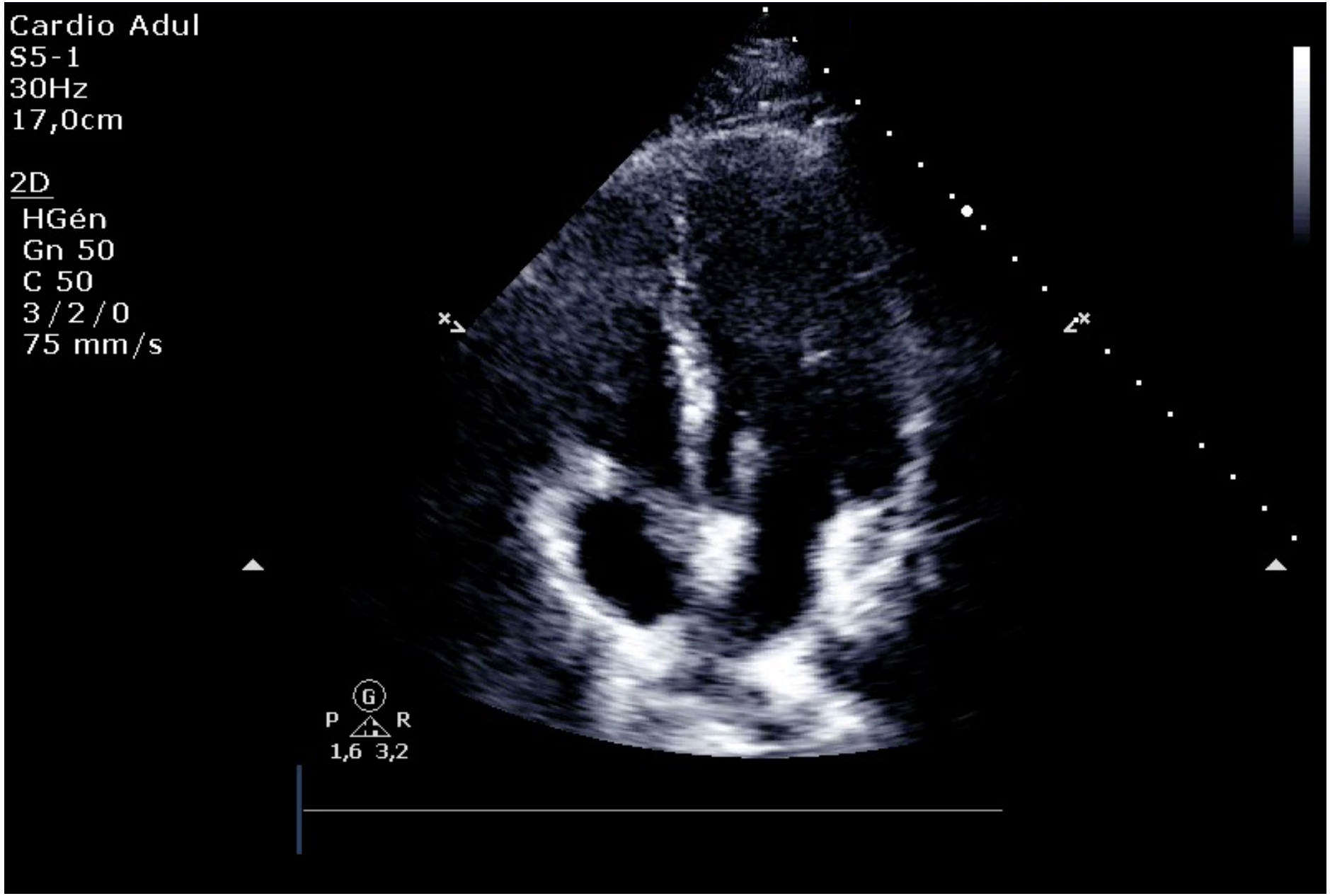
Diastolic overload : dilatation ventriculaire

Normal	Dilatation modérée	Dilatation majeure
		
STDVD/STDVG < 0,6	**0,6 < STDVD/STDVG < 1**	**STDVD/STDVG > 1**

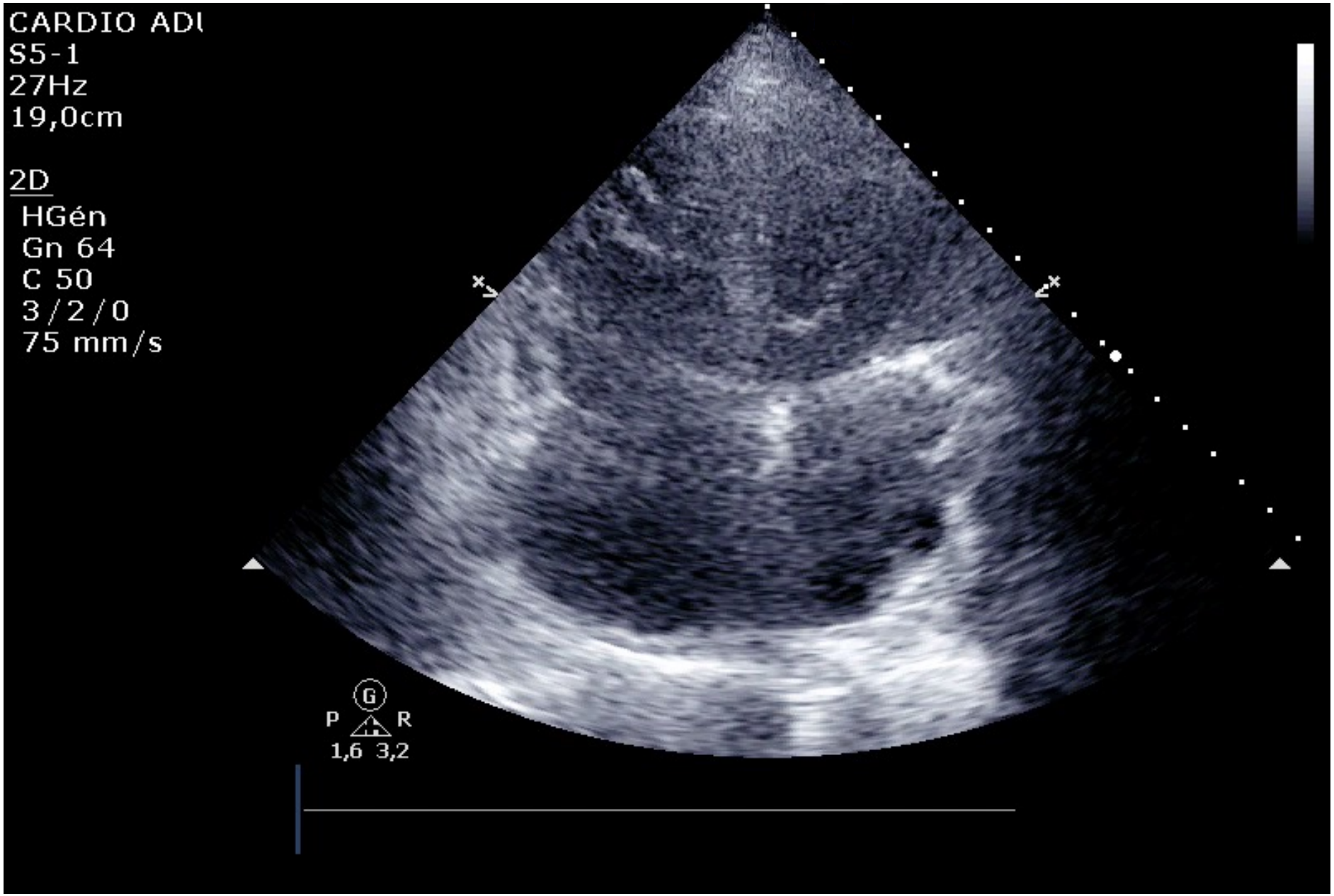
D'après L. Muller

Jardin et al. Chest 1997

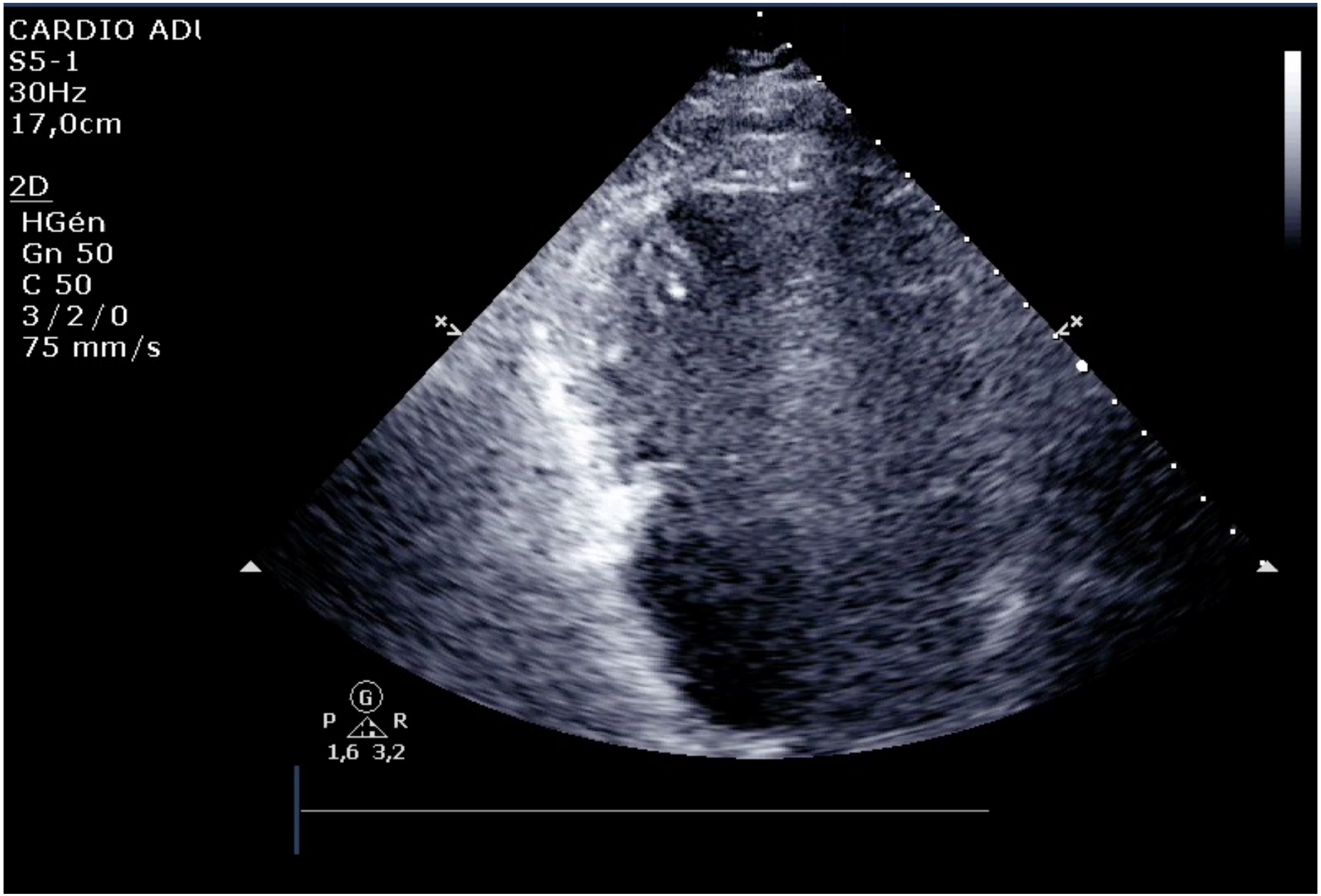
Diastolic overload : dilatation ventriculaire



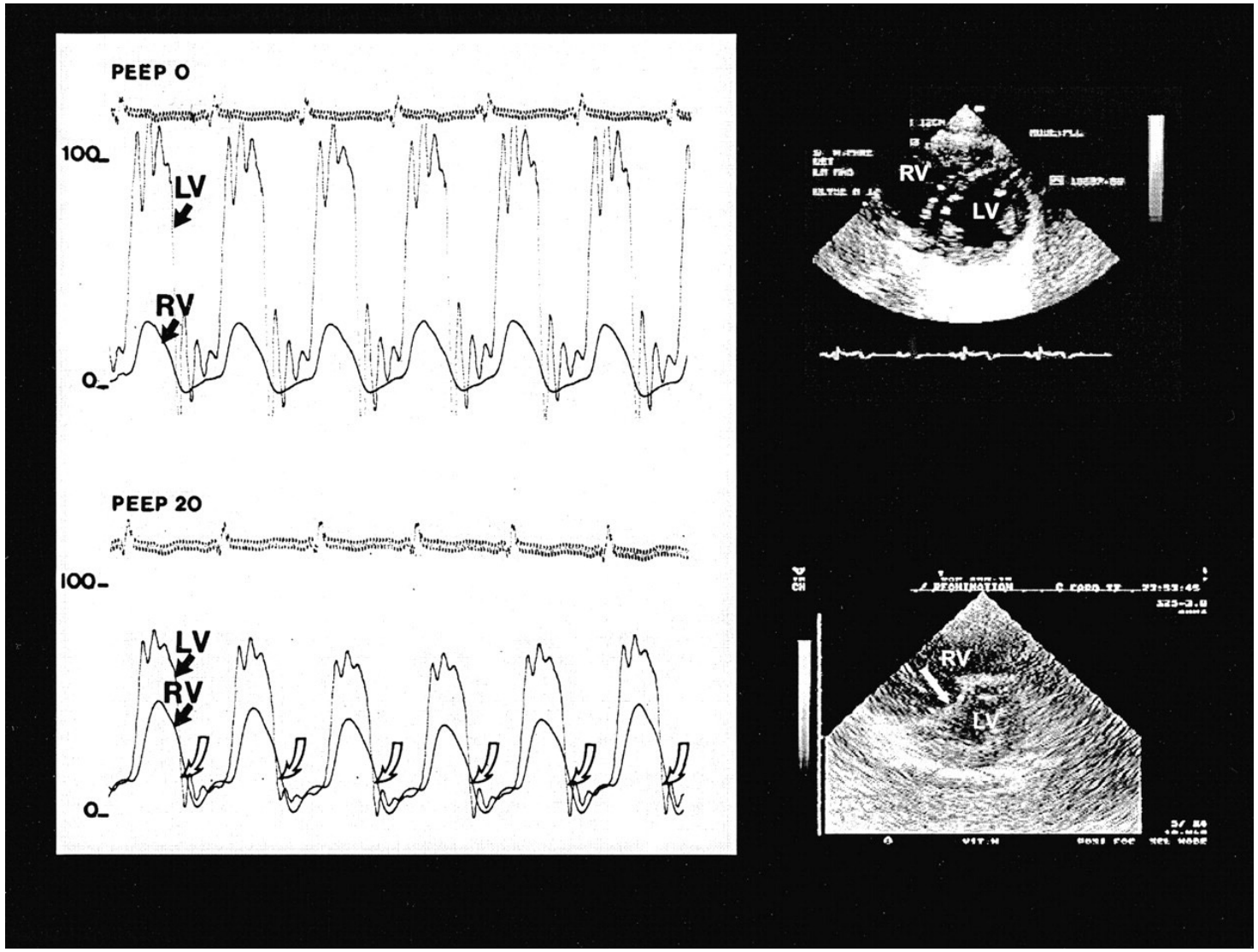
Diastolic overload : dilatation ventriculaire



Diastolic overload : dilatation ventriculaire

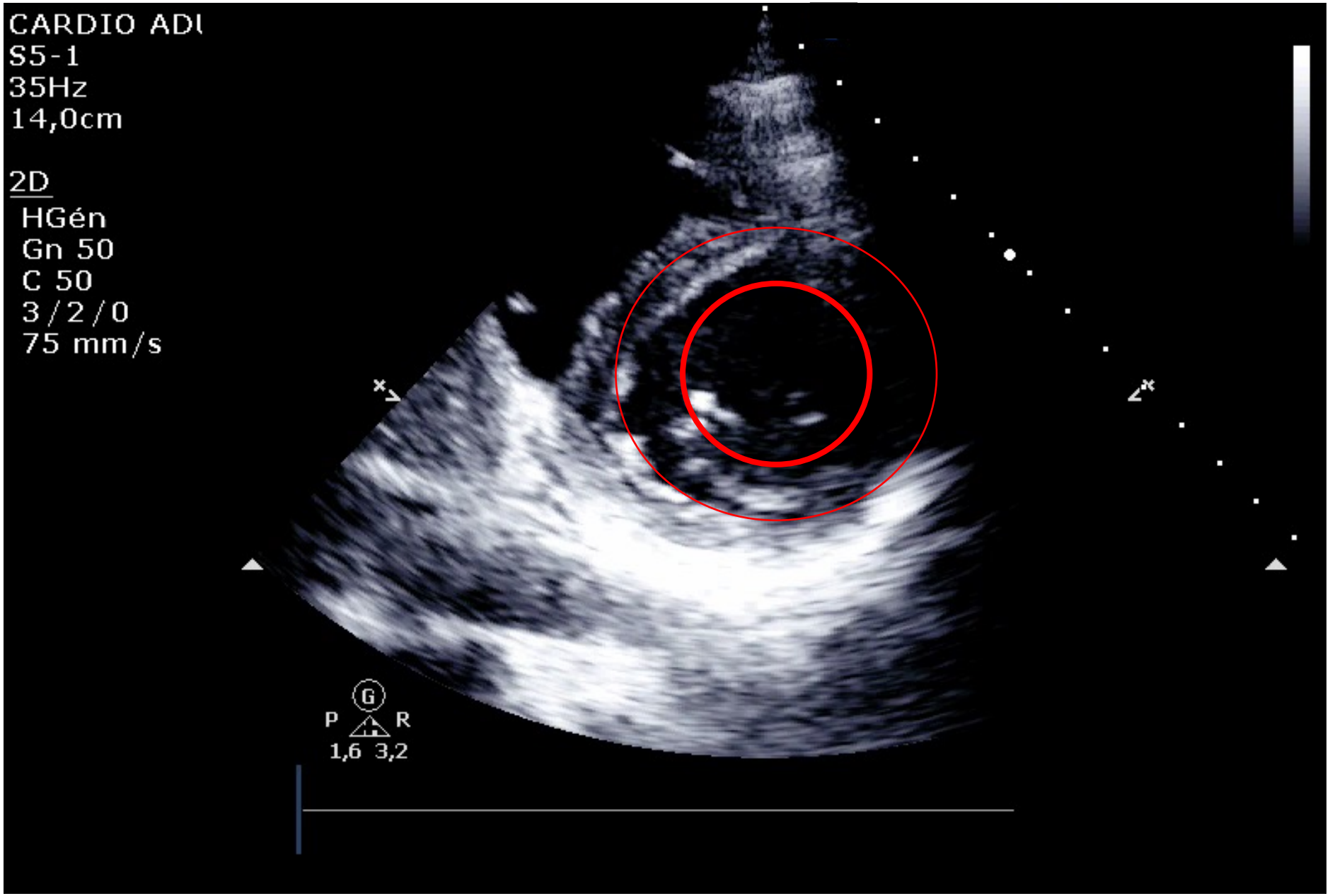


Systolic overload : septum paradoxal

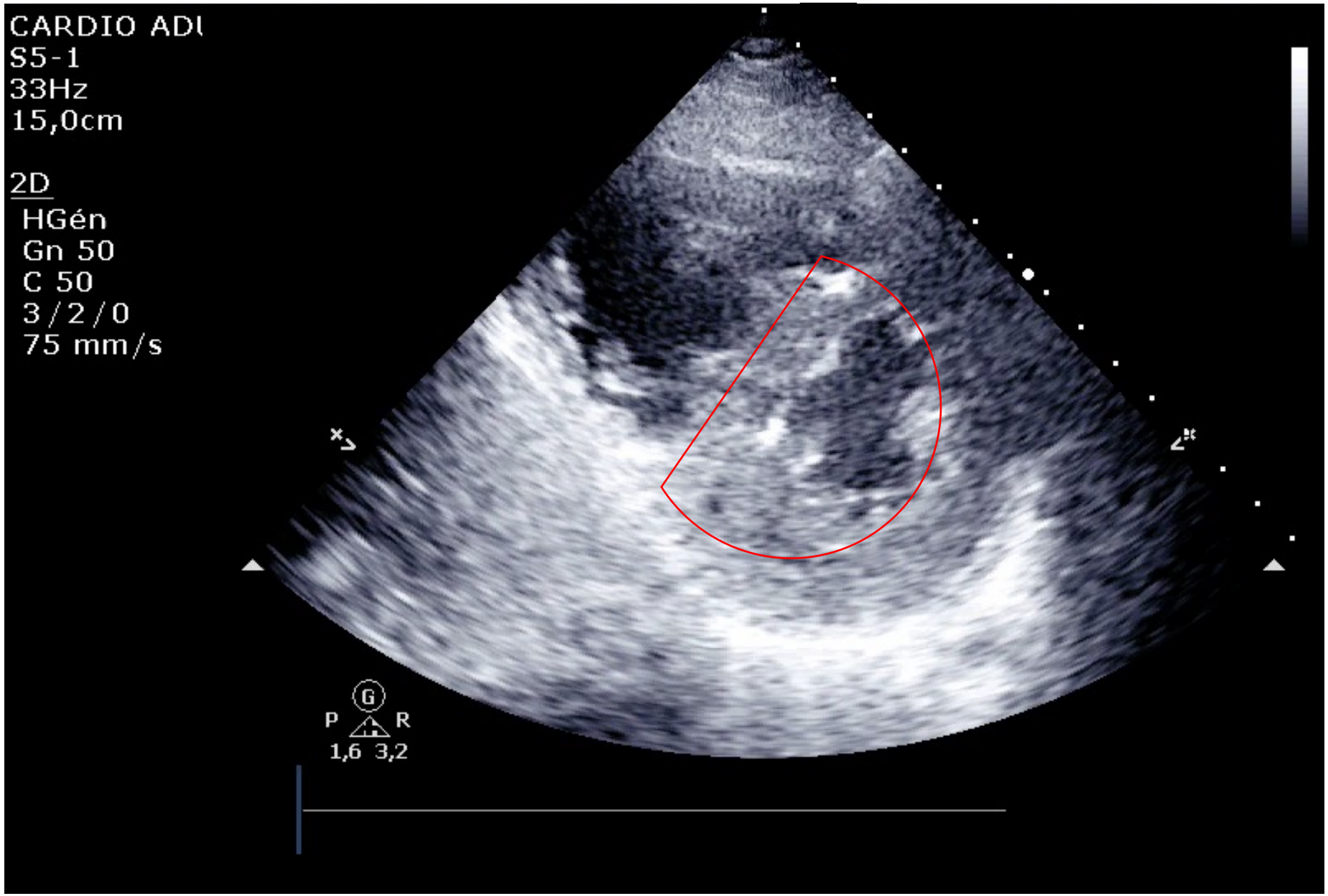


Vieillard-Baron et al. Am J Respir Crit Care Med 2002

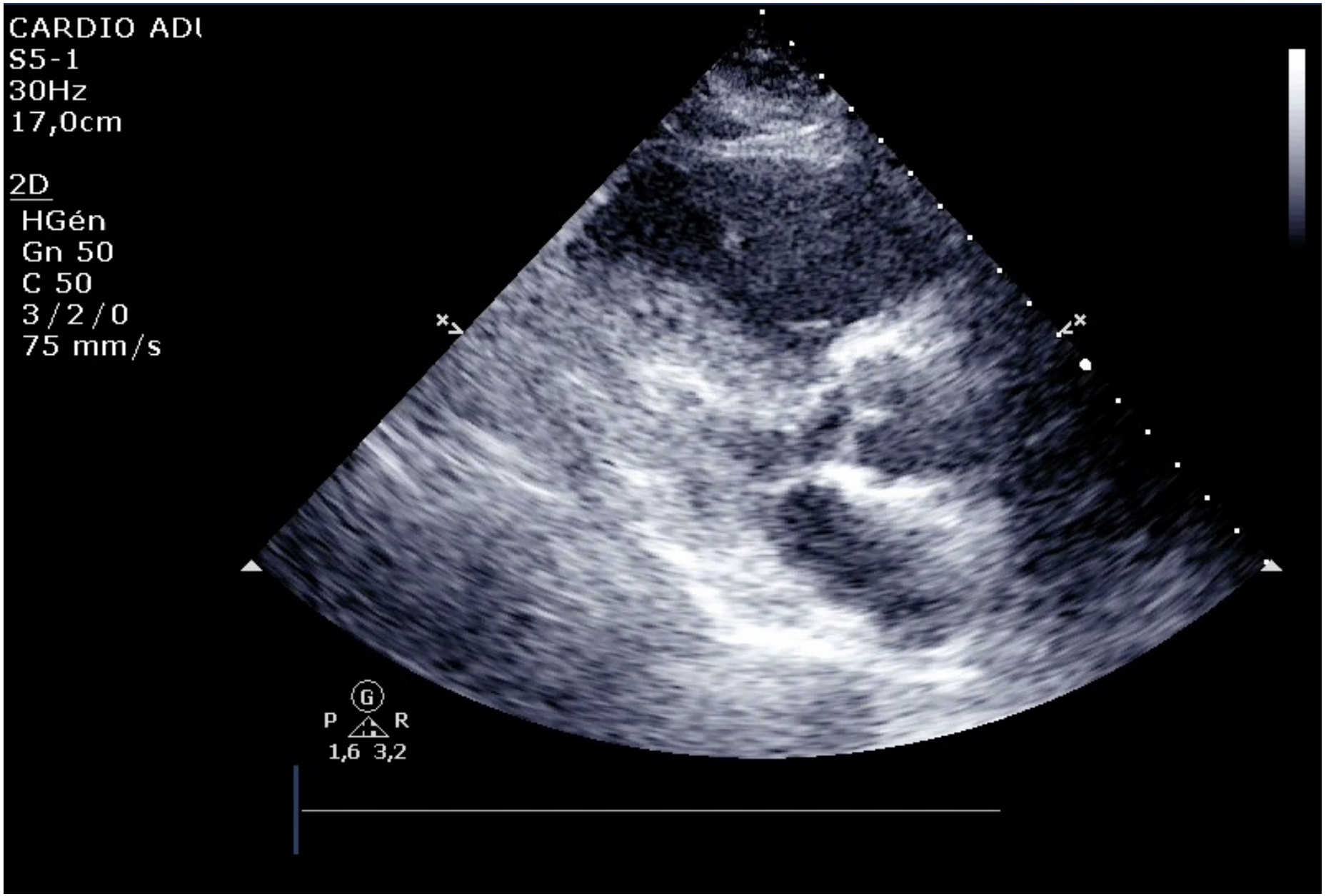
Systolic overload : septum paradoxal



Systolic overload : septum paradoxal



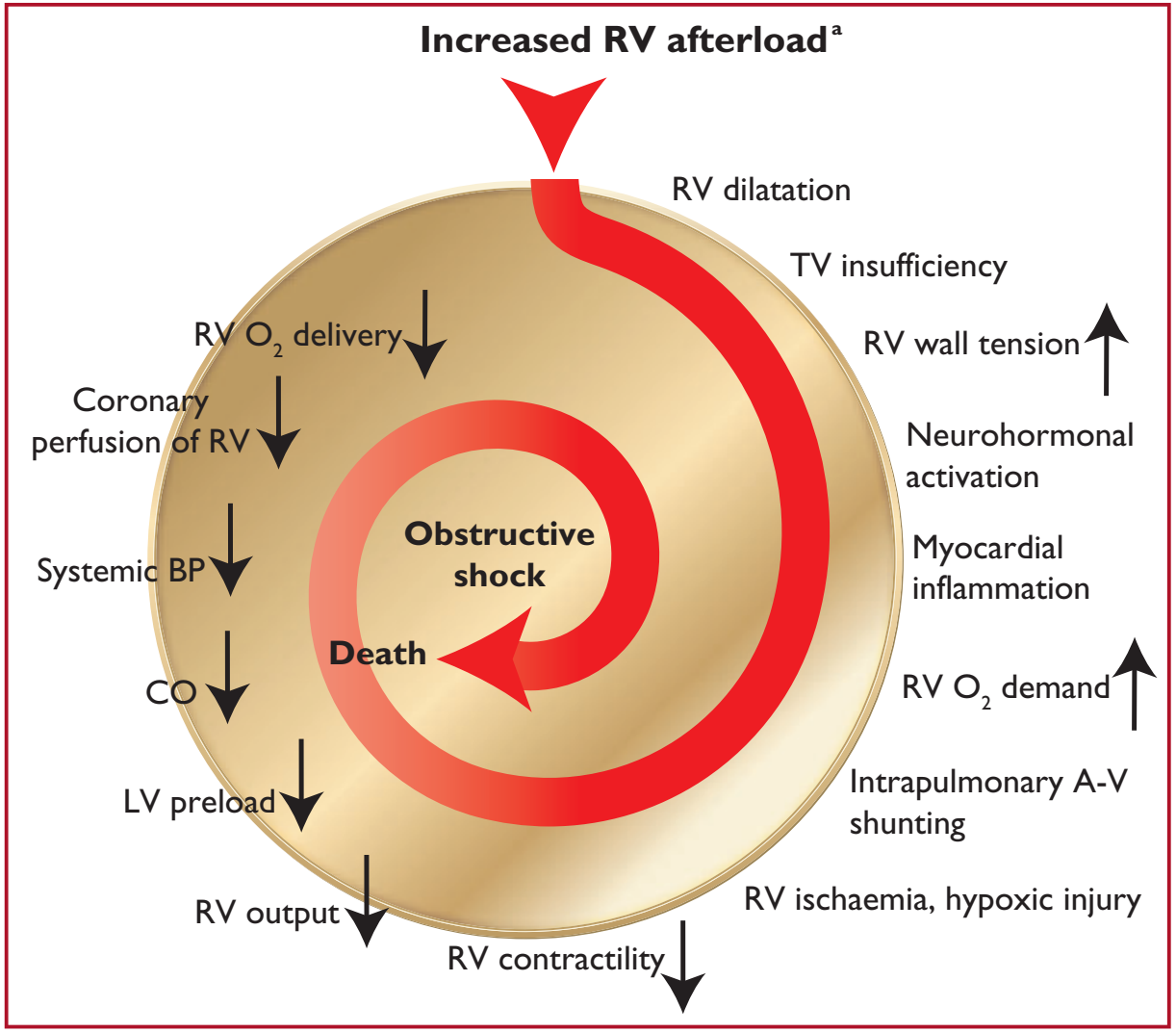
Systolic overload : septum paradoxal



Cœur Pulmonaire Aigu

Diagnostics principaux

- Embolie Pulmonaire
- Pneumopathie hypoxémiante
- Syndrome de Détresse Respiratoire Aigue
- Iatrogène = Ventilation mécanique



ESC Acute Pulmonary Embolism 2019

Cœur Pulmonaire Aigu

Diagnostics anecdotiques

- Asthme aigu grave
- STA du drépanocytaire

(60% HTP compliquée de 13% CPA)

- Acidose lactique primitive

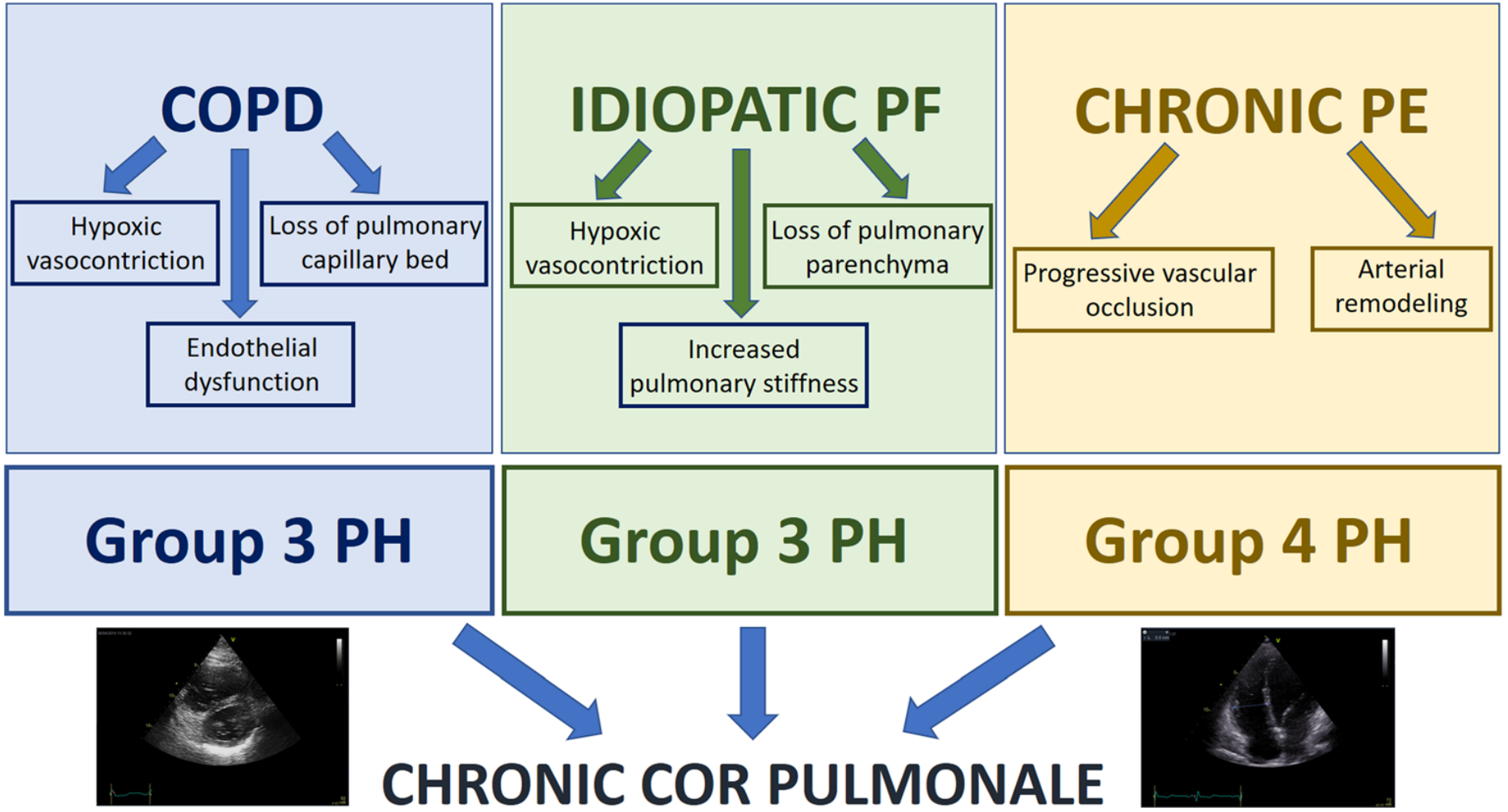
Associés à la ventilation mécanique (PP)

- Cardiomyopathie septique
- IDM étendu au VD
- Cardiopathies VD secondaires aux assistance coeur

Évènement intercurrent aigu sur HTP chronique

Torbicki et al. Eur Respir J 1999

Cœur Pulmonaire Chronique



Mandoli et al. Heart Failure Reviews 2021

Hémodynamique VD et Cœur Pulmonaire

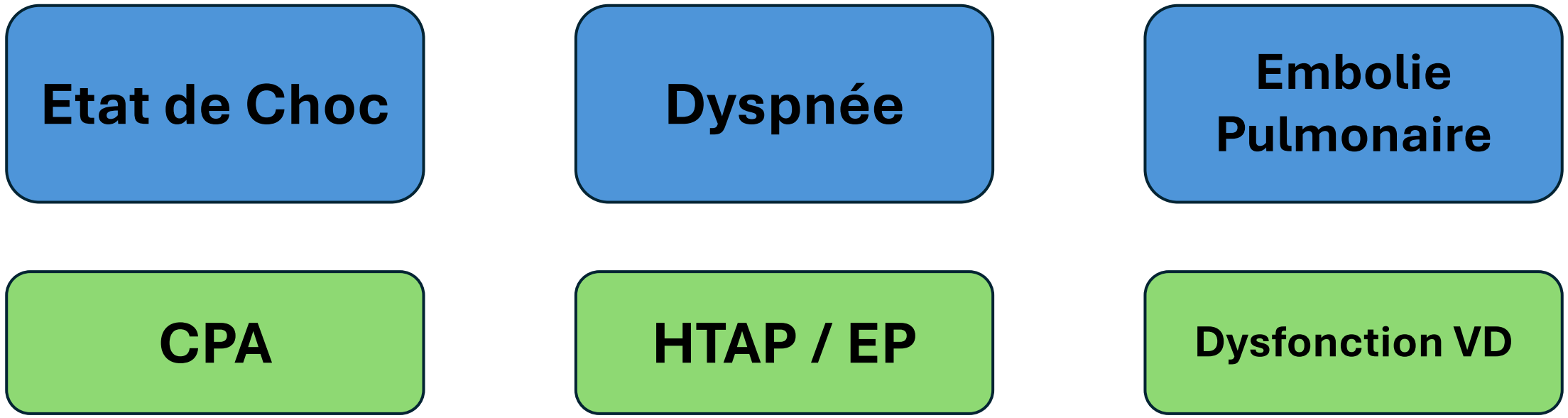
POURQUOI ?

JAMA Cardiology | Special Communication

Time to Add a Fifth Pillar to Bedside Physical Examination

Inspection, Palpation, Percussion, Auscultation, and Insonation

Jagat Narula, MD, PhD; Y. Chandrashekhar, MD; Eugene Braunwald, MD



JAMA Cardiology | Special Communication

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Etat de Choc

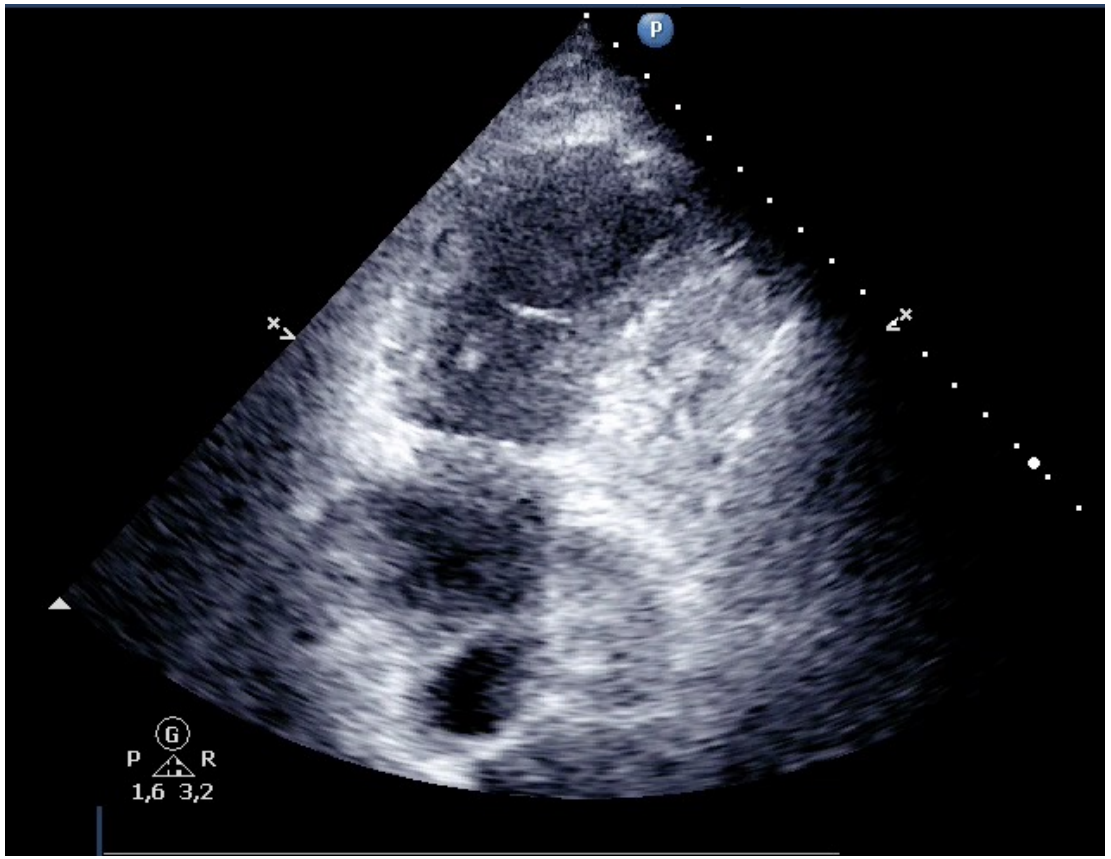
CPA

CHRONIQUE

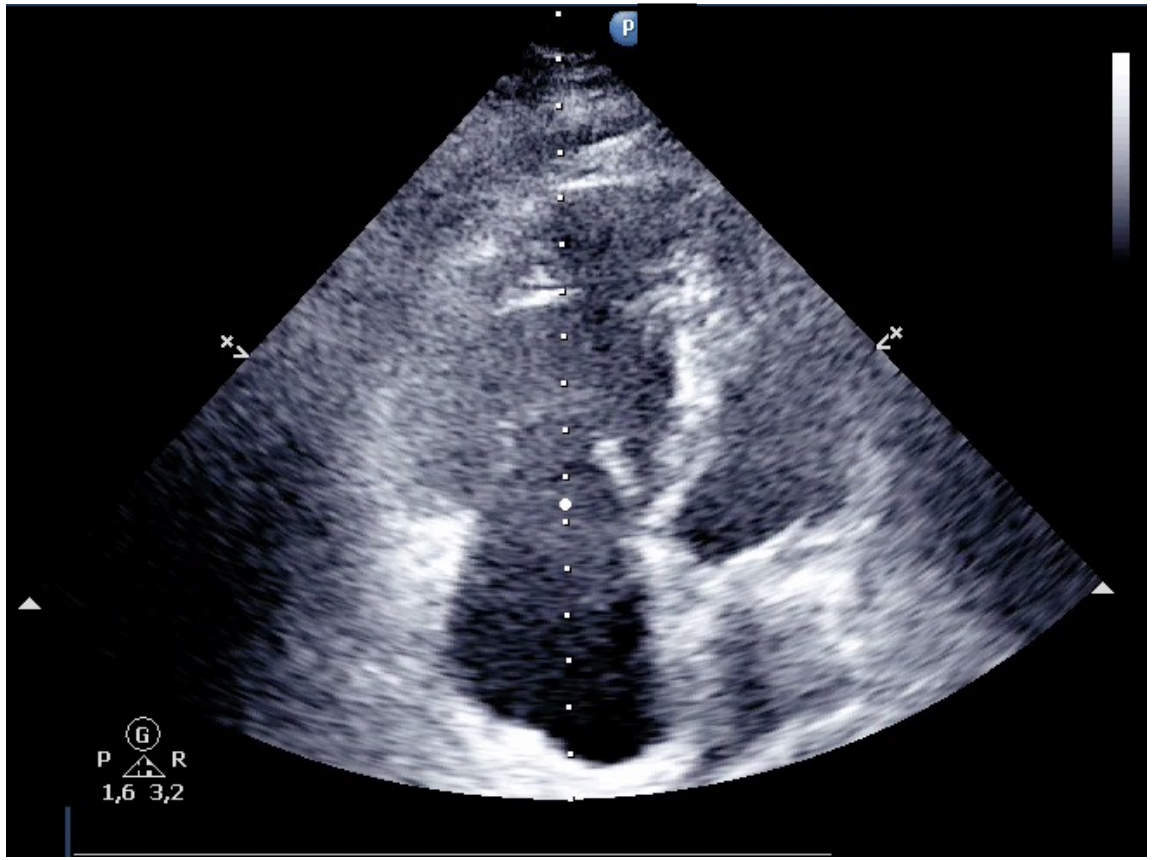
AIGUË

Cœur Pulmonaire

Etat de choc

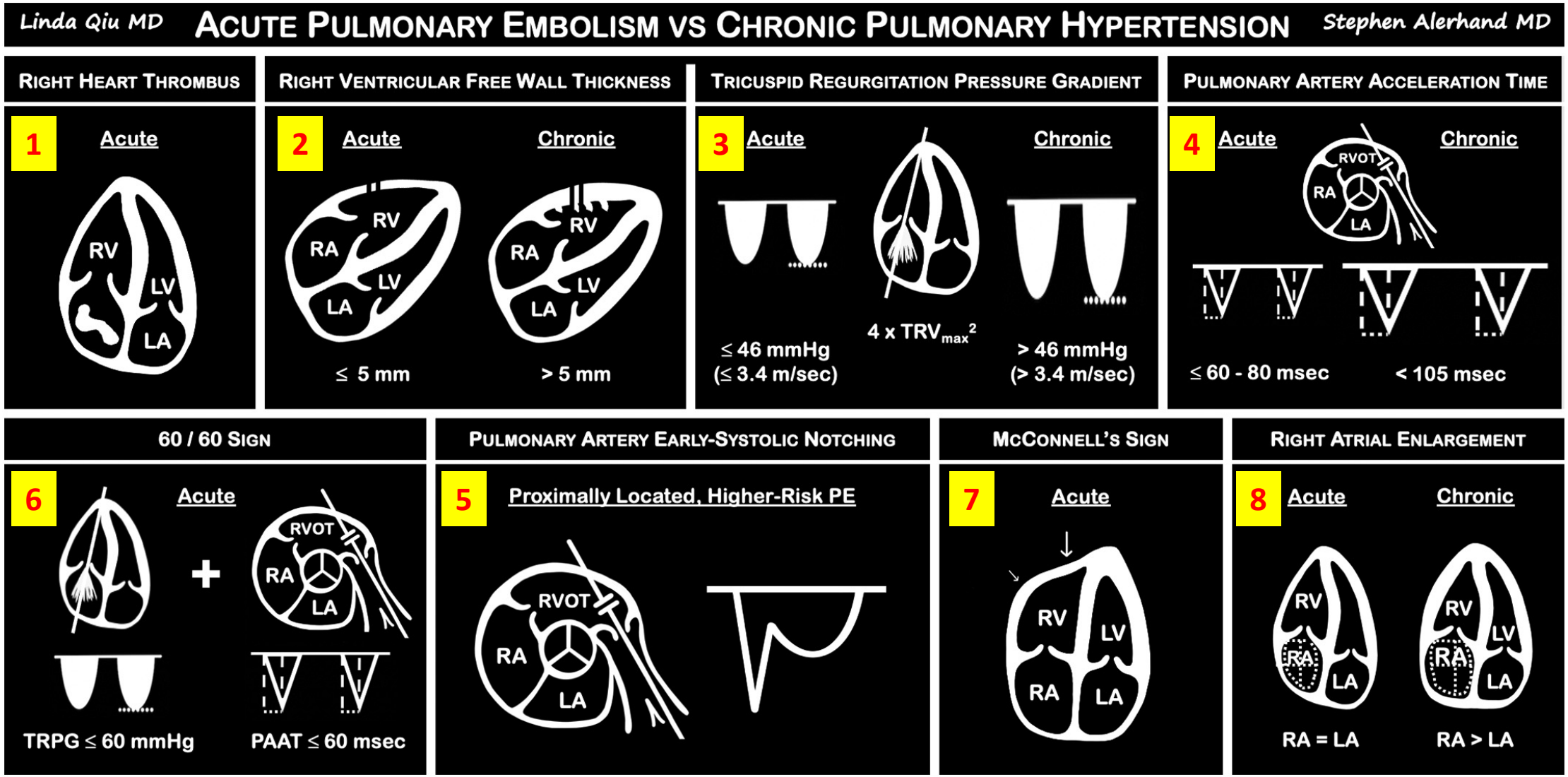


CHRONIQUE



AIGUE

Hypertension Pulmonaire Aiguë ou Chronique ??



Alerhand et al. AJEM 2023

1 - Thrombus intra-cavitaire droit

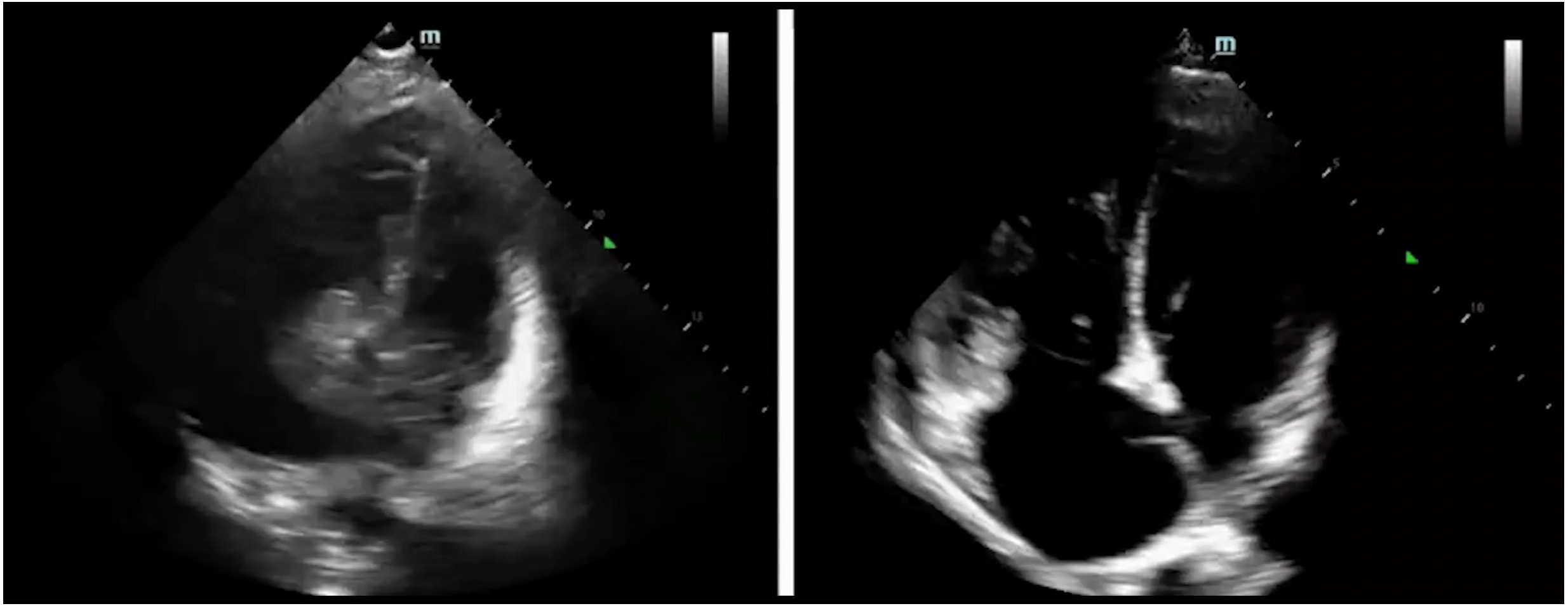
- Masse longue, fine, flottante et vermiforme
- Peut se déplacer au travers la valve tricuspide ou pulmonaire au cours du cycle cardiaque

- Sensibilité : 4,7 à 5 %
- Spécificité : 99 à 100 %
- HD instables : prévalence de 16 à 19%

Falster et al. Thorax 2022

Kurnicka et al. JASE 2016

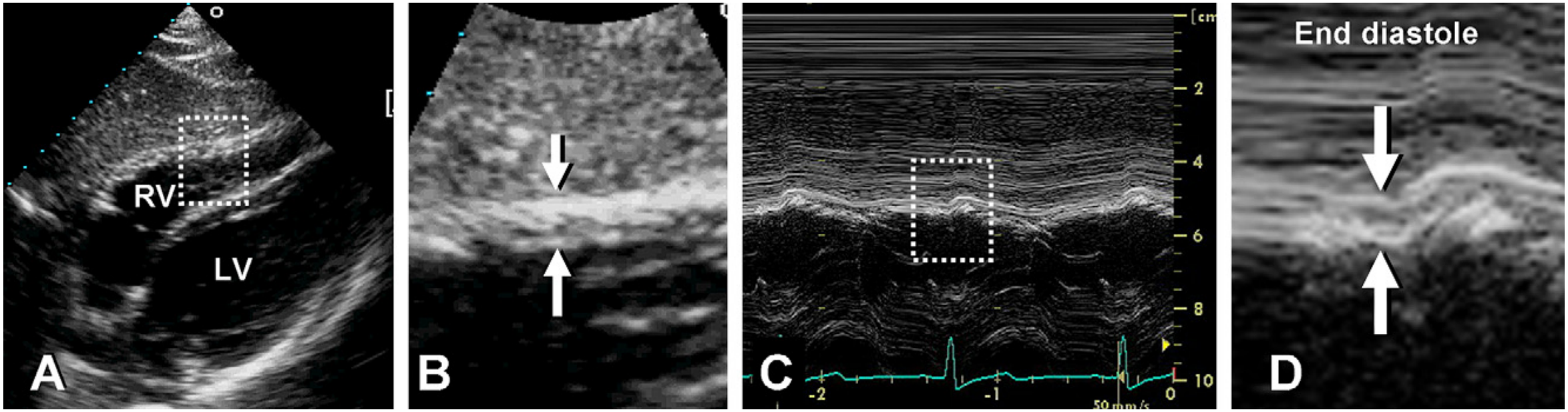
1 - Thrombus intra-cavitaire droit



Alerhand et al. AJEM 2023

1 - Thrombus intra-cavitaire droit

2 - Epaisseur de la paroi libre du VD



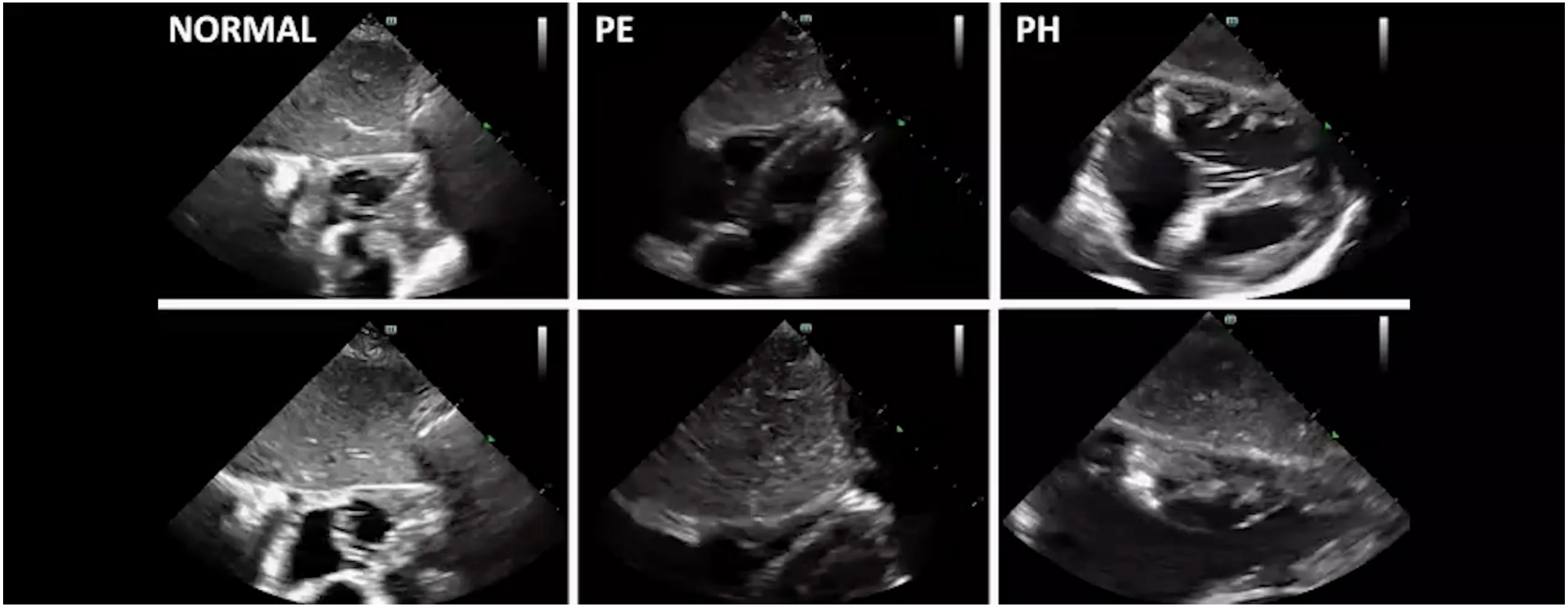
Epaisseur paroi VD < 6 mm

Loi de Laplace : stress mural = (P° ventriculaire x rayon) / (2 x épaisseur paroi)

Sensibilité : 90 à 93 %
Spécificité : 94 à 95 %

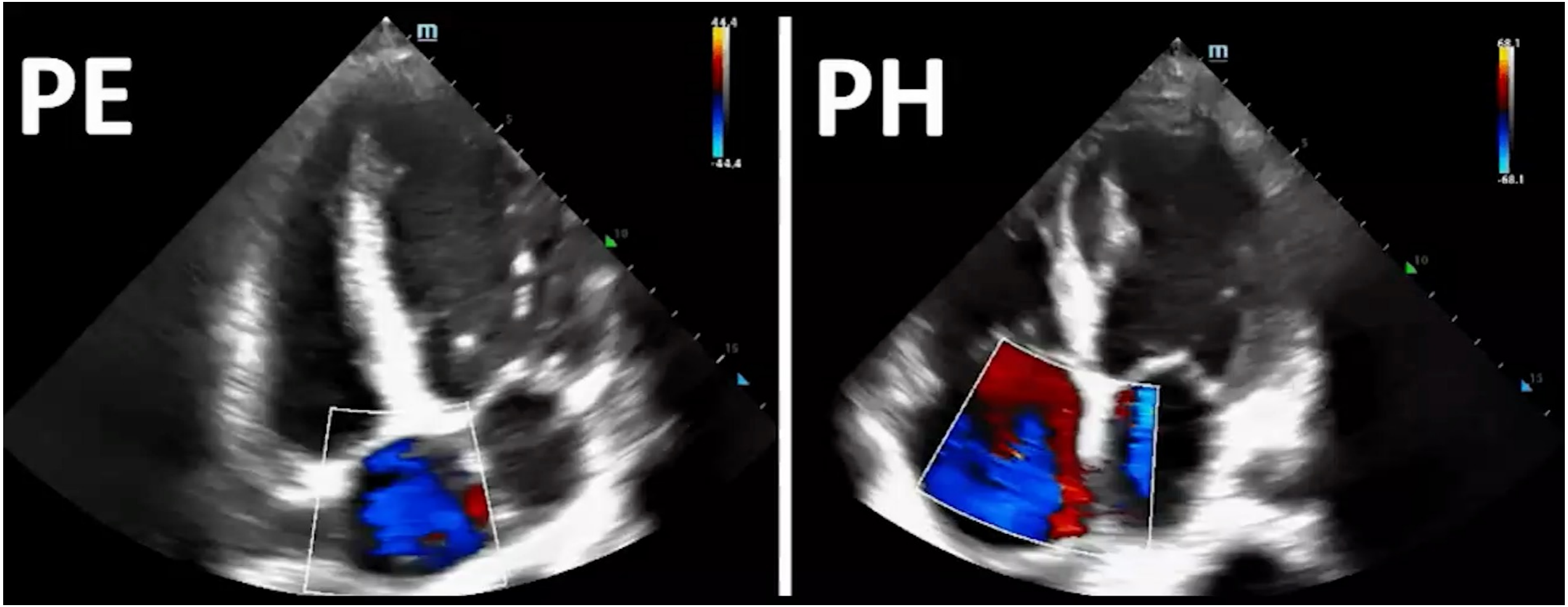
Rudski et al. JASE 2010

2 - Epaisseur de la paroi libre du VD

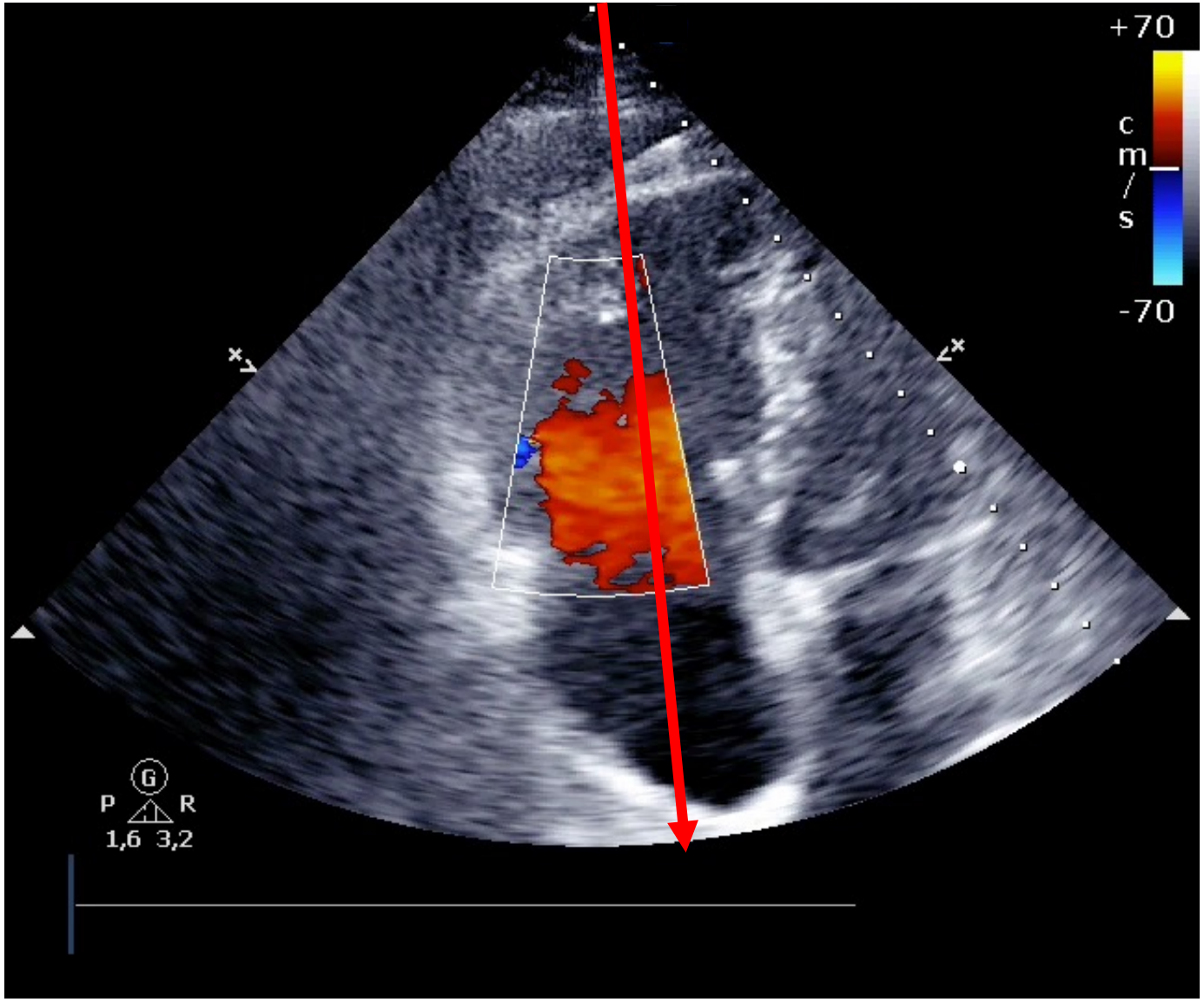


Alerhand et al. AJEM 2023

3 - Régurgitation Tricuspide



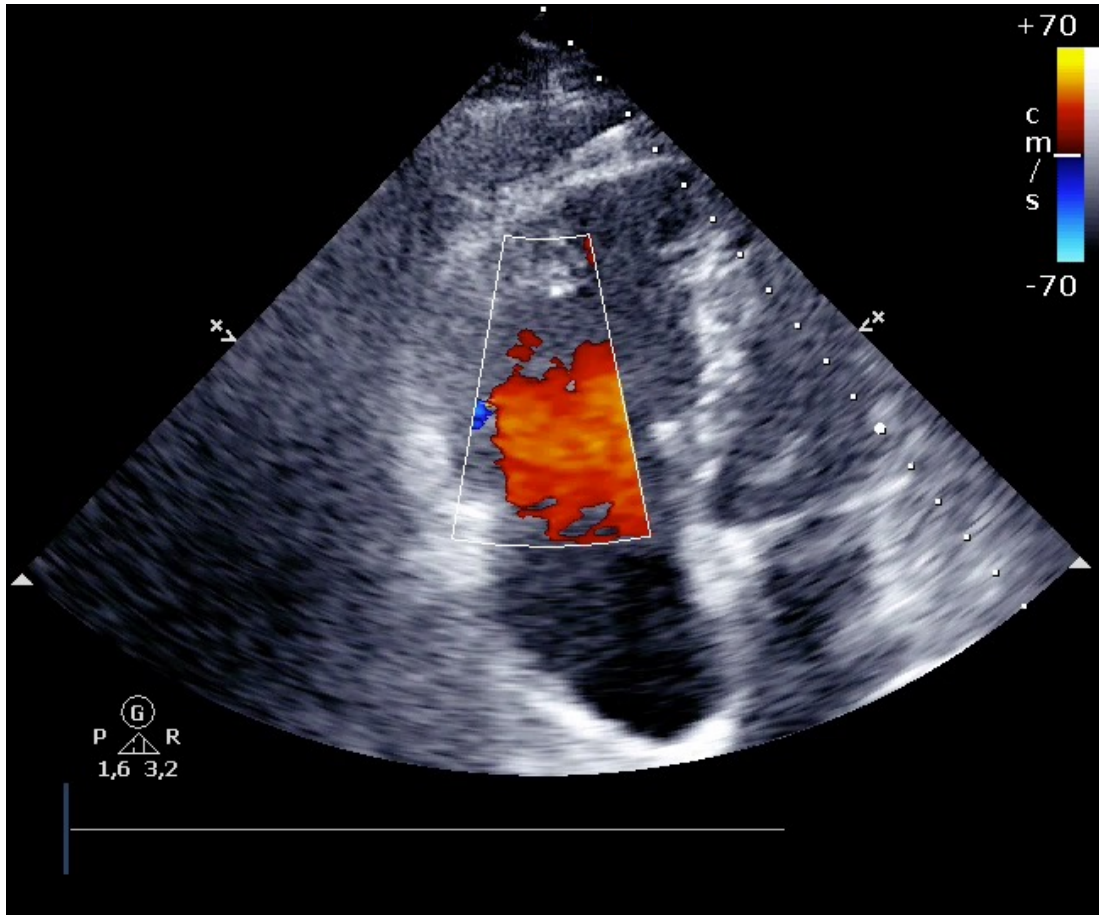
3 - Régurgitation Tricuspide



- Coupe apicale 4 cavités centrée sur VD
- **Doppler continu**

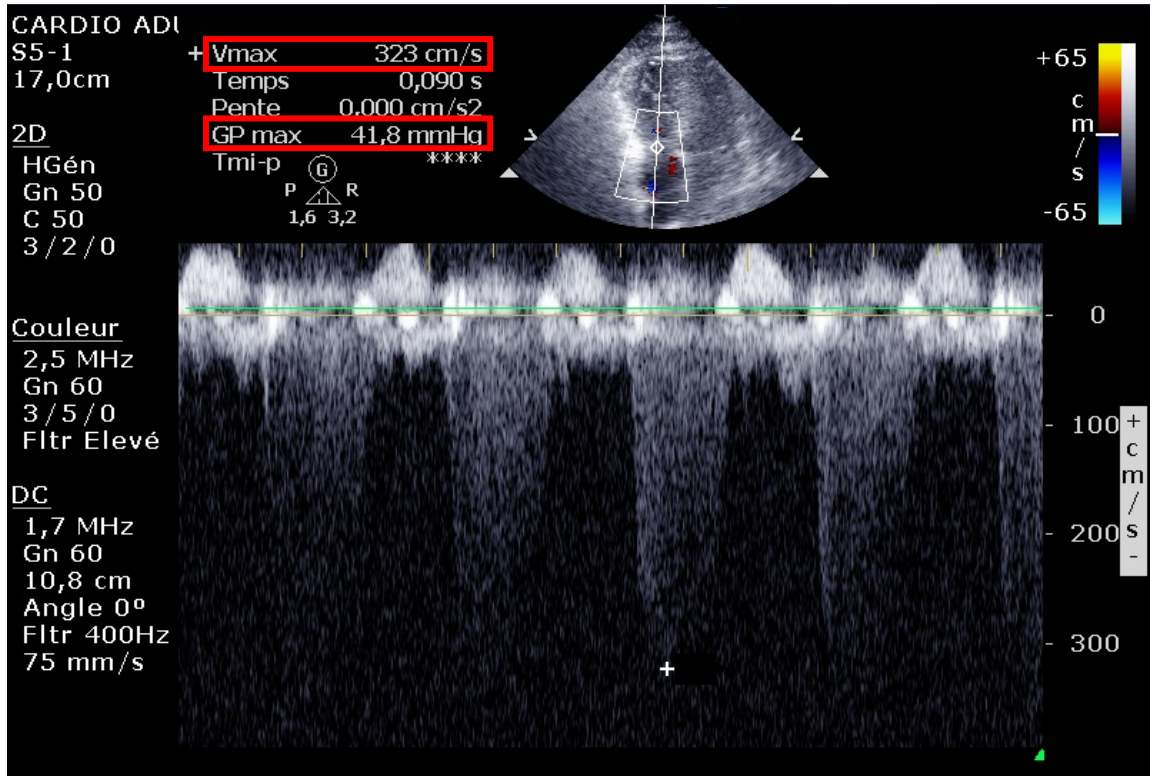
- Alignement parallèle de préférence
- Angle de 10° à 20° = sous-estimation de 2 à 6 %
- Angle de 30° à 45° = sous-estimation de 13 à 29%

3 - Régurgitation Tricuspide



Delta P = 4 x (Vmax IT)²

PAPs = Delta P + POD



3 - Régurgitation Tricuspide

Doppler Continu sur IT

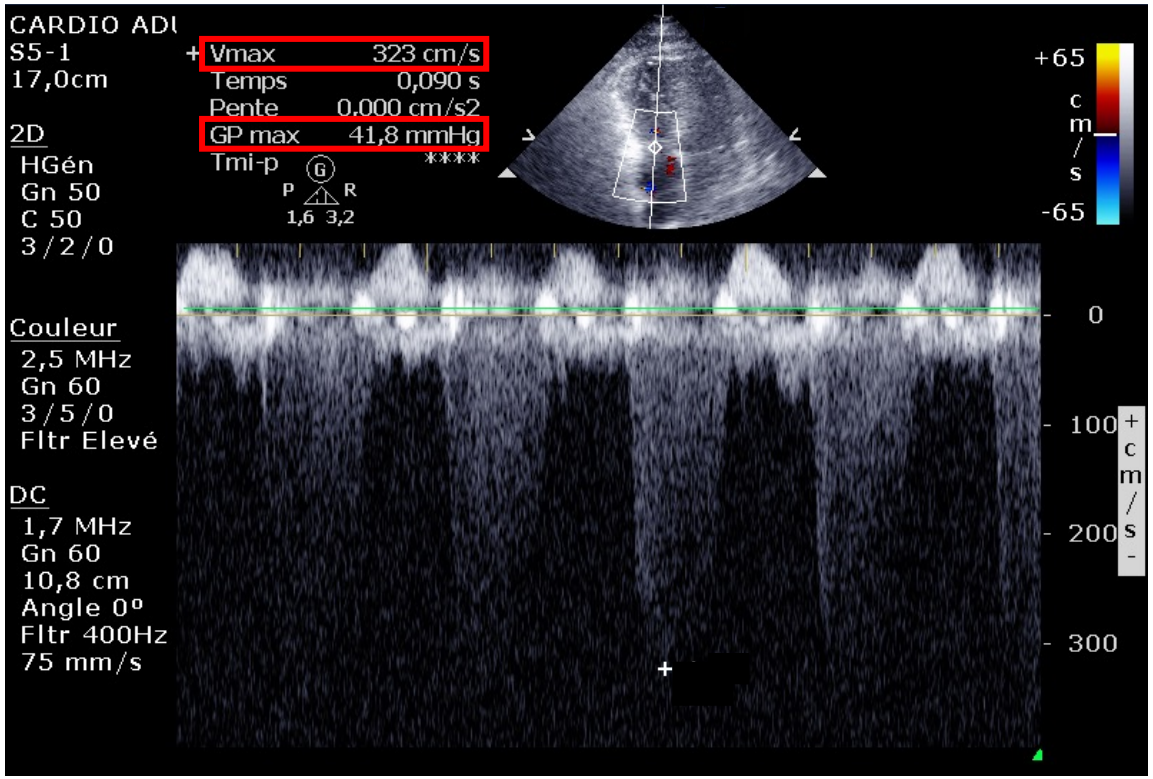
2 infos !

GP max

Vmax

Delta P = 4 x (Vmax IT)²

PAPs = Delta P + POD



3 - Régurgitation Tricuspide

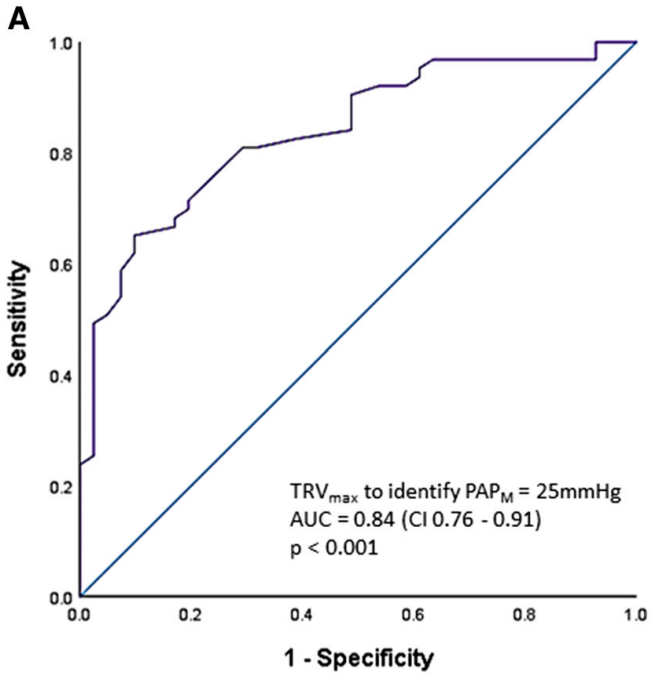
Delta P = 4 x (Vmax IT)²

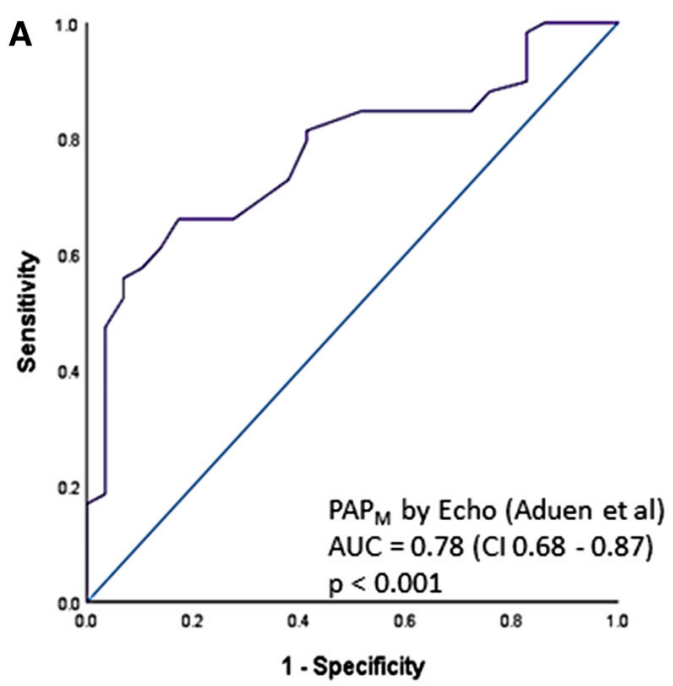
PAPs = Delta P + POD

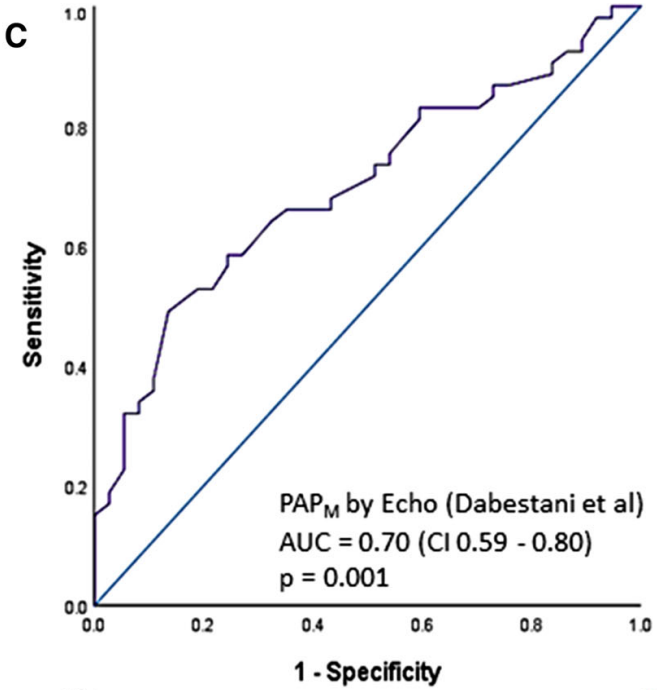
Diamètre de la VCi (mm)	Variations respiratoires de la VCi (%)	Valeur de POD (mmHg)
Bas < 15	Collapsus inspiratoire de 100%	5
Normal : 15-25	> 50 < 50	10 15
Elevé > 25	< 50 Absentes	20 > 20

Luthra et al. Echo made easy Anshan eds 2007
Wong et al. Practice of clinical echocardiography 2002
Brennan et al. JASE 2007

3 - Régurgitation Tricuspide







Method	Cut off	Sensitivity (%)	Specificity(%)	Positive predictive value (%)	Negative predictive value (%)
Aduen et al.	25 mm Hg	85	38	74	55
Chemla et al.	25 mm Hg	78	67	80	63
Dabestani et al.	25 mm Hg	83	35	63	61
Abbas et al.	25 mm Hg	48	84	86	43
TRV$_{max}$	2.8 m/sec	83	61	77	69

Björkman et al. Echocardiography 2021

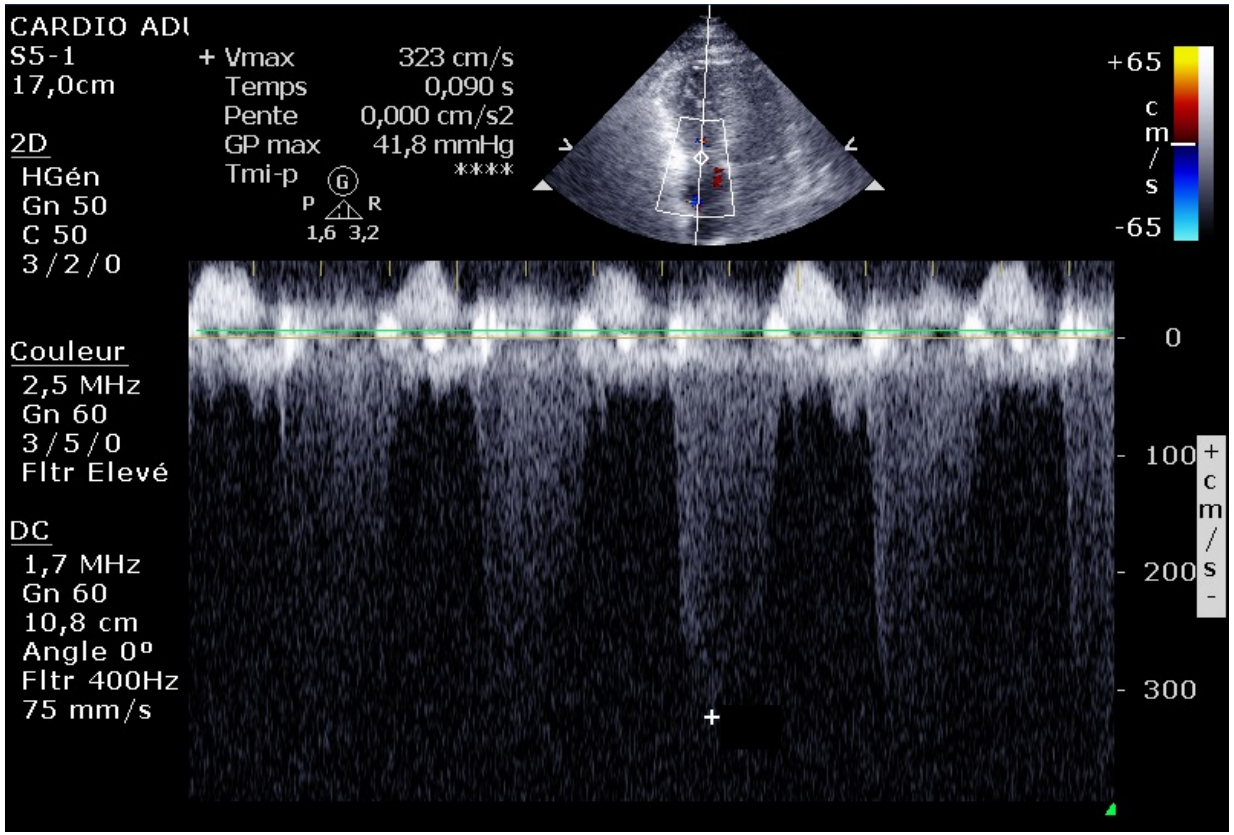
3 - Régurgitation Tricuspide

Doppler Continu sur IT

2 infos !

GP max

Vmax



HTP

GP max > 31 – 33 mmHg

Vmax IT > 2,8 à 2,9 m/s

ESC/ERS Guidelines HTP 2022

3 - Régurgitation Tricuspide

HTP

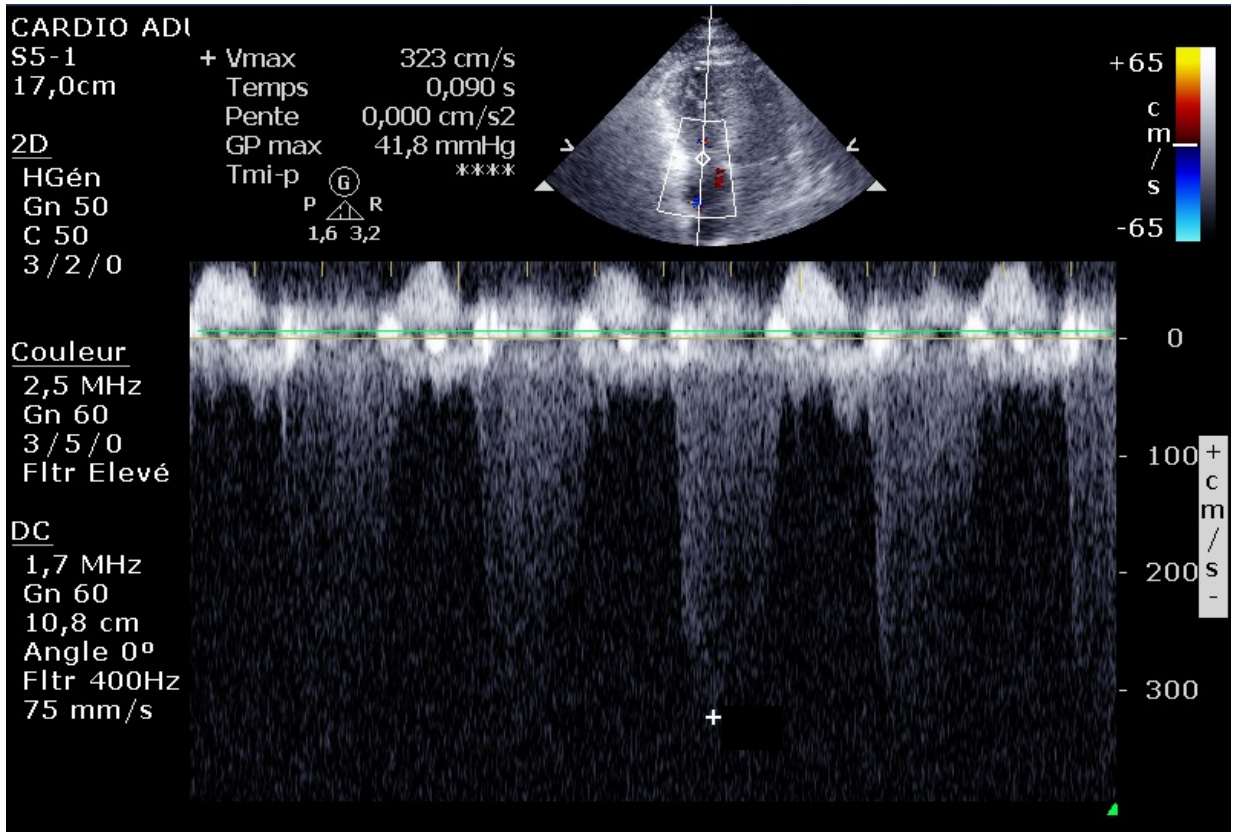
GP max > 31 – 33 mmHg

Vmax IT > 2,8 à 2,9 m/s

HTP chronique

GP max > 46 mmHg

Vmax IT > 3,4 m/s



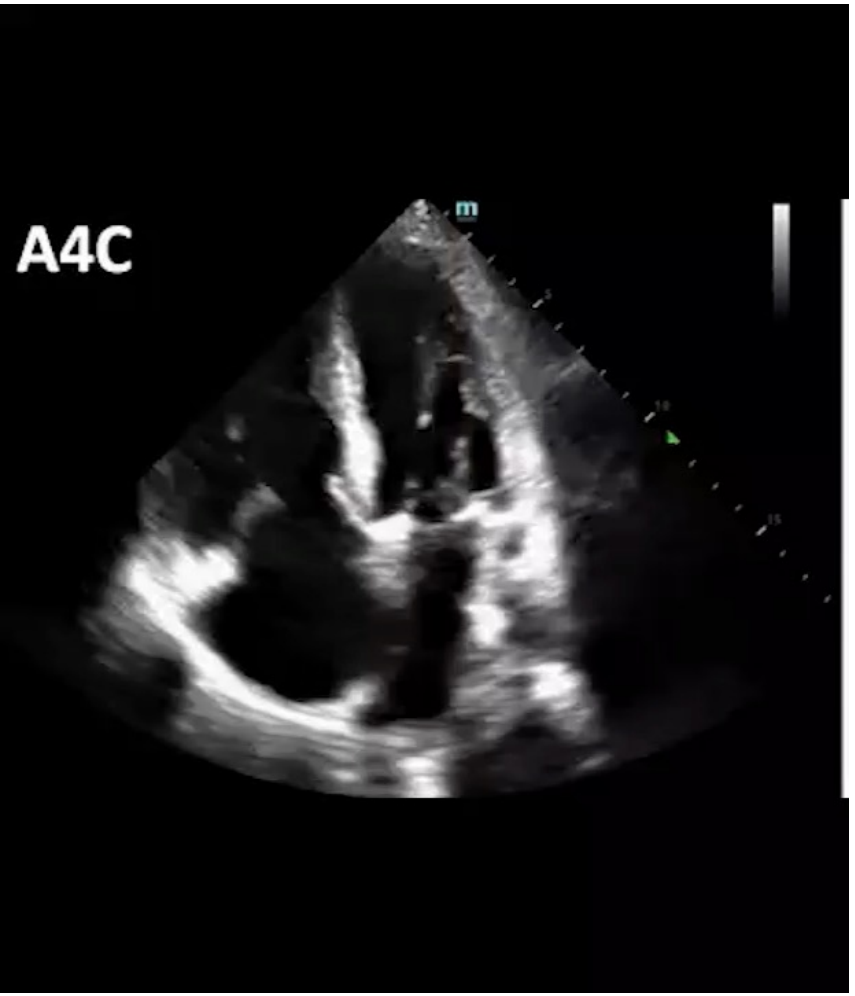
ESC/ERS Guidelines HTP 2022

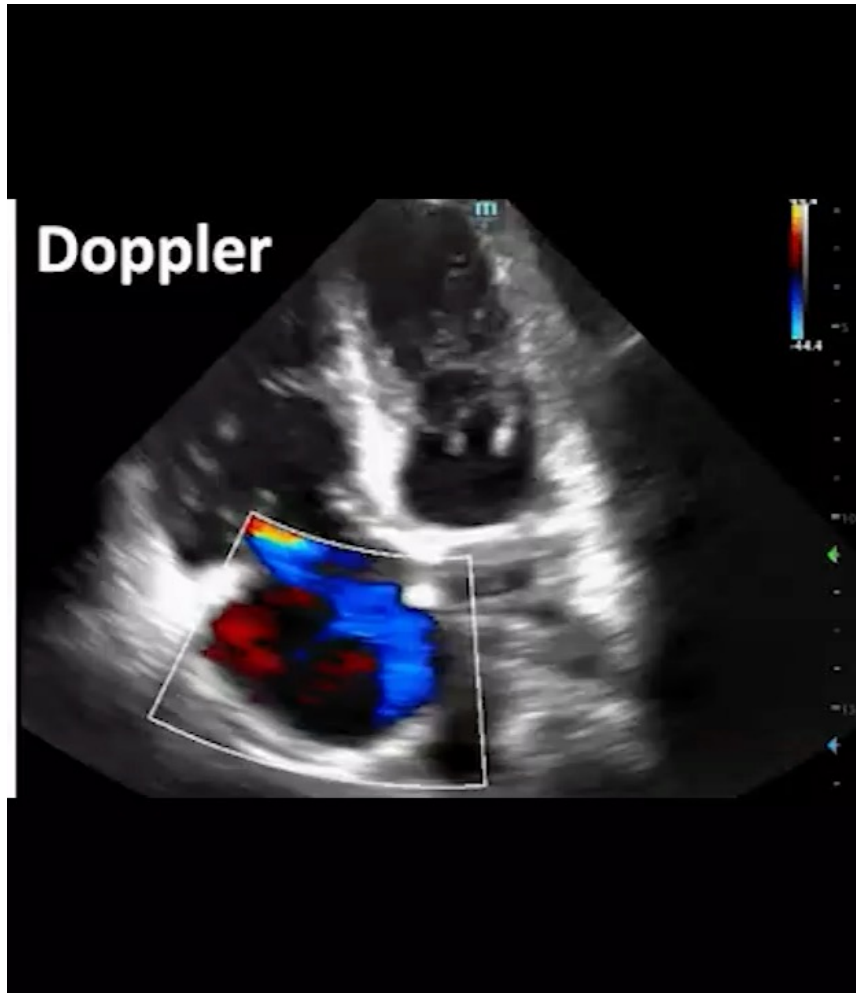
- Femme de 70 ans
- ATCD : insuffisance cardiaque
- MdH : asthénie
- Constantes :
  - PA 90/47 ;
  - FC 63 bpm ;
  - FR 17 / min ;
  - spO2 93% AA ;
  - T° = 38
- Radio Thorax : pneumonie lobe inférieur droit

➢ Expansion volémique

➢ Antibiothérapie probabiliste

Beckman et al. AJEM 2024

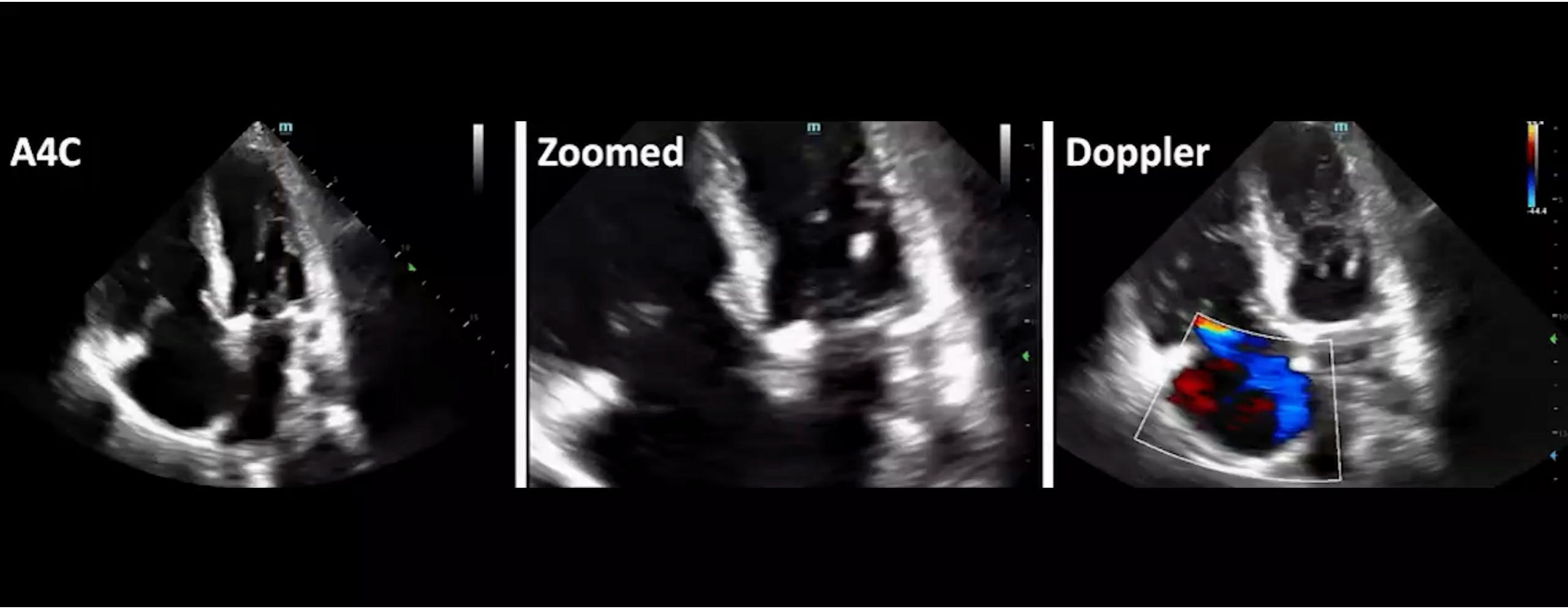




Vmax IT = 1,2 m/s

GP max = 5,8 mmHg

Beckman et al. AJEM 2024



Vmax IT = 1,2 m/s

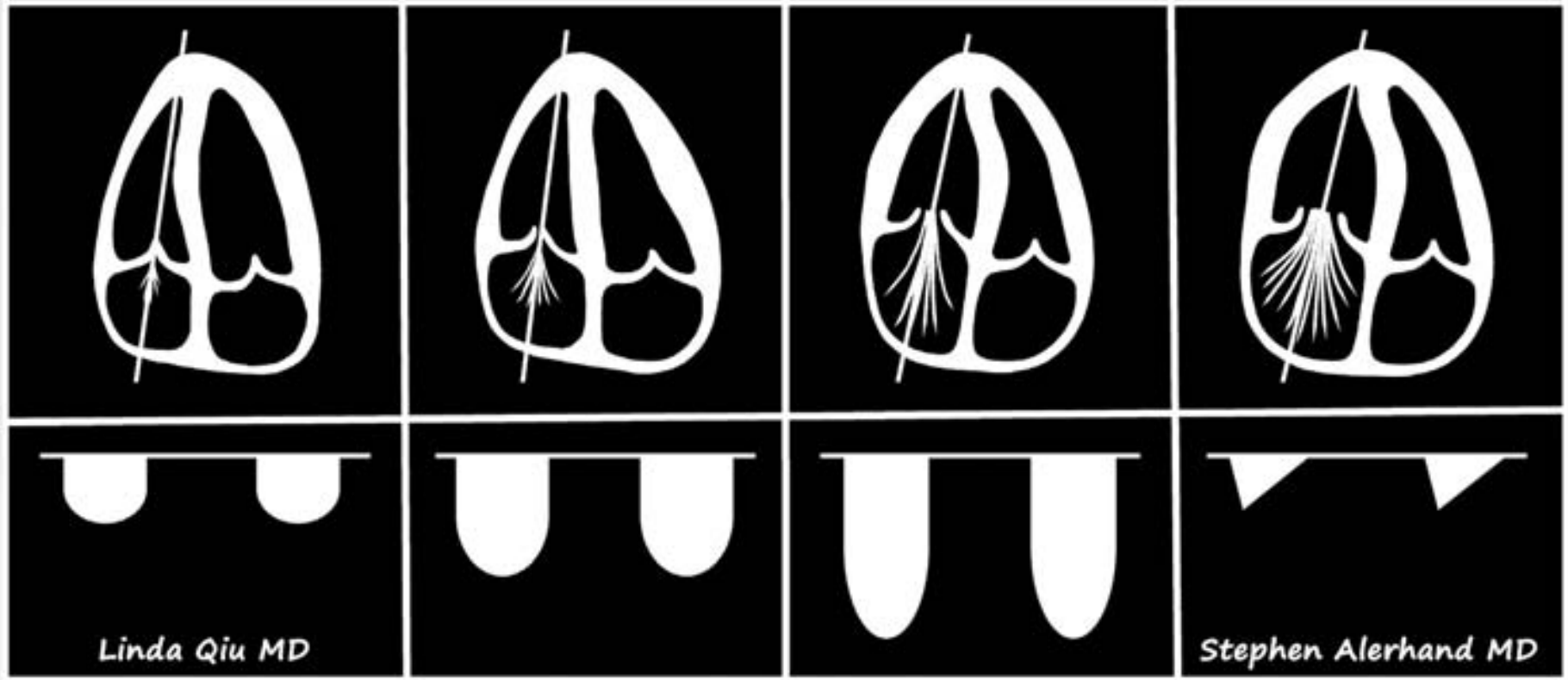
GP max = 5,8 mmHg

Beckman et al. AJEM 2024

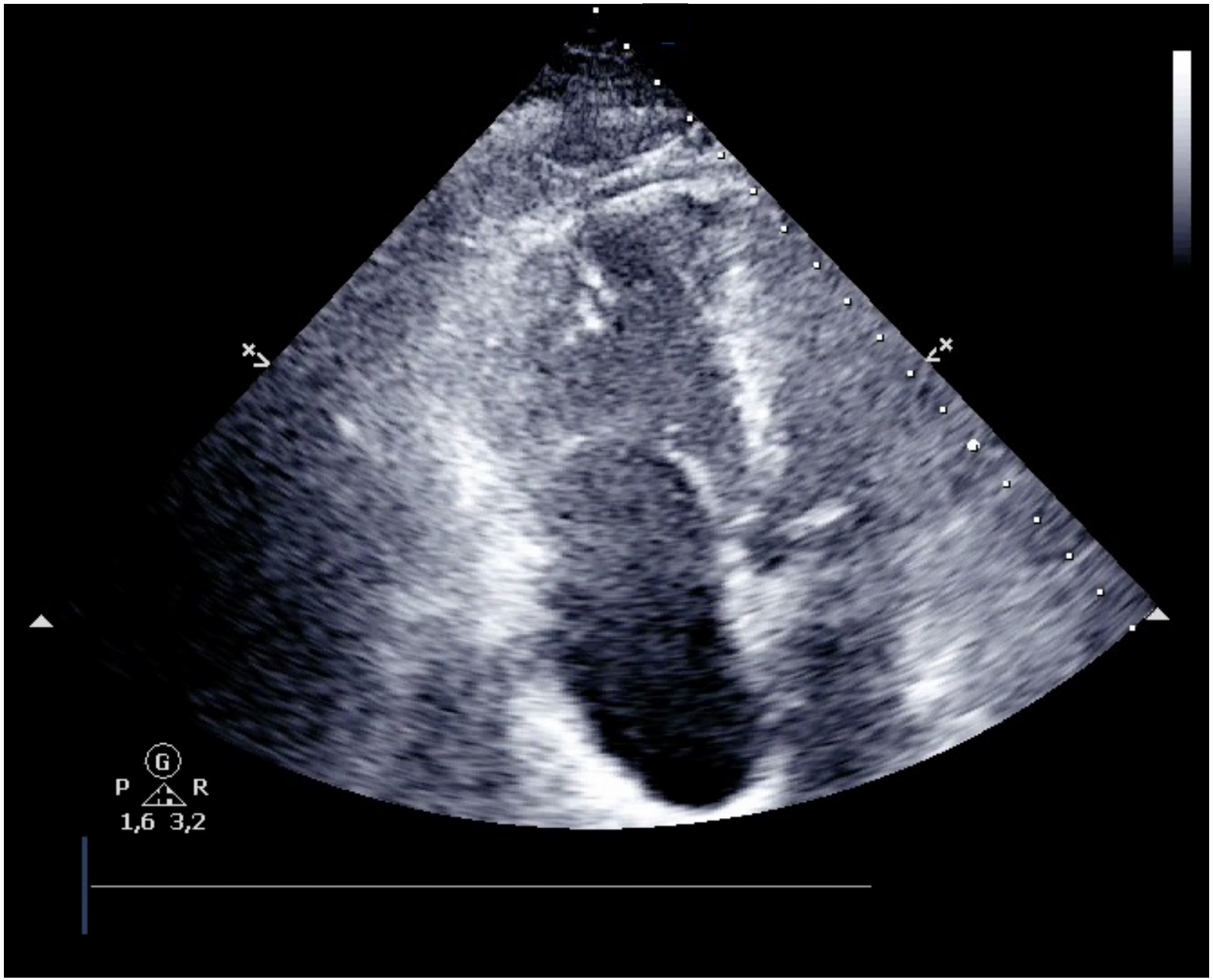
Right Ventricular Dysfunction Severity

Based on TR Jet Morphology, TRV_{MAX}, and TRPG

Normal	Moderate	Severe	Wide-Open
< 2.8 – 2.9 m/s < 31.4 - 33.6 mmHg	> 2.9 – 3.6 m/s < 33.7 – 51.9 mmHg	> 3.6 m/s ≥ 52.0 mmHg	< 2.5 m/s < 25 mmHg



7 - signe de McConnell



Embolie Pulmonaire

Sensibilité : 22 à 29 %

Spécificité : 97 à 99 %

Falster et al. Thorax 2022

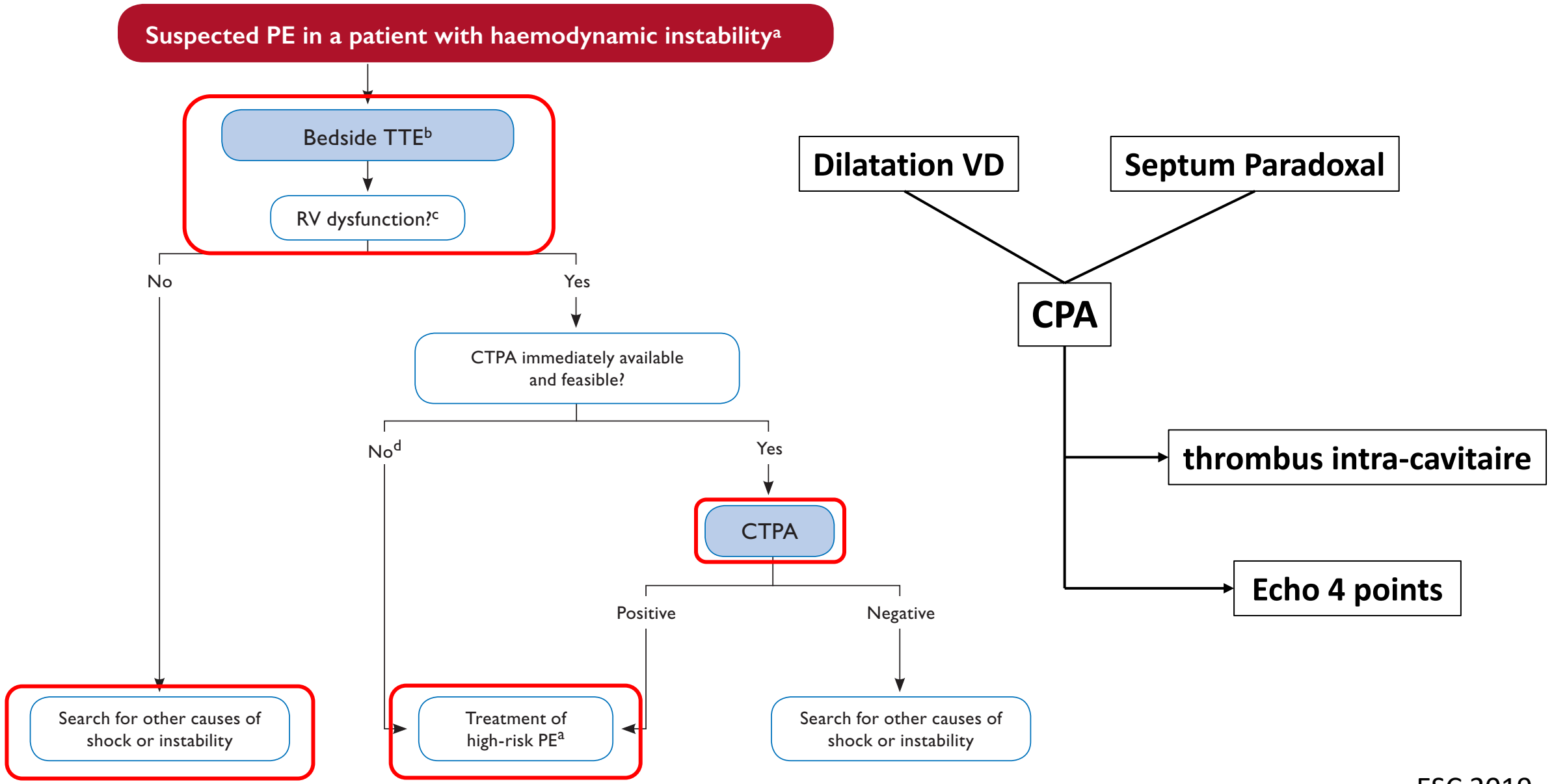
Cœur Pulmonaire Aigu

Diagnostics principaux

- Embolie Pulmonaire
- Pneumopathie hypoxémiante
- Syndrome de Détresse Respiratoire Aigue
- Iatrogène = Ventilation mécanique

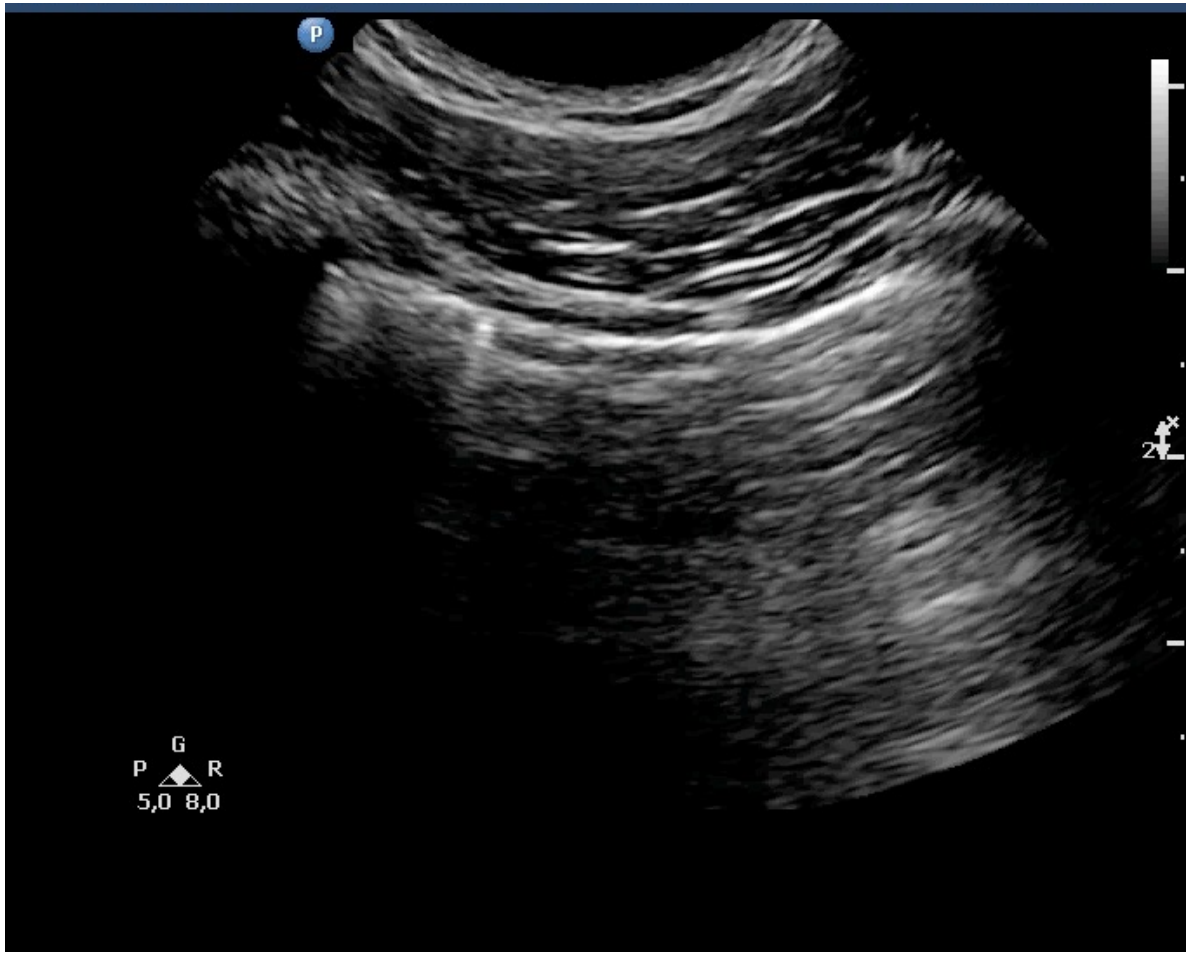
ESC Acute Pulmonary Embolism 2019

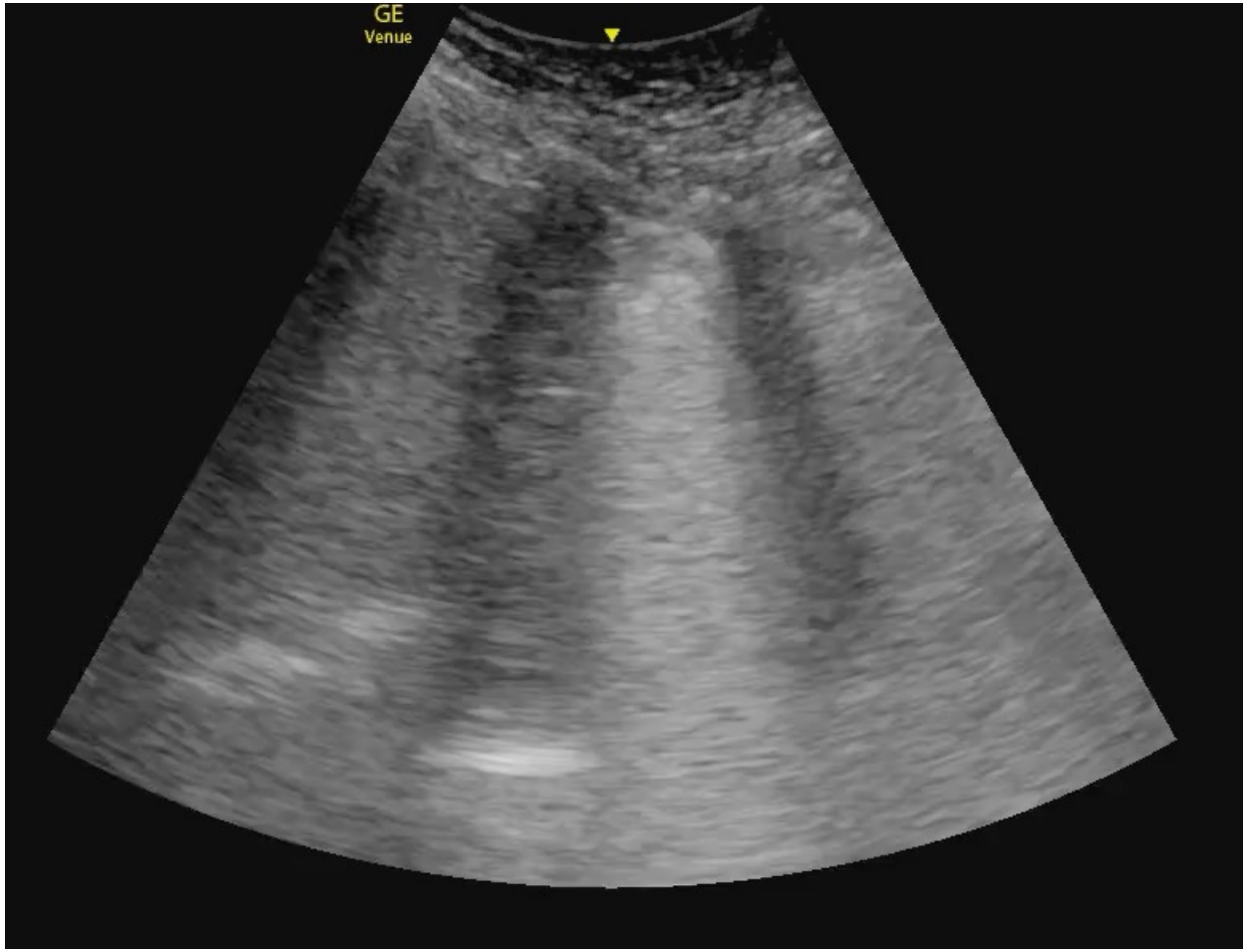
Echo et embolie pulmonaire : Etat de Choc



ESC 2019

Echo et embolie pulmonaire : Etat de Choc





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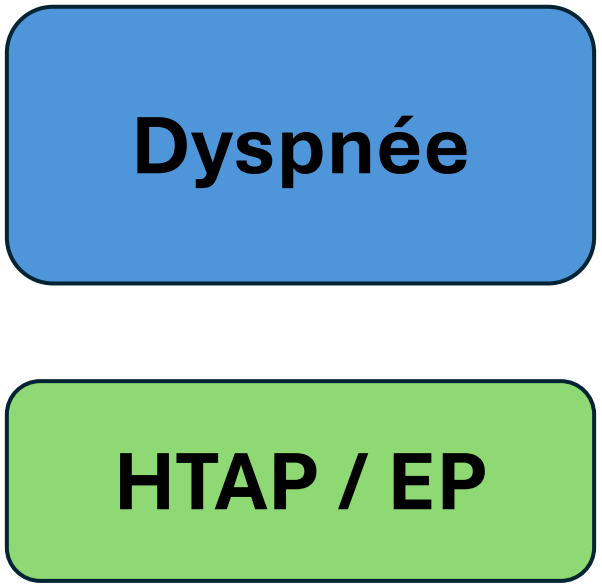
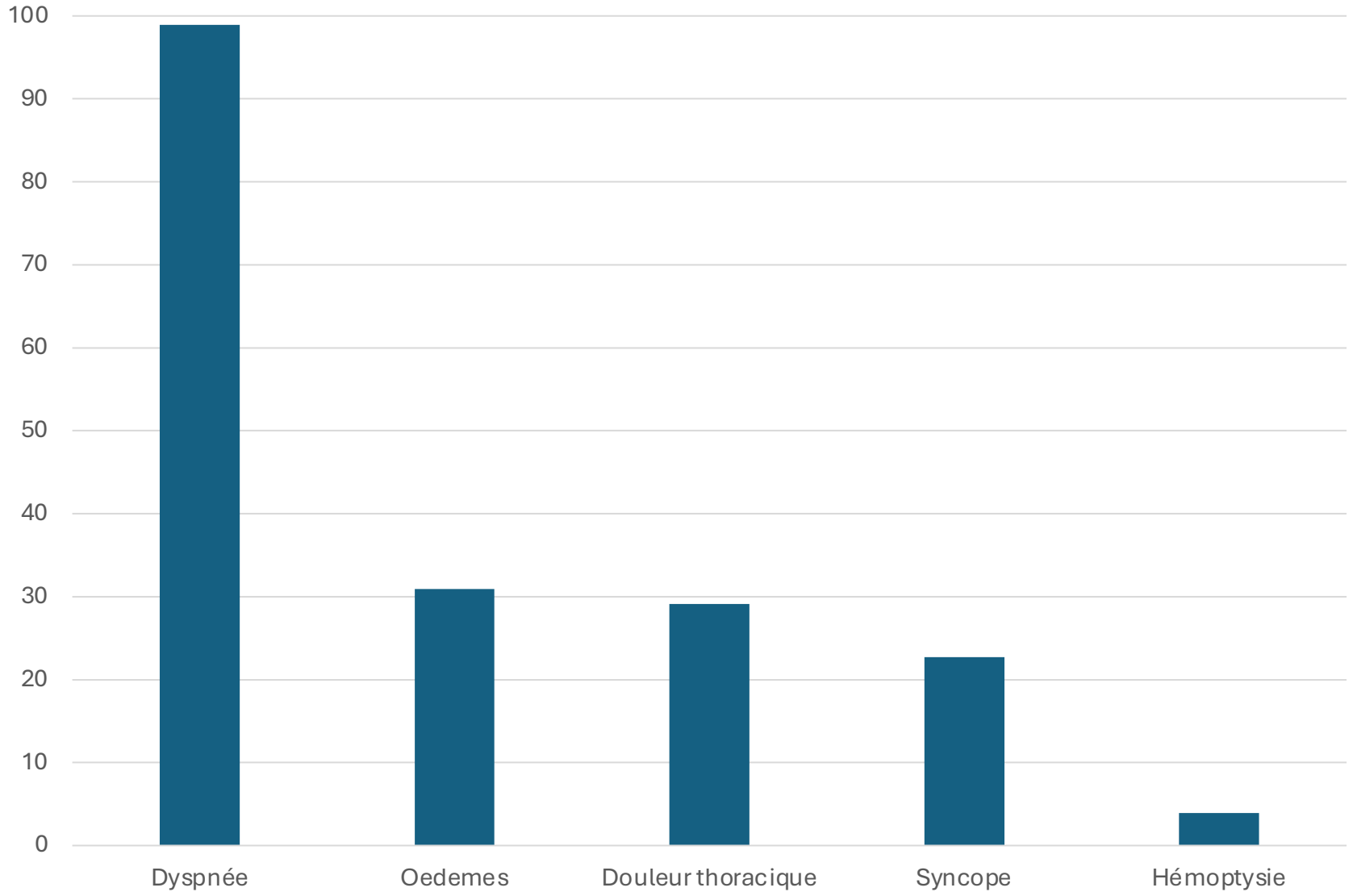
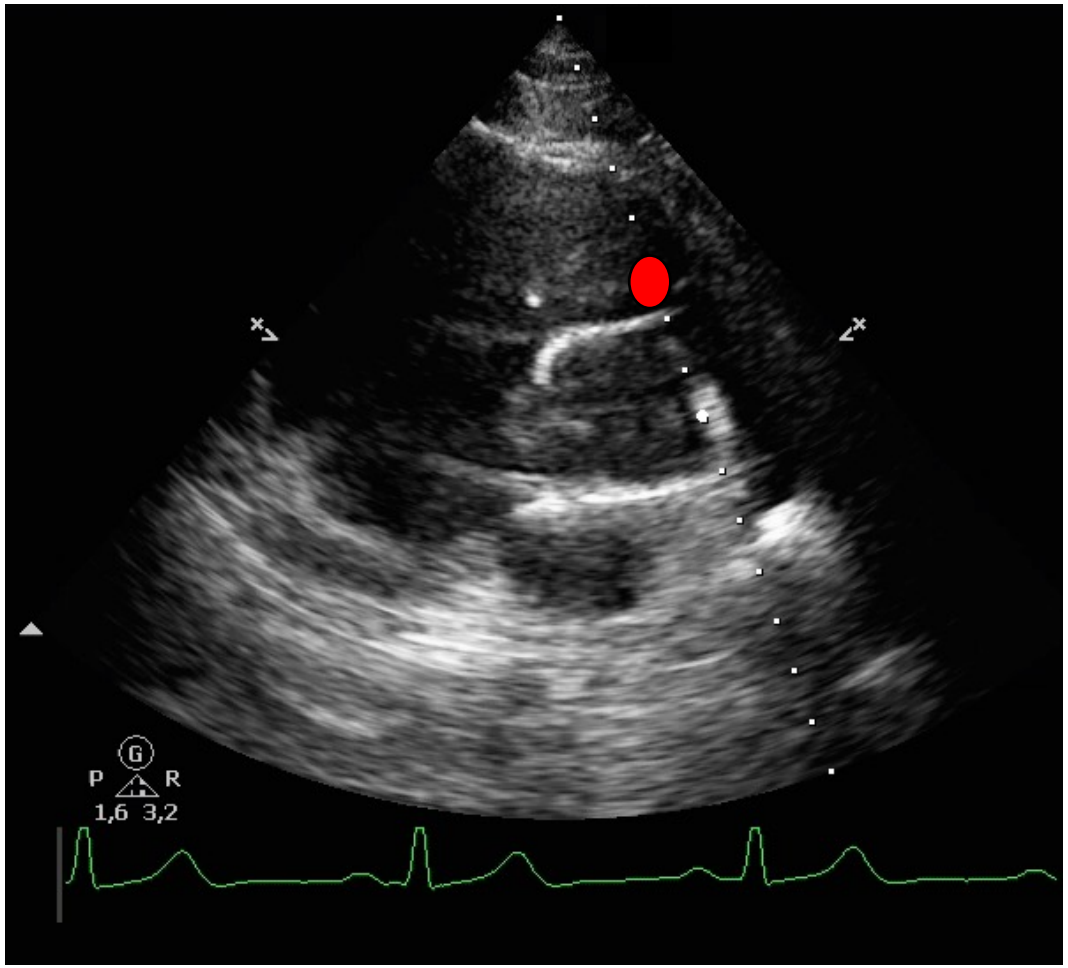


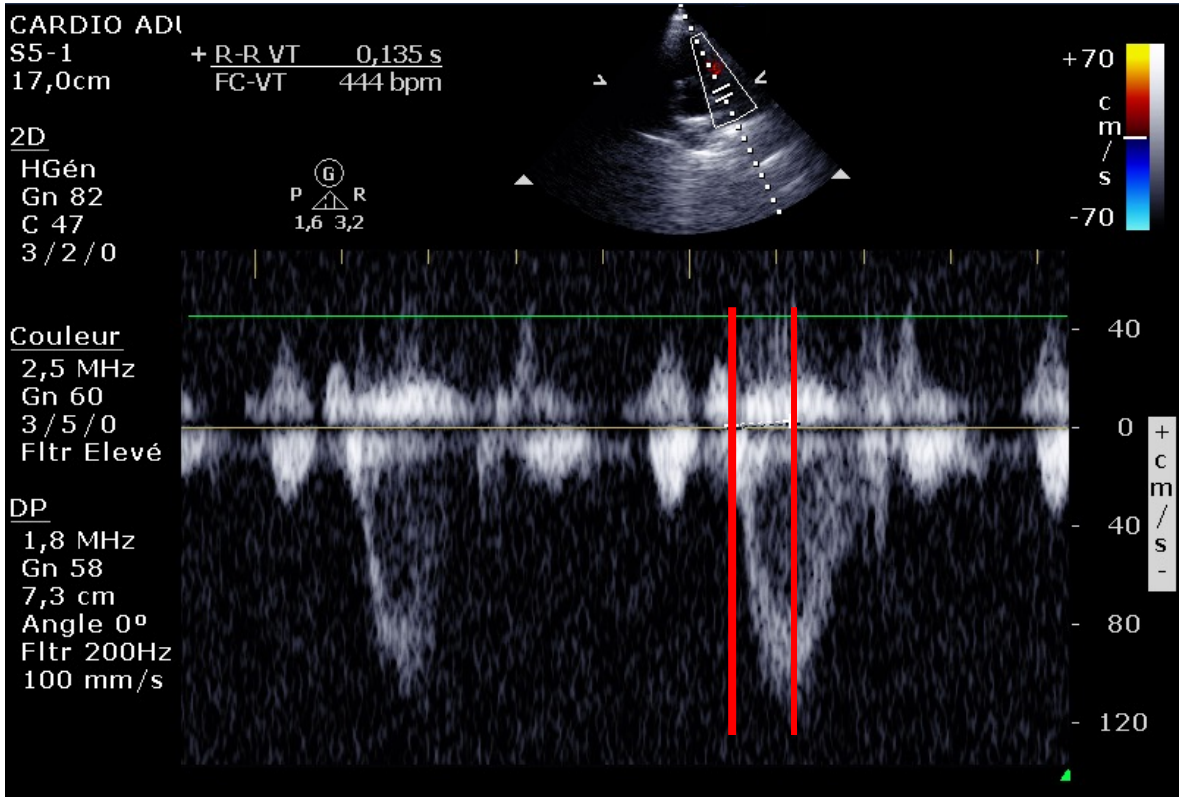
HTAP et Dyspnée



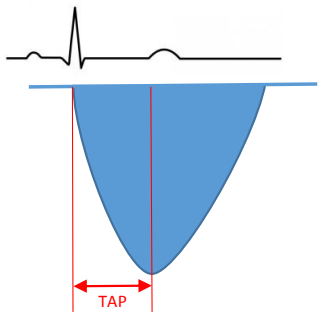
Ling et al. Am J Respir Crit Care Med. 2012

Flux d’éjection pulmonaire

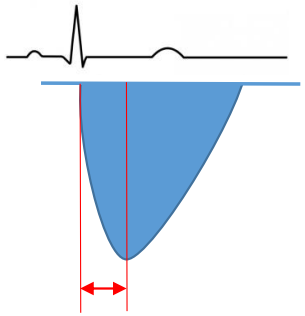




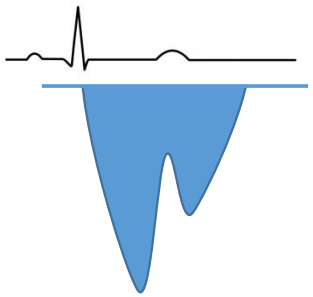
Flux d'éjection pulmonaire



Flux normal



HTAP modérée



HTAP sévère

Flux pulmonaire

- normal = en dôme, pic mésosystolique
- HTP = pic précoce ou dédoublé

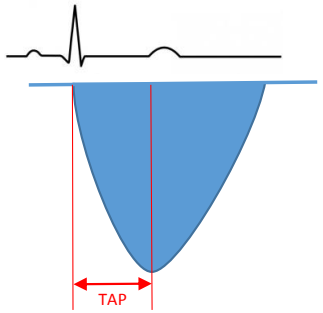
TAP = Temps d'Accélération Pulmonaire = Tacc

- normal = 120 à 160 ms
- HTP si ≤ 100 ms
- HTP sévère si < 60 ms

Intérêt pour **VPN +++**

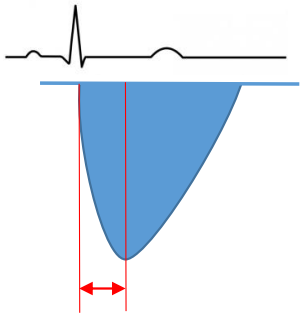
Dabestani et al. Am J Cardiol 1987

Flux d'éjection pulmonaire



Flux normal

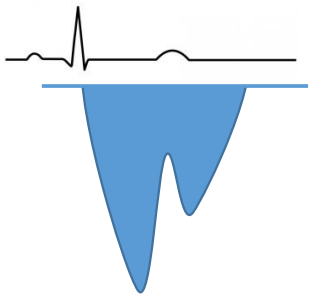
HTP = Tacc < 100 ms



HTAP modérée

HTP chronique = Tacc < 105 ms

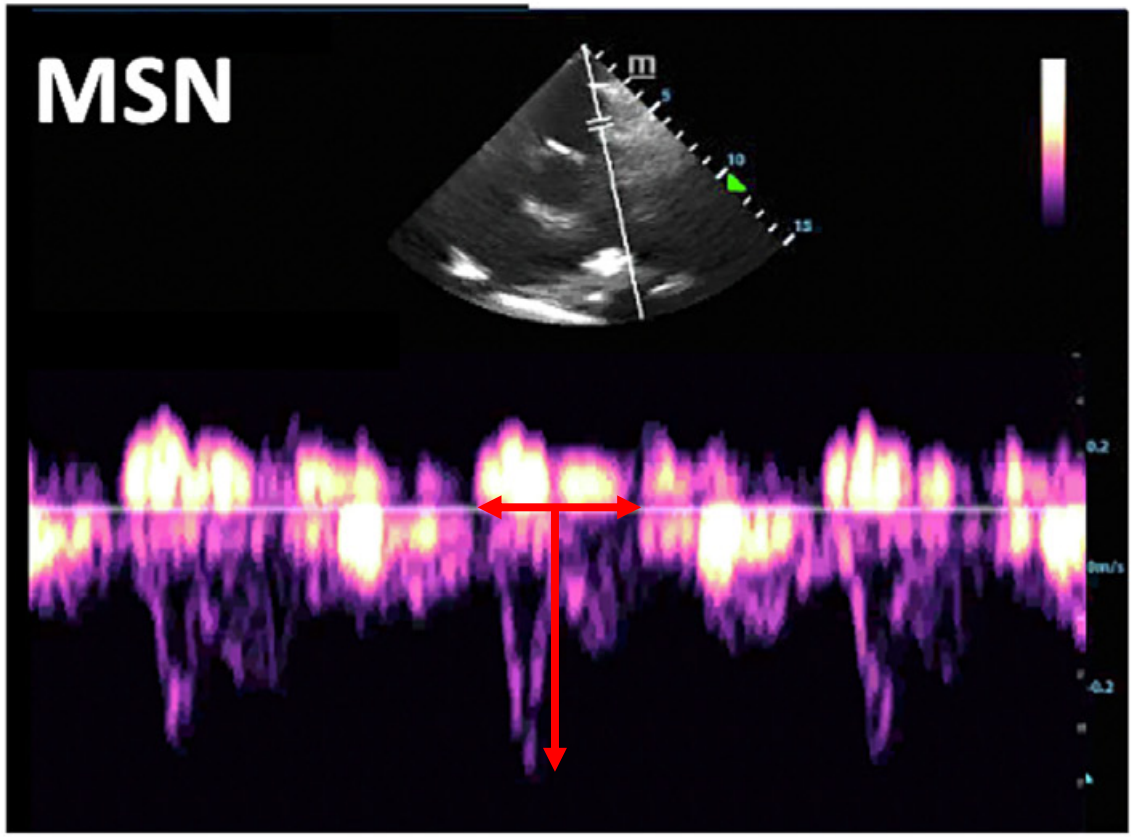
HTP aiguë = Tacc ≤ 60 – 80 ms

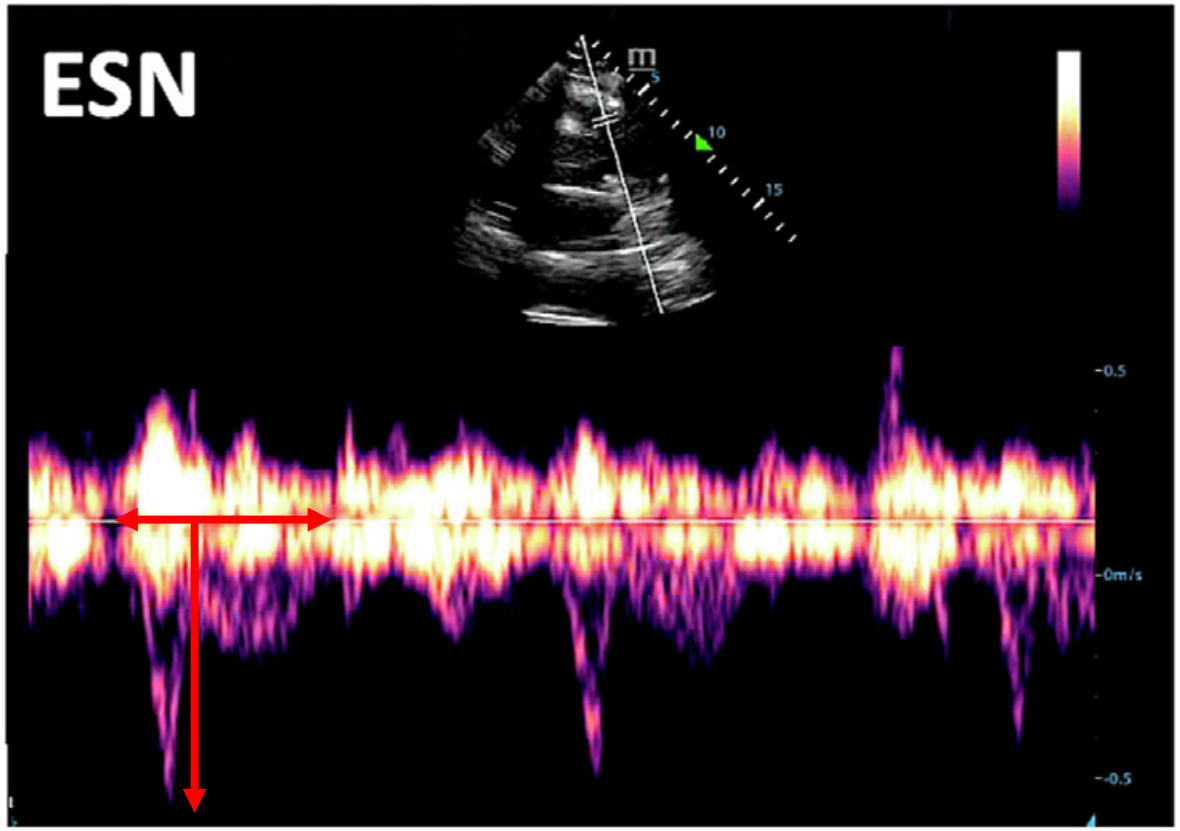


HTAP sévère

Dabestani et al. Am J Cardiol 1987

Spike-and-dome





EP à faible risque (périphérique)

HTP chronique

EP à haut risque (proximale)

Embolie Pulmonaire
Sensibilité : 34 à 75 %
Spécificité : 99 à 100 %

EP à haut risque
Sensibilité : 69 à 97 %
Spécificité : 90 à 99 %

Alerhand et al. AJEM 2023

Echo et embolie pulmonaire : Patient stable

Echo et embolie pulmonaire : Patient stable

Variable	All (n=232)	PE (n=51)	Non-PE n=181)	*P* value
EF %	57.8 ± 6	58.7 ± 3	57.6 ± 7	0.2
LA Volume	71.9 ± 41	60.5 ± 32	75.2 ± 43	0.01
RA area	17 ± 6	17 ± 7	17 ± 6	0.8
LVEDD cm	4.7 ± 0.7	4.7 ± 0.7	4.7 ± 0.7	0.8
LVESD cm	2.8 ± 0.7	2.7 ± 0.7	2.8 ± 0.7	0.5
LV mass gr	177 ± 74	175 ± 70	177 ± 75	0.9
Stroke volume cc	47.4 ± 18	45.7 ± 14	47.9 ± 18	0.4
Stroke volume index	26.1 ± 9	25.0 ± 6	26.3 ± 9	0.3
E'	5.9 ± 2.1	5.5 ± 2.8	6.1 ± 1.8	0.6
E wave	0.84 ± 0.31	0.74 ± 0.22	0.86 ± 0.32	0.006
A wave	0.82 ± 0.24	0.85 ± 0.21	0.81 ± 0.25	0.5
E/A ratio	1.1 ± 0.7	0.9 ± 0.4	1.16 ± 0.7	0.008
SPAP mmHg	37 ± 18	40 ± 20	37 ± 17	0.4
RIMP	0.37 ± 0.2	0.4 ± 0.3	0.4 ± 0.3	0.7
RV end diastolic area cm2	15.5 ± 5	15.5 ± 5	15.5 ± 5	0.9
RV end systolic area cm2	9.3 ± 4	9.2 ± 4	9.2 ± 5	0.9
RV fractional area change	42 ± 11	42 ± 11	42 ± 12	0.7
Declaration time, msec	200 ± 64	190 ± 65	204 ± 63	0.2
PA diameter	2.6 ± 2	2.5 ± 0.4	2.6 ± 2	0.7
AT ms	96.5 ± 28	85 ± 29	100 ± 27	0.01
AT/RR interval	129 ± 48	119 ± 49	131 ± 47	0.1
RV end diastolic diameter cm	3.2 ± 0.8	3.2 ± 0.7	3.2 ± 0.8	0.4
LV end diastolic diameter cm	4.1 ± 0.7	4 ± 0.7	4.1 ± 0.7	0.4
RVEDD/LVEDD > 0.9	0.7 ± 0.2	0.7 ± 0.2	0.7 ± 0.2	0.8
LVED/RVED > 0.9	14%	16%	14%	0.7
Sign 60/60	14%	31%	9%	0.0002
IVC expiratory diameter cm	1.8 ± 1.4	1.6 ± 0.5	1.8 ± 1.6	0.2
IVC inspiratory diameter cm	1 ± 1.7	0.9 ± 0.5	1.1 ± 1.9	0.3
RA pressure mmHg	8 ± 4.5	8 ± 4.5	8.5 ± 4.5	0.4
McConnell's sign	14.68%	40%	7.65%	0.001
D sign	11.87%	20.41%	9.41%	0.05

235 patients dyspnéiques

- **51 embolies pulmonaires**
  - 43 faibles risques
  - 4 risques intermédiaires
  - 3 risques élevés
  - 1 thrombolyse

AUC < 0,7

Shmueli et al. Isr Med Assoc J. 2020

Echo et embolie pulmonaire : Patient stable

Early mortality risk		Indicators of risk			
		Haemodynamic instability[a]	Clinical parameters of PE severity and/ or comorbidity: PESI class III–V or sPESI ≥I	RV dysfunction on TTE or CTPA[b]	Elevated cardiac troponin levels[c]
High		+	(+)[d]	+	(+)
Intermediate	Intermediate–high	-	+[e]	+	+
	Intermediate–low	-	+[e]	One (or none) positive	
Low		-	-	-	Assesment optional; if assessed, negative

ESC 2019

Echo et embolie pulmonaire : Patient stable

ESC European Society of Cardiology
European Heart Journal (2019) **40**, 902–910
doi:10.1093/eurheartj/ehy873

FASTTRACK CLINICAL RESEARCH

Prognostic value of right ventricular dysfunction or elevated cardiac biomarkers in patients with low-risk pulmonary embolism: a systematic review and meta-analysis

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Table 2 Rates of short-term adverse events in low-risk patients with or without imaging and laboratory indicators of right ventricular dysfunction or myocardial injury

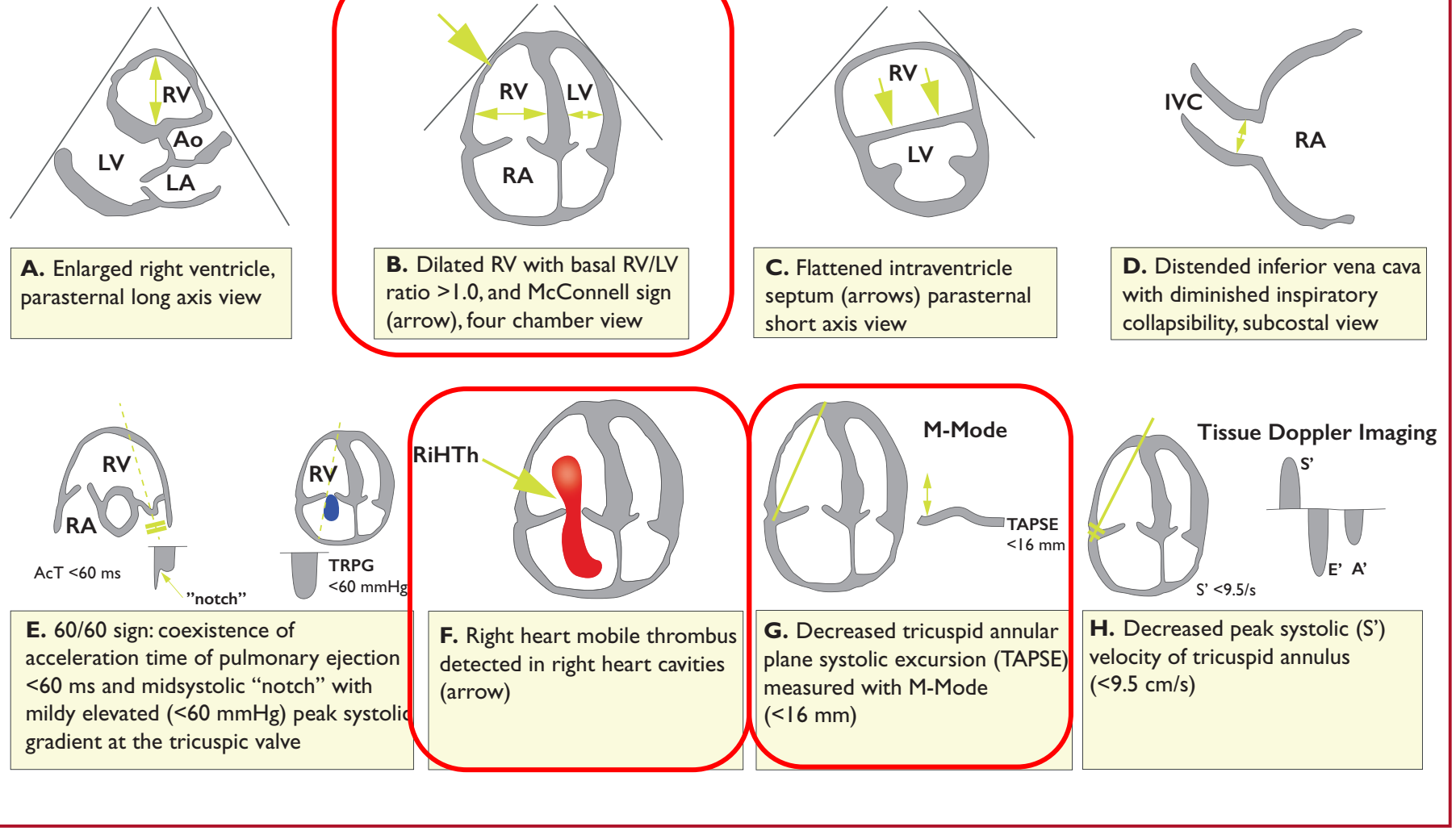
	RV dysfunction (exposure)	Study population (*n* studies)	With RV dysfunction, % (95% CI)	Without RV dysfunction, % (95% CI)
Early all-cause mortality	RV pressure overload (echo/CTPA)	1597 (7)	1.8 (0.9–3.5)	0.2 (0.03–1.7)
	Troponin	1176 (11)	3.8 (2.1–6.8)	0.5 (0.2–1.3)
	BNP/NT-proBNP	—	—	—
Early PE-related adverse outcome	RV pressure overload (echo/CTPA)	1488 (6)	3.7 (0.9–14.4)	0.7 (0.06–6.4)
	Troponin	1137 (8)	10.2 (7.2–14.3)	0.6 (0.1–5.6)
	BNP/NT-proBNP	1405 (6)	5.4 (1.8–14.6)	1.3 (0.6–2.6)

Echo et embolie pulmonaire : Patient stable

VD / VG > 0,9

Thrombus IC

TAPSE < 16 mm



A. Enlarged right ventricle, parasternal long axis view

B. Dilated RV with basal RV/LV ratio >1.0, and McConnell sign (arrow), four chamber view

C. Flattened intraventricle septum (arrows) parasternal short axis view

D. Distended inferior vena cava with diminished inspiratory collapsibility, subcostal view

E. 60/60 sign: coexistence of acceleration time of pulmonary ejection <60 ms and midsystolic "notch" with mildy elevated (<60 mmHg) peak systolic gradient at the tricuspic valve

F. Right heart mobile thrombus detected in right heart cavities (arrow)

G. Decreased tricuspid annular plane systolic excursion (TAPSE) measured with M-Mode (<16 mm)

H. Decreased peak systolic (S') velocity of tricuspid annulus (<9.5 cm/s)

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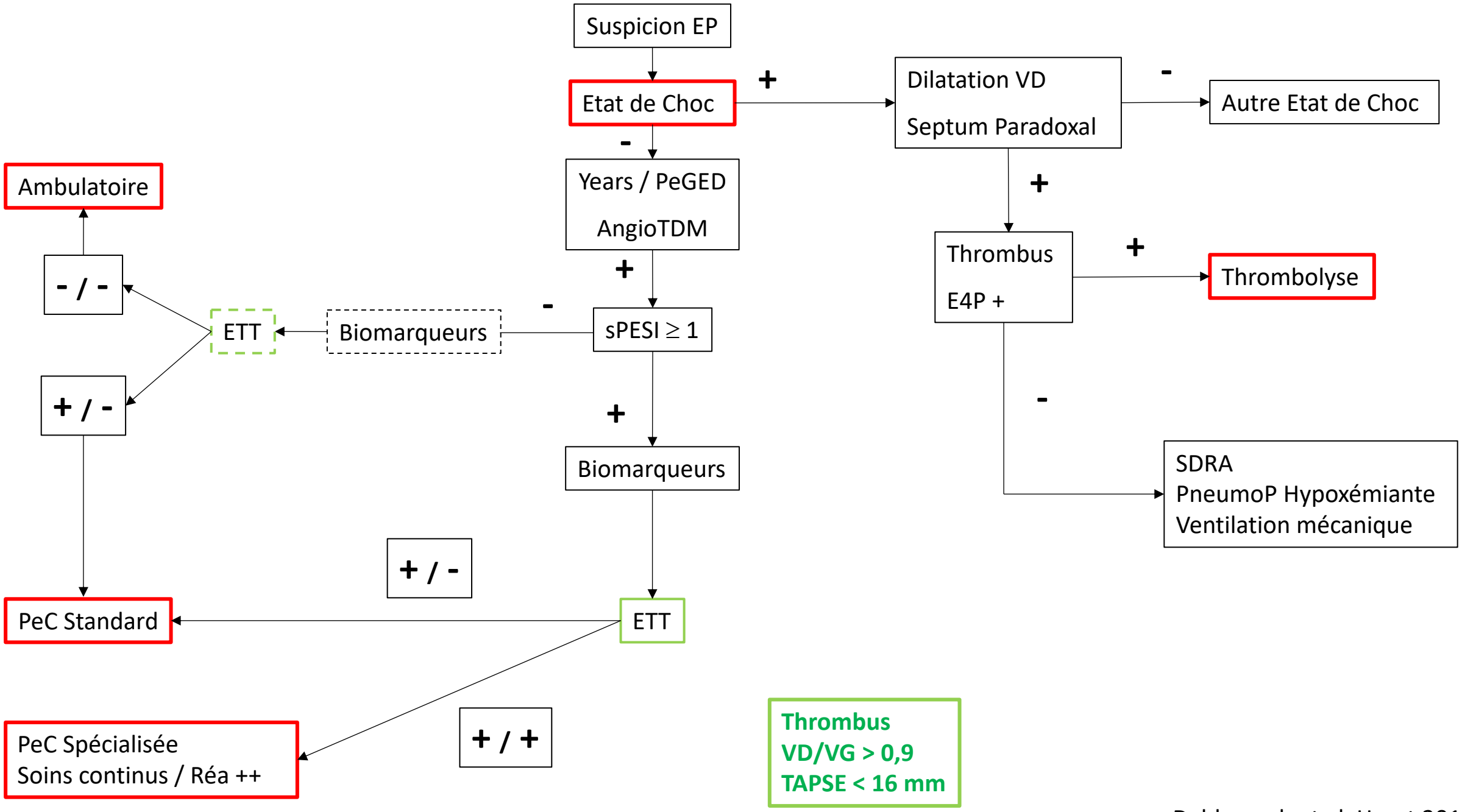

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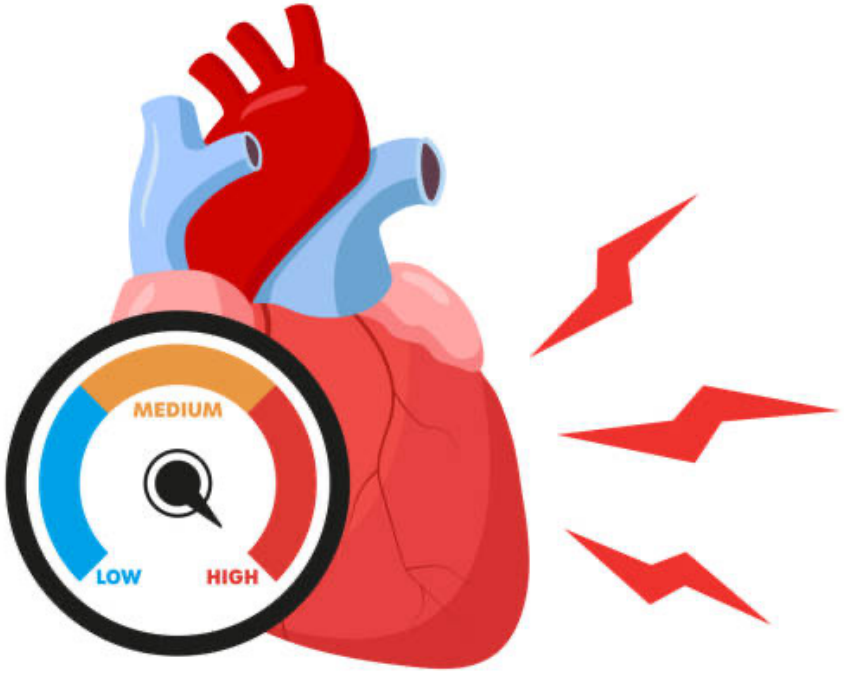
The Forgotten Ventricle

- Dysfonction VD aux urgences peu fréquente mais grave
- Etat de choc et Cœur Pulmonaire Aigu
- Dyspnée et TACC
- Intérêt pronostic majeur dans l’embolie pulmonaire
- Remplissage vasculaire prudent
- Ventilation mécanique à risque



08h45 – 09h00 : Accueil des participants

09h00 – 09h30 : Concept des pressions de remplissage du ventricule gauche

09h30 – 10h30 : Le Ventricule Droit

10h30 – 11h00 : Pause

11h00 – 12h00 : Ateliers pratiques

12h00 – 13h00 : Pause repas

13h00 – 14h00 : Détresse respiratoire

14h00 – 15h00 : Etat de choc

15h00 – 16h00 : Ateliers pratiques

16h00 – 17h00 : Quizz interactif