Cas cliniques d'échographie

DES Anesthésie-Réanimation

AP-HM

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14/12/2016

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Assistance Publique Hôpitaux de Marseille

Faculté de Médecine Aix*Marseille Université

Cas n°1

- Patient 66 ans
- Coronarien stenté (x2), diabétique type II, opéré sous bétabloquant
- Pontage fémoro-poplité droit
- 2h30 de chirurgie, extubation sur table
- Hypotension en SSPI (75 / 45 (50)) FC à 65bpm, Sat 98% sous 2L, Fréquence respi à 28 / min
- Marbrures cutanées membres inférieurs

Que faites vous !?

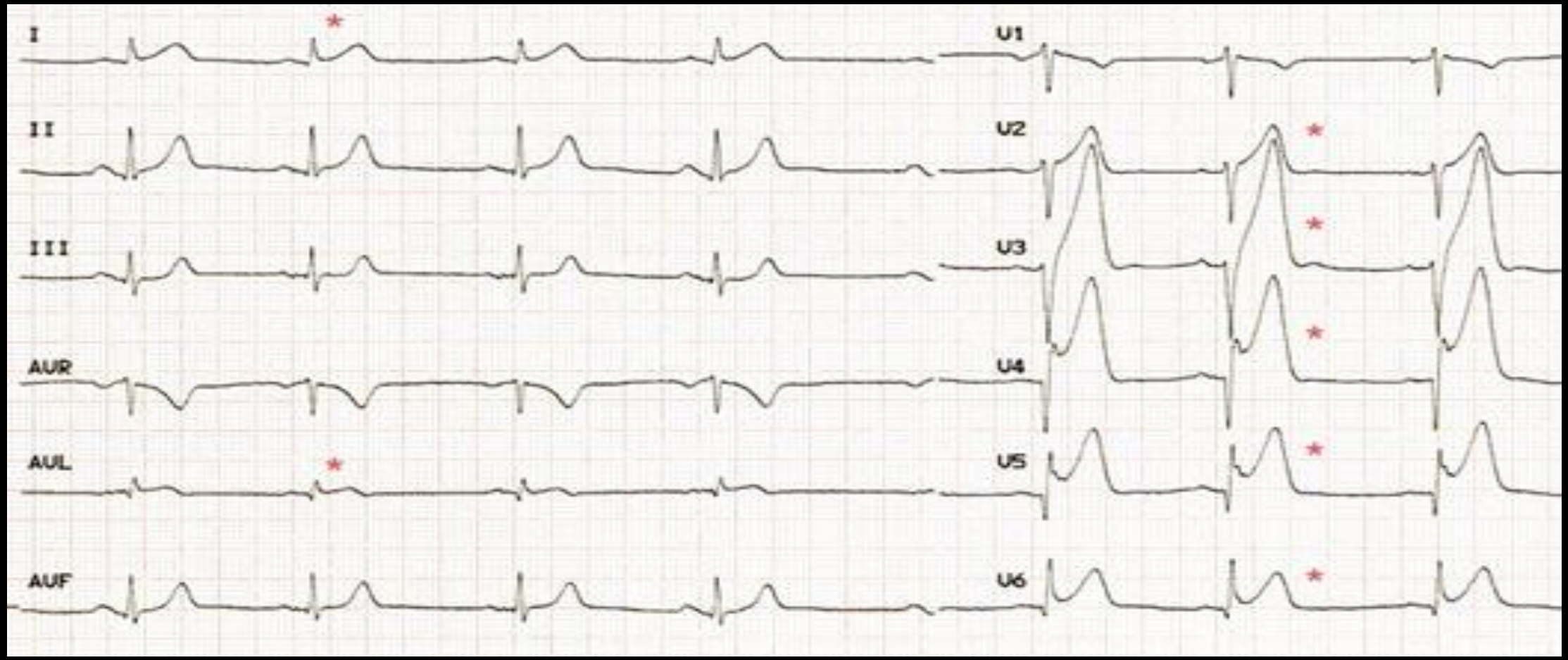
UNE ECHO !

Que faites vous !?

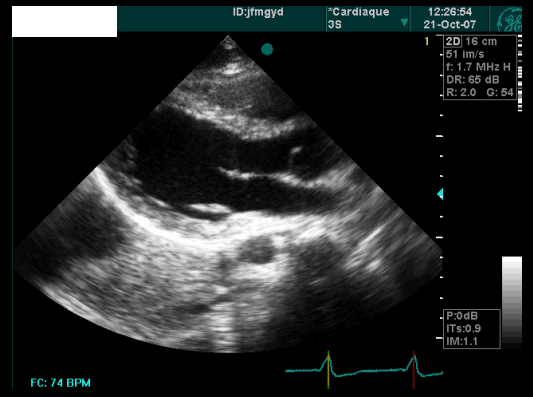
Que faites vous ?

- Redons , pansement, allo chirurgiens?
- Bio : Hémocue, NFS + coag, gazo, Tropo
- Injection d’un produit?
- ECG

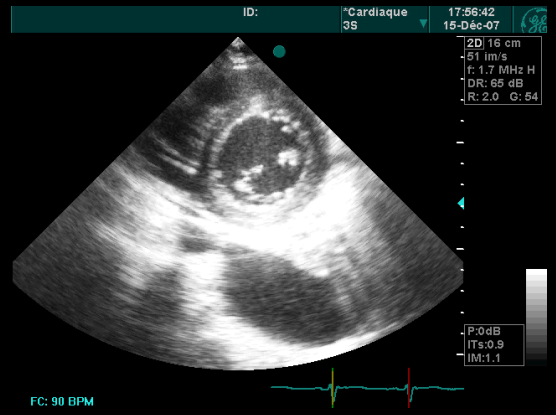
ECG



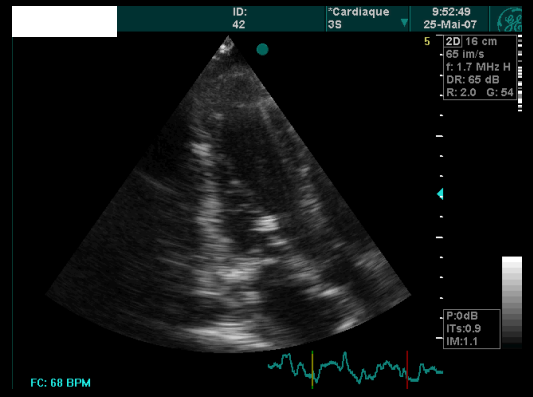
Diagnostic???



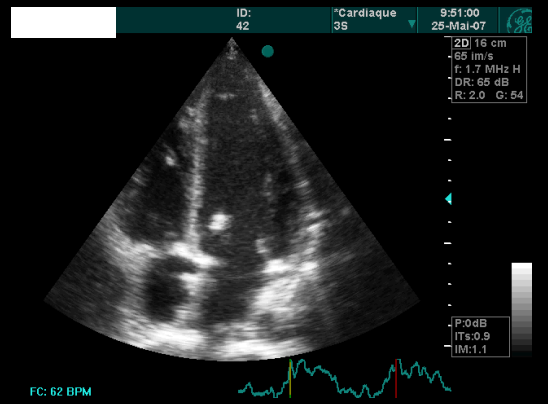
Coupe parasternale grand axe



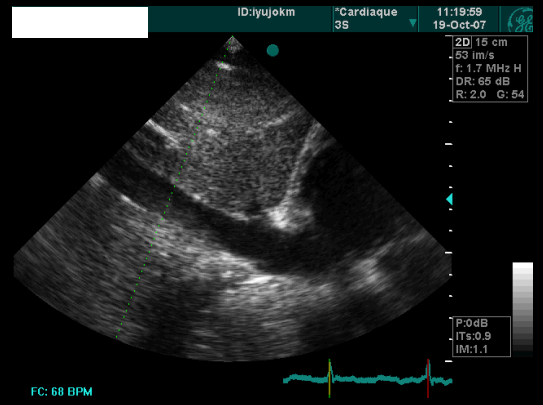
Coupe parasternale petit axe



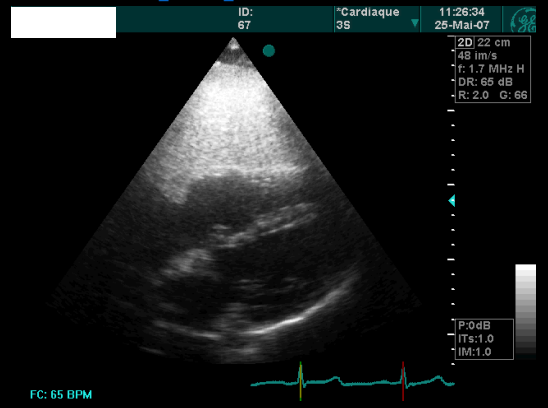
Coupe apicale 2 cavités



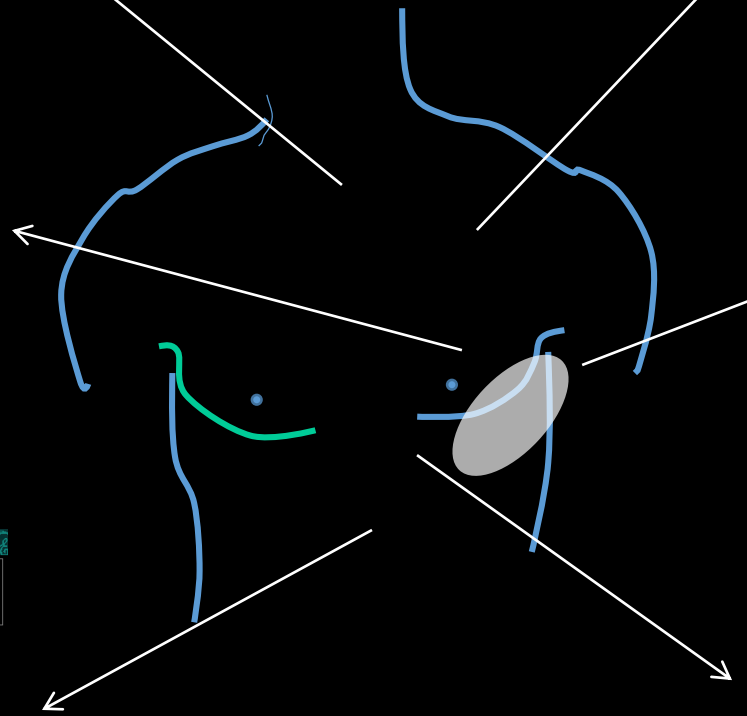
Coupe apicale 4 cavités



Coupe sous costale veine cave inf

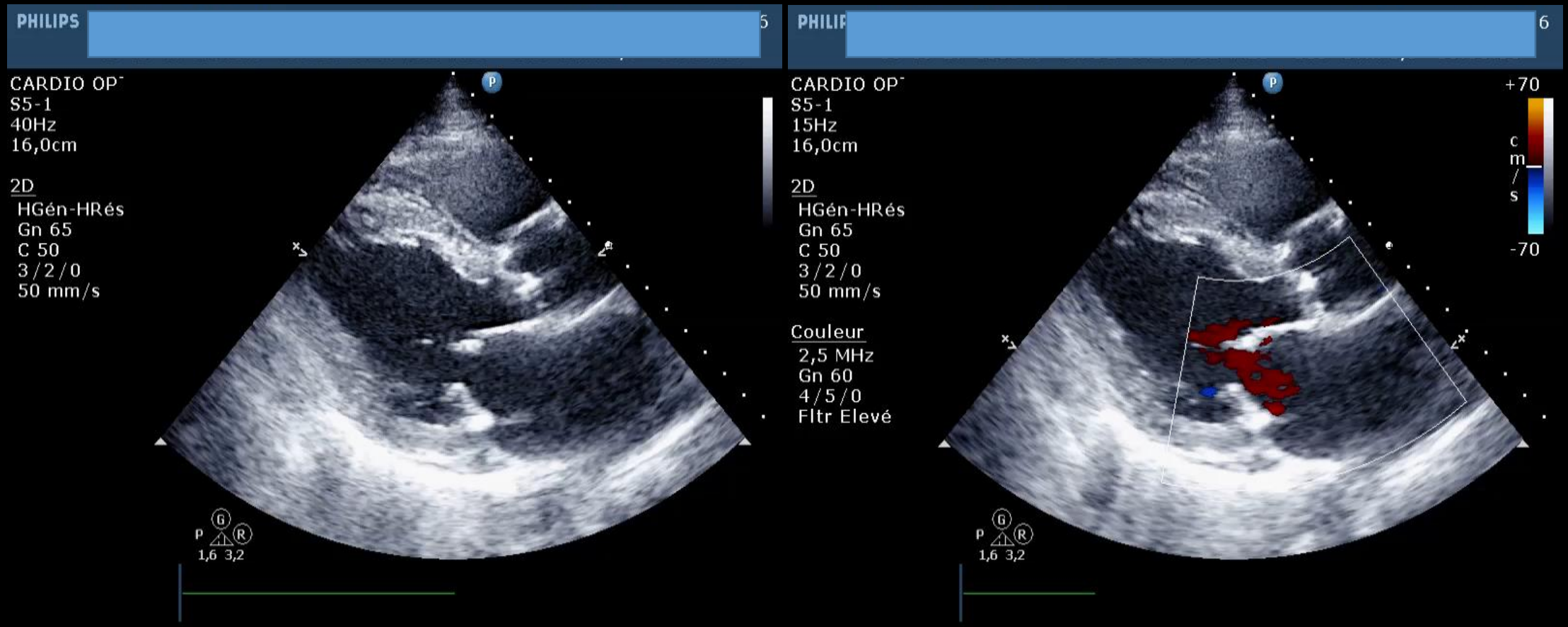


Coupe sous costale 4 cavités



Indices doppler

Parasternale grand axe



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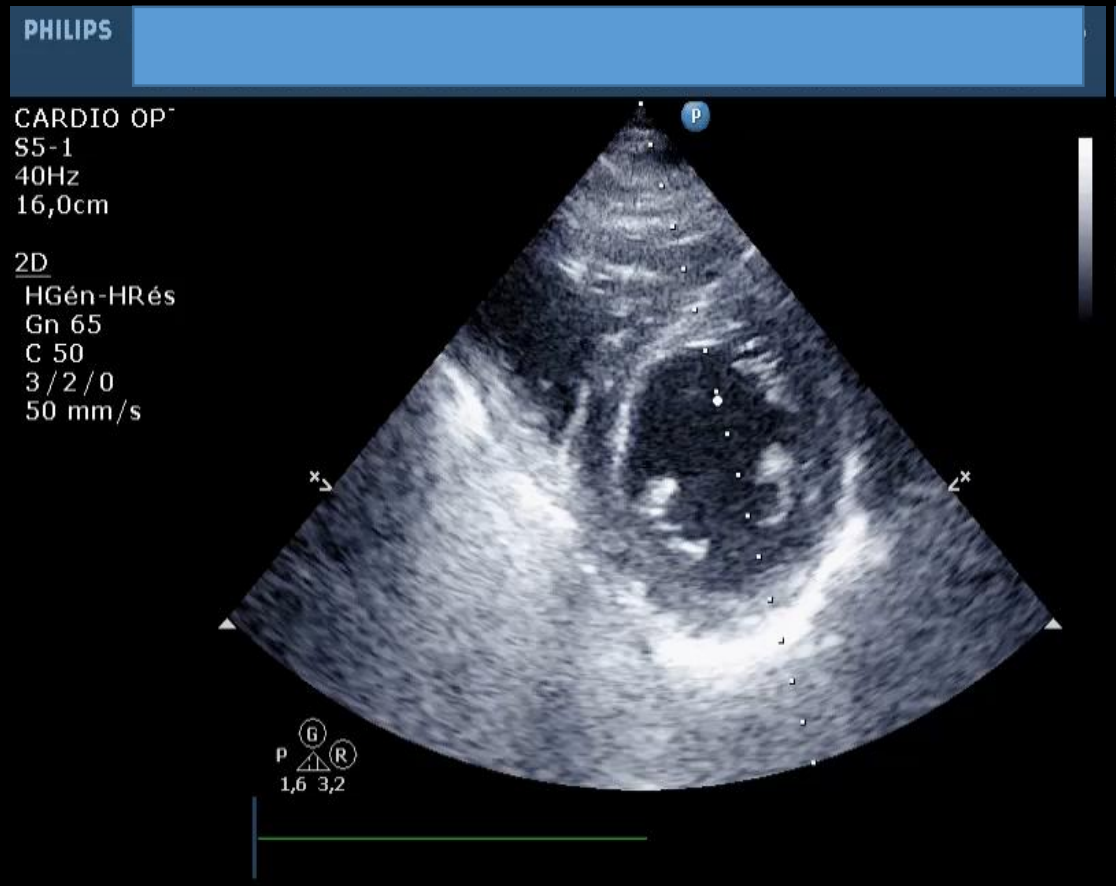
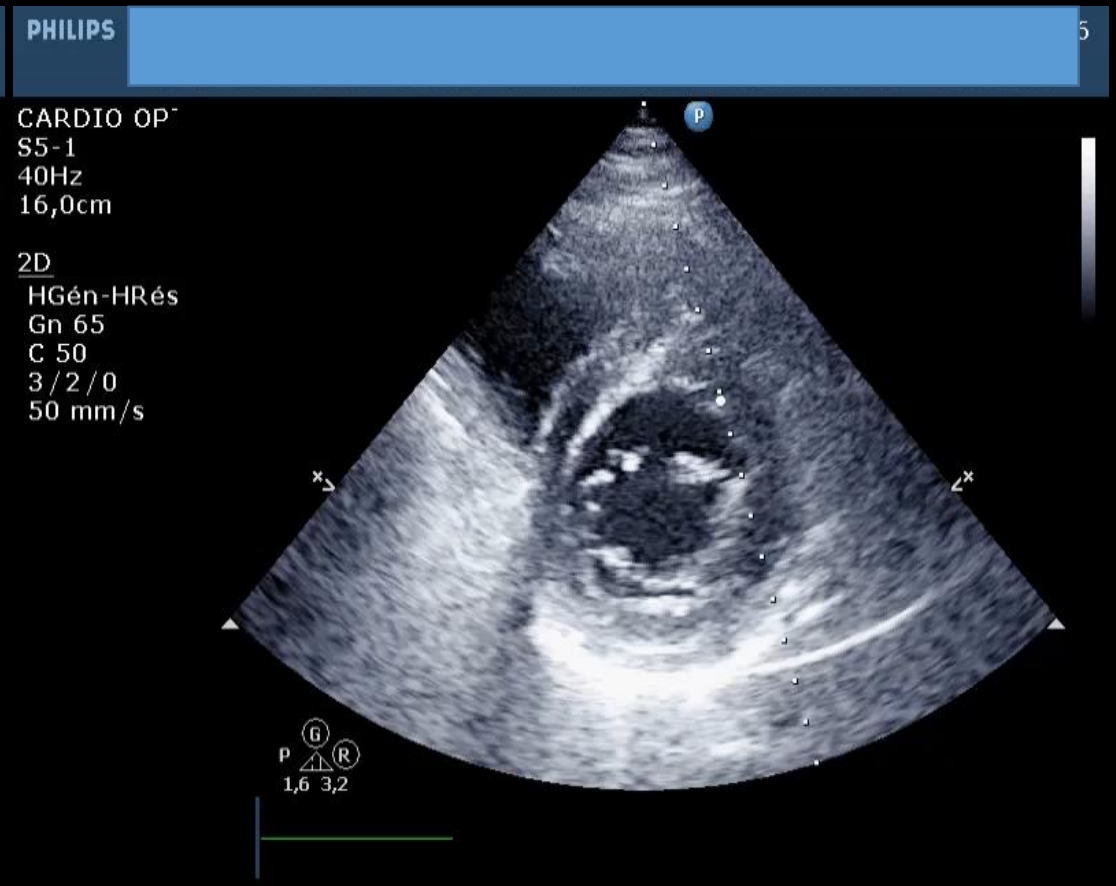
Parasternale petit axe





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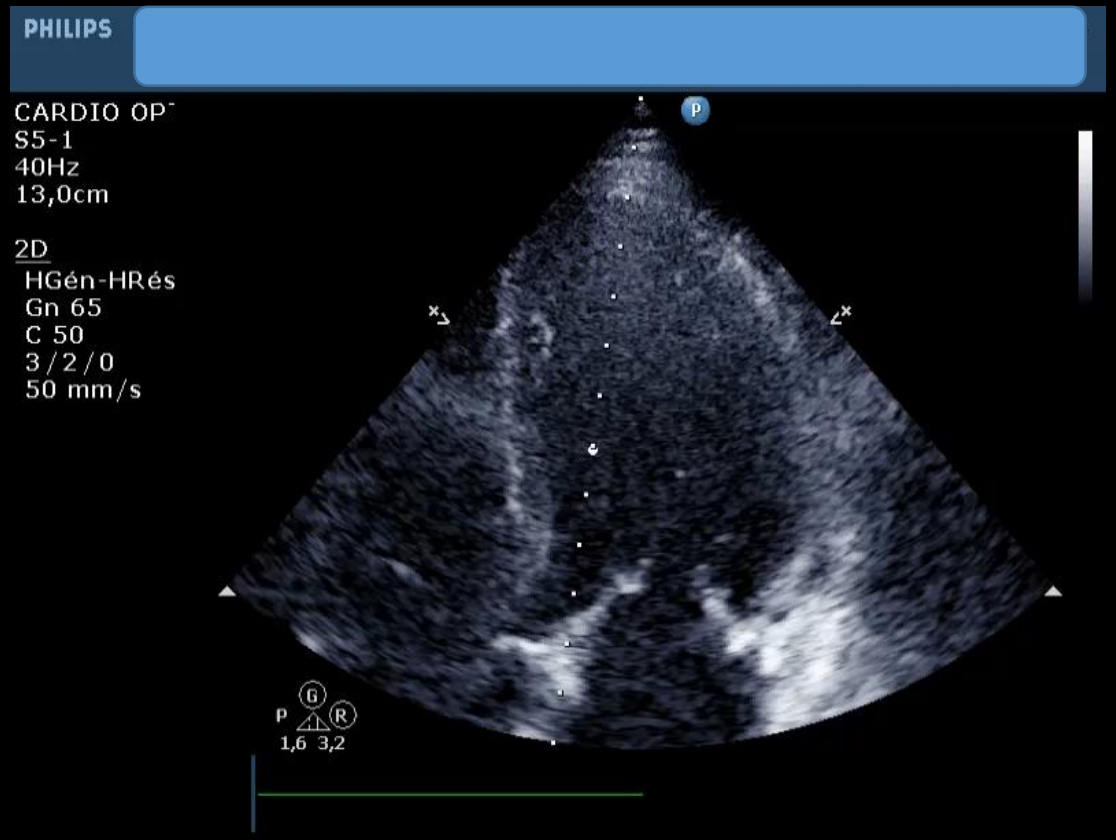
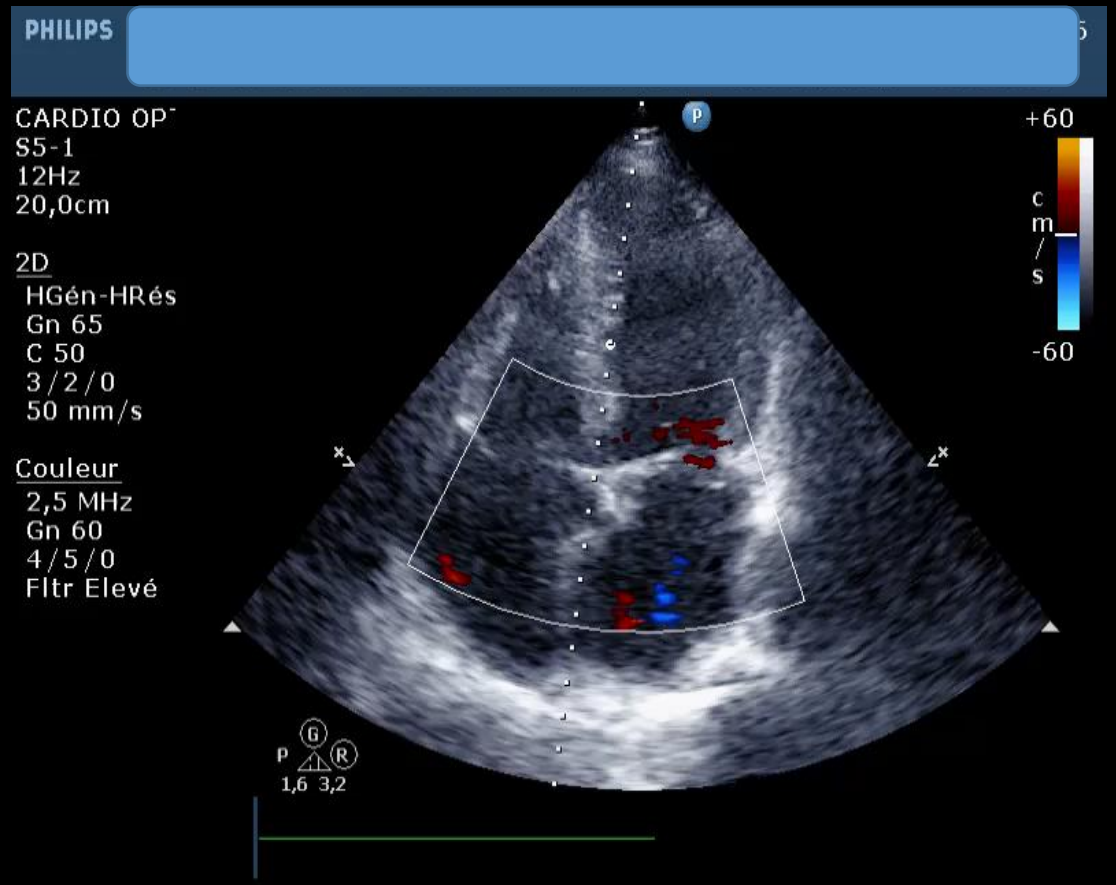
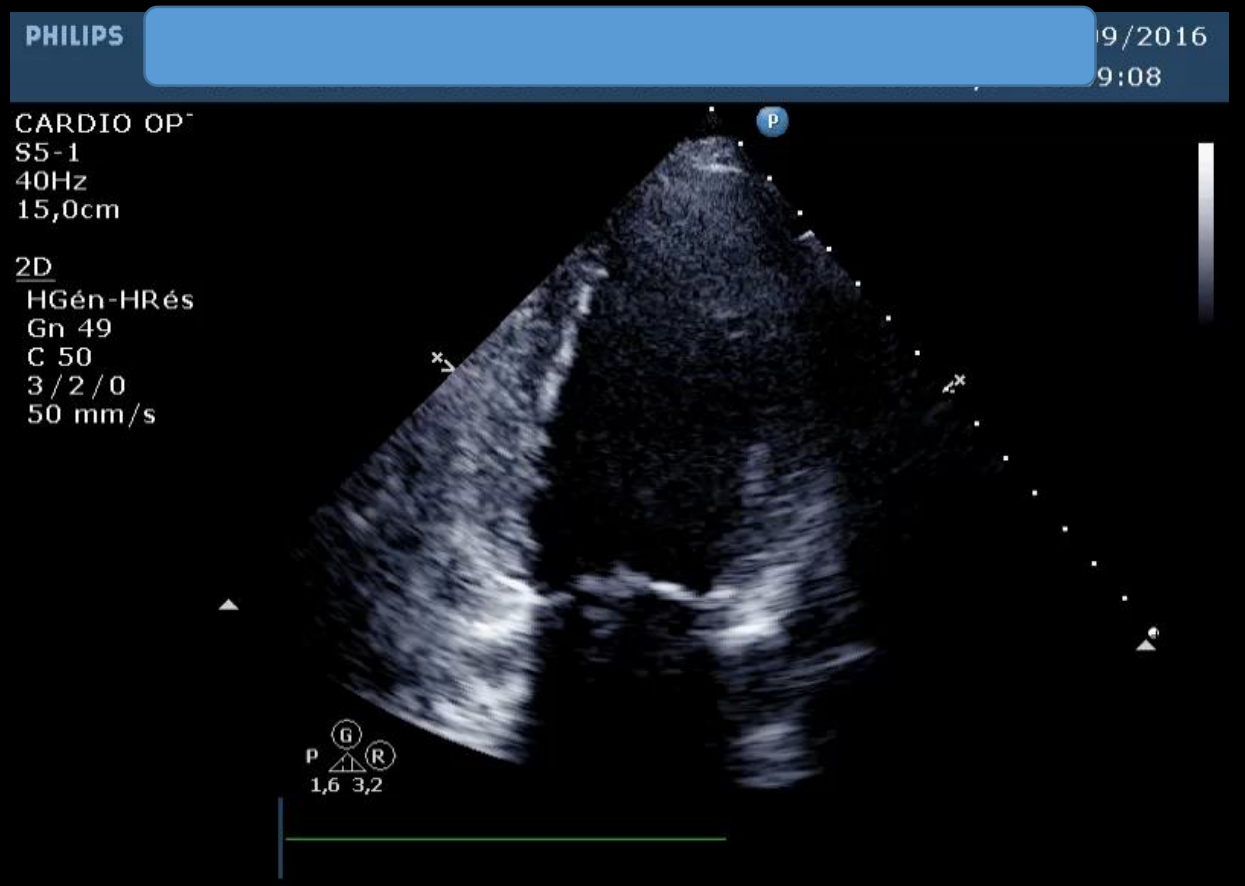
Apicale 4 Cavités





Retour

Apicale 2 Cavités



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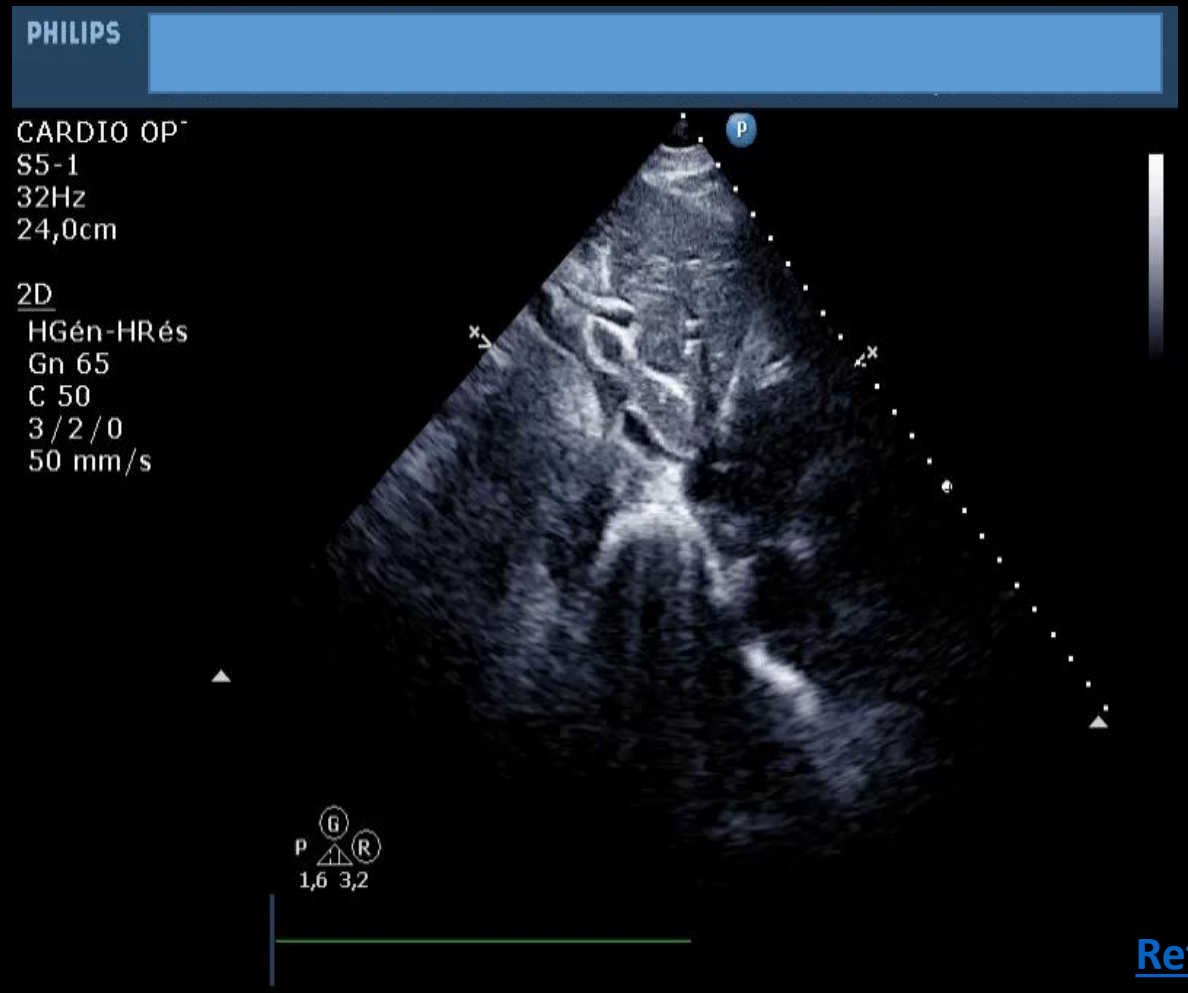
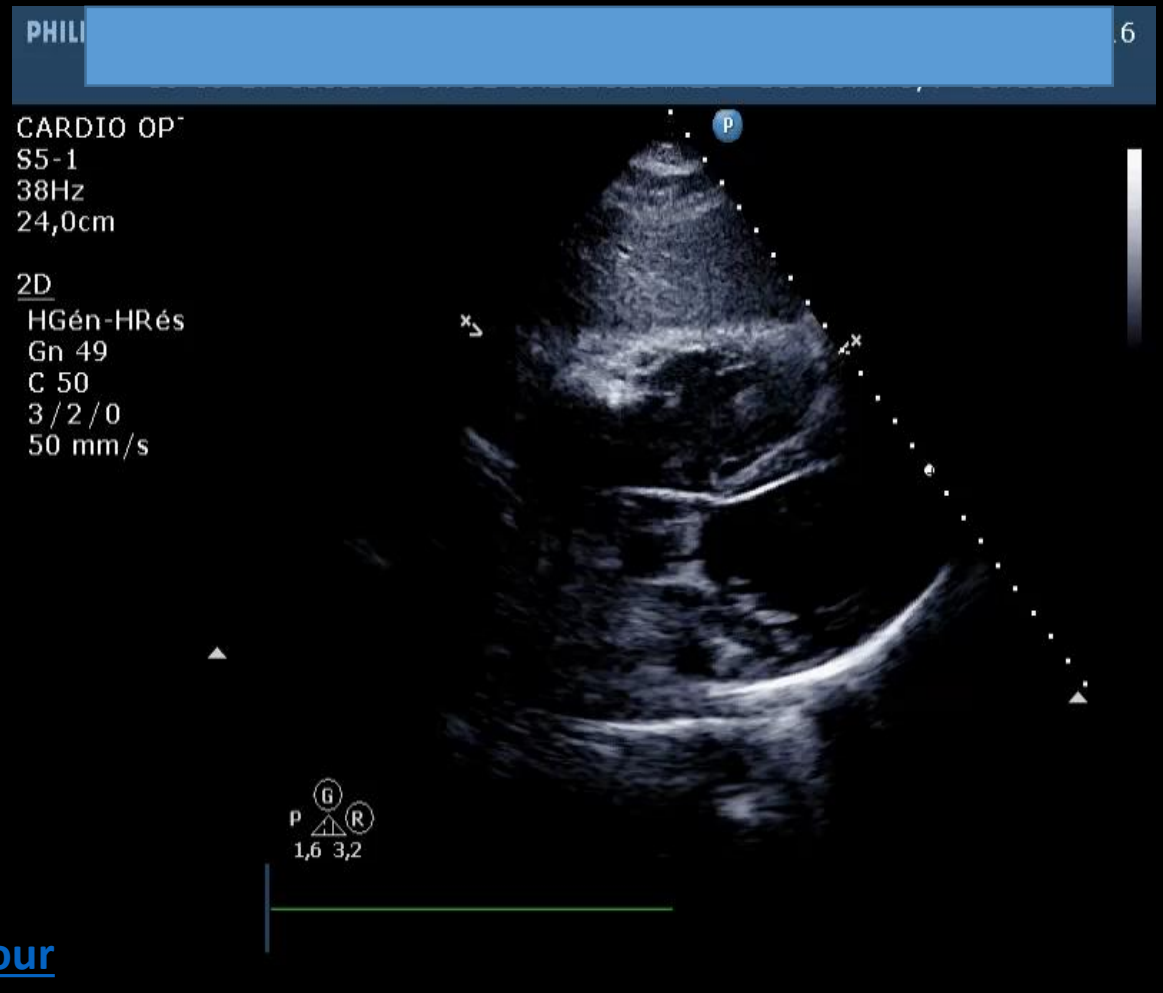
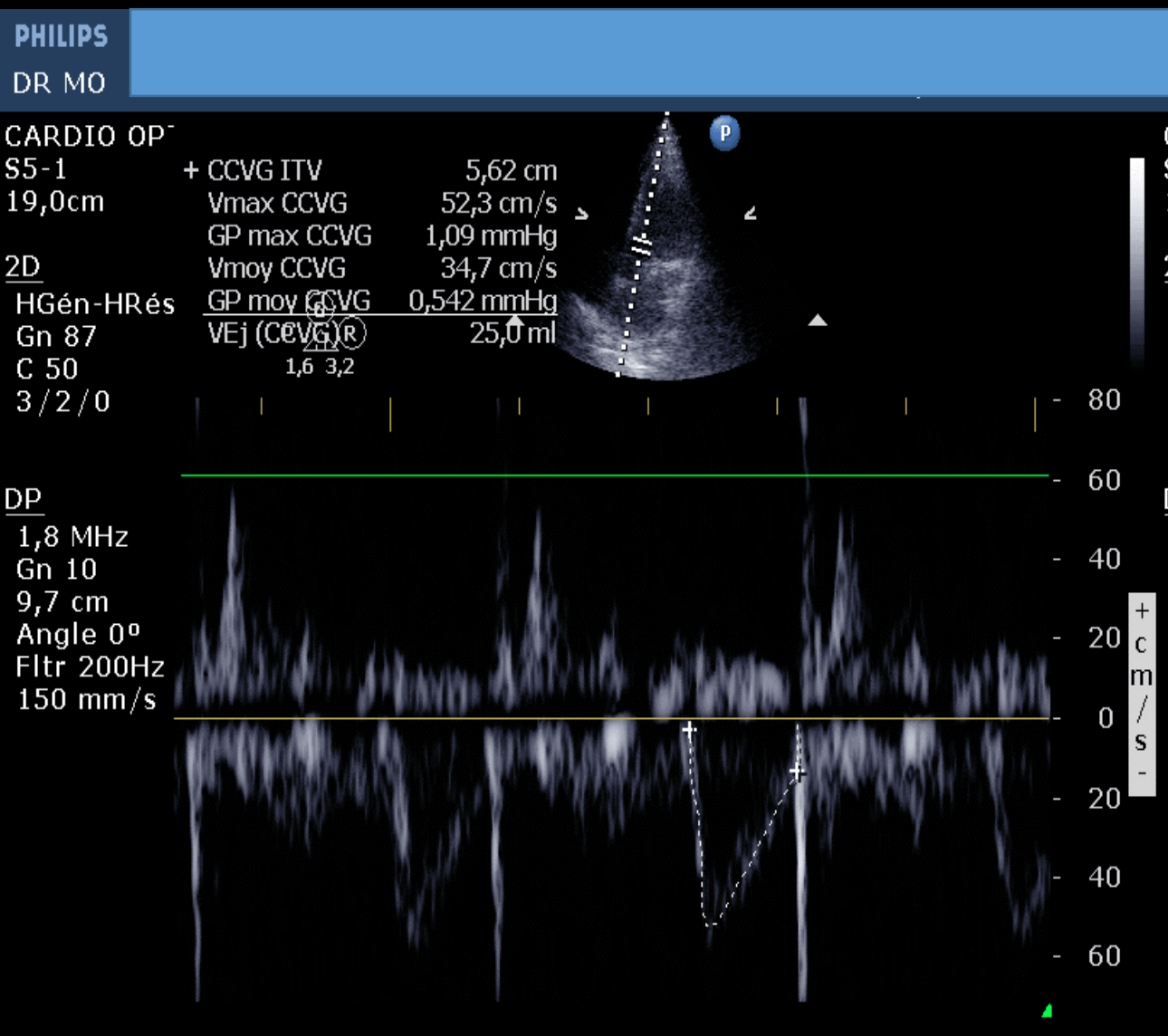
Coupe sous costale

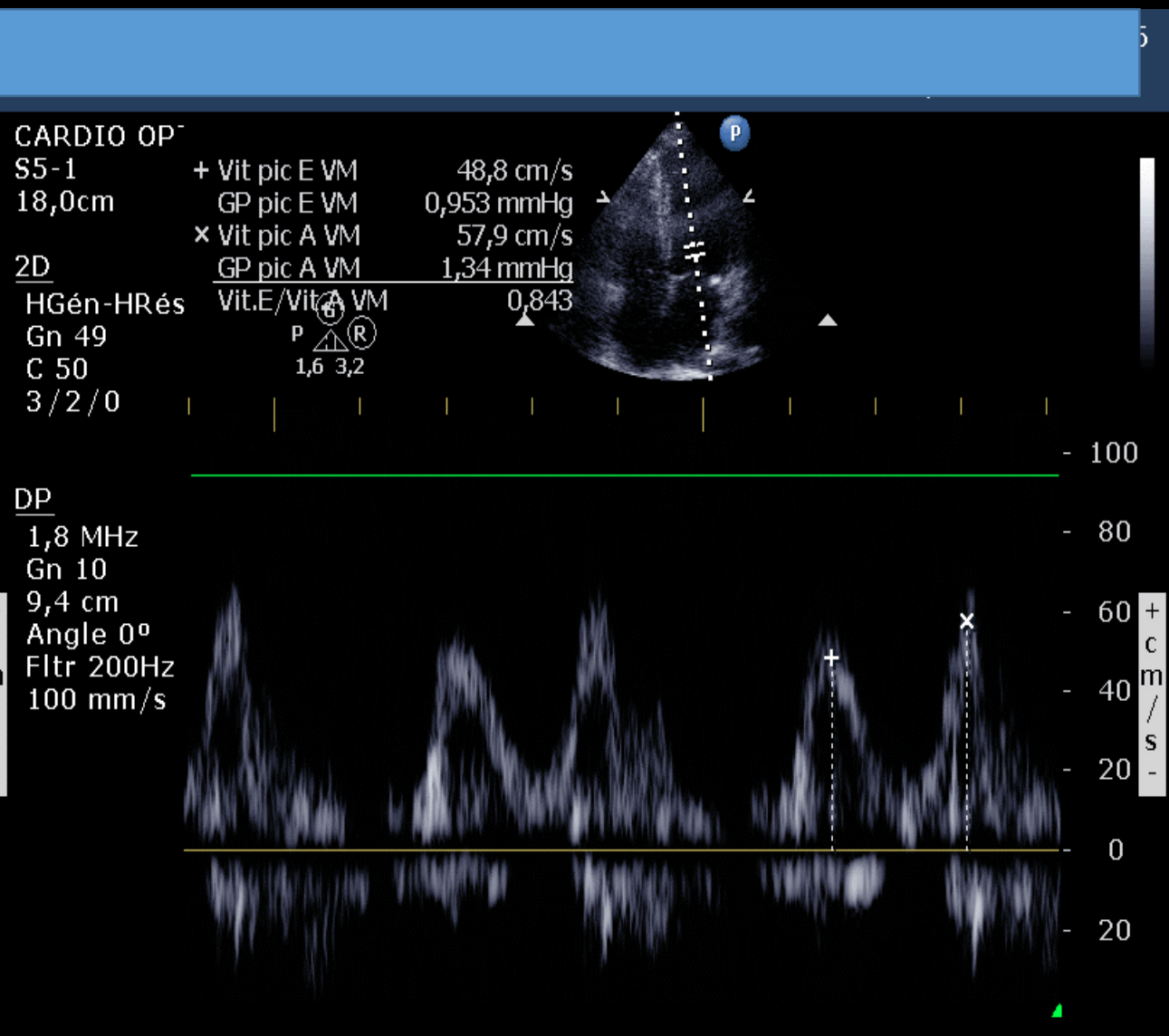




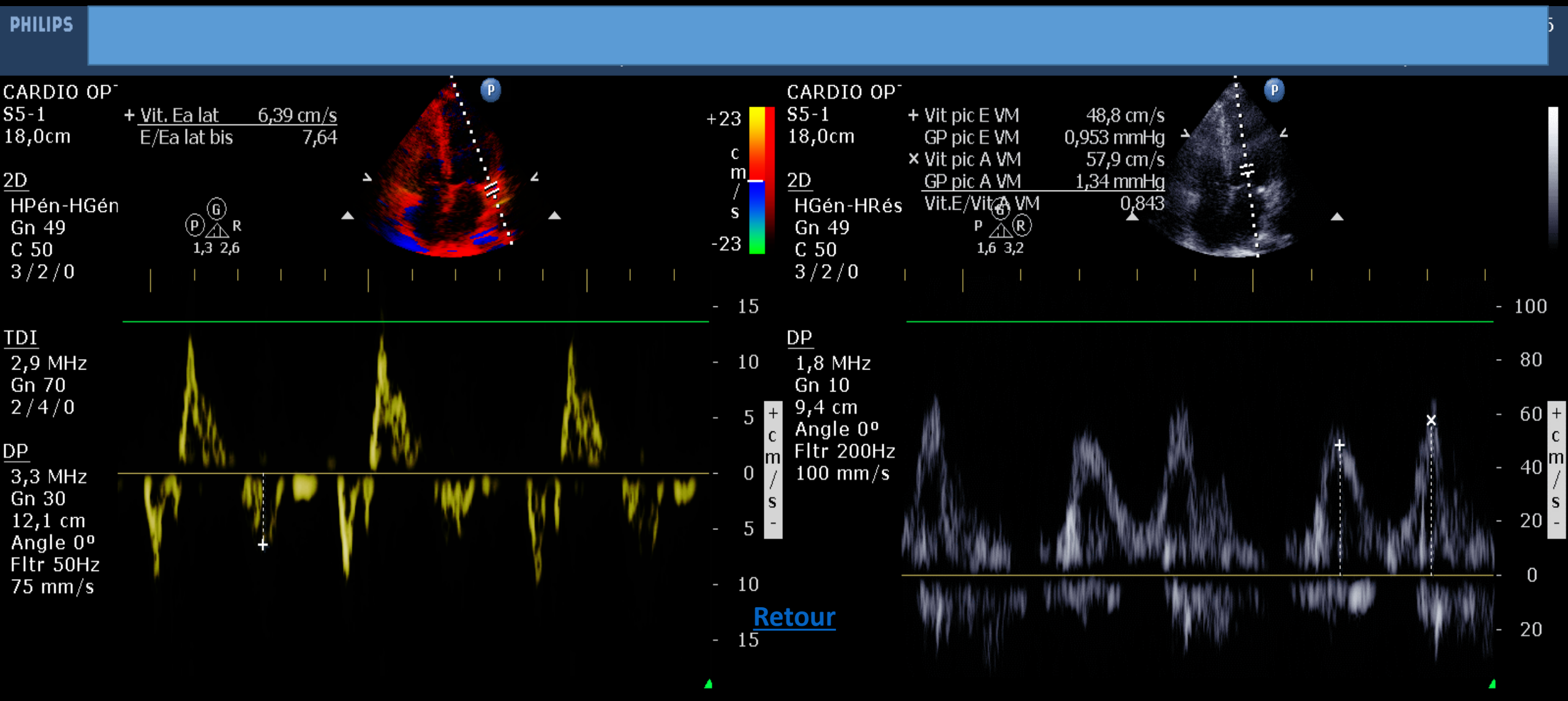
Retour

Indices Dopplers





Indices dopplers



Diagnostic?

- Choc Cardiogénique
- Syndrome coronarien aigue
- Avec élévation du segment ST
- Probable occlusion IVA

Que faites vous?

- Allo cardiologue ?
- Dobutamine?
- Lasilix ?
- Remplissage?
- Noradrénaline?

Que faites vous?

- Allo cardiologue
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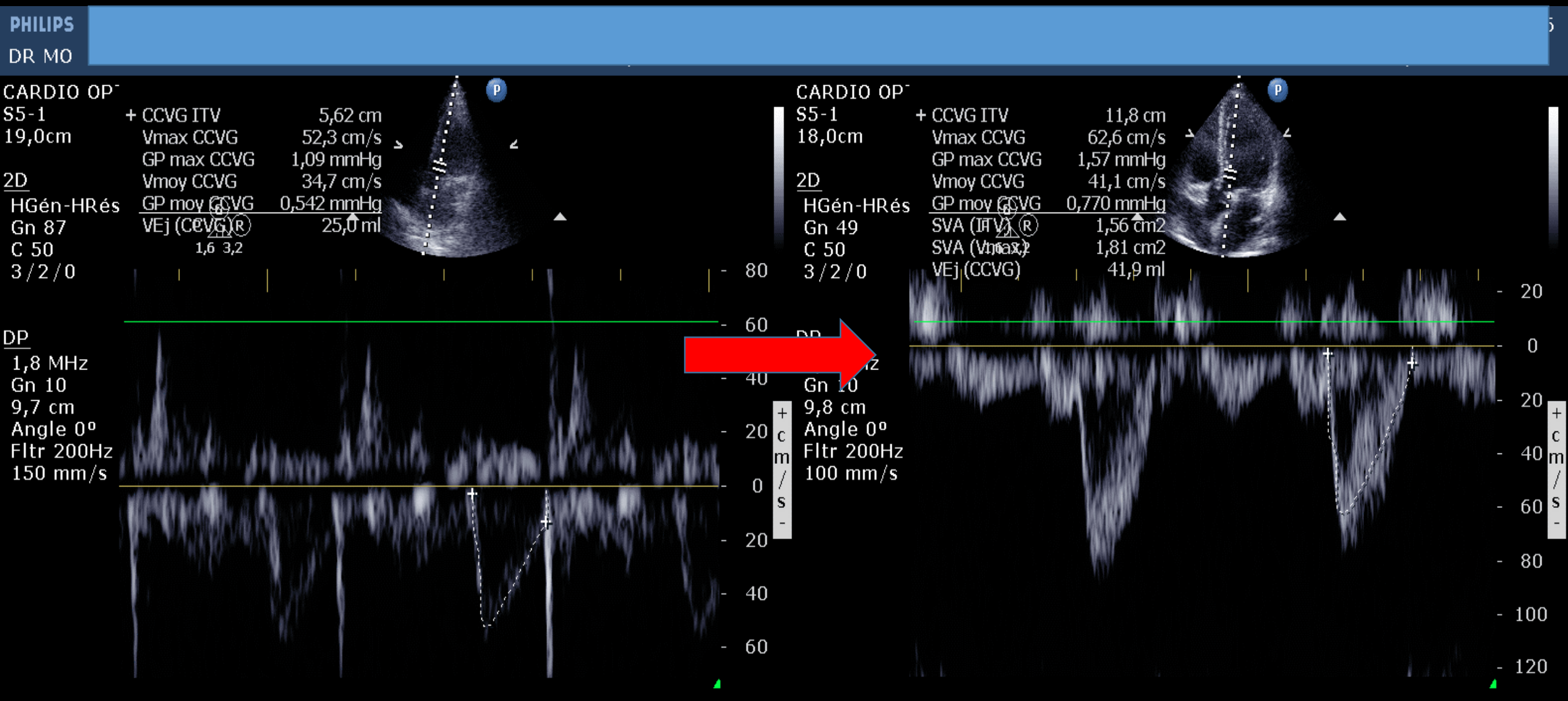
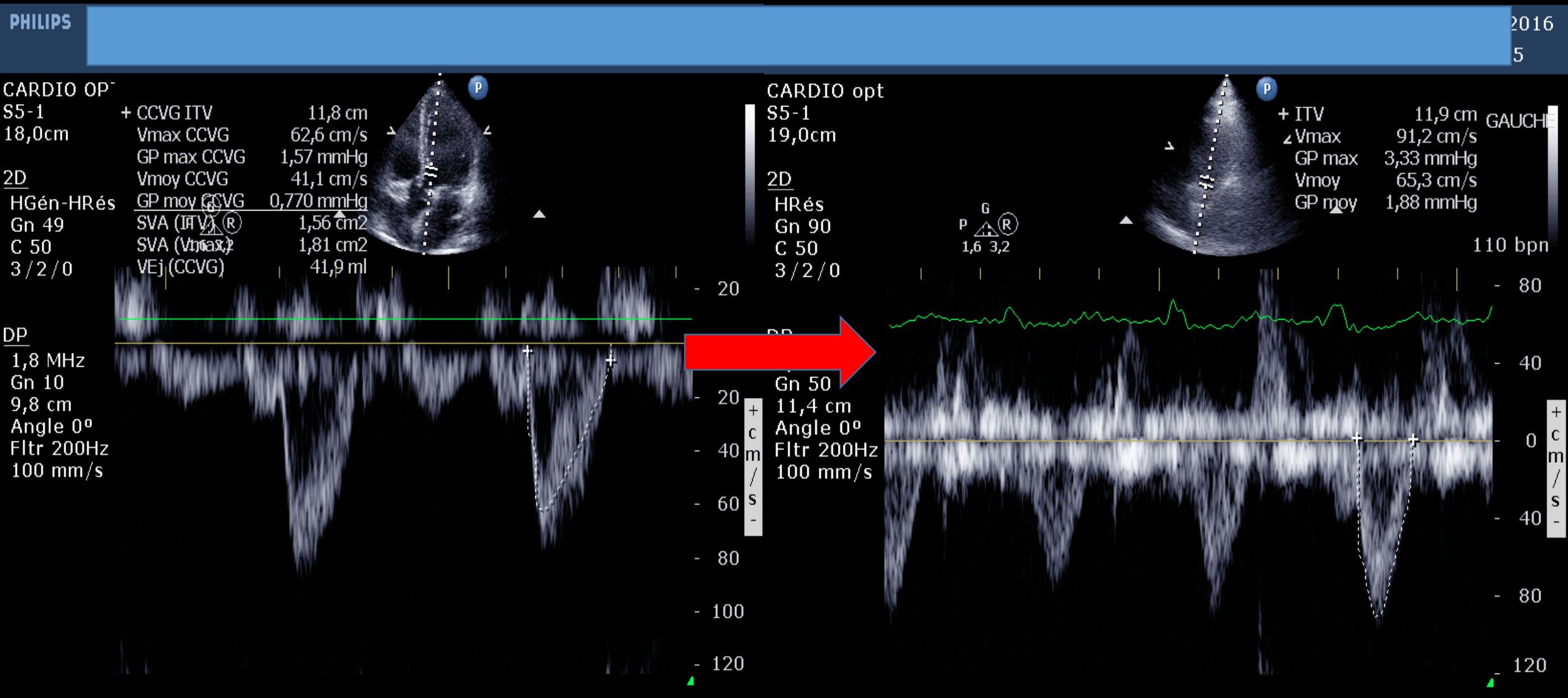
- Noradrénaline

Remplissage titré 250 + 250



Remplissage titré 500 + 250

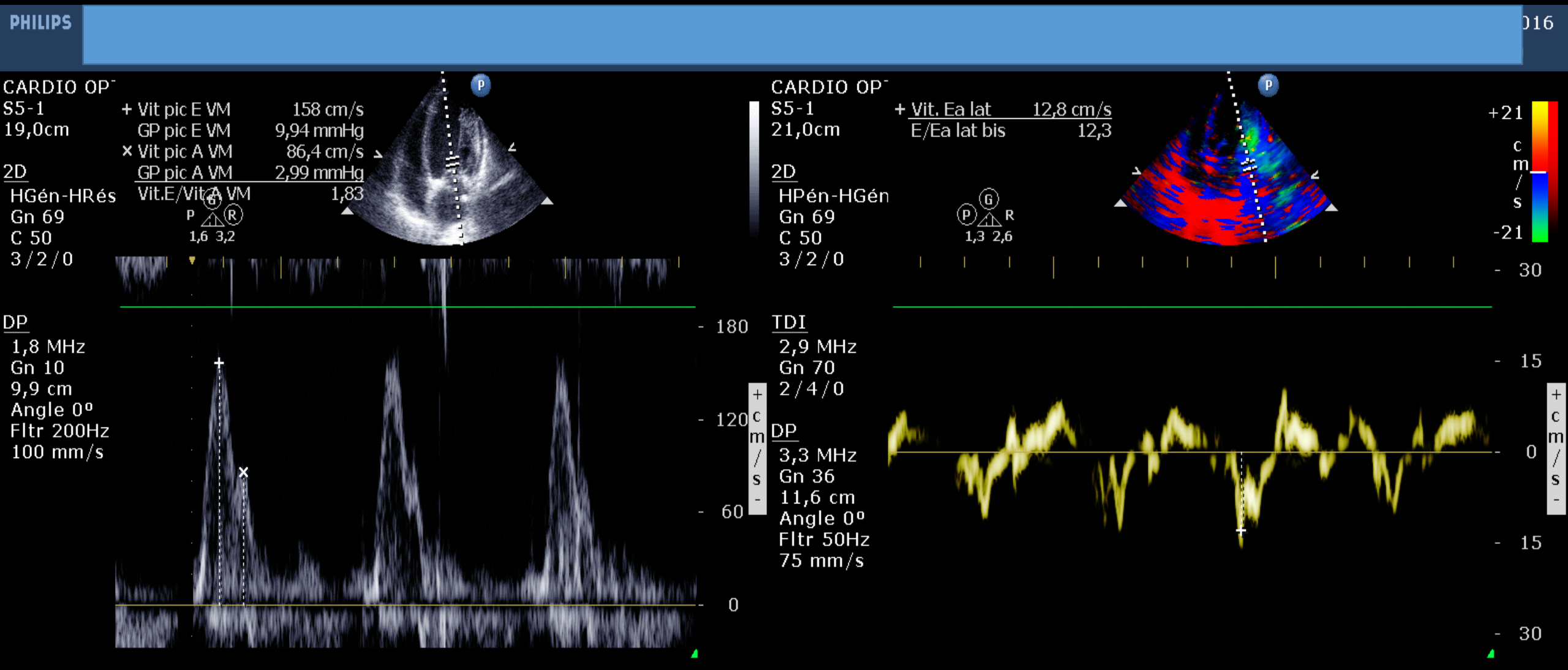


Apparition d’une dyspnée

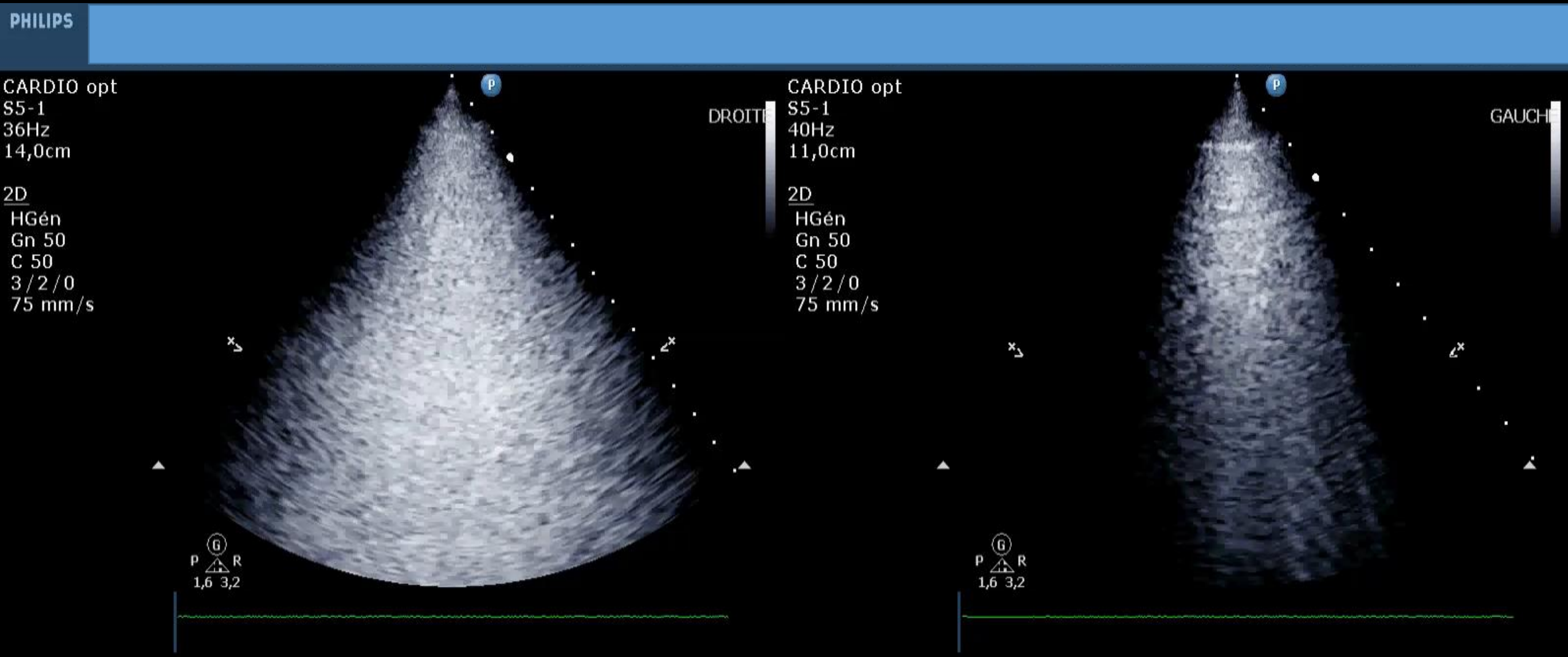
- Augmentation de l’oxygeno-dépendance à 8L
- Constantes:
  - 114 / 55 (67) sous 0,2µg/kg/min de NA
  - 95 bpm
  - Sat 92 %
  - FR 32 / min
- Lactatémie 3,8 mmol/L

Quels indices échographiques ?

Quels indices échographiques ?



Quels indices échographiques ?



Que faites vous?

- Intubation ?
- VNI ?
- Lasilix?
- Inotropes?
- Remplissage?
- Refaire une écho ?

Que faites vous?

- Intubation
- VNI
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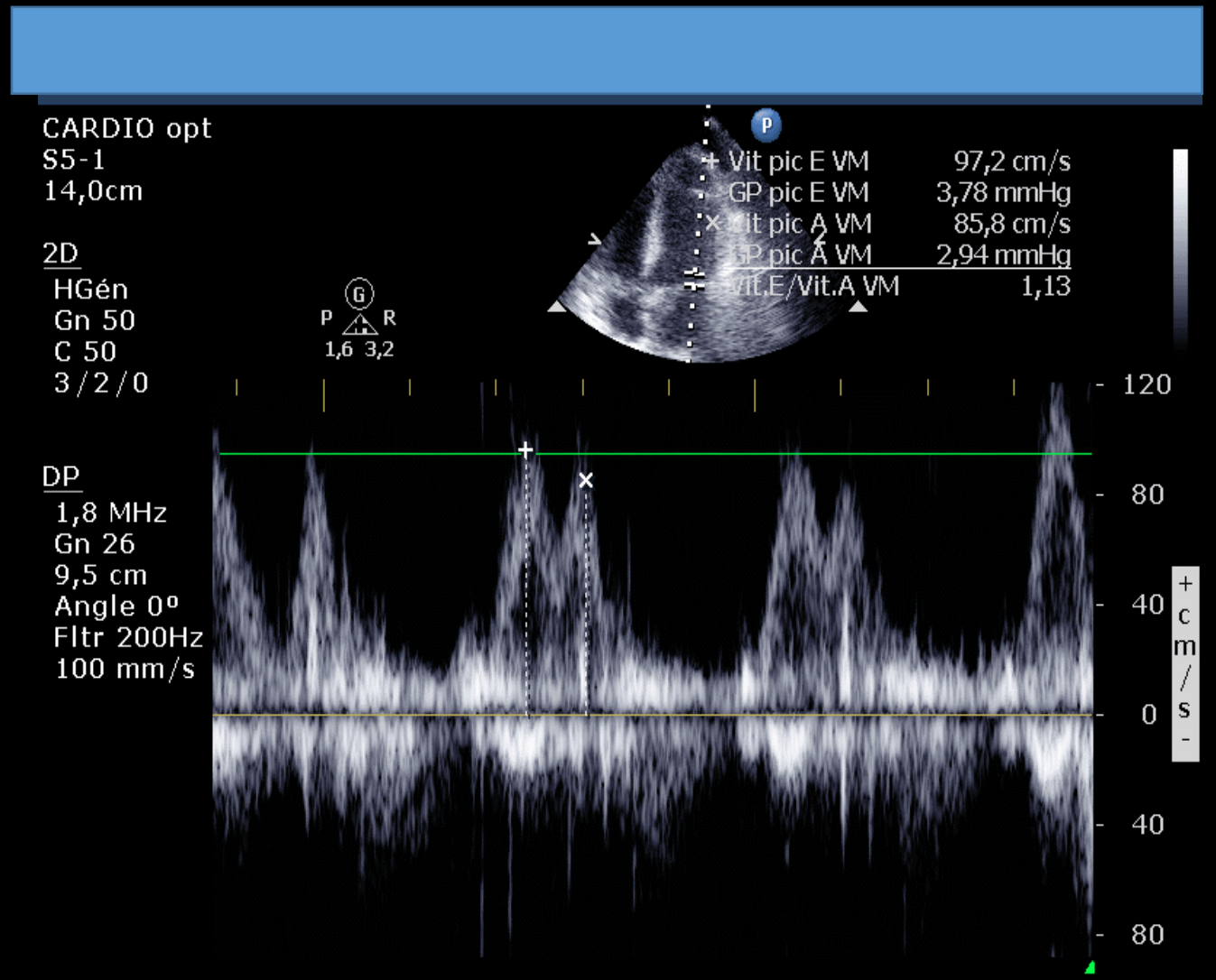
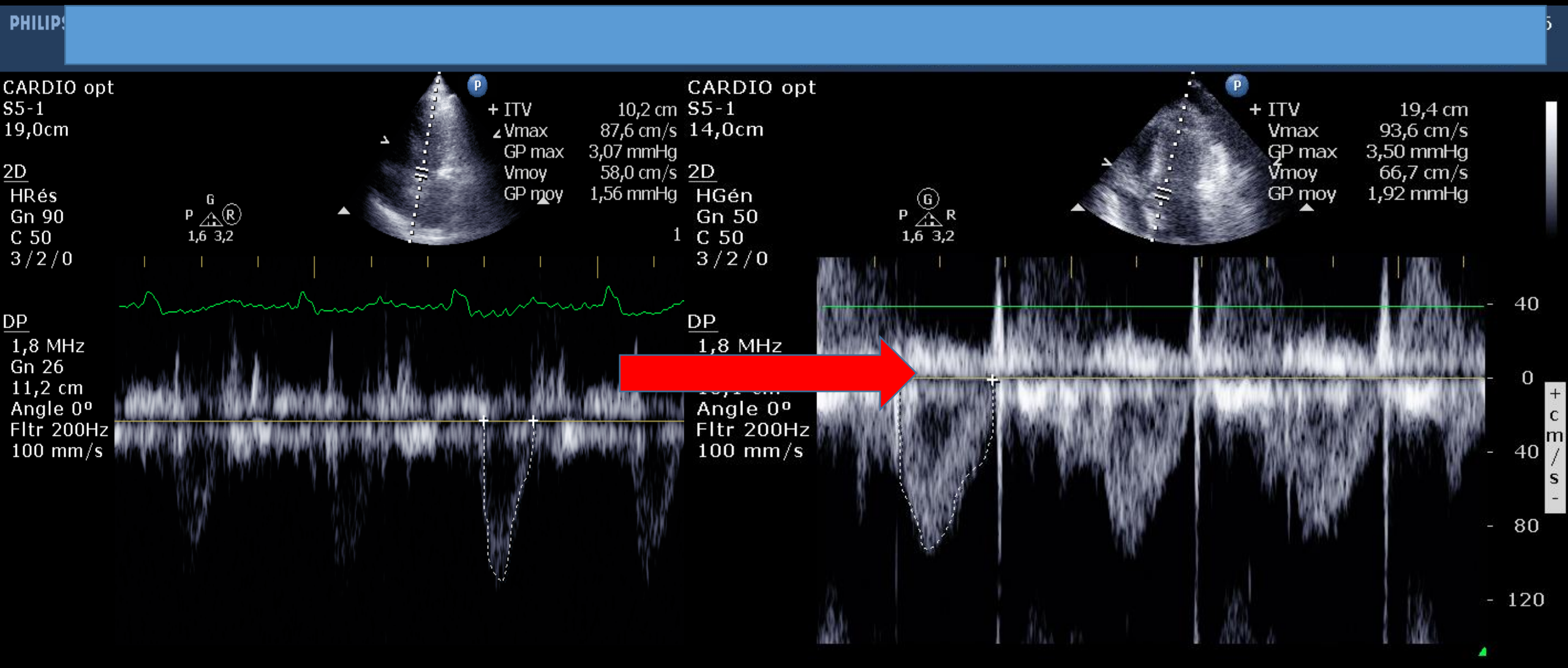
Après dobutamine 5µg/kg/min

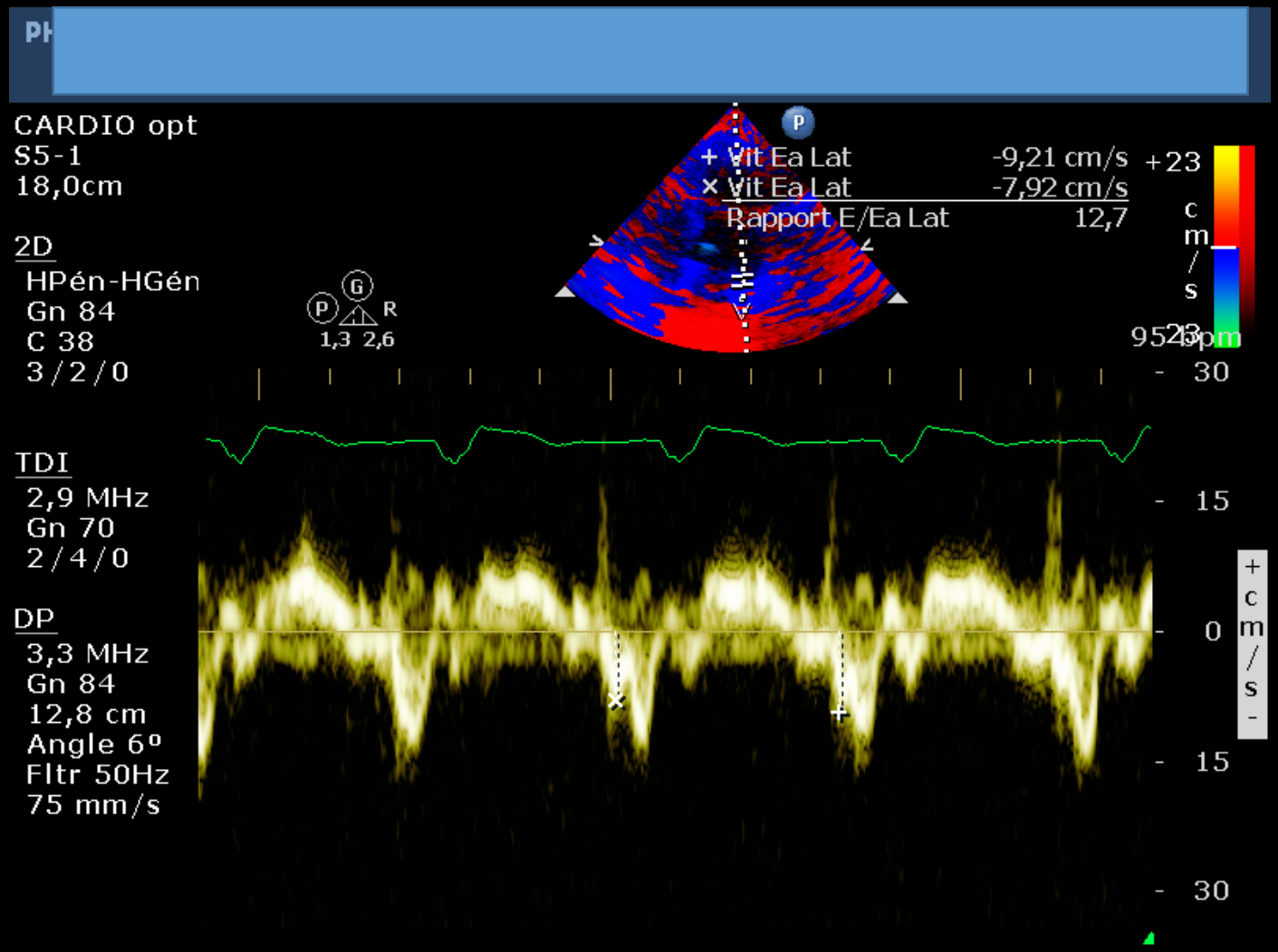


Remplissage?

Remplissage?



Après 250ml …


CARDIO opt
S5-1
18,0cm
2D
HPén-HGén
Gn 84
C 38
3 / 2 / 0
1,3 2,6
+ Vit Ea Lat -9,21 cm/s
× Vit Ea Lat -7,92 cm/s
Rapport E/Ea Lat 12,7
+23
cm/s
-23
95 bpm
30
TDI
2,9 MHz
Gn 70
2 / 4 / 0
15
DP
3,3 MHz
Gn 84
12,8 cm
Angle 6°
Fltr 50Hz
75 mm/s
0
+ cm/s -
15
30

Messages clés

- Le profil transmitral **n’est pas** un indice de précharge dépendance
- Les conditions de charge du VG varient en fonction du traitement catécholaminergique
- Il faut savoir répéter les échographies
- On peut (doit?) remplir un choc cardiogénique

Profil Transmitral = PAPO

Tableau 2 Exemples de valeurs seuils proposées pour certains indices Doppler afin de prédire de manière semi-quantitative le niveau de pression de remplissage du ventricule gauche chez des patients de réanimation ou en peropératoire de chirurgie cardiaque

Paramètres Doppler	Valeur seuil	Pression de remplissage VG prédite (mmHg)	Sensibilité	Spécificité	Valeur prédictive positive
E/A	> 2	> 18	-	-	100 % [19][b,c]
Fraction systolique[a]	< 55 %	> 15	91 %	87 %	- [25]
	< 40 %	> 18	-	-	55 % [19][b,c]
	≤ 40 %	≥ 18	100 %	100 %	100 % [20][b,c]
	≤ 44 %	> 18	85 %	88 %	- [23][b,c]
TD_D	< 175 ms	≥ 18	100 %	94 %	- [26][b]
E/E'	> 15	> 15	86 %	88 %	- [27][c]
	> 7	≥ 13	86 %	92 %	- [21][b,c]
	> 7,5	≥ 15	86 %	81 %	- [22][b,c]
	> 9,5	> 18	100 %	86 %	- [23][b,c]
E/Vp	> 2	≥ 13	-	-	- [21][b,c]
	> 2,6	> 18	100 %	86 %	- [23][b,c]

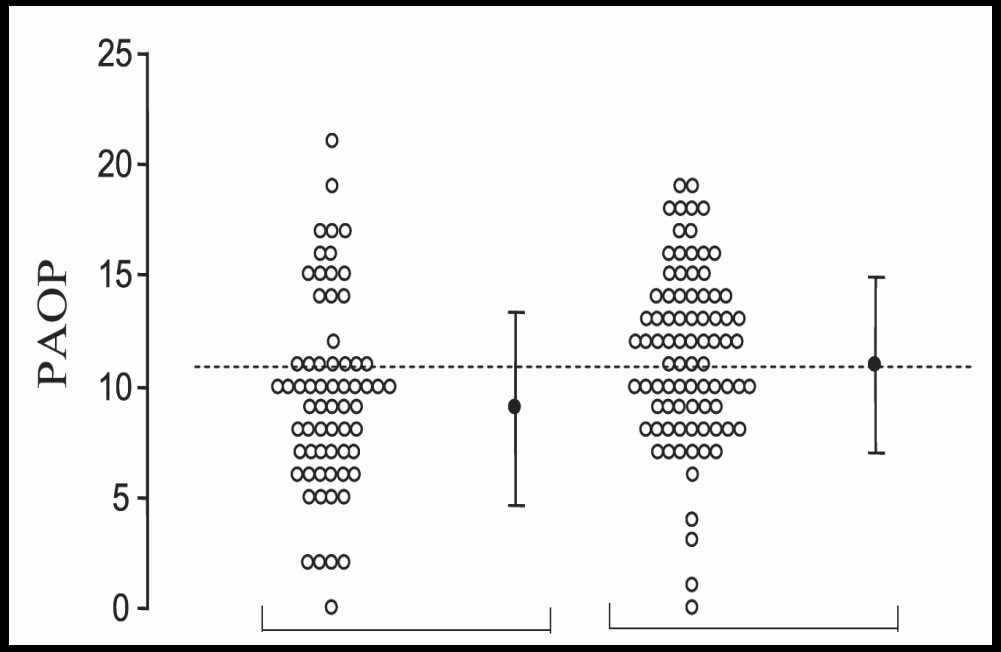
VG : ventricule gauche ; TD_D : temps de décélération de l'onde D pulmonaire ; E' : onde protodiastolique recueillie en doppler tissulaire à l'anneau mitral (paroi latérale) ; Vp : vitesse de propagation du courant protodiastolique dans le ventricule gauche mesuré en mode TM couleur.

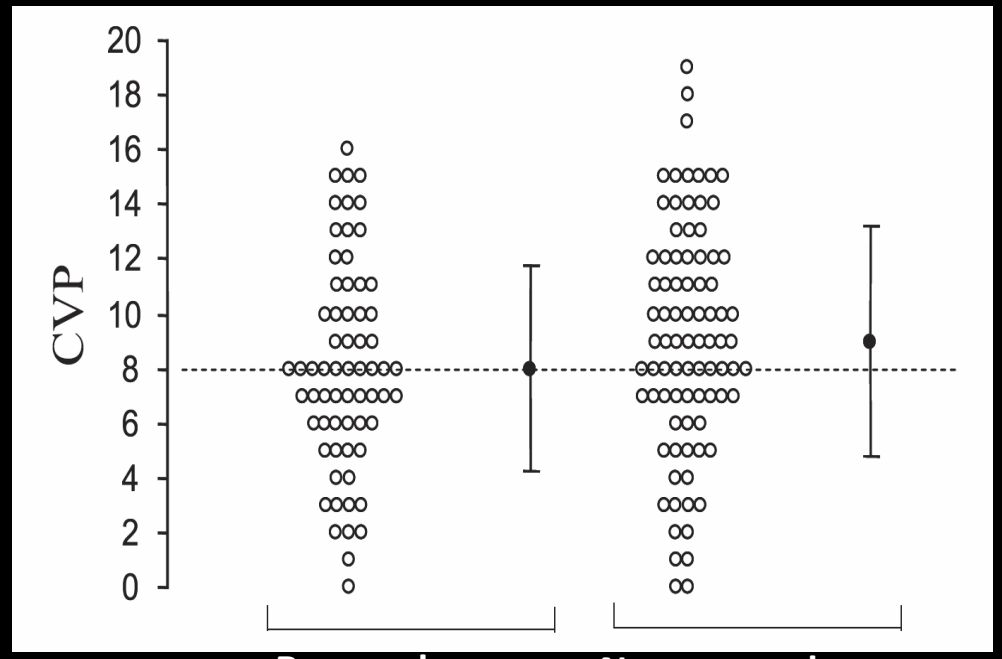
[a] ITV onde S/ITV onde S + ITV onde D exprimé en pourcentage (doppler veineux pulmonaire ; ITV : intégrale temps-vitesse).

[b] Patients ventilés.

[c] Patients de réanimation.

Profil Transmitral = PAPO

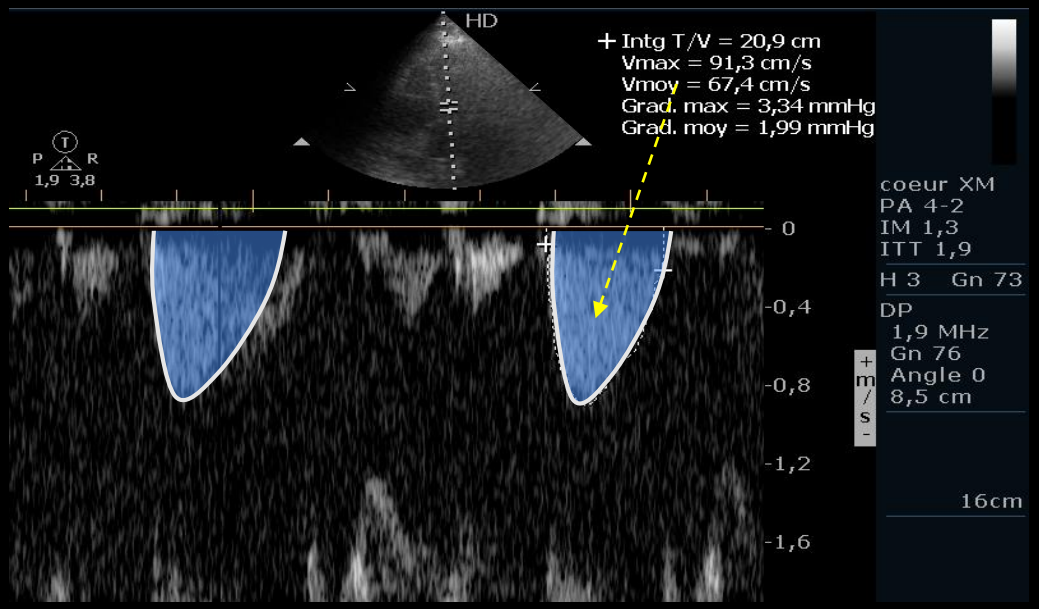


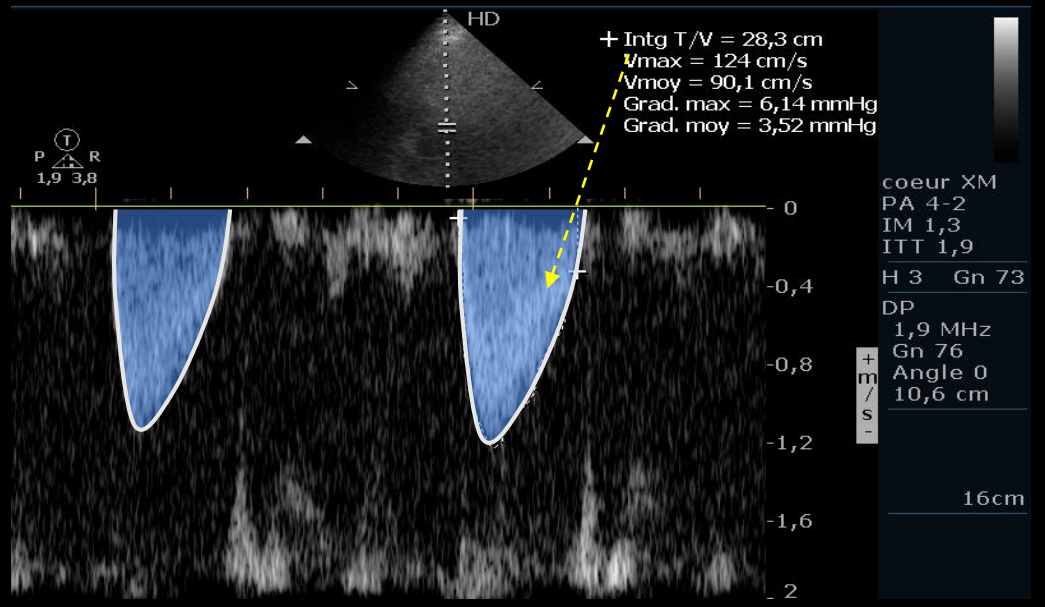


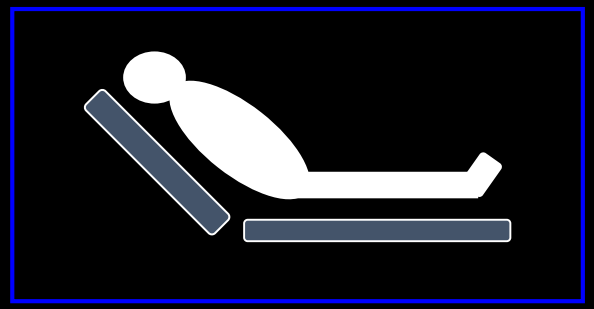
Cardiac filling pressures are not appropriate to predict hemodynamic response to volume challenge*

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

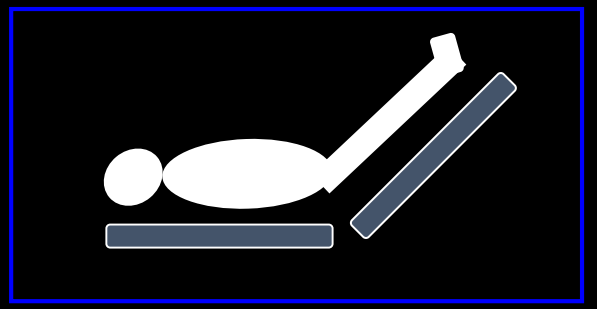
Indices de précharge dépendance en écho?







Cut-off 12%



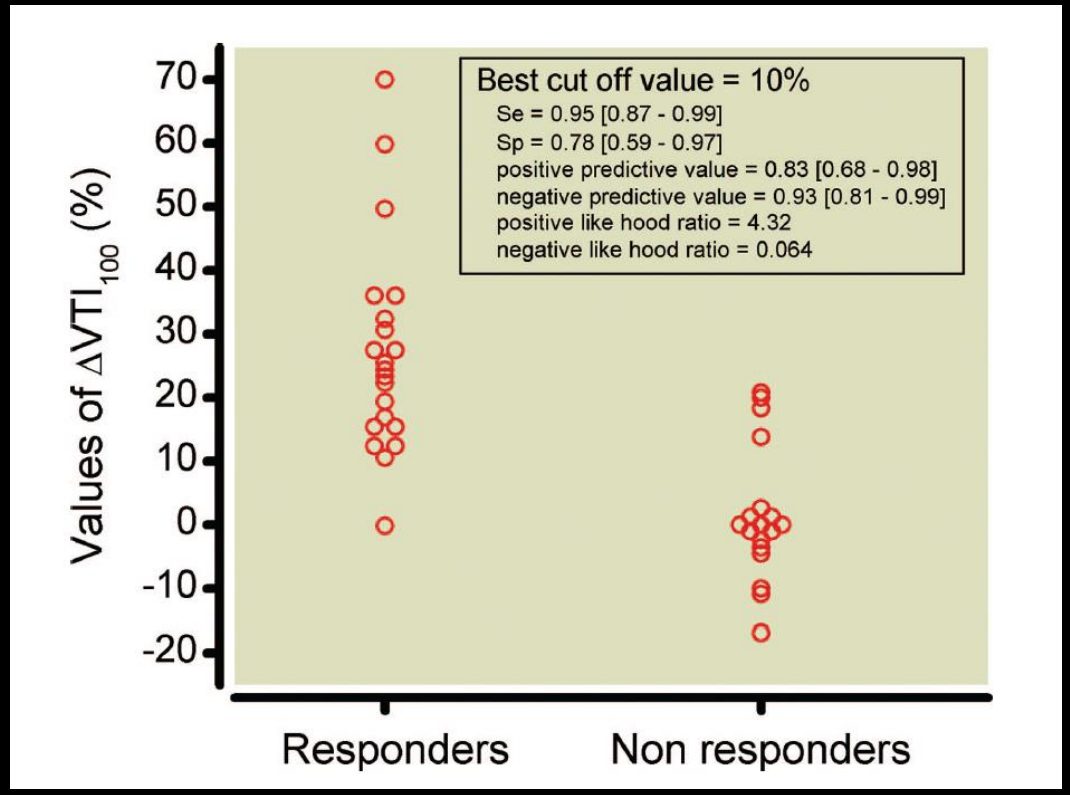
Intensive Care Med (2007) 33:1125–1132 ORIGINAL

Bouchra Lamia
Ana Ochagavia
Xavier Monnet
Denis Chemla
Christian Richard
Jean-Louis Teboul

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

D'après J.L TEBOUL

Indices de précharge dépendance en écho?



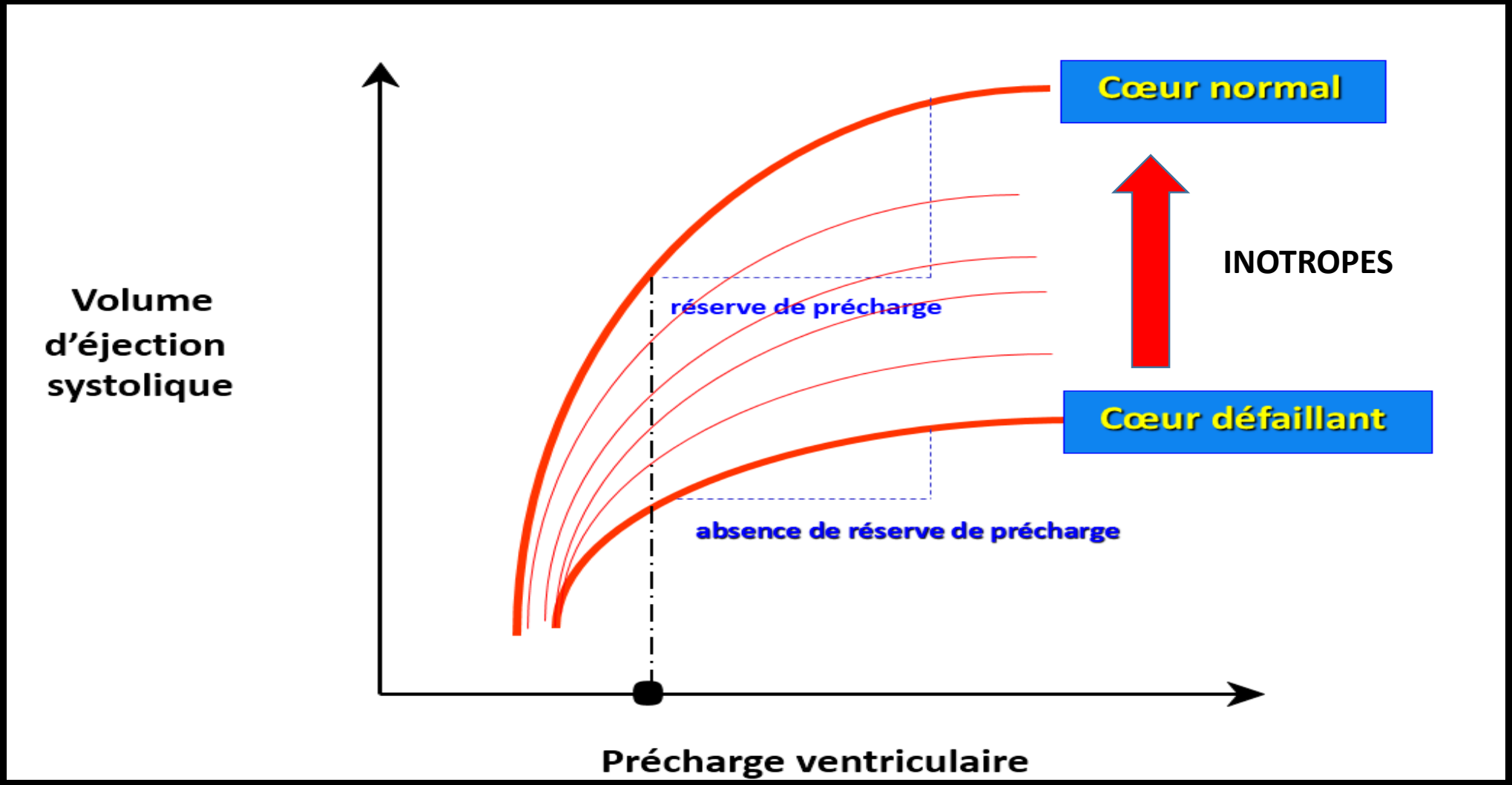
An Increase in Aortic Blood Flow after an Infusion of 100 ml Colloid over 1 Minute Can Predict Fluid Responsiveness

The Mini-fluid Challenge Study

Laurent Muller, M.D., M.Sc.,* Medhi Toumi, M.D.,* Philippe-Jean Bousquet, M.D.,† Béatrice Riu-Poulenc, M.D.,‡ Guillaume Louart, M.D.,* Damien Candela, M.D.,* Lana Zoric, M.D.,* Carey Suehs, Ph.D.,† Jean-Emmanuel de La Coussaye, M.D., Ph.D.,§ Nicolas Molinari, Ph.D.,† Jean-Yves Lefrant, M.D., Ph.D.,§ in the AzuRéa Group

Anesthesiology 2011; 115:541–7

Modifications des conditions de charge



D'après J.L TEBOUL

European Heart Journal (2016) **37**, 2129–2200
doi:10.1093/eurheartj/ehw128

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

Recommendations regarding applied diagnostic measurements

Recommendations	Class [a]	Level [b]	Ref [c]
Upon presentation a measurement of plasma natriuretic peptide level (BNP, NT-proBNP or MR-proANP) is recommended in all patients with acute dyspnoea and suspected AHF to help in the differentiation of AHF from non-cardiac causes of acute dyspnoea.	I	A	531–534
At admission in all patients presenting with suspected AHF, the following diagnostic tests are recommended:			
a. 12-lead ECG;	I	C	
b. chest X-ray to assess signs of pulmonary congestion and detect other cardiac or non-cardiac diseases that may cause or contribute to the patient's symptoms;	I	C	
c. the following laboratory assessments in the blood: cardiac troponins, BUN (or urea), creatinine, electrolytes (sodium, potassium), glucose, complete blood count, liver function tests and TSH.	I	C	
Echocardiography is recommended immediately in haemodynamically unstable AHF patients and within 48 hours when cardiac structure and function are either not known or may have changed since previous studies.	I	C	

AHF = acute heart failure; BNP = B-type natriuretic peptide; BUN = blood urea nitrogen; ECG = electrocardiogram; MR-proANP = mid-regional pro A-type natriuretic peptide; NT-proBNP = N-terminal pro-B type natriuretic peptide; TSH = thyroid-stimulating hormone

[a]Class of recommendation.

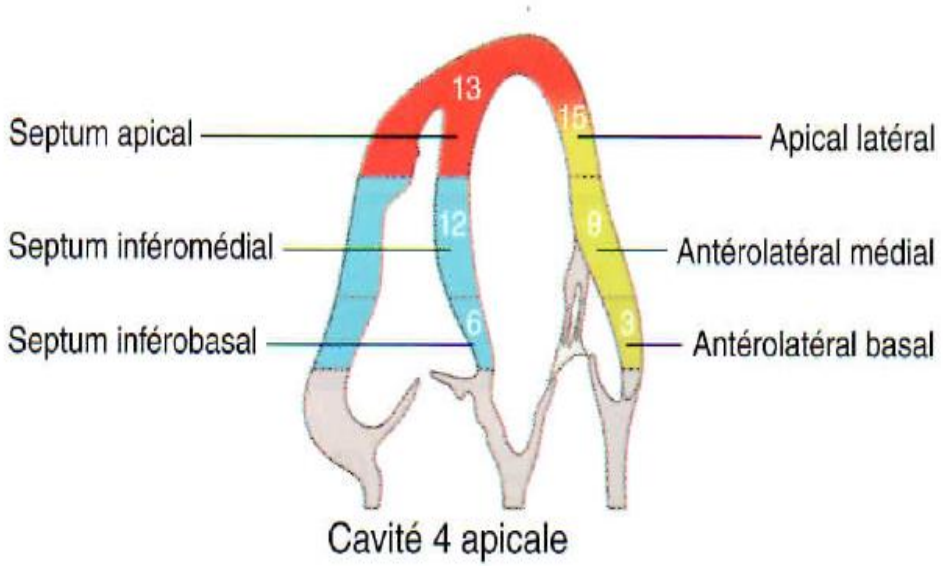
[b]Level of evidence.

[c]Reference(s) supporting recommendations.

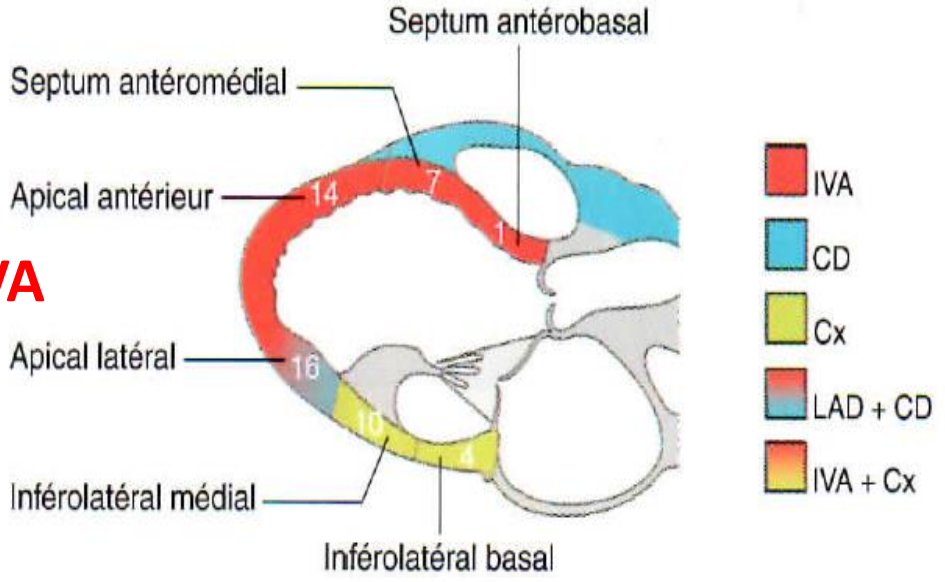
Analyse segmentaire

L'évaluation de la contractilité segmentaire se fait à partir des différentes coupes par ETT.

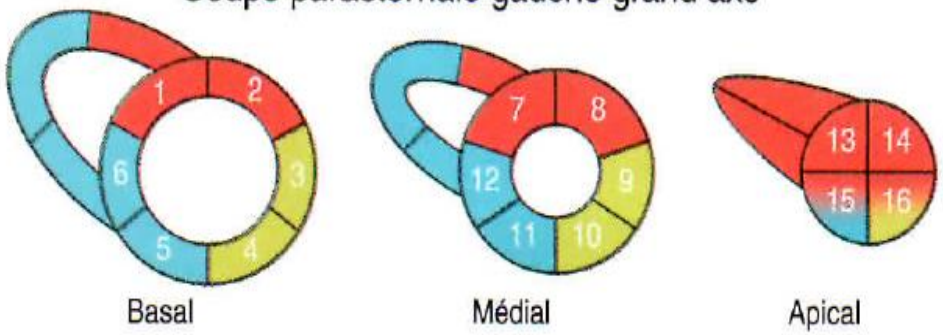
4 Cavités peut sous évaluer un déficit IVA



Cavité 4 apicale



Coupe parasternale gauche grand axe

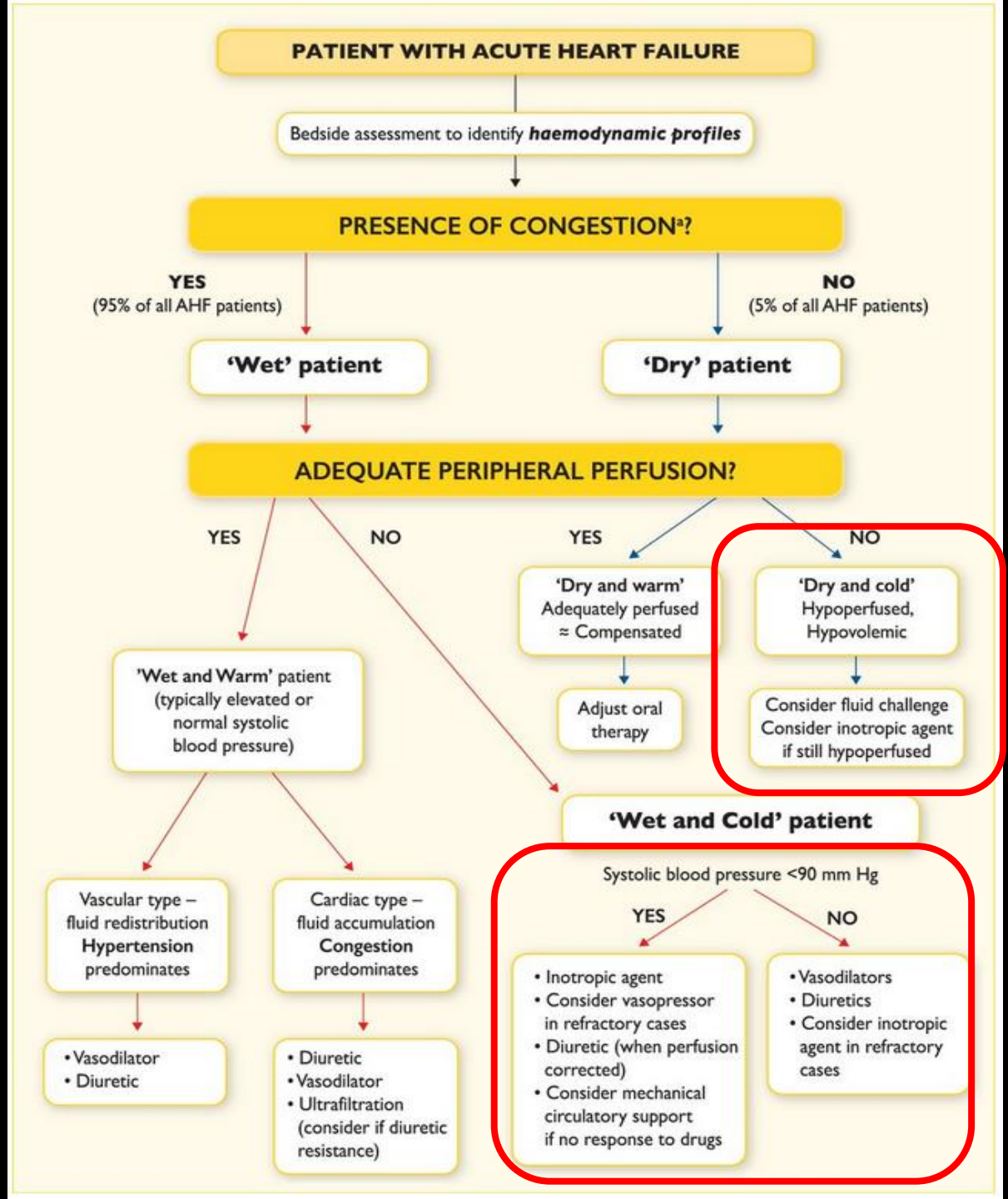


Basal Médial Apical

Évaluation semi-quantitative de contractilité segmentaire

Normal
Hypokinétique
Akinétique
Dyskinétique
Anévrismal

Les territoires vasculaires sont indiqués en couleur : IVA : interventriculaire antérieure ; CD : coronaire droite ; Cx : circonflexe.


PATIENT WITH ACUTE HEART FAILURE
Bedside assessment to identify haemodynamic profiles
PRESENCE OF CONGESTION[a]?
YES
(95% of all AHF patients)
NO
(5% of all AHF patients)
'Wet' patient
'Dry' patient
ADEQUATE PERIPHERAL PERFUSION?
YES
NO
YES
NO
'Wet and Warm' patient
(typically elevated or normal systolic blood pressure)
'Dry and warm'
Adequately perfused
≈ Compensated
'Dry and cold'
Hypoperfused, Hypovolemic
Adjust oral therapy
Consider fluid challenge
Consider inotropic agent if still hypoperfused
'Wet and Cold' patient
Vascular type – fluid redistribution
Hypertension predominates
Cardiac type – fluid accumulation
Congestion predominates
• Vasodilator
• Diuretic
• Diuretic
• Vasodilator
• Ultrafiltration (consider if diuretic resistance)
Systolic blood pressure <90 mm Hg
YES
NO
• Inotropic agent
• Consider vasopressor in refractory cases
• Diuretic (when perfusion corrected)
• Consider mechanical circulatory support if no response to drugs
• Vasodilators
• Diuretics
• Consider inotropic agent in refractory cases

Recommendations regarding management of patients with cardiogenic shock

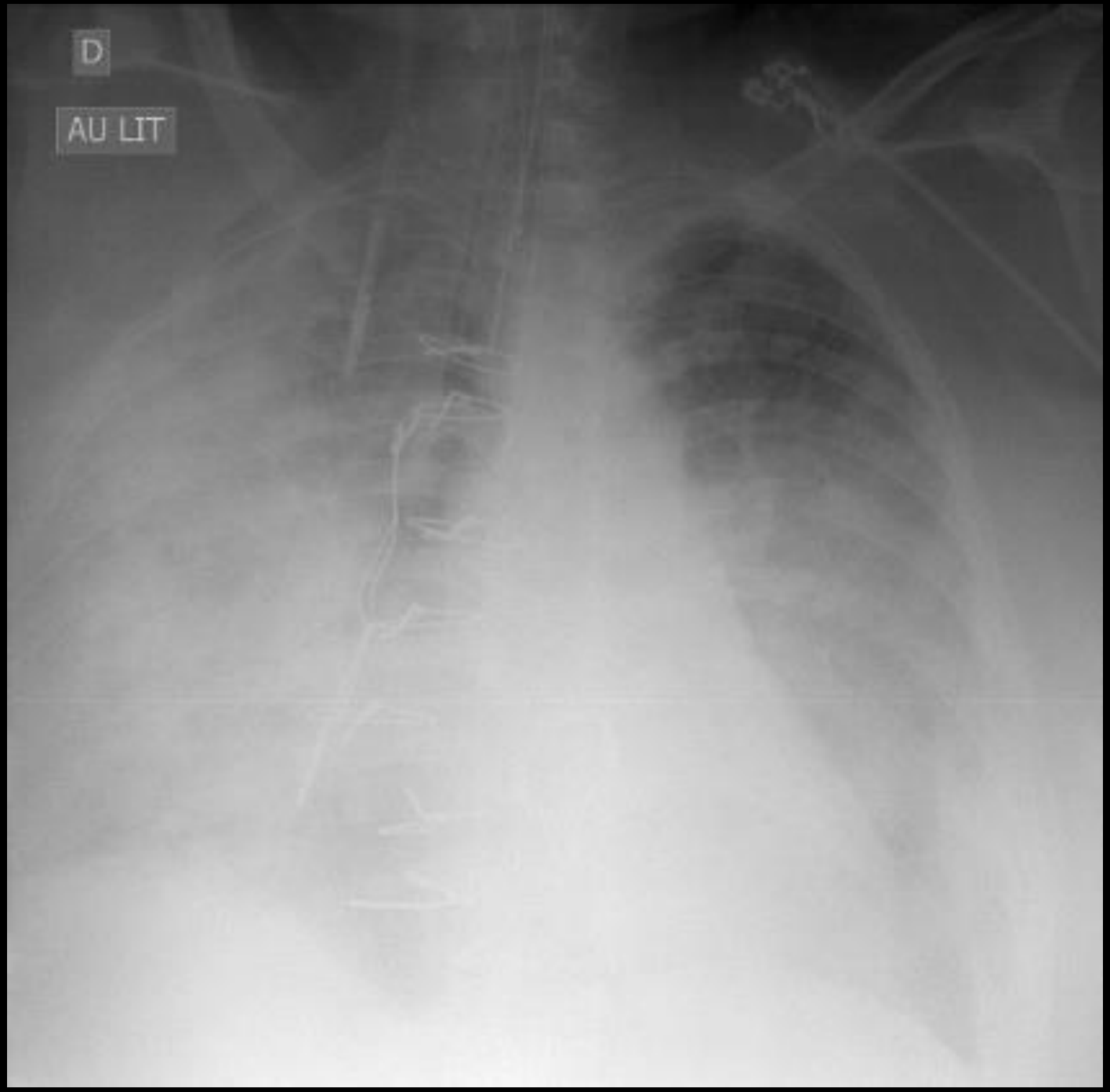
Recommendations	Class [a]	Level [b]	Ref [c]
In all patients with suspected cardiogenic shock, immediate ECG and echocardiography are recommended.	I	C	
All patients with cardiogenic shock should be rapidly transferred to a tertiary care center which has a 24/7 service of cardiac catheterization, and a dedicated ICU/CCU with availability of short-term mechanical circulatory support.	I	C	
In patients with cardiogenic shock complicating ACS an immediate coronary angiography is recommended (within 2 hours from hospital admission) with an intent to perform coronary revascularization.	I	C	
Continous ECG and blood pressure monitoring are recommended.	I	C	
Invasive monitoring with an arterial line is recommended.	I	C	
Fluid challenge (saline or Ringer's lactate, >200 ml/15–30 min) is recommended as the first-line treatment if there is no sign of overt fluid overload.	I	C	
Intravenous inotropic agents (dobutamine) may be considered to increase cardiac output.	IIb	C	
Vasopressors (norepinephrine preferable over dopamine) may be considered if there is a need to maintain SBP in the presence of persistent hypoperfusion.	IIb	B	558
IABP is not routinely recommended in cardiogenic shock.	III	B	585, 586
Short-term mechanical circulatory support may be considered in refractory cardiogenic shock depending on patient age, comorbidities and neurological function.	IIb	C	

Cas clinique n°2

- Monsieur A, 53 ans, BPCO , Coronarien ponté il y a 3 semaines
- Dyspnée progressive
- Détresse respiratoire hypercapnique et hypoxique, pas de douleur Thx
- IOT , VAC, Sat 94% sous FIO2 80%
- VVC pour Noradrénaline (0,3µg/kg/min) post intubation
- 38,2°c
- Hémoglobine à 7,5g/dl; Leucocytes 11Giga /L; Lactates 5,6mmol/L

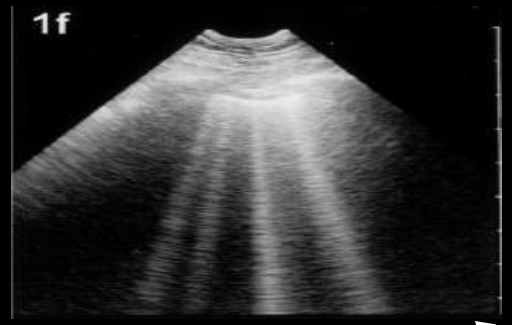
Cas clinique n°2

- Delta PP à 23%
- Remplissage de 500ml de cristalloïdes
- Delta PP à 25%

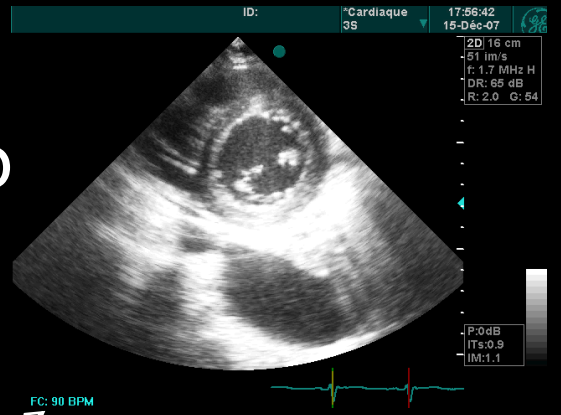

D
AU LIT

Que faites vous?

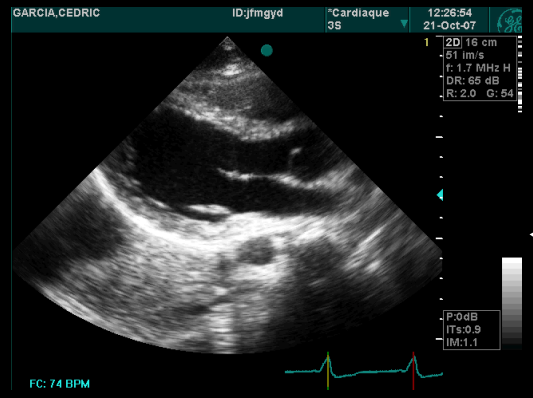
Diagnostic???



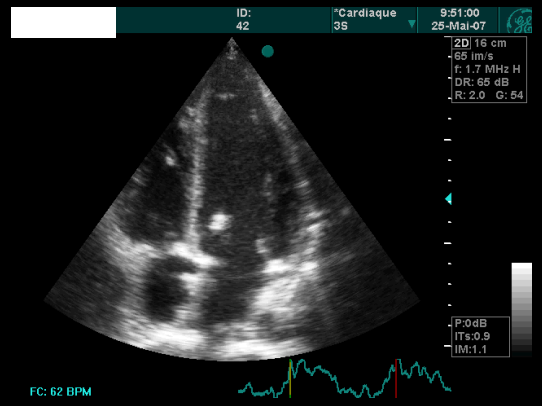
Thorax antérieur



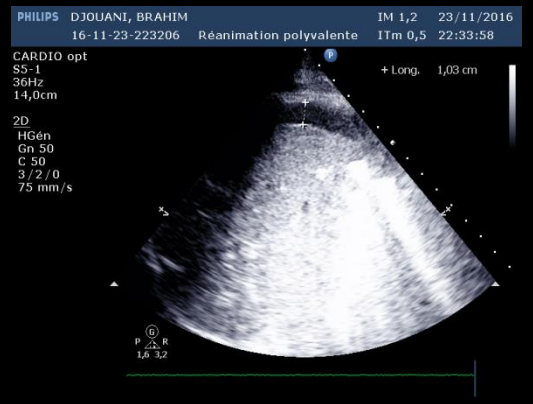
Coupe parasternale petit axe



Coupe parasternale grand axe

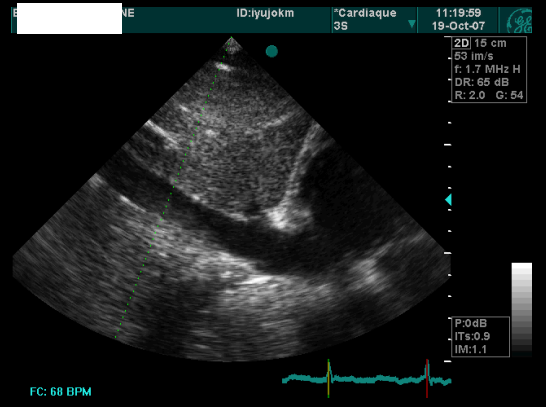


Coupe apicale 4 cavités



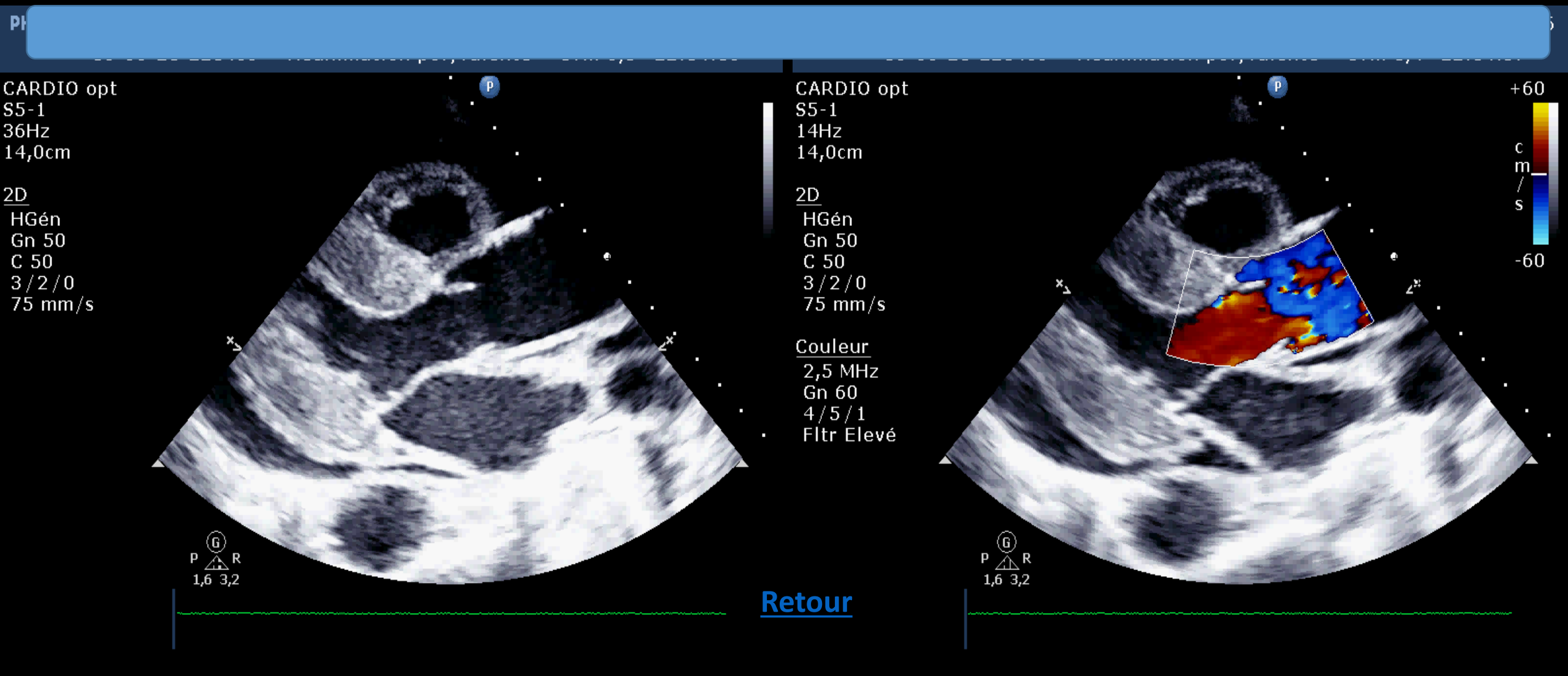
Thorax base

Indices doppler



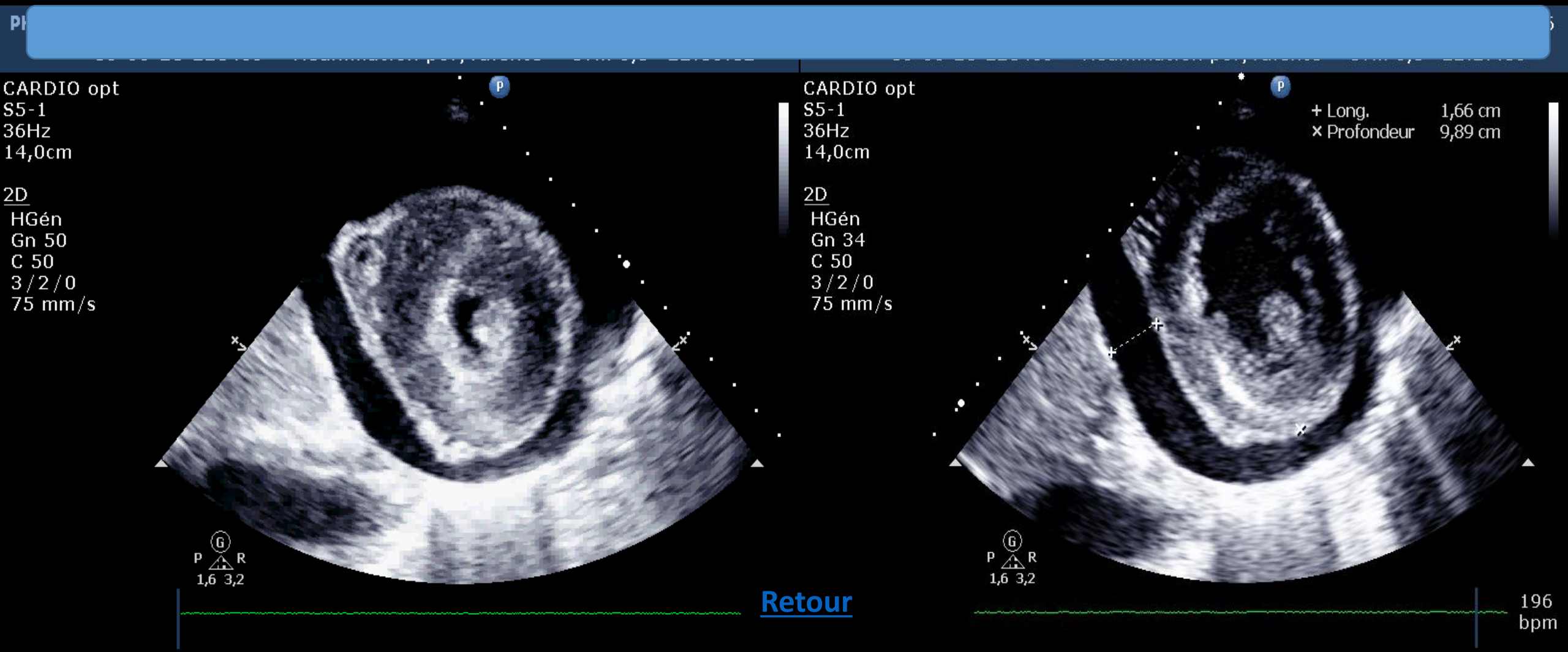
Coupe sous costale veine cave inf

PSGA


CARDIO opt
S5-1
36Hz
14,0cm
2D
HGén
Gn 50
C 50
3/2/0
75 mm/s
P
G
P R
1,6 3,2
CARDIO opt
S5-1
14Hz
14,0cm
2D
HGén
Gn 50
C 50
3/2/0
75 mm/s
Couleur
2,5 MHz
Gn 60
4/5/1
Fltr Elevé
+60
cm/s
-60
P
G
P R
1,6 3,2

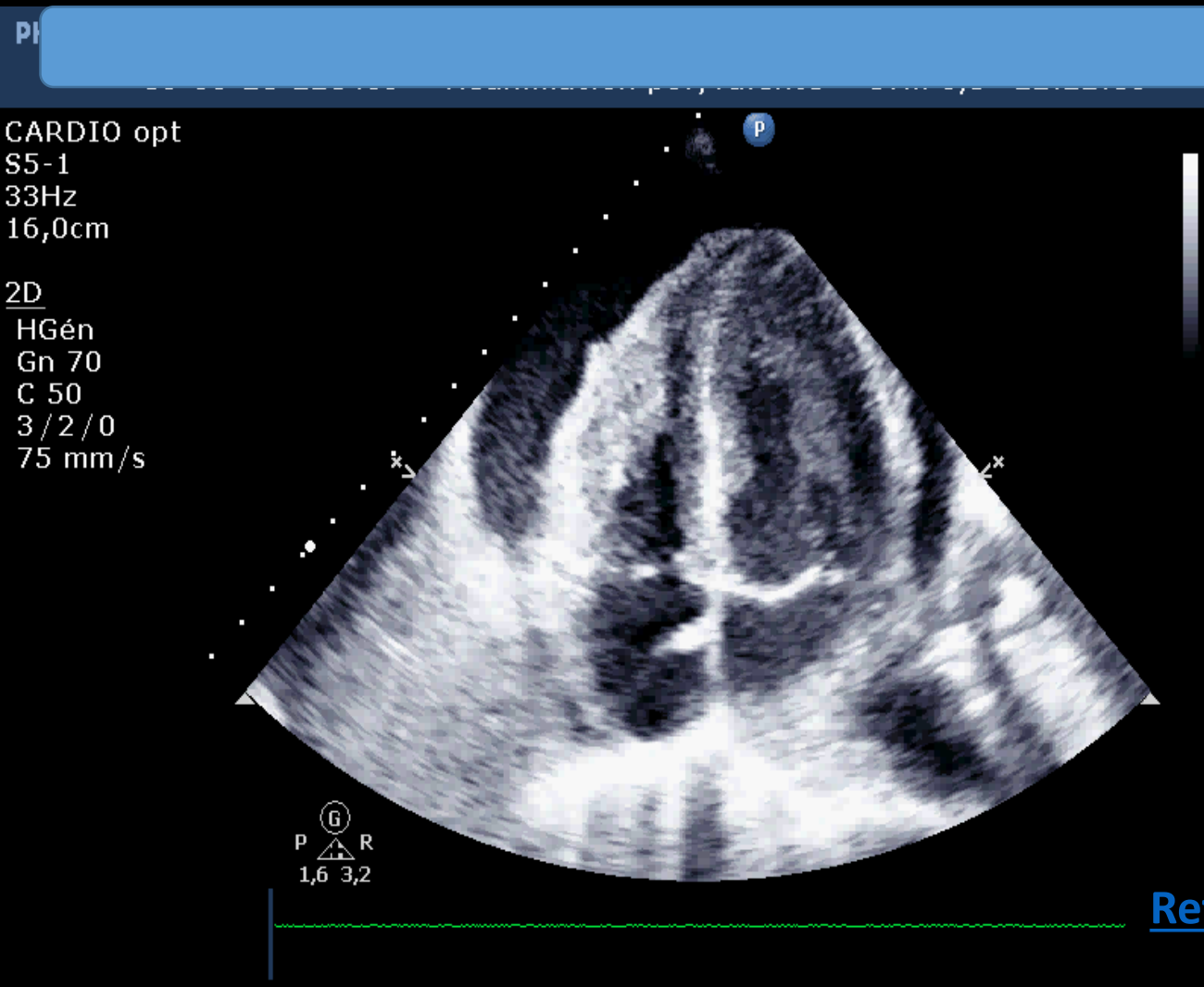
Retour

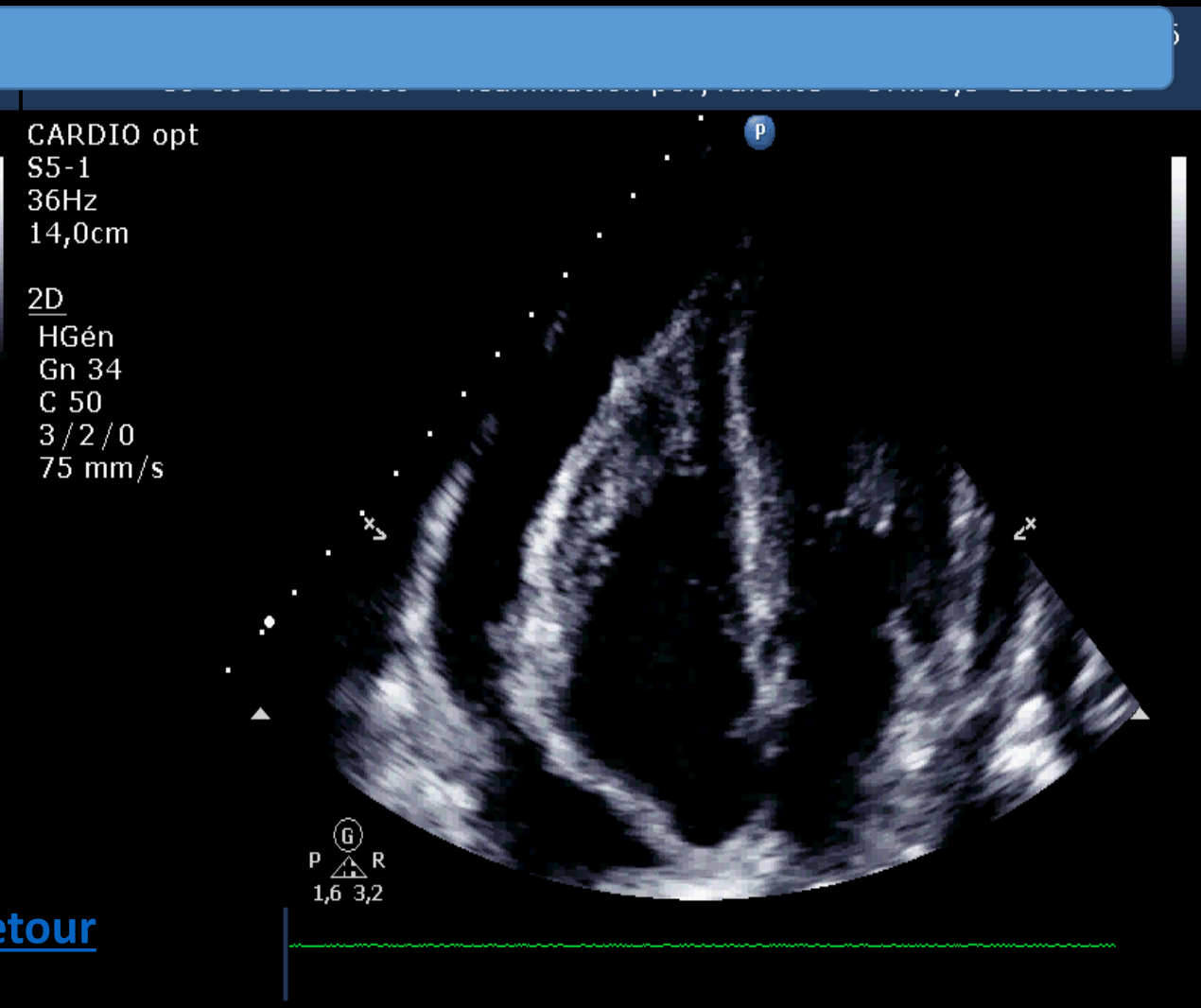
PSPA


CARDIO opt
S5-1
36Hz
14,0cm
2D
HGén
Gn 50
C 50
3/2/0
75 mm/s
P
R
1,6 3,2
CARDIO opt
S5-1
36Hz
14,0cm
2D
HGén
Gn 34
C 50
3/2/0
75 mm/s
+ Long. 1,66 cm
× Profondeur 9,89 cm
P
R
1,6 3,2
196
bpm

Retour

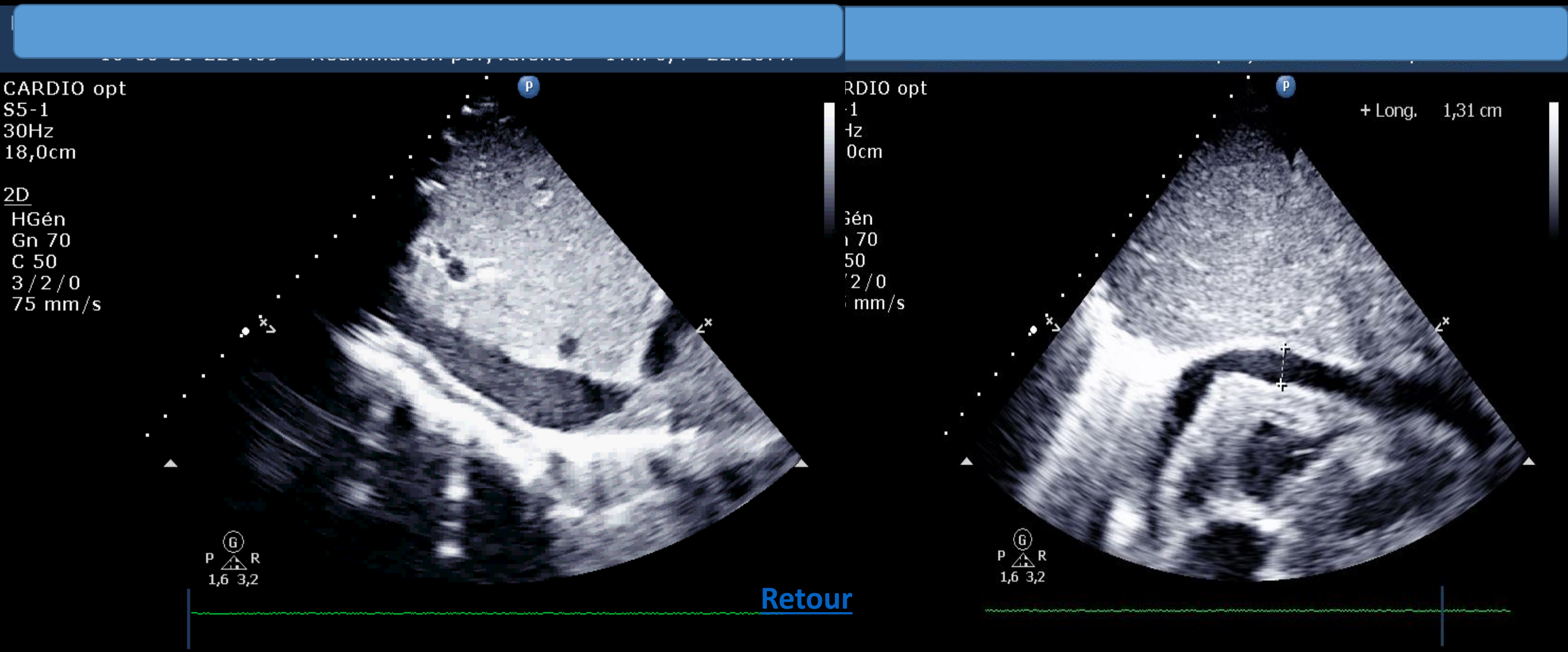
Apicale 4 cav





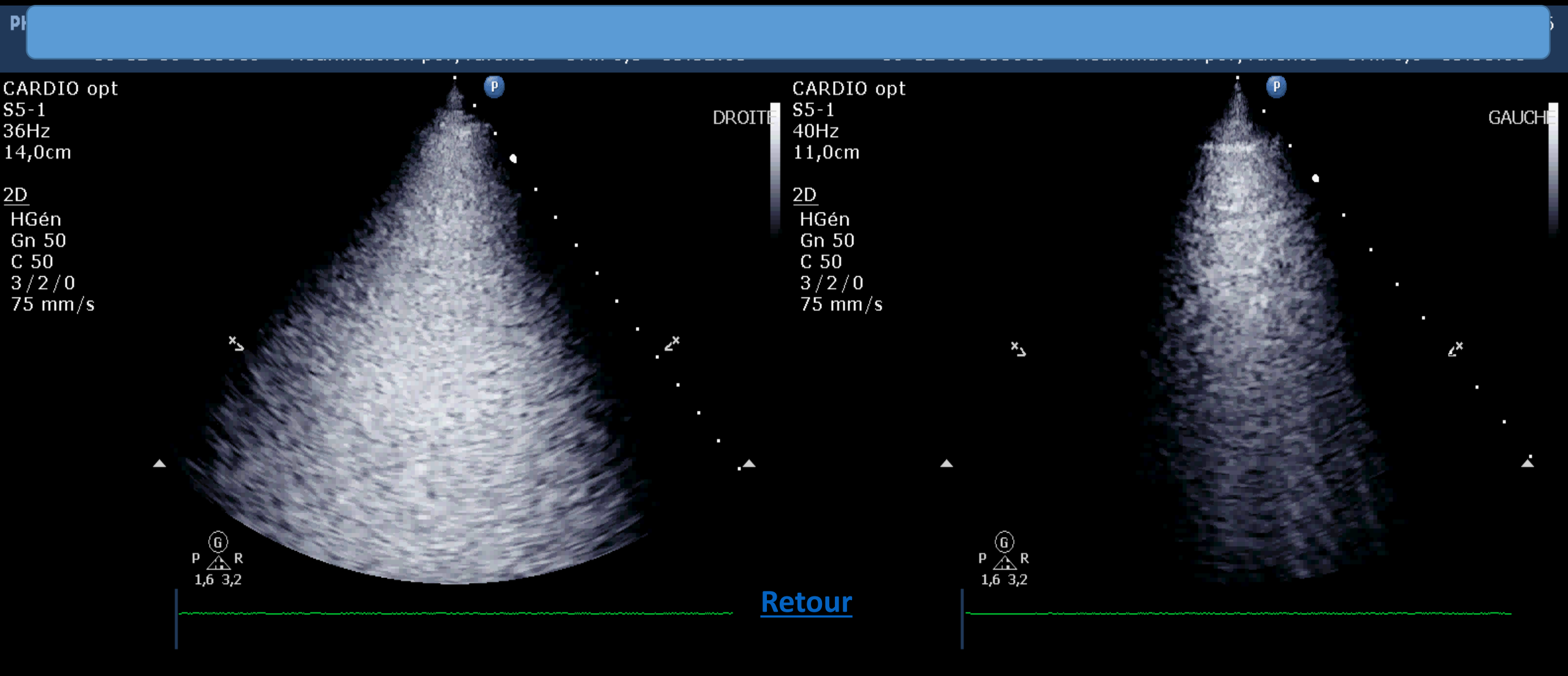
Retour

Sous costale VCI

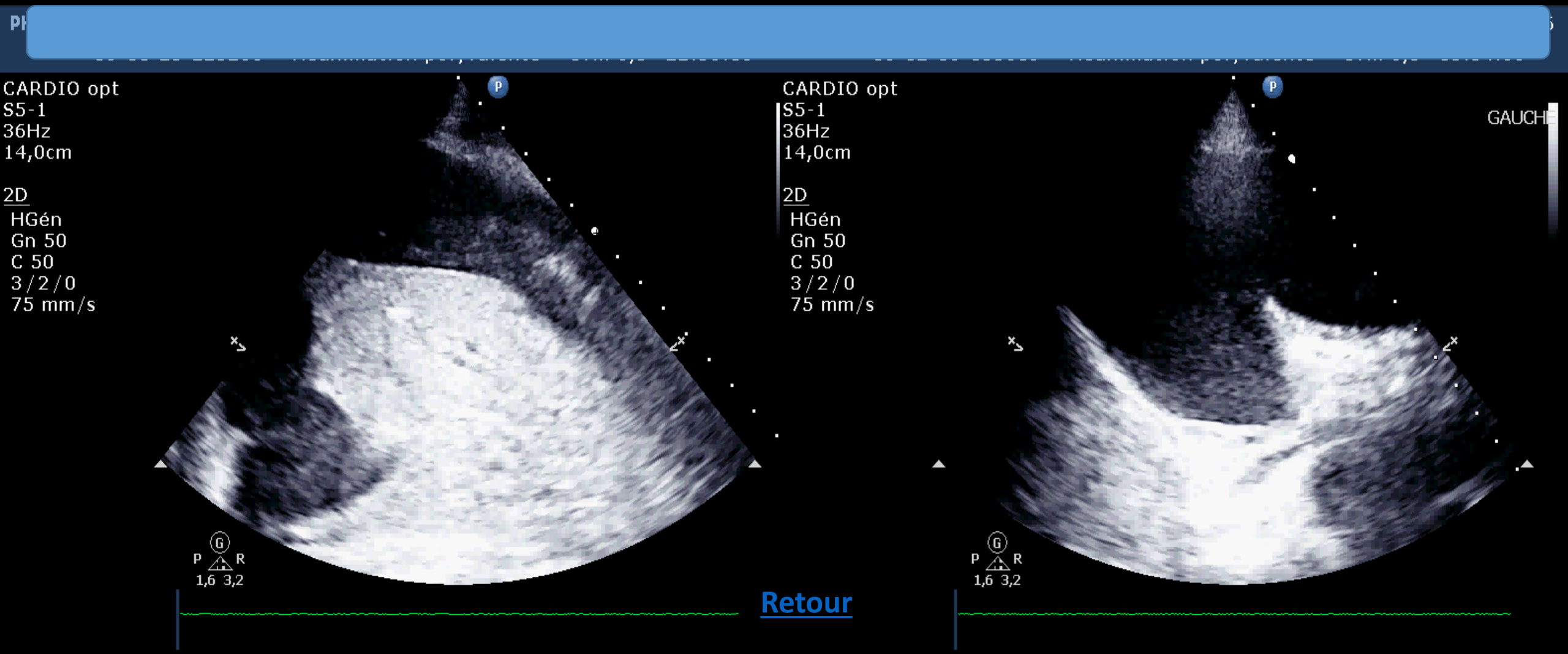


Retour

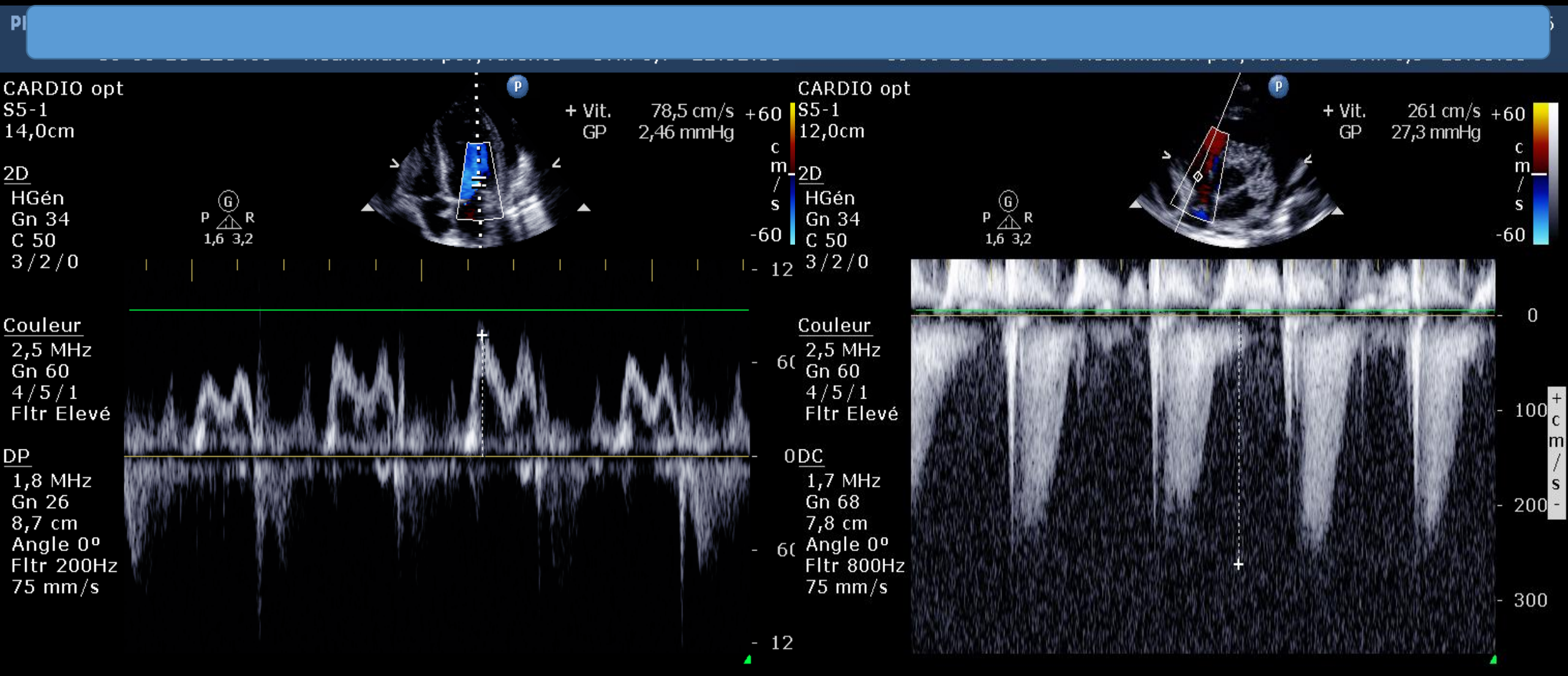
Thorax antérieur



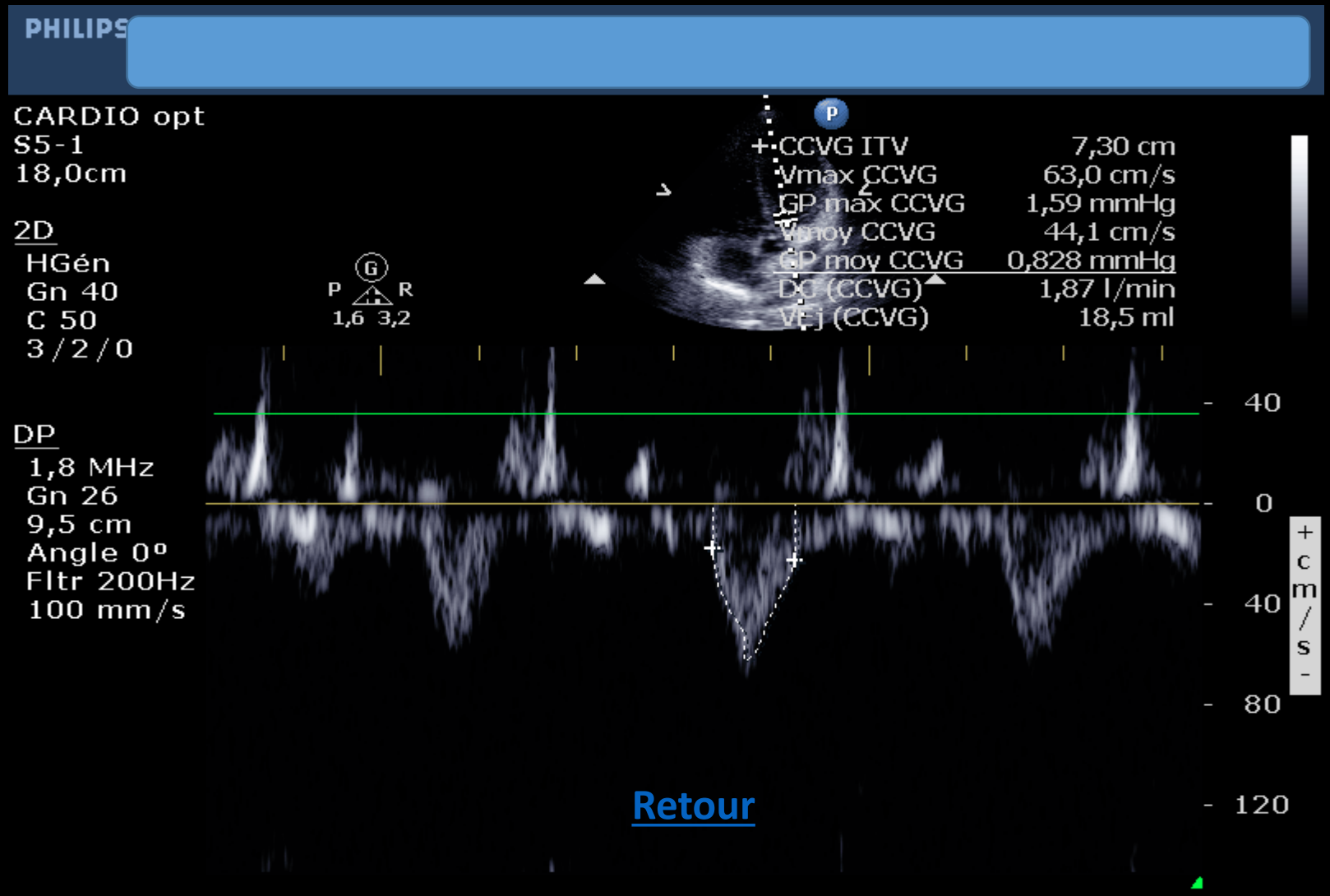
Thorax base


CARDIO opt
S5-1
36Hz
14,0cm
2D
HGén
Gn 50
C 50
3/2/0
75 mm/s
P
G
P R
1,6 3,2
CARDIO opt
S5-1
36Hz
14,0cm
2D
HGén
Gn 50
C 50
3/2/0
75 mm/s
GAUCHE
P
G
P R
1,6 3,2
Retour

Indices doppler et mesures



Indices doppler



[Retour]

Diagnostic?

- Choc obstructif
- Tamponnade
- Hémopéricarde
- Hémothorax bilatéral

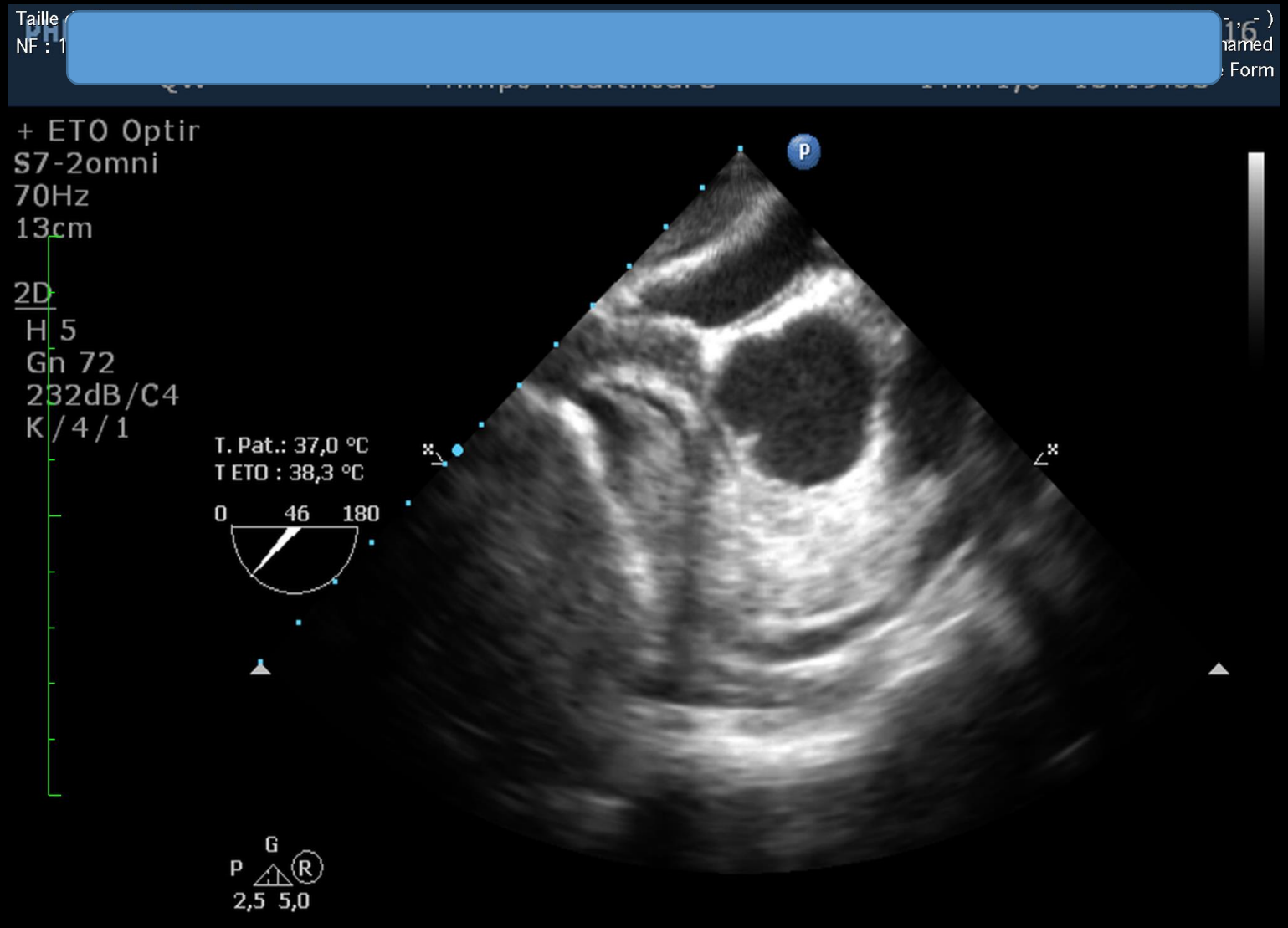
Que proposez vous ?

- Ponction péricardique en 1er intention?
- Drainage pleural?
- Transfusion?
- TDM ?
- ETO?
- Remplissage vasculaire?

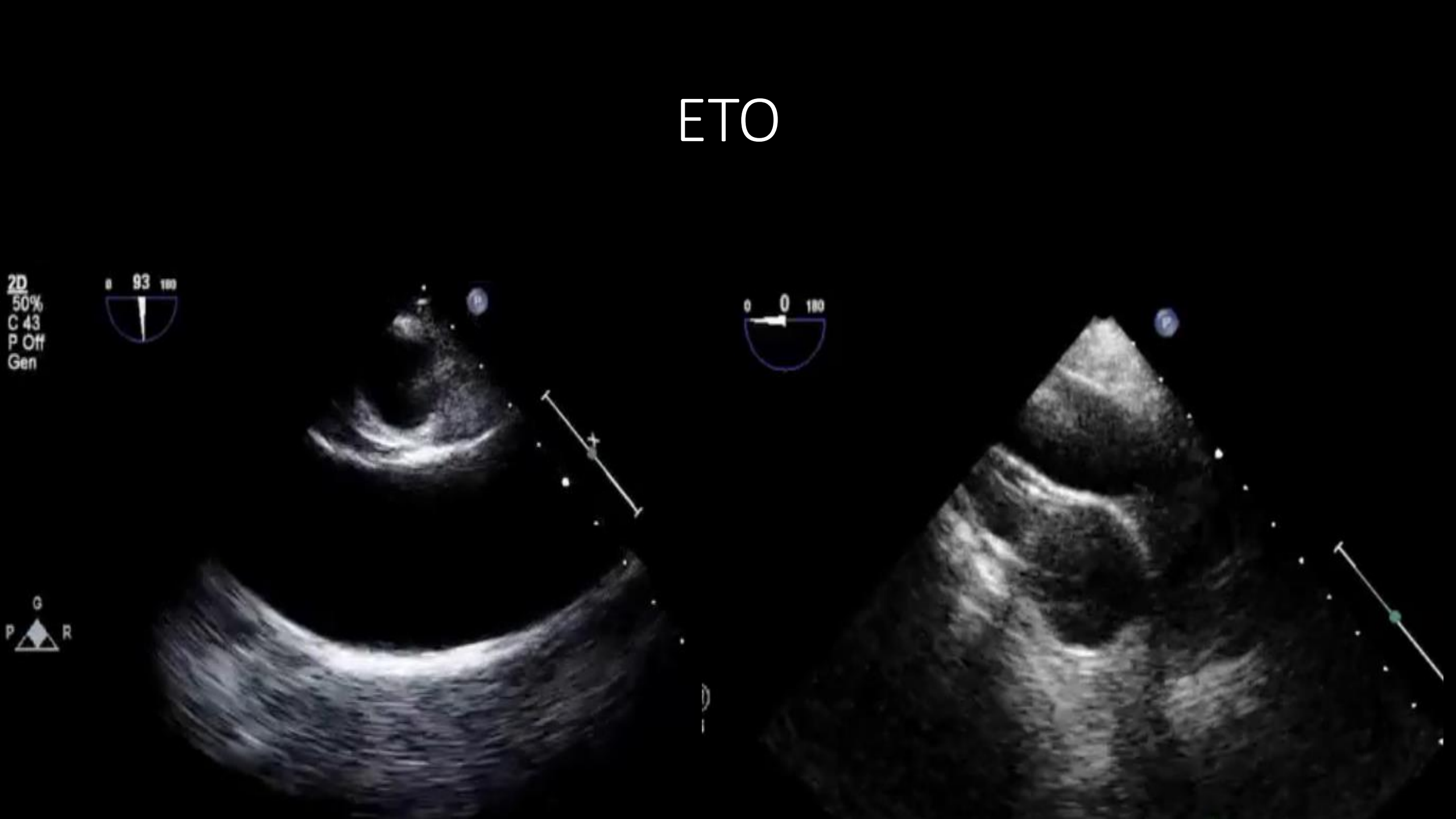
Que proposez vous ?

- Ponction péricardique en 1er intention
- Drainage pleural (réalisé au bloc dans le même temps que le drainage chirurgical)
- Transfusion
- TDM (seulement si patient très très stable)
- ETO
- Remplissage vasculaire

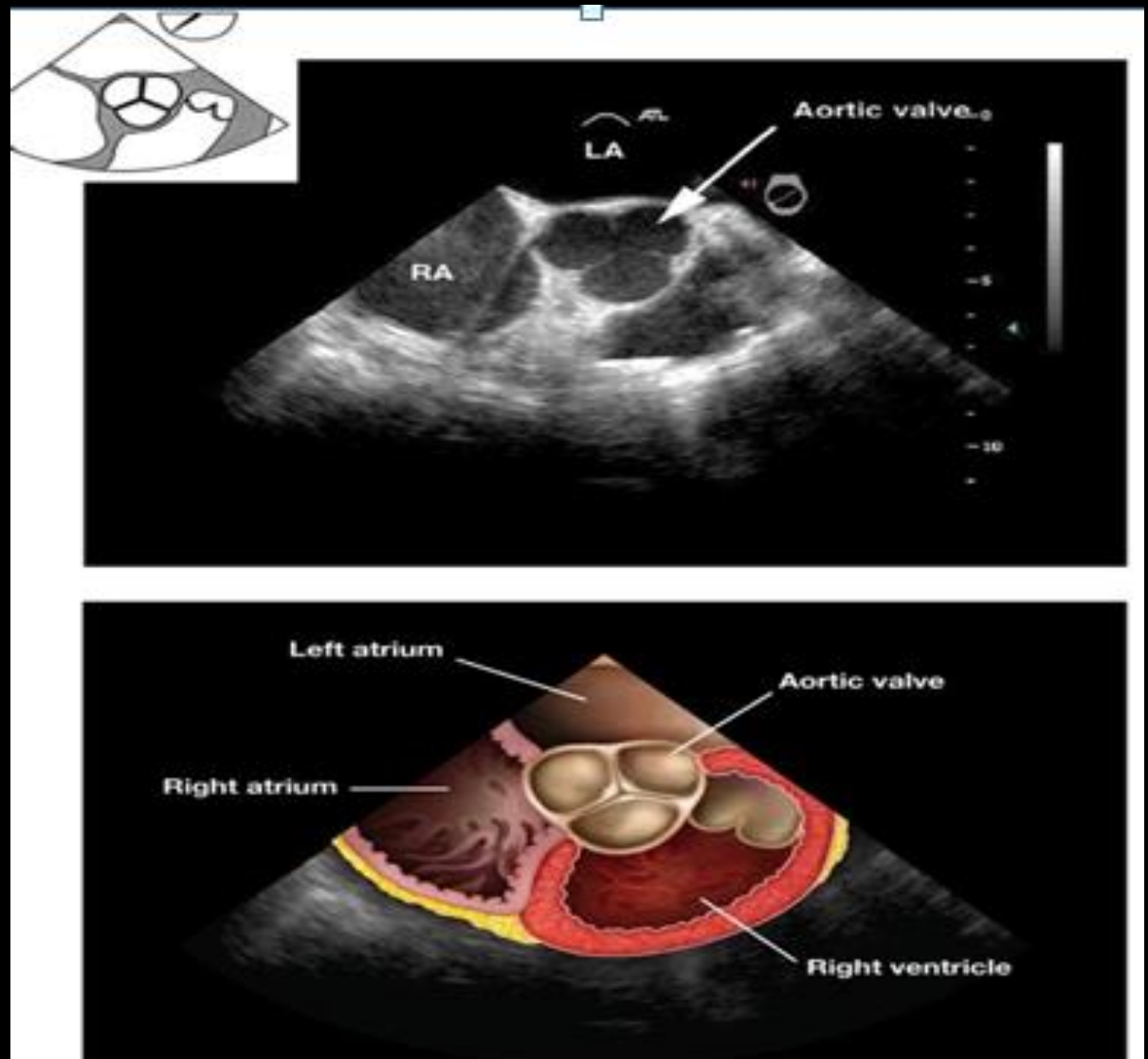
ETO


+ ETO Optir
S7-2omni
70Hz
13cm
2D
H 5
Gn 72
232dB/C4
K/4/1
T. Pat.: 37,0 °C
T ETO : 38,3 °C
0 46 180
P
G
P R
2,5 5,0

ETO



Quelle est la coupe?

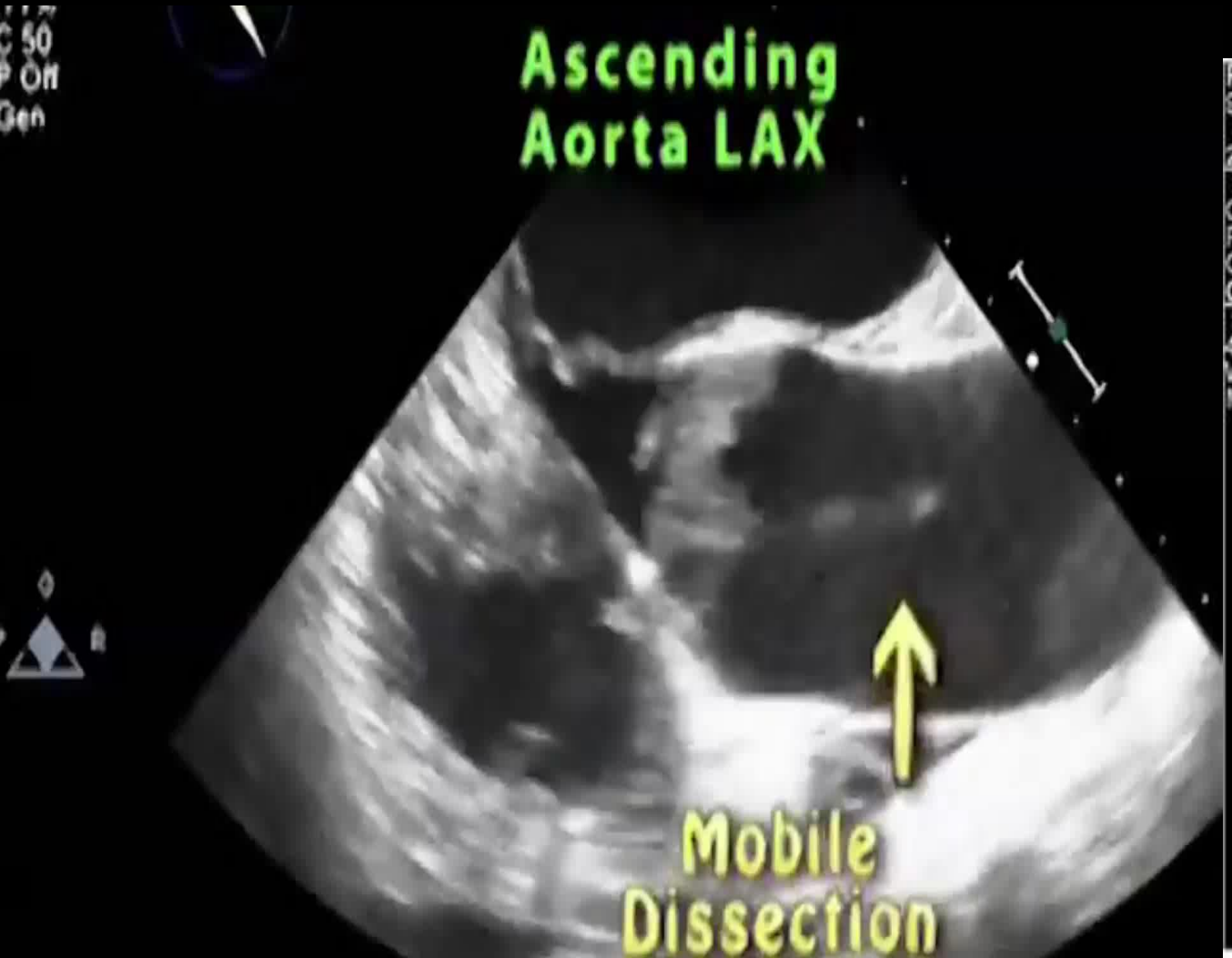


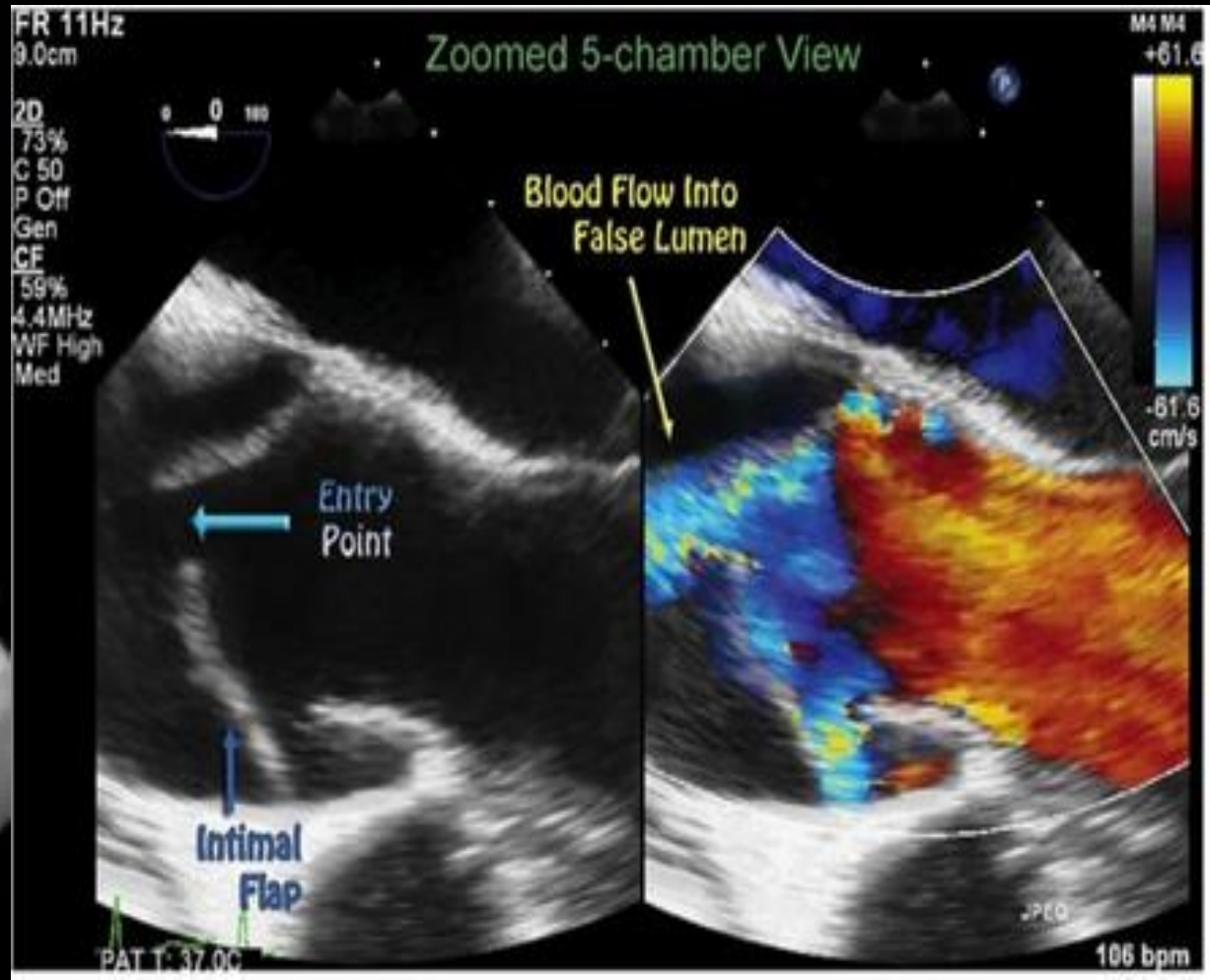
Signes de dissection ?

Signes de dissection ?

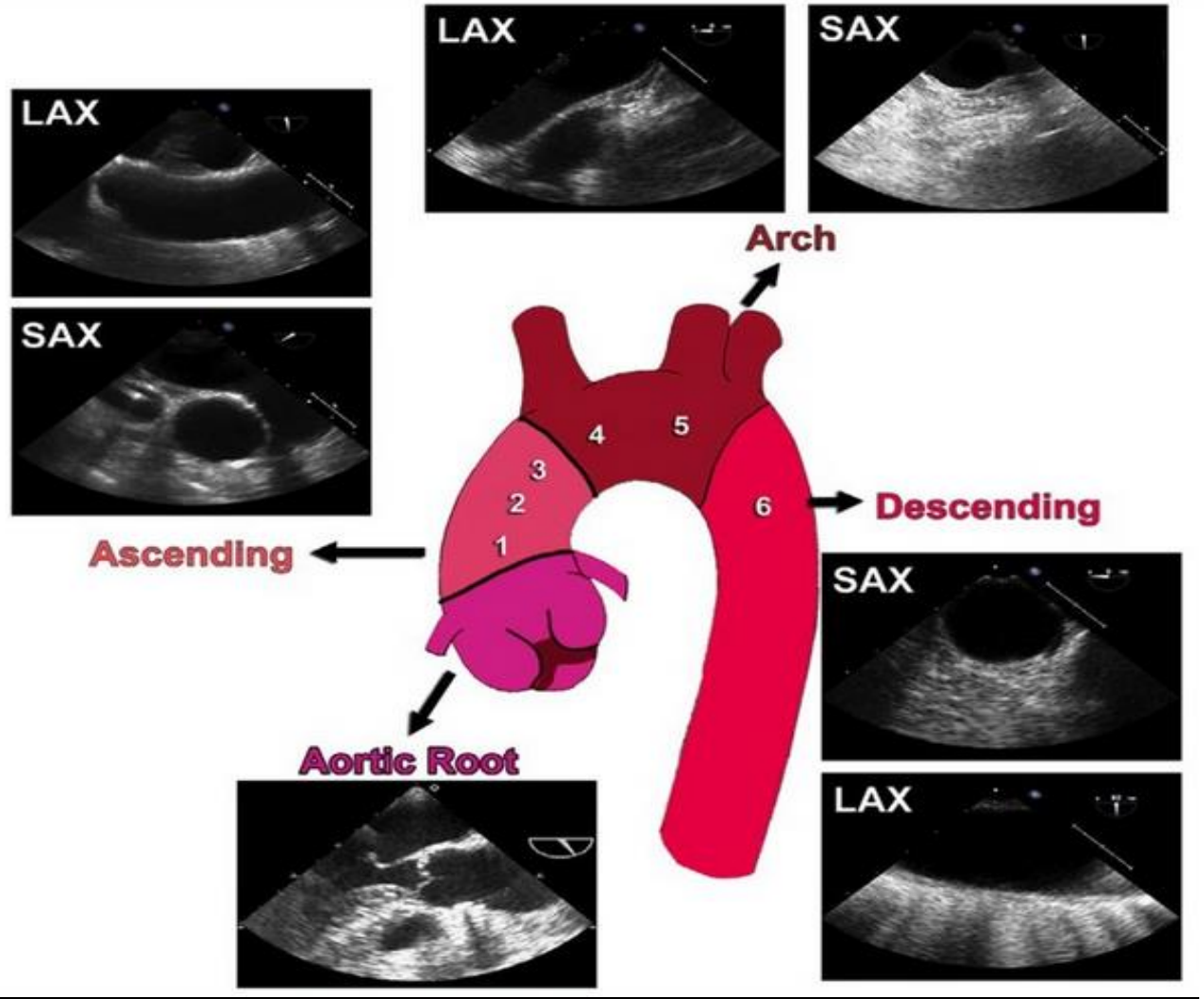
- Flap intimal
- Faux chenal
- Insuffisance aortique massive
- Dilatation des segments 0 et 1

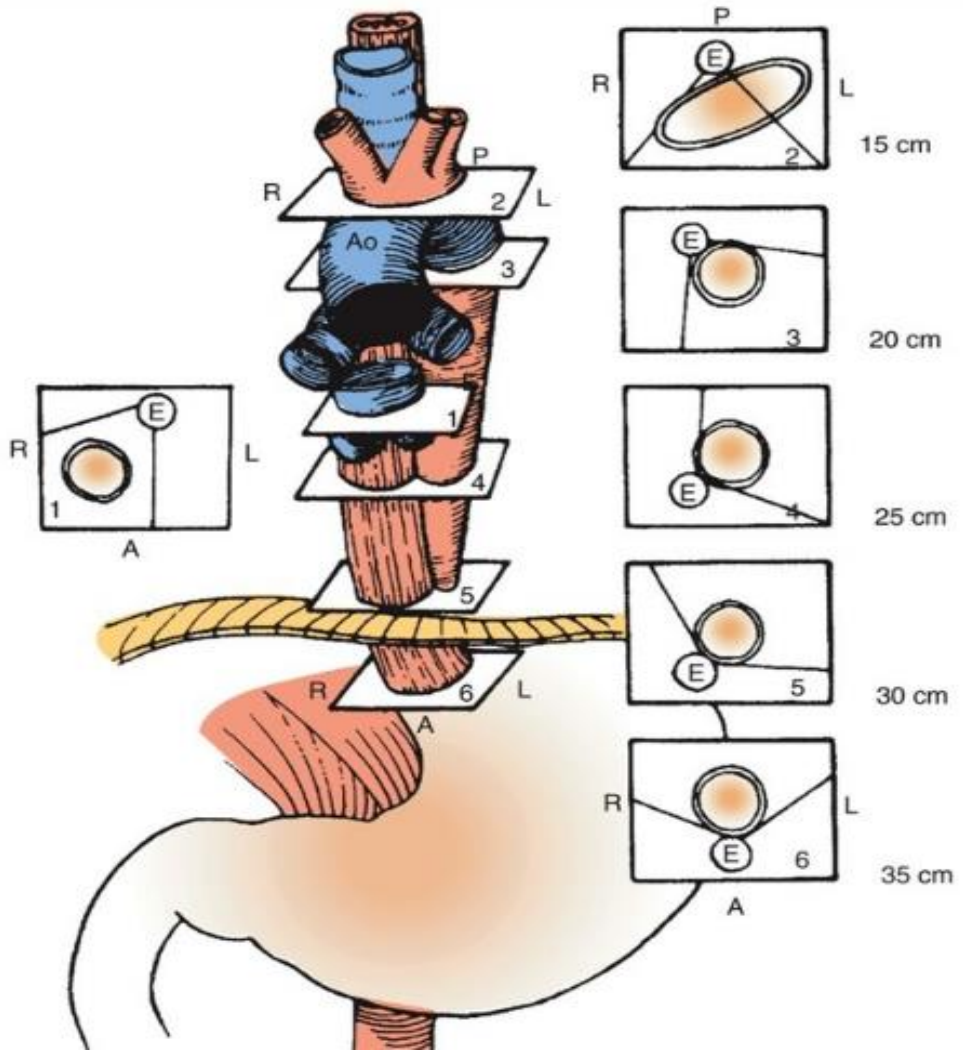
Signes de dissection



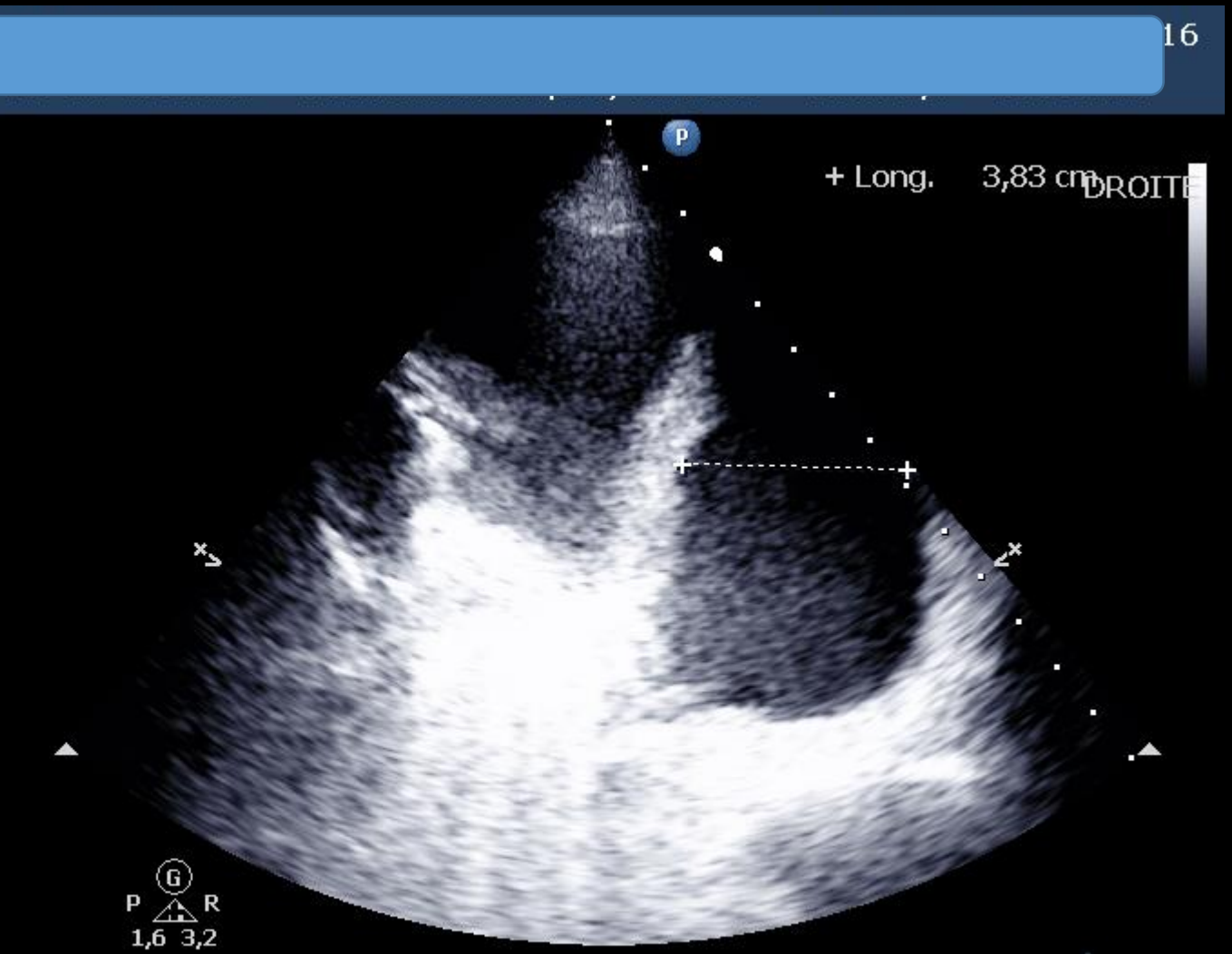


ETO et dissection aortique



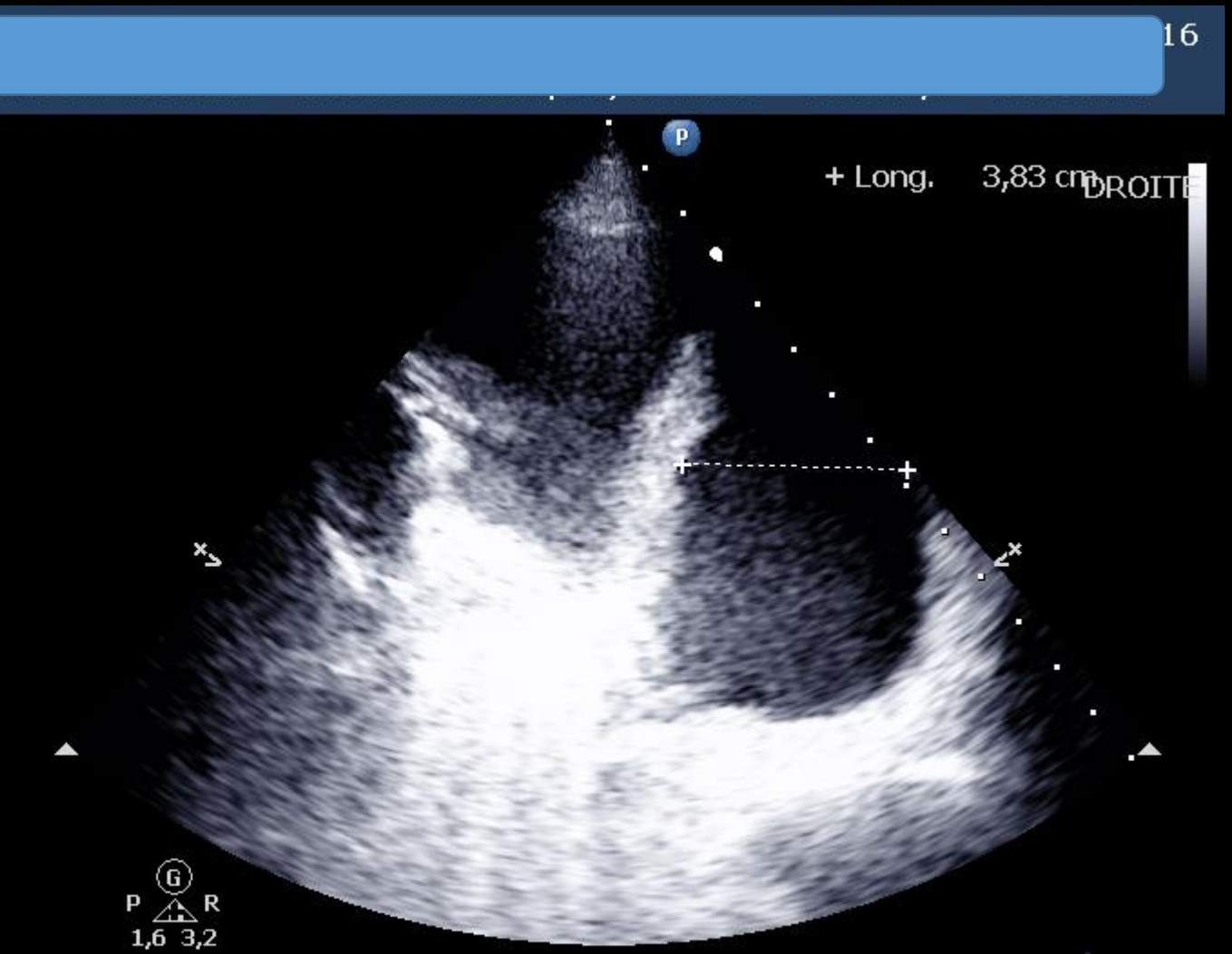


A propos de cet épanchement…



- **Il est mesuré en coupe longitudinal**
- **Il est mesuré en coupe transversal**
- **Il fait environ 800ml**
- **Il fait environ 400ml**
- **Il fait environ 1200ml**

A propos de cet épanchement…



- **Il est mesuré en coupe longitudinale**
- **Il est mesuré en coupe transversale**
- **Il fait environ 800ml**
- **Il fait environ 400ml**
- **Il fait environ 1200ml**

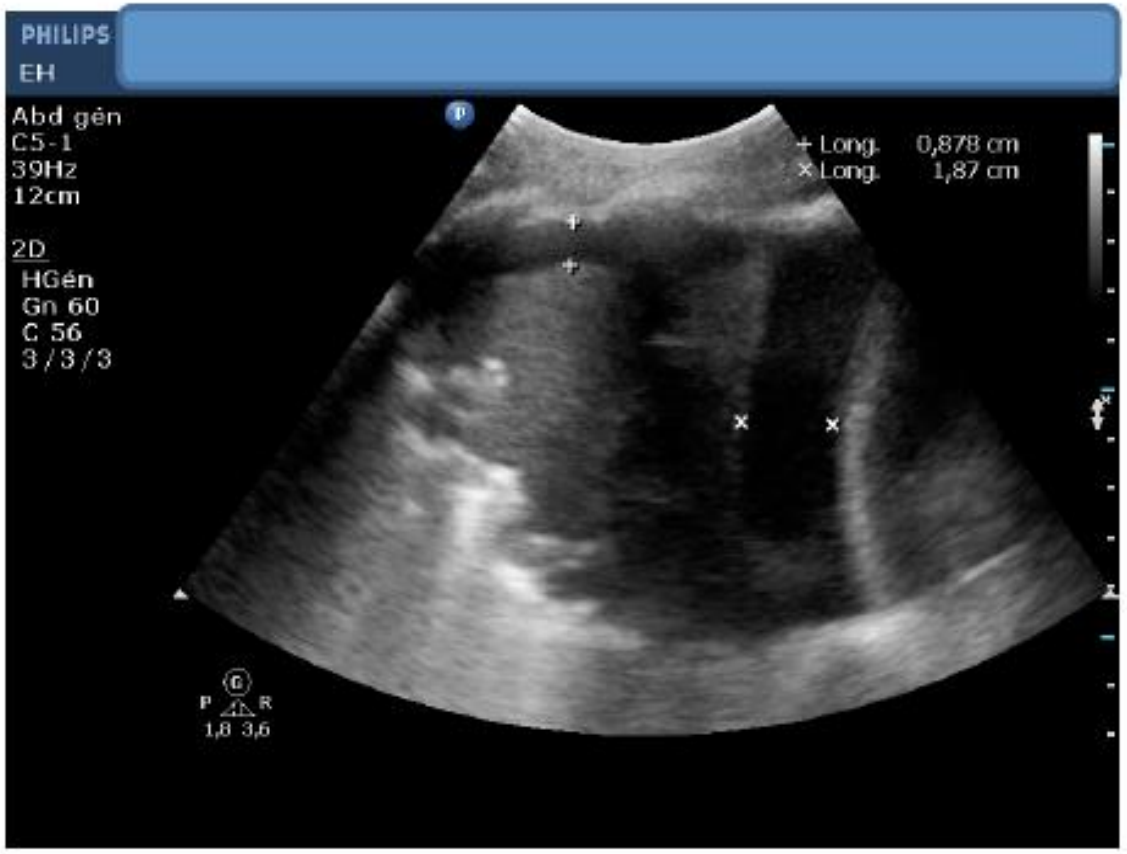
Méthodes de quantification des EP

Roch	PLD base > 5 cm → EP>500ml
Remerand	PE volume= HE × S à mi-hauteur
Balik	V(ml)= 20 × Epaisseur de E
Vignon	Distance à la base> 50mm → 800ml

D'après L. Zieleskiewicz

Méthodes de quantification des EP

Coupe longitudinale



Coupe transversale +++

D'après L. Zieleskiewicz

A propos de l'épanchement péricardique…

- **Il comprime préférentiellement les cavités gauches?**
- **Il comprime préférentiellement les cavités droites?**
- **Il y a indication de drainage s'il est supérieur à 0,5cm d'épaisseur?**
- **On diagnostique la tamponnade plus facilement en ETO?**
- **Il y a forcément indication de drainage s'il est circonférentiel?**

A propos de l'épanchement péricardique…

- **Il comprime préférentiellement les cavités gauches**
- **Il comprime préférentiellement les cavités droites**
- **Il y a indication de drainage s'il est supérieur à 0,5cm d'épaisseur**
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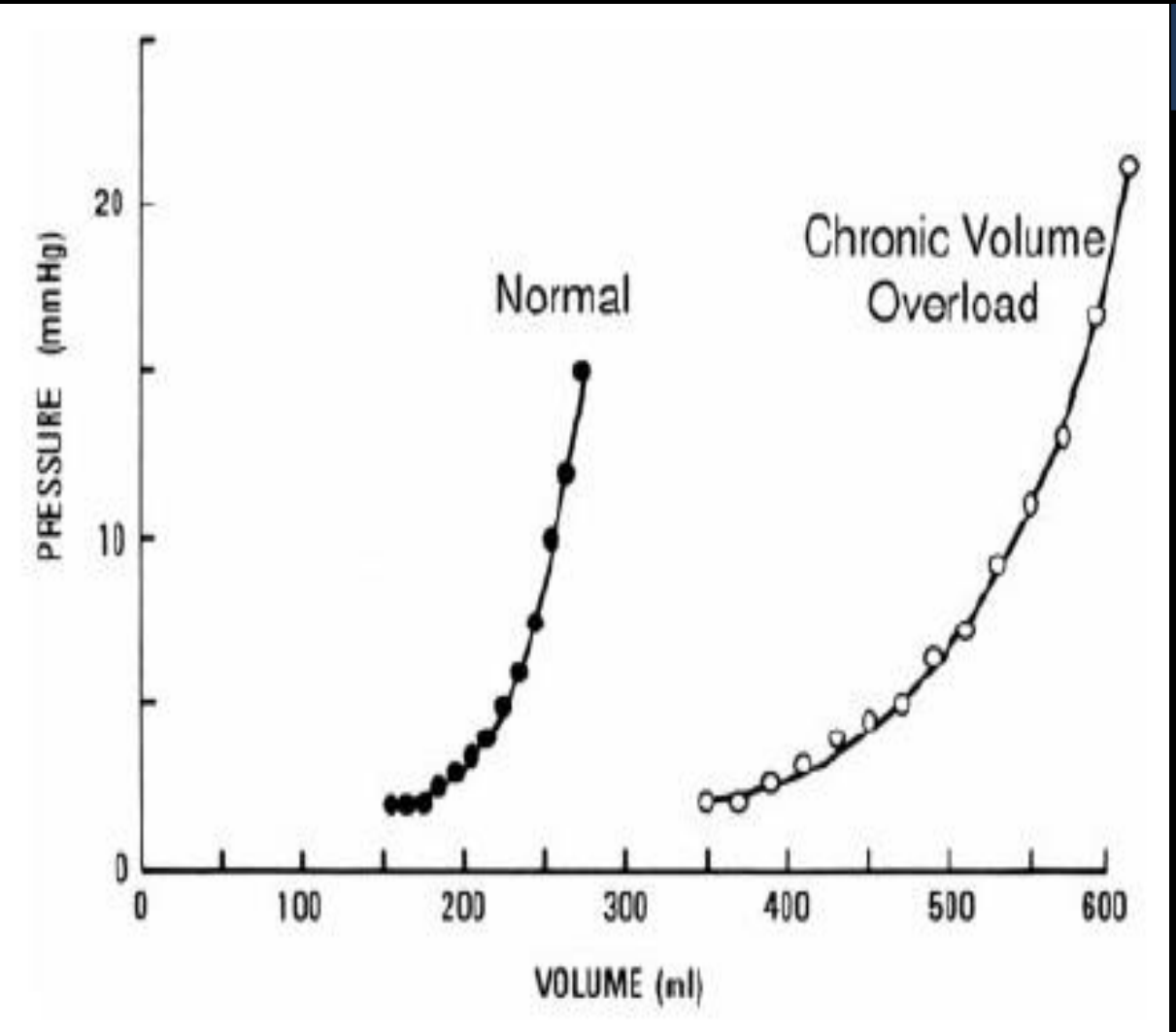
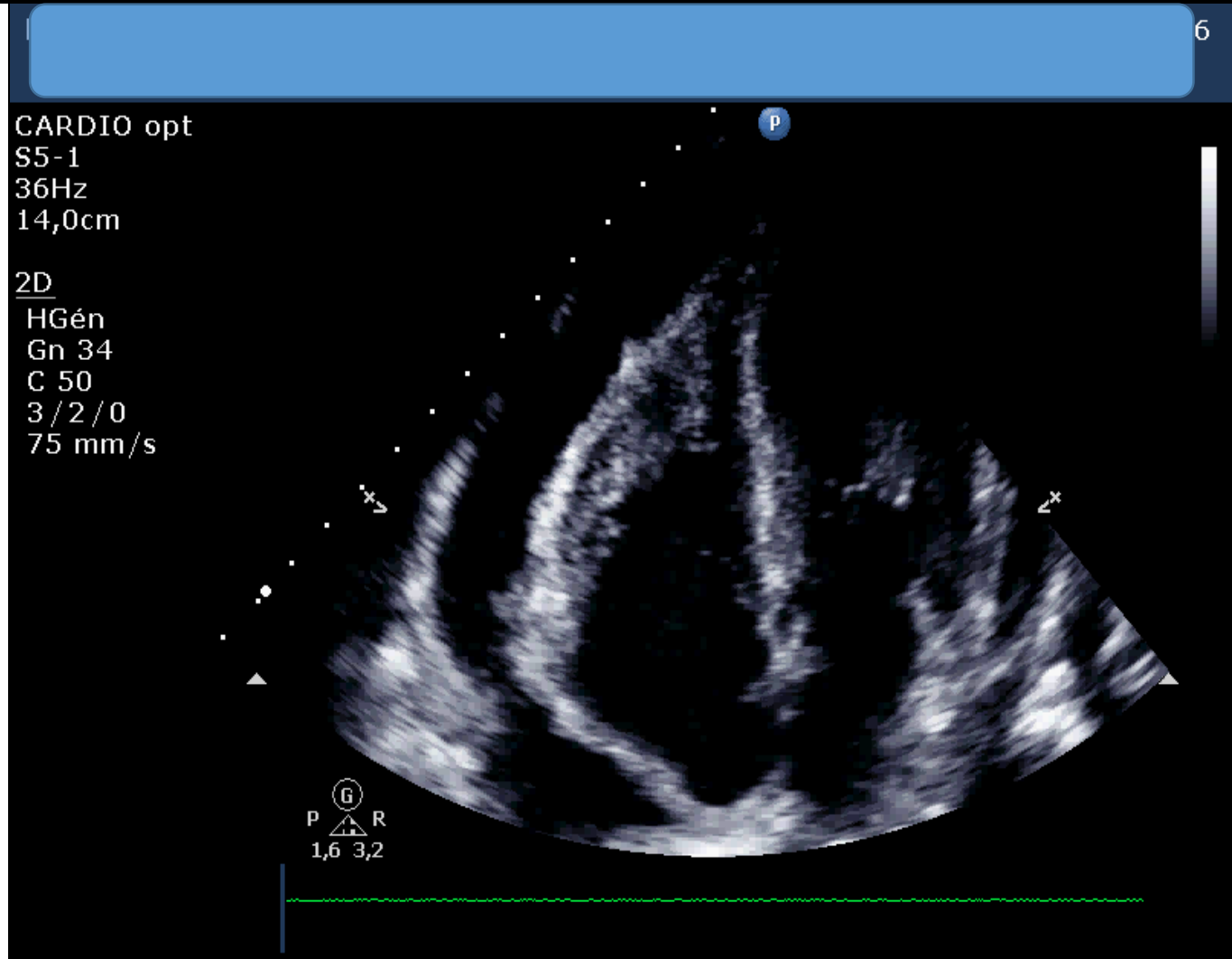
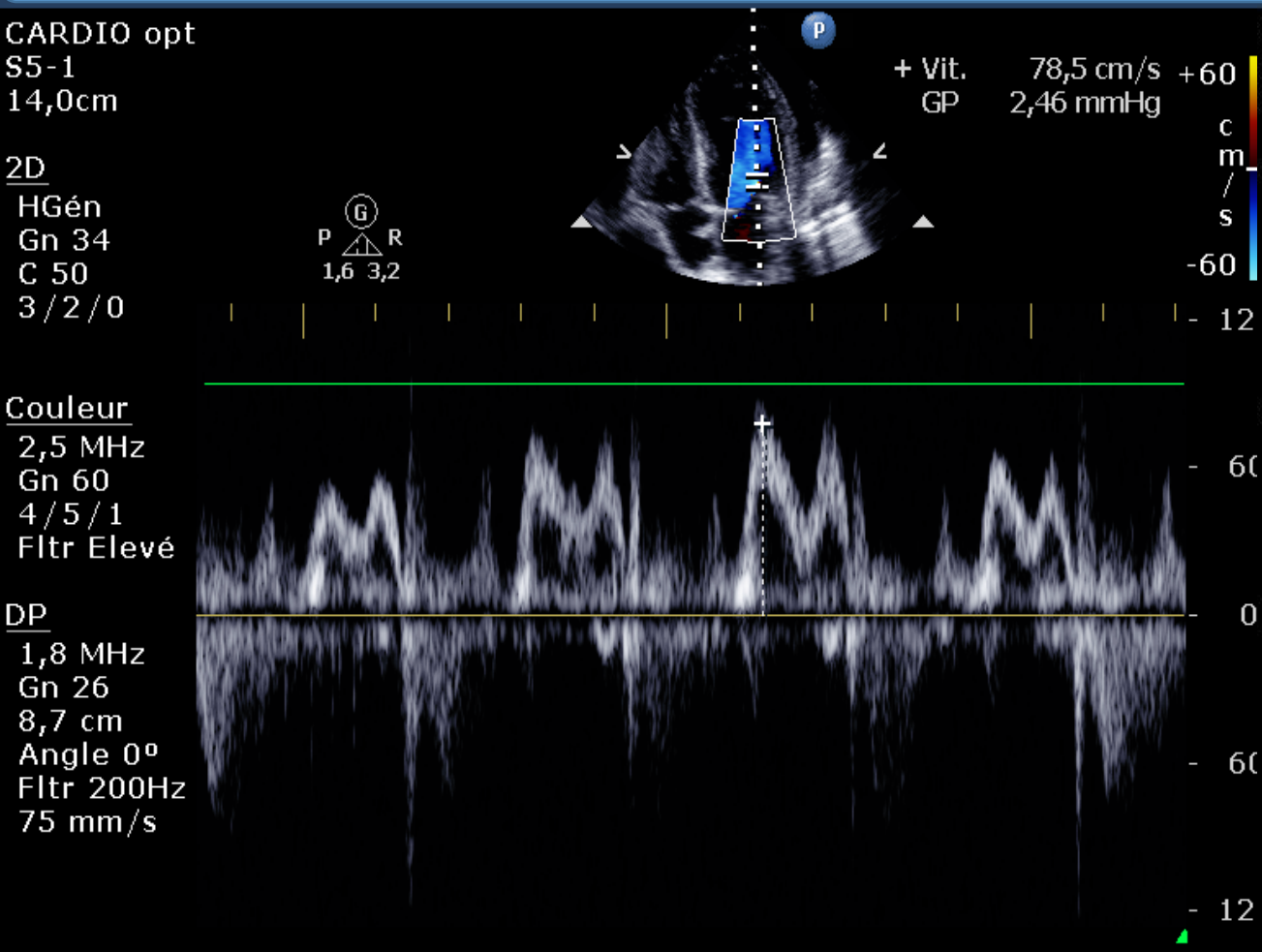
- **Il y a forcément indication de drainage s'il est circonférentiel**

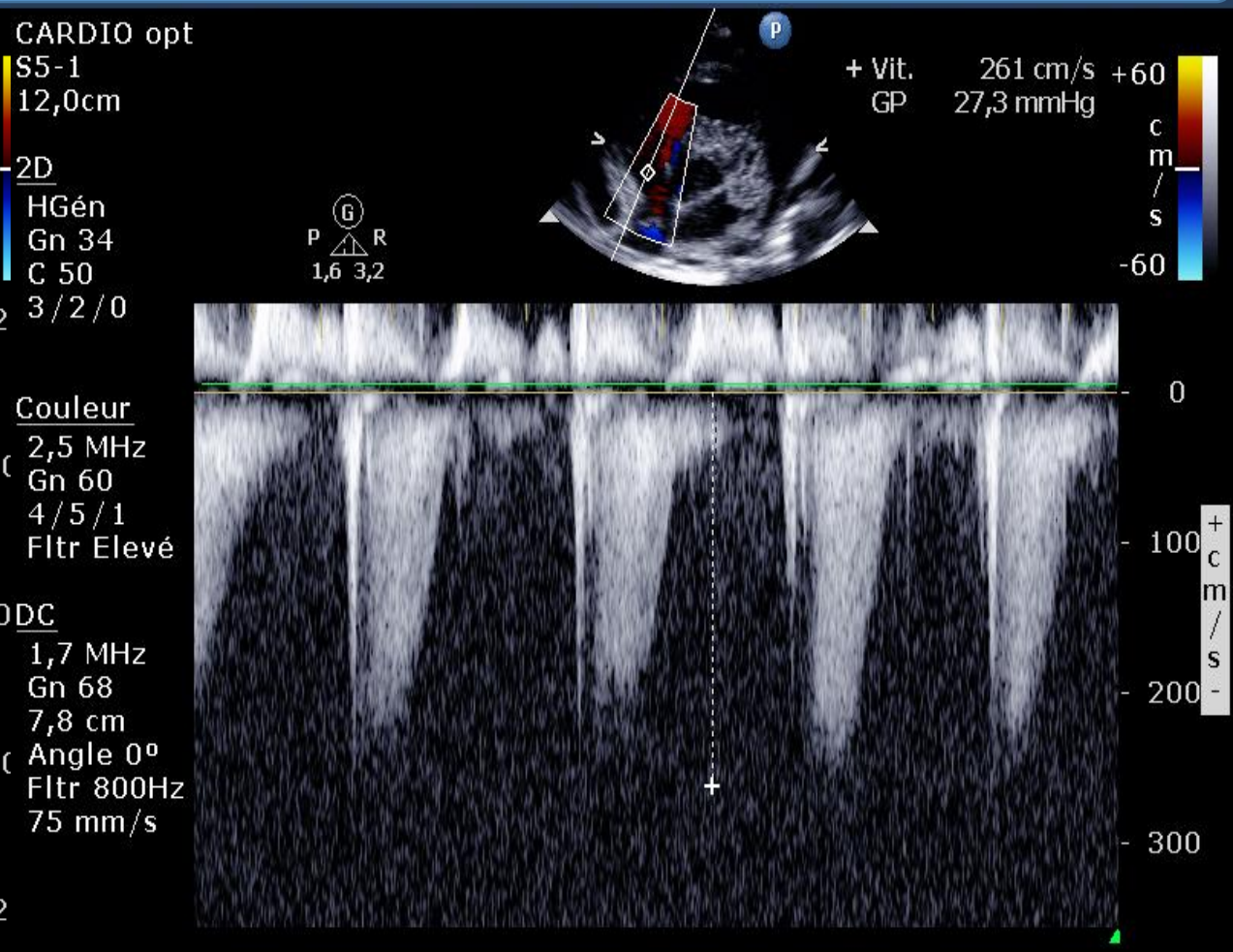
Péricarde et cœur droit





Variations Respiratoires





Tamponnade et ETO

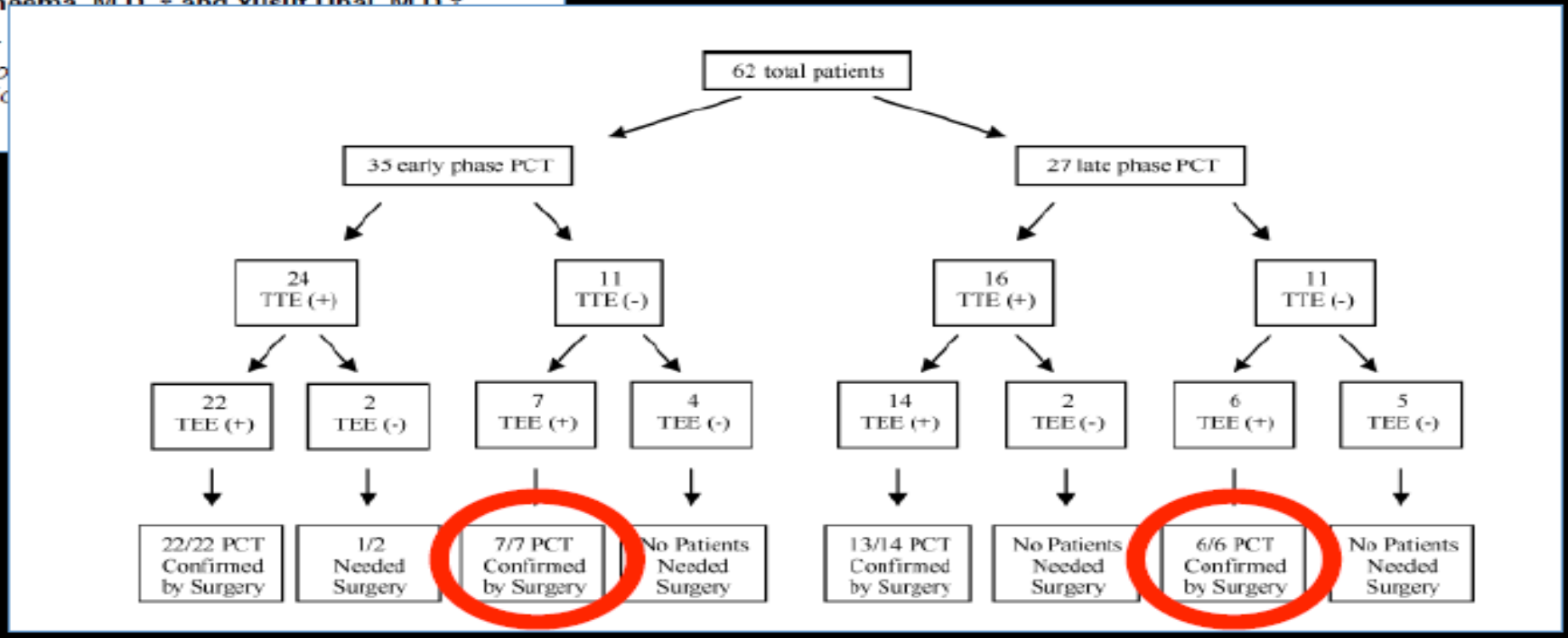
The Importance of Transesophageal Echocardiography in Diagnosis of Pericardial Tamponade After Cardiac Surgery

Yildirim Imren, M.D.,* Irfan Tasoglu, M.D.,* Gursel Levent Oktar, M.D.,*
Ariel Benson, B.A.,† Tariq Naseem,† Faisal Cheema, M.D. † and Yusuf Unal, M.D.‡

*Gazi University Medical Faculty, Cardiovascular
†Columbia University, New York Presbyterian Ho
New York, New York; and ‡Gazi University Medic
Department, Ankara, Turkey

J CARD SURG
2008;23:450-453

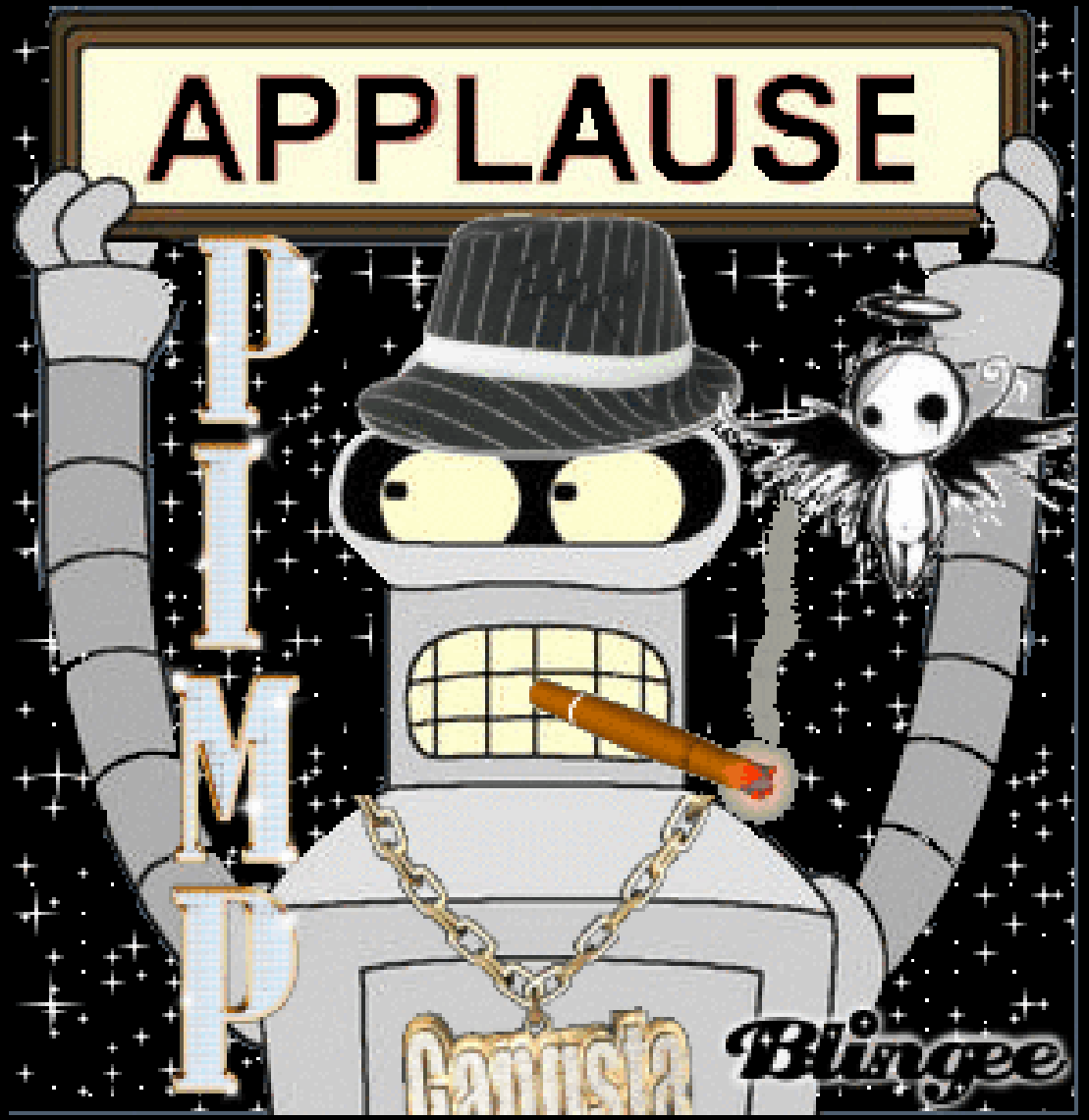
- 66 patients, observationnelle
- Faux négatifs en ETT dans 59% des cas !



Cas clinique n°3

- Patiente 38ans
- Détresse respiratoire à J2 post césarienne
- Polypnée 32 mvt / min
- Hypoxique 82% de saturation sous 15L MHC
- IOT
- Tachycarde à 118bpm
- Pression artérielle 87/56 (66)

Que faites vous?


APPLAUSE
PIMP
Gangsta
Blingee

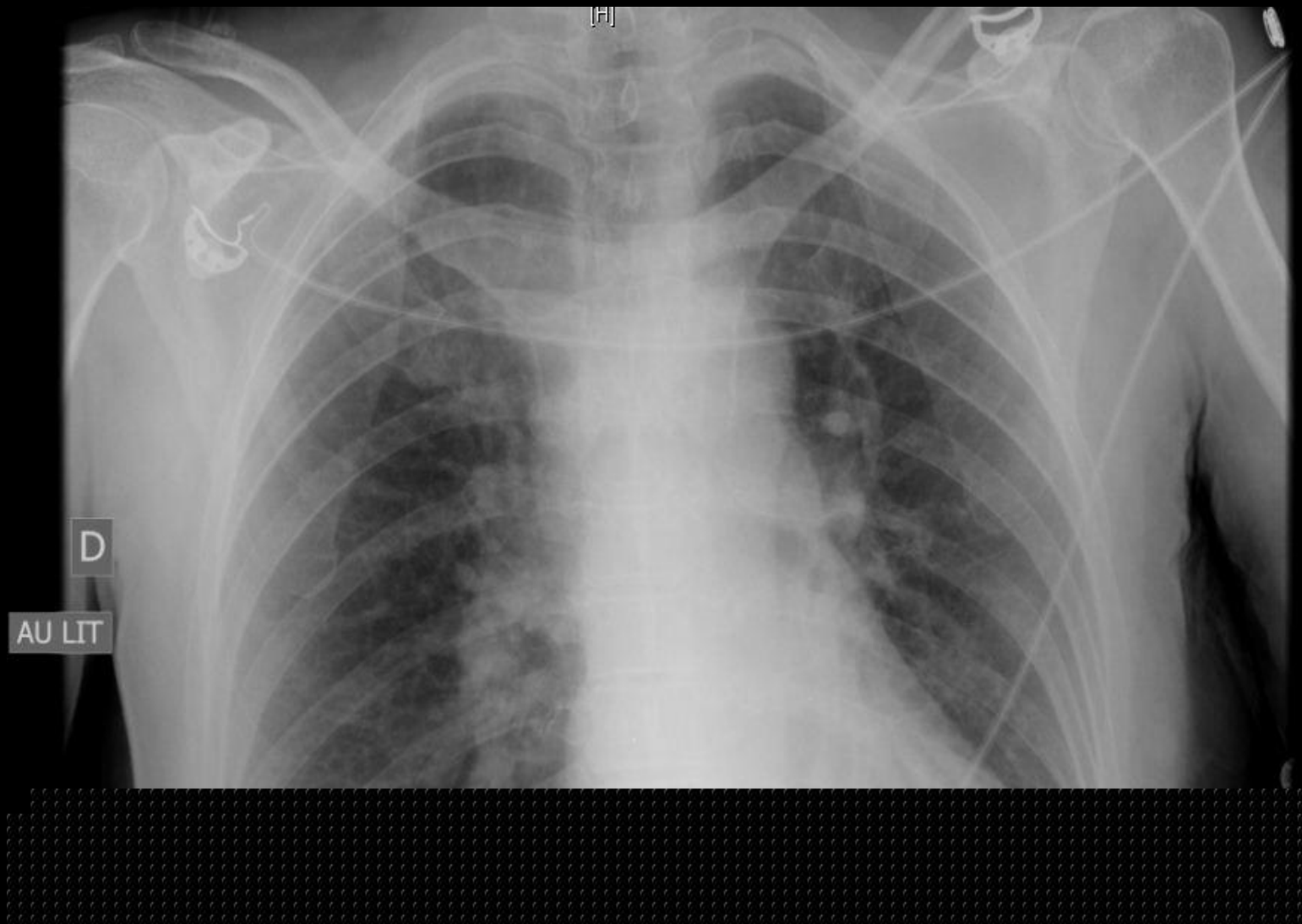
Examen clinique

- Auscultation normale et symétrique
- Marbrures cutannées
- Œdème bilatéral des membres inférieurs

Examen complémentaire

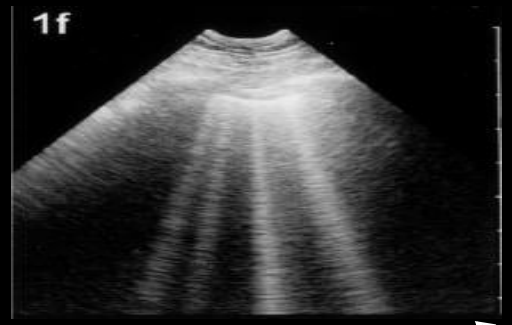
- NFS coag iono normaux (du matin)
- ECG normal
- Radiographie thoracique

Radiographie thoracique

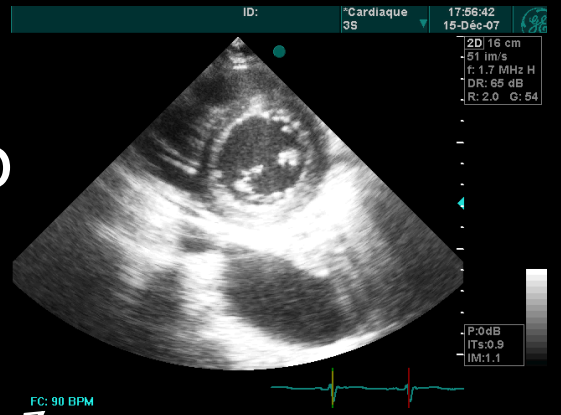


Que faites vous?

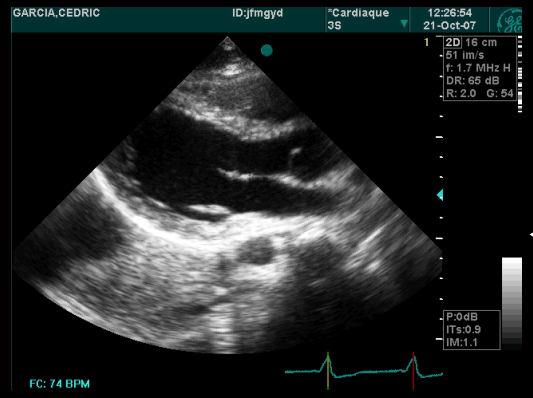
Diagnostic???



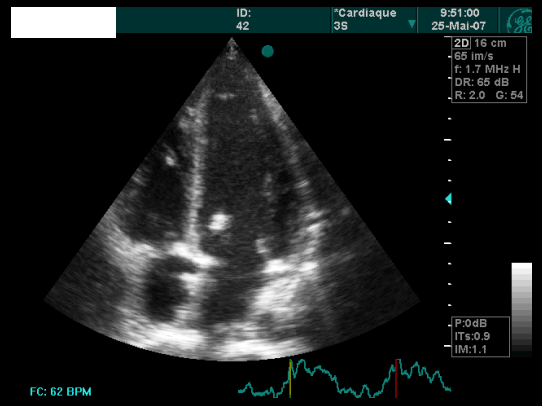
Thorax antérieur



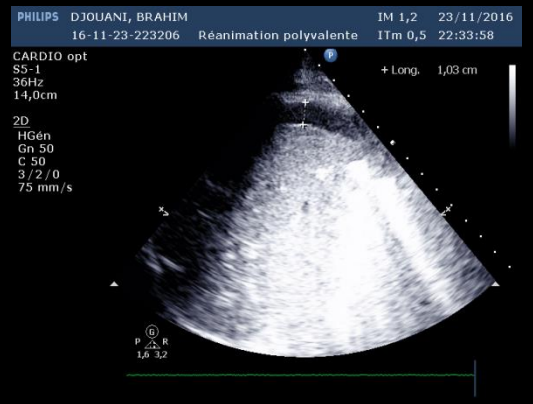
Coupe parasternale petit axe



Coupe parasternale grand axe

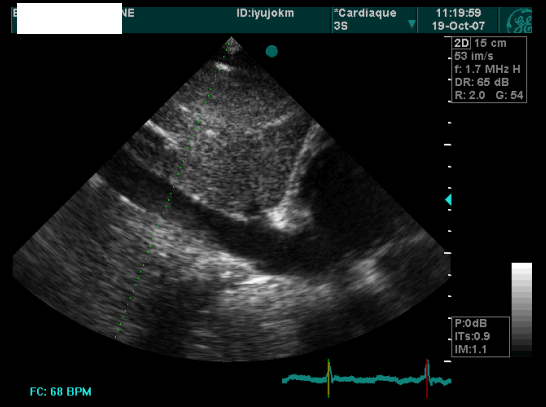


Coupe apicale 4 cavités

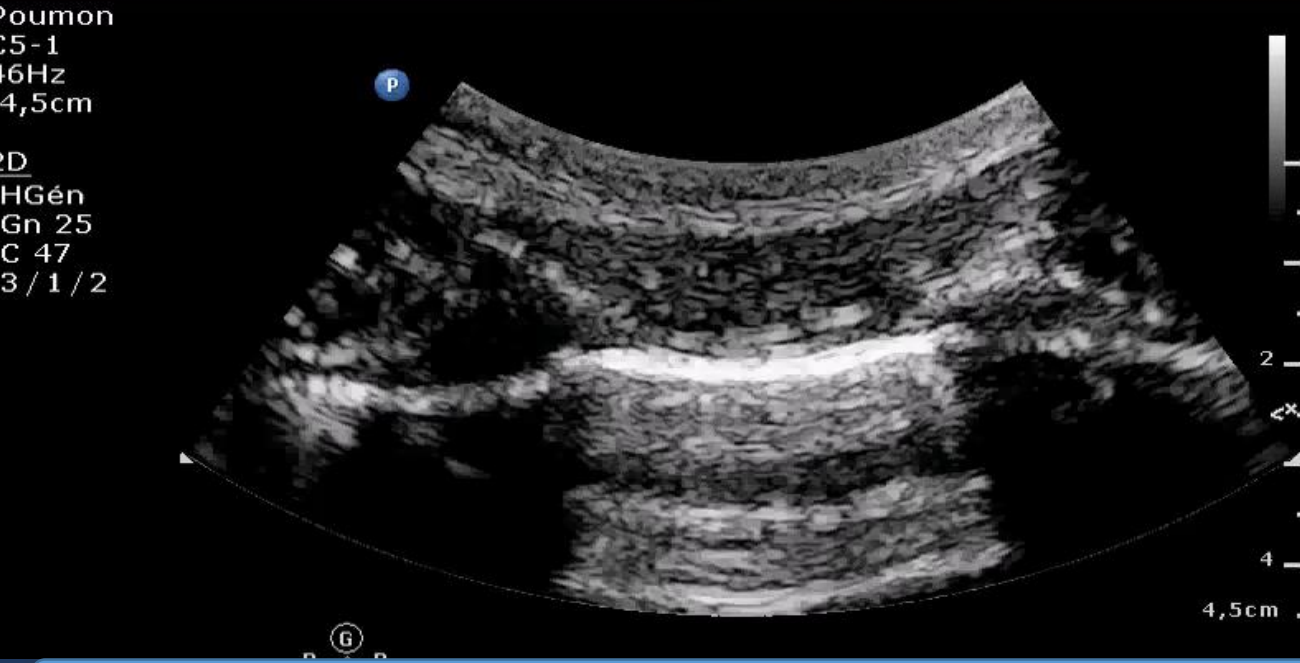


Thorax base

Indices doppler



Coupe sous costale veine cave inf

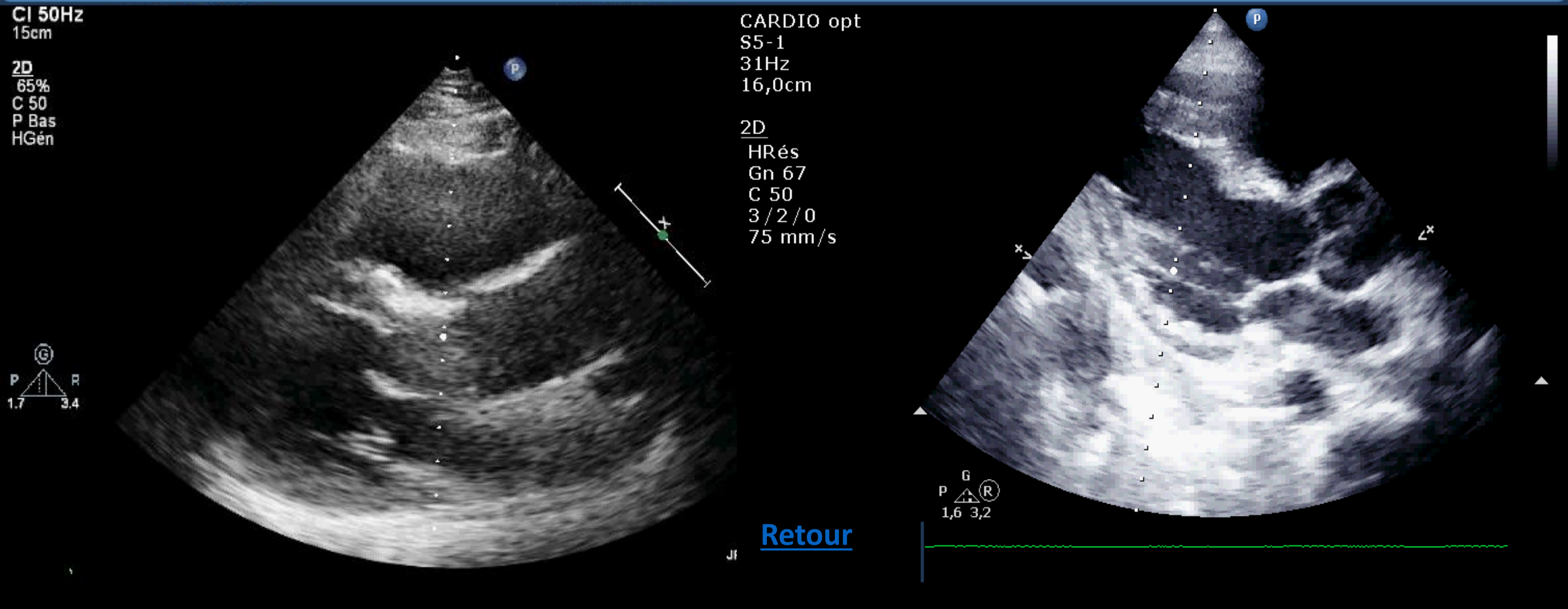

Poumon
C5-1
46Hz
4,5cm
2D
HGén
Gn 25
C 47
3 / 1 / 2
2
4
4,5cm


Poumon
C5-1
51Hz
9,0cm
2D
HGén
Gn 47
C 47
3 / 1 / 2


Poumon
C5-1
51Hz
9,0cm
2D
HGén
Gn 77
C 47
3 / 1 / 2
5
9,0cm
1,8 3,6

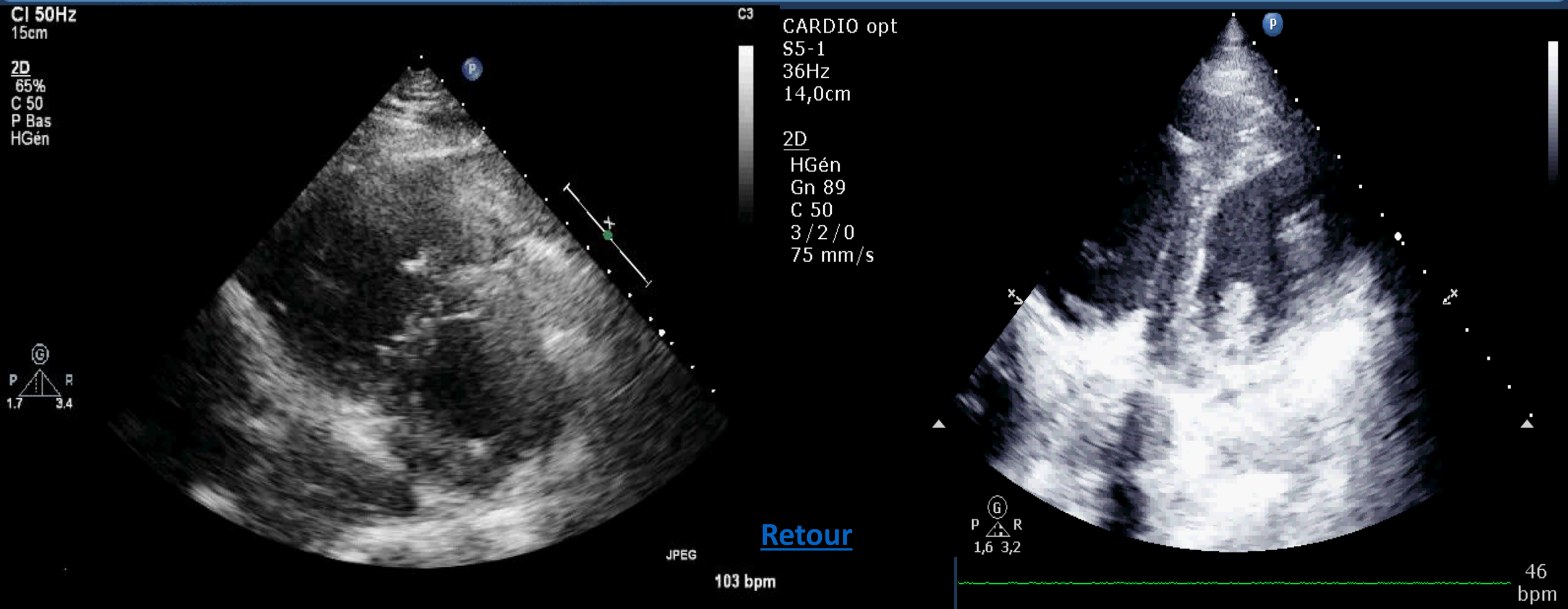

Poumon
C5-1
51Hz
9,0cm
2D
HGén
Gn 77
C 47
3 / 1 / 2
GAUCHE
5
9,0cm
1,8 3,6

PSGA

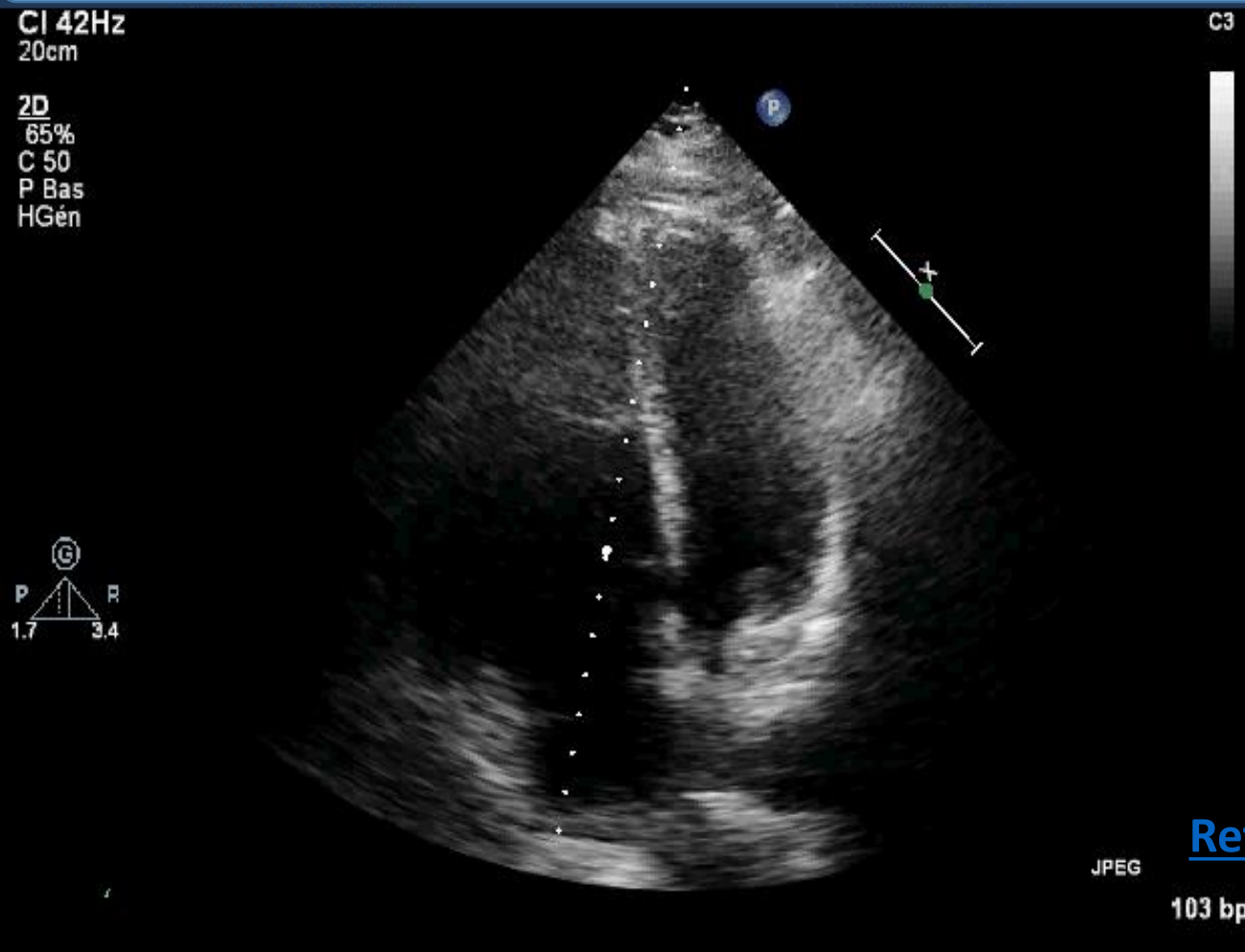

CI 50Hz
15cm
2D
65%
C 50
P Bas
HGén
P
1.7
3.4
CARDIO opt
S5-1
31Hz
16,0cm
2D
HRés
Gn 67
C 50
3/2/0
75 mm/s
P
1,6
3,2

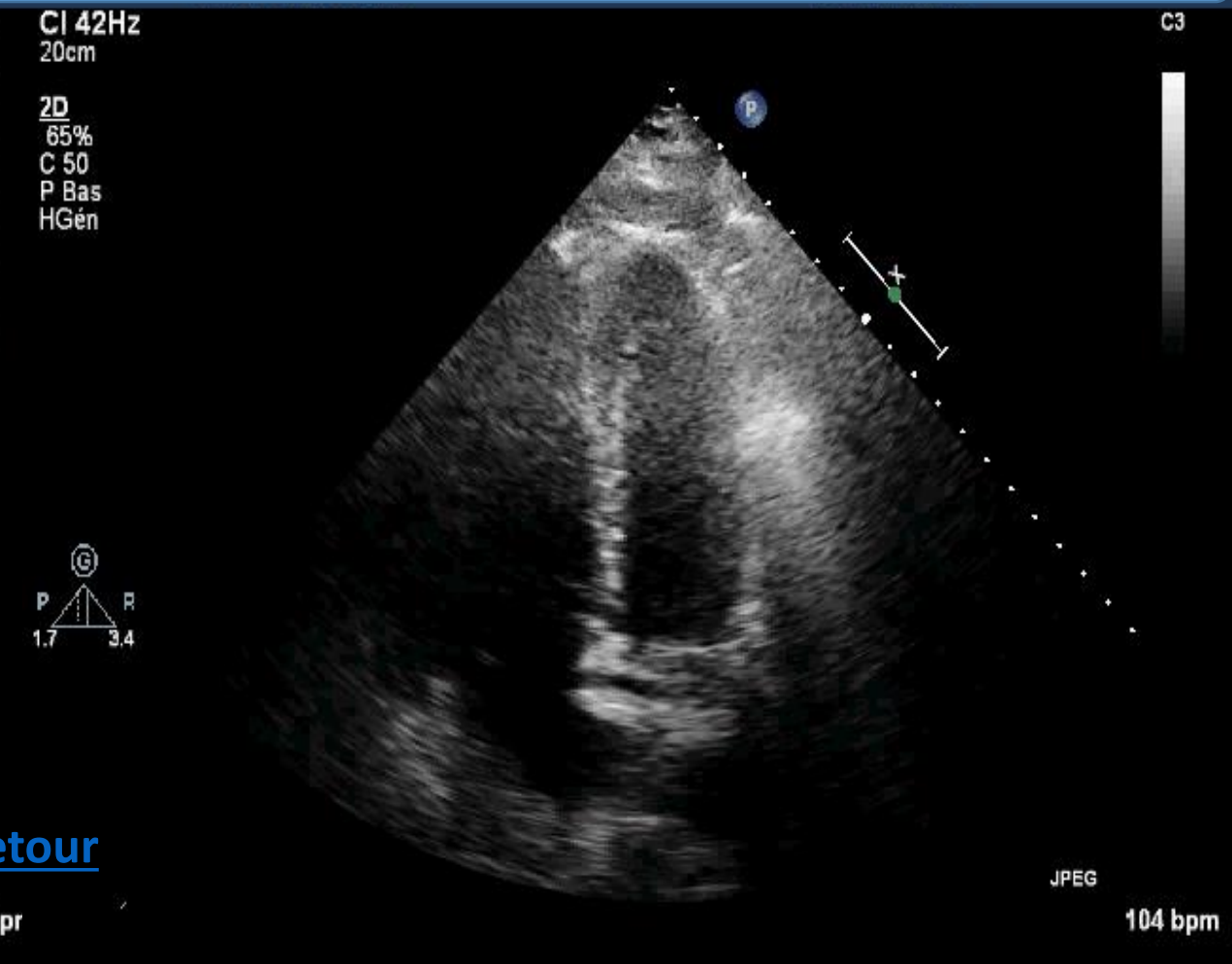
Retour

PSPA


CI 50Hz
15cm
2D
65%
C 50
P Bas
HGén
C3
CARDIO opt
S5-1
36Hz
14,0cm
2D
HGén
Gn 89
C 50
3/2/0
75 mm/s
P
R
1.7
3.4
JPEG
103 bpm
Retour
1,6 3,2
46
bpm

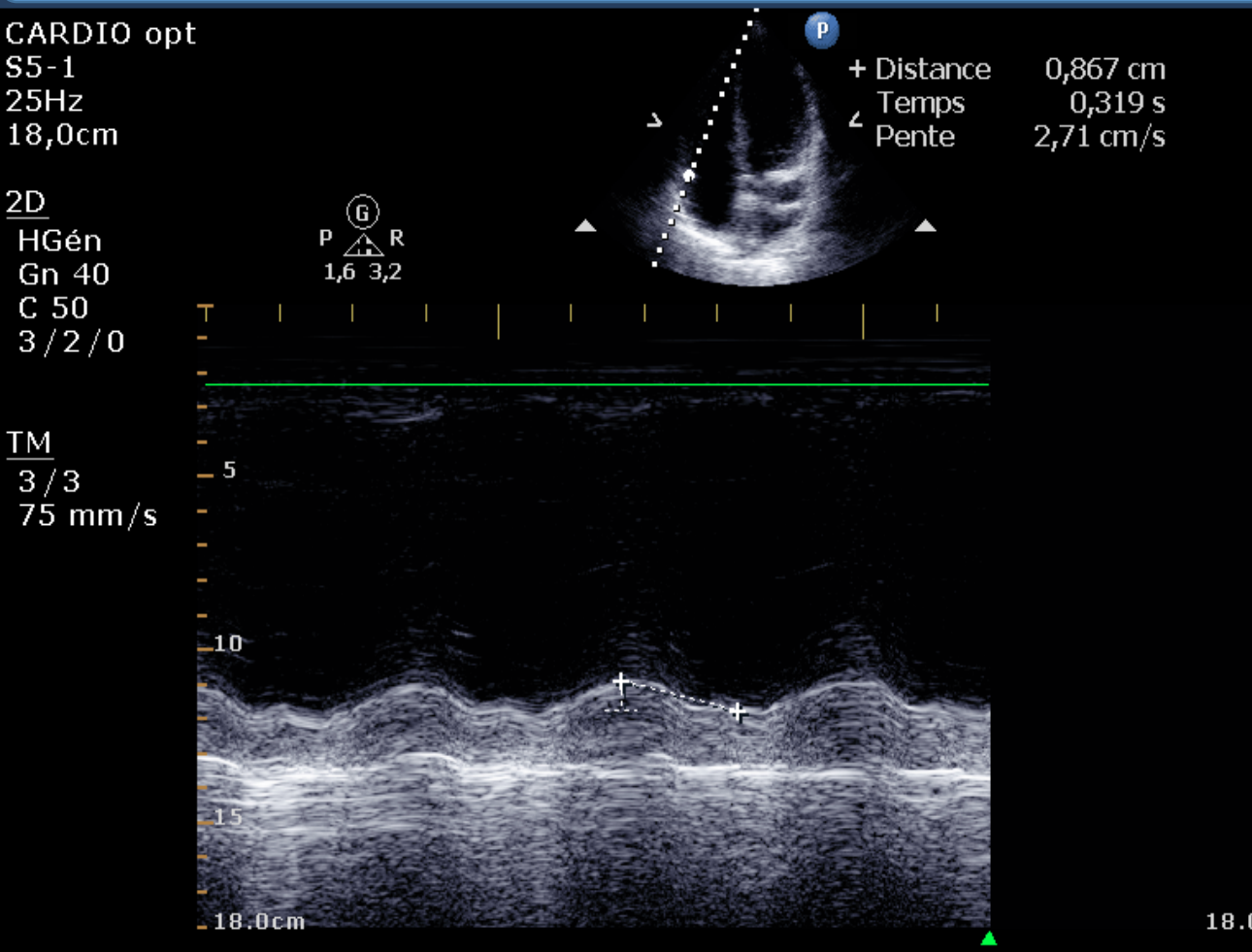
Apicale 4 Cavités

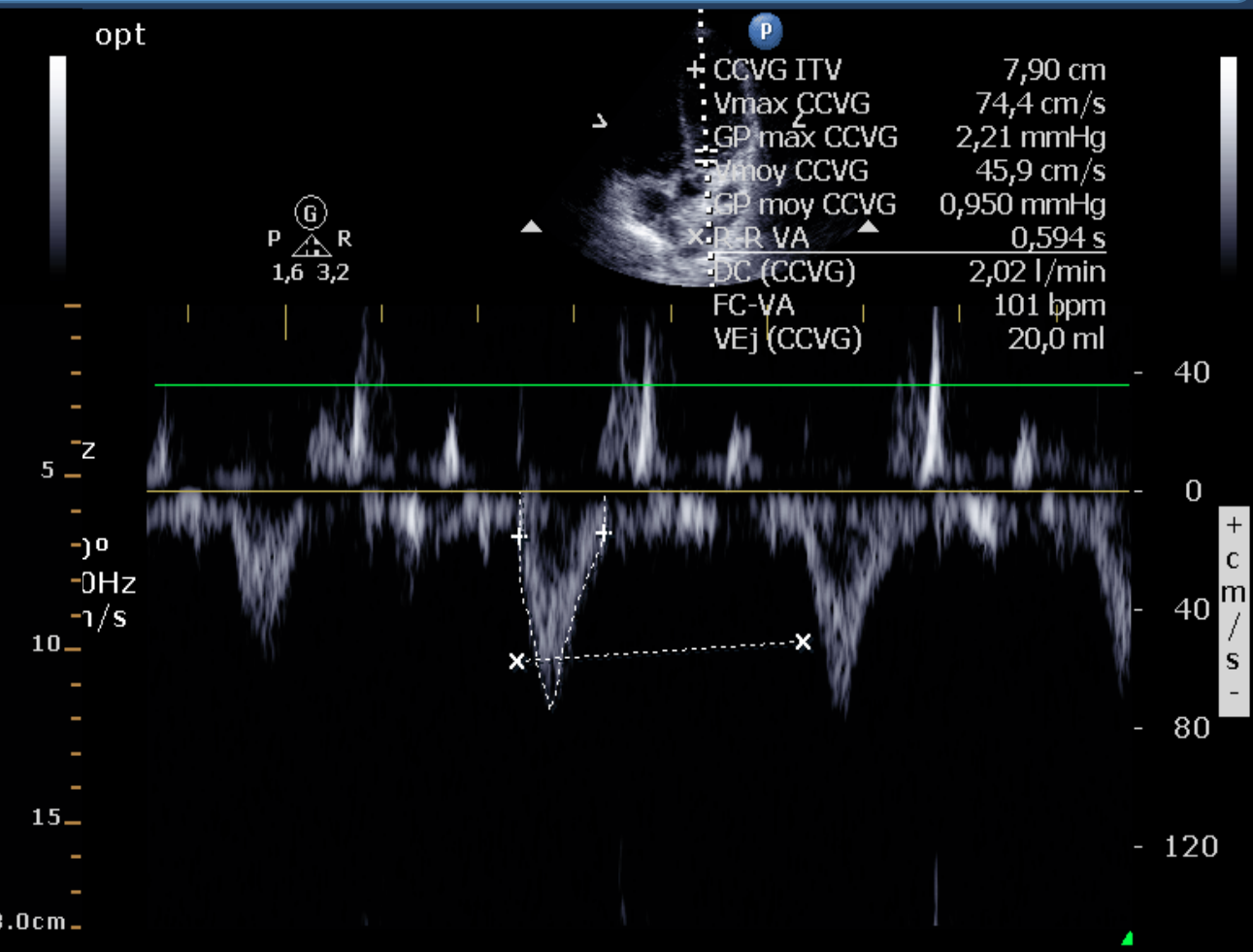




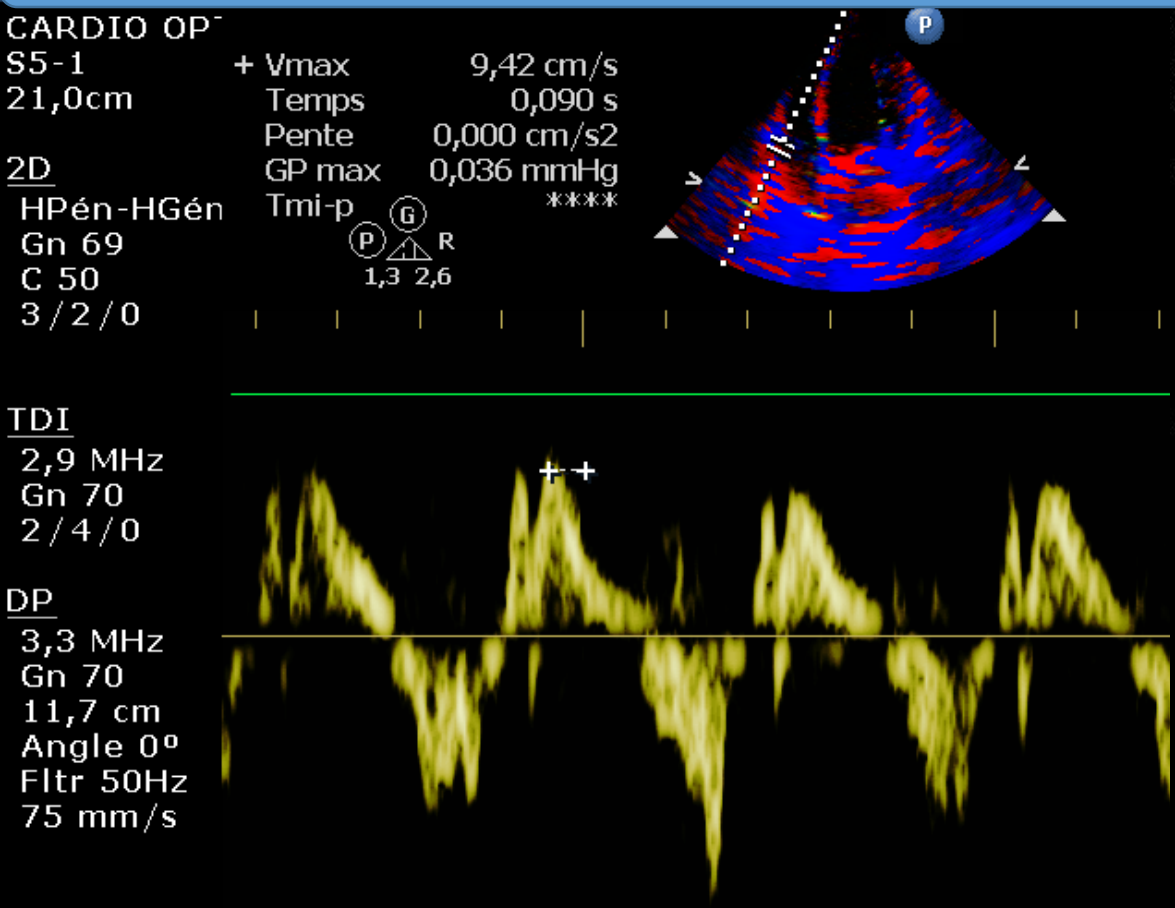
Retour

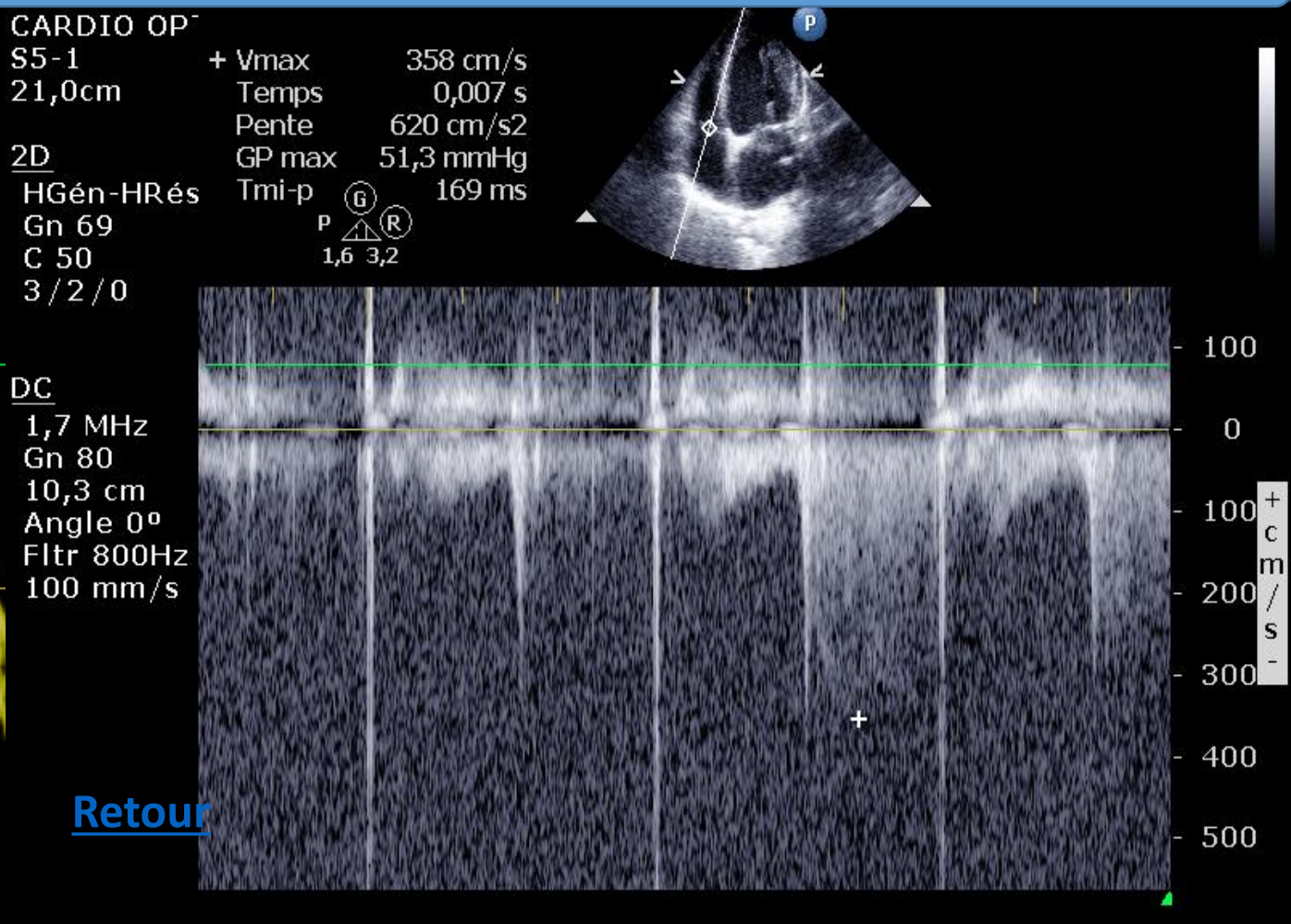
Indices doppler





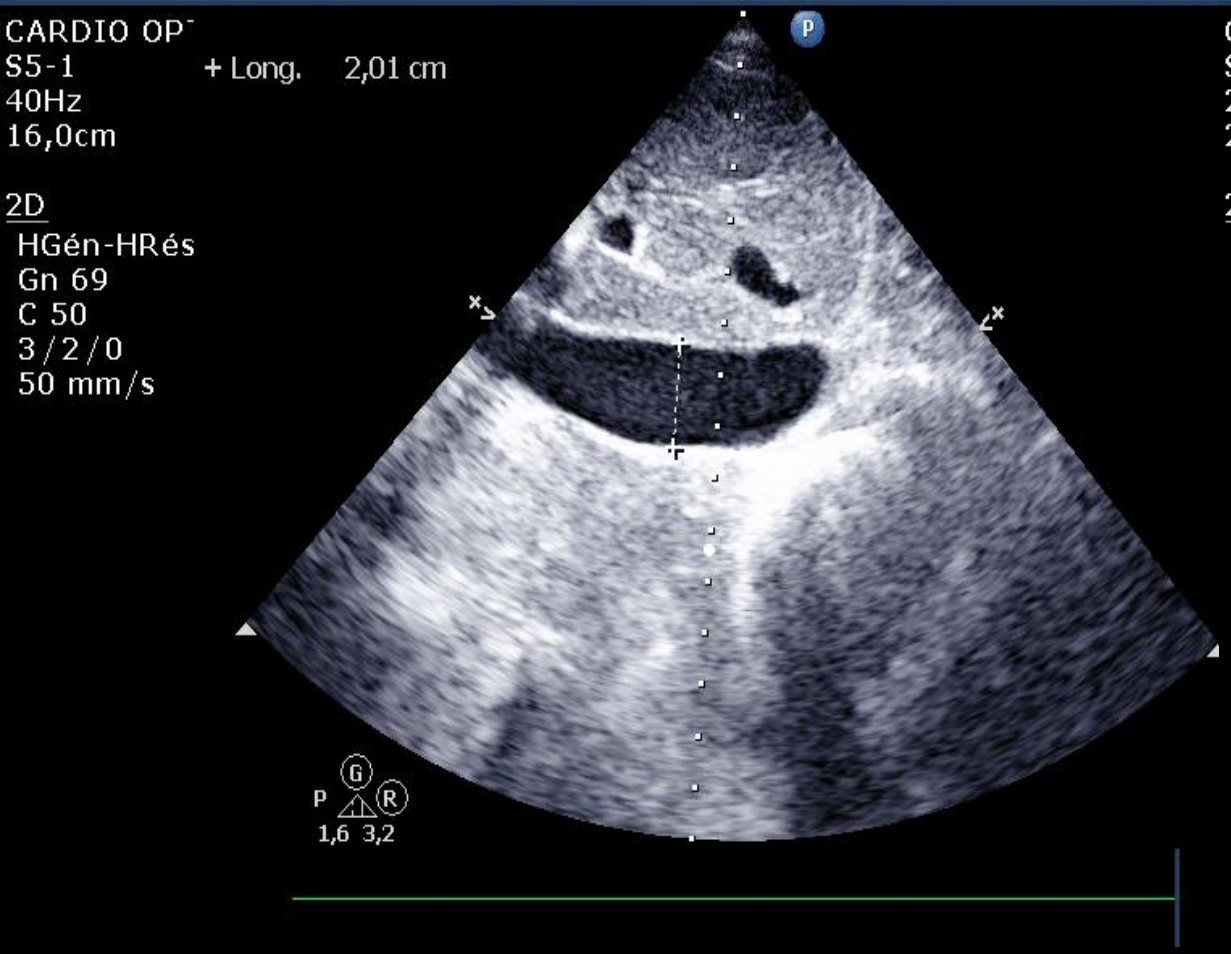
Indices doppler

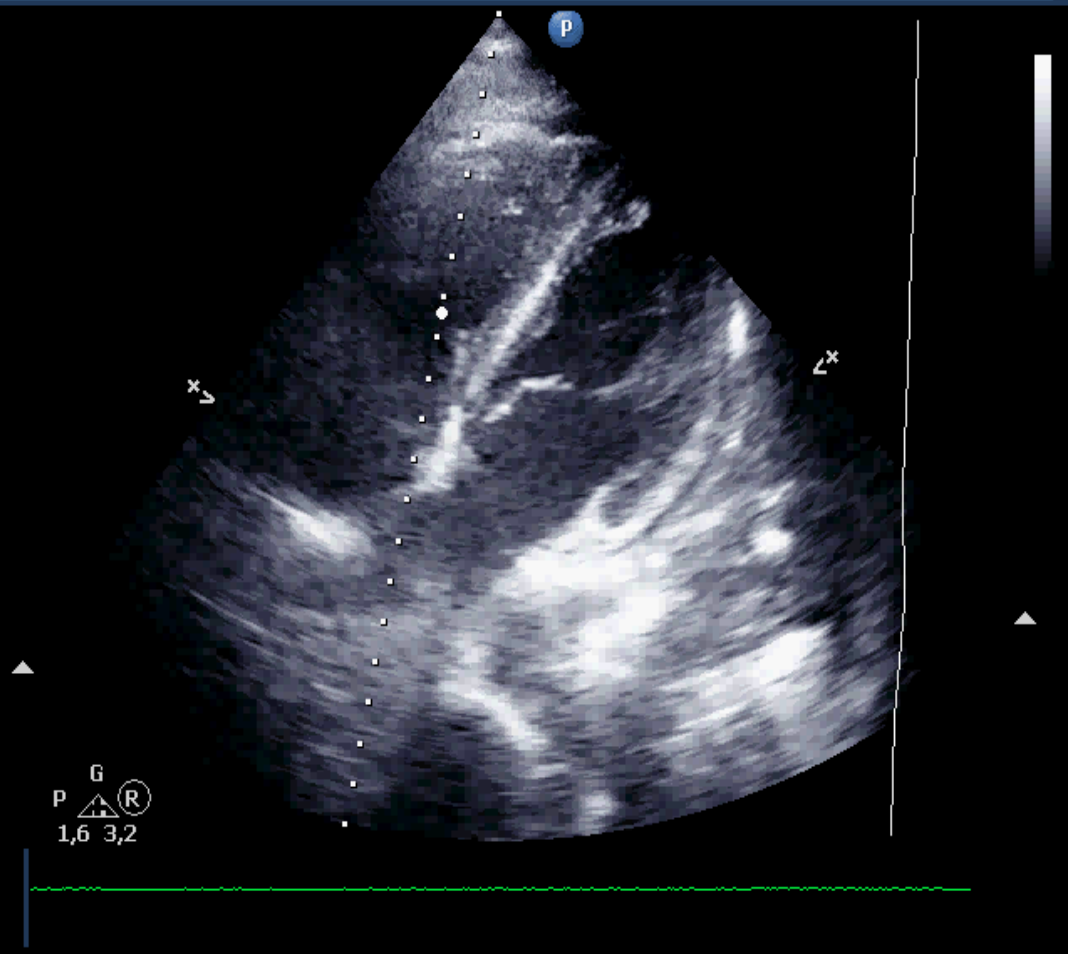




Retour

Sous costale





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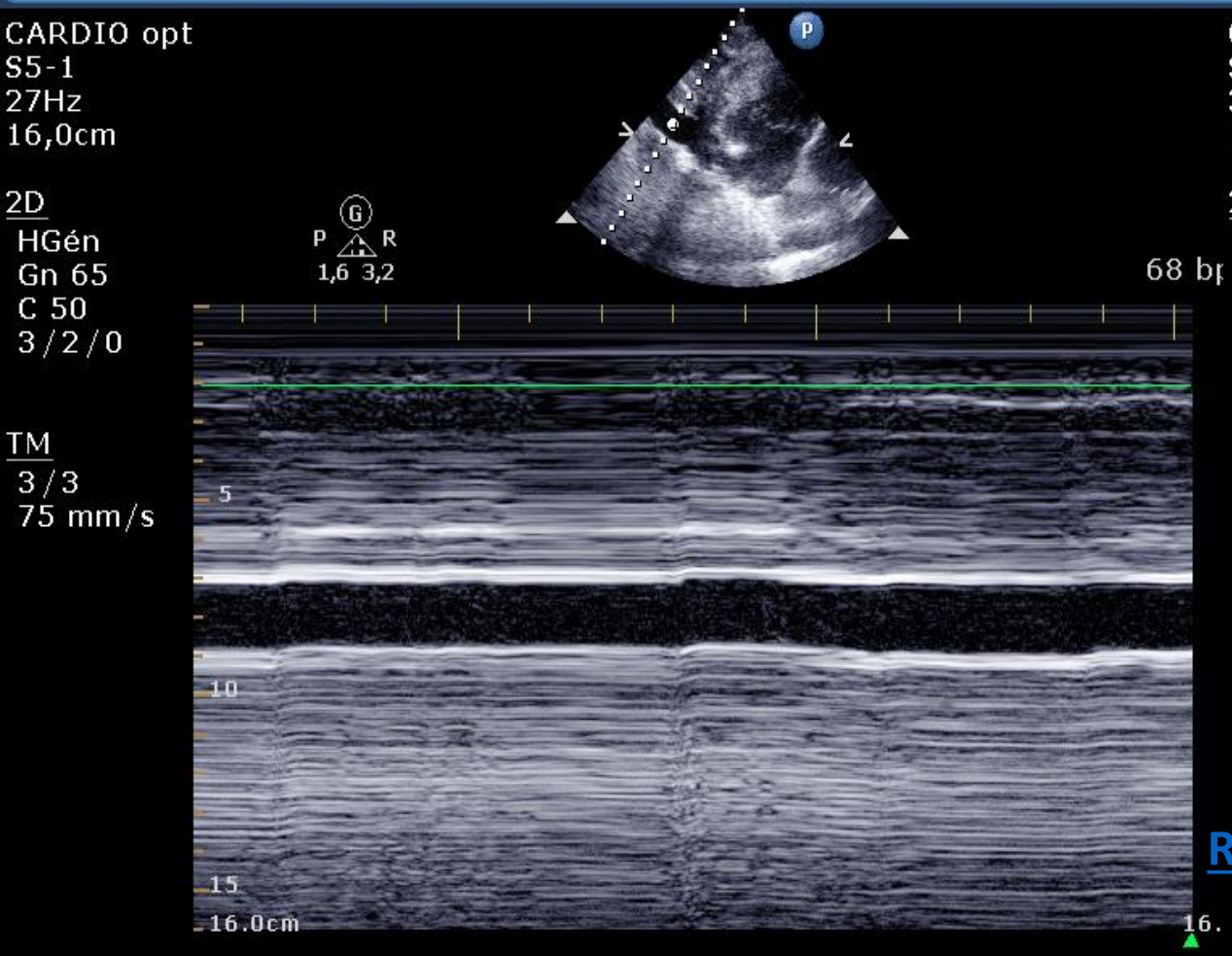
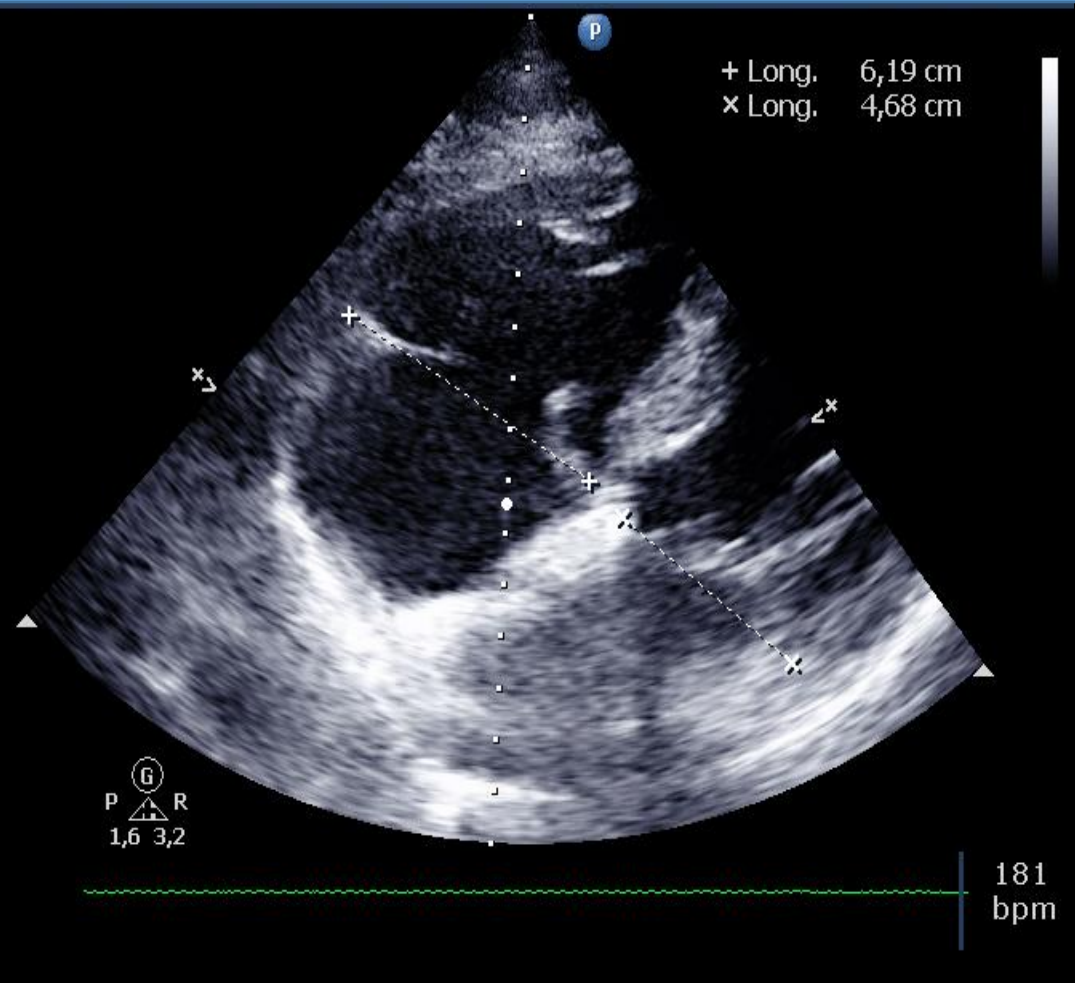
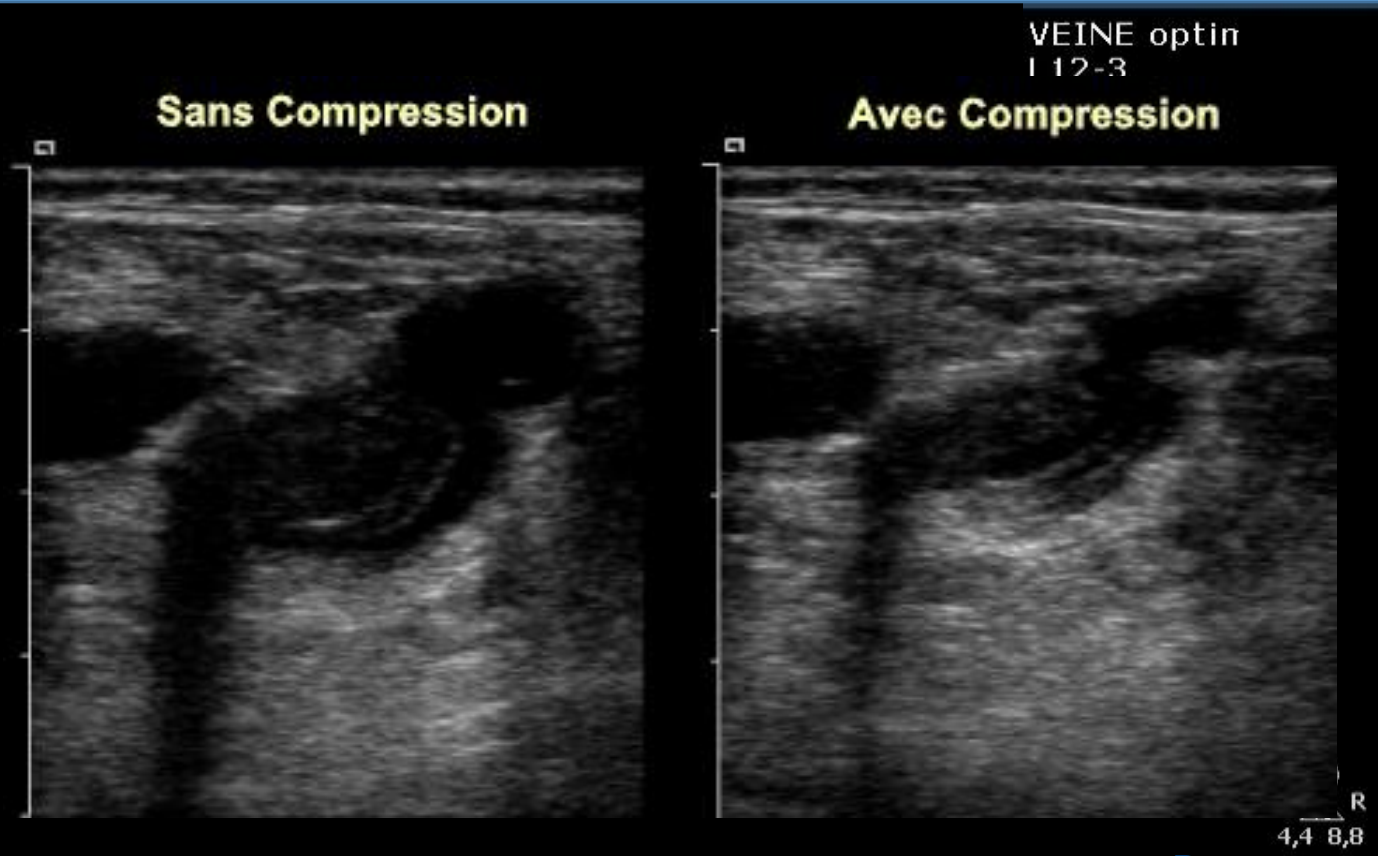
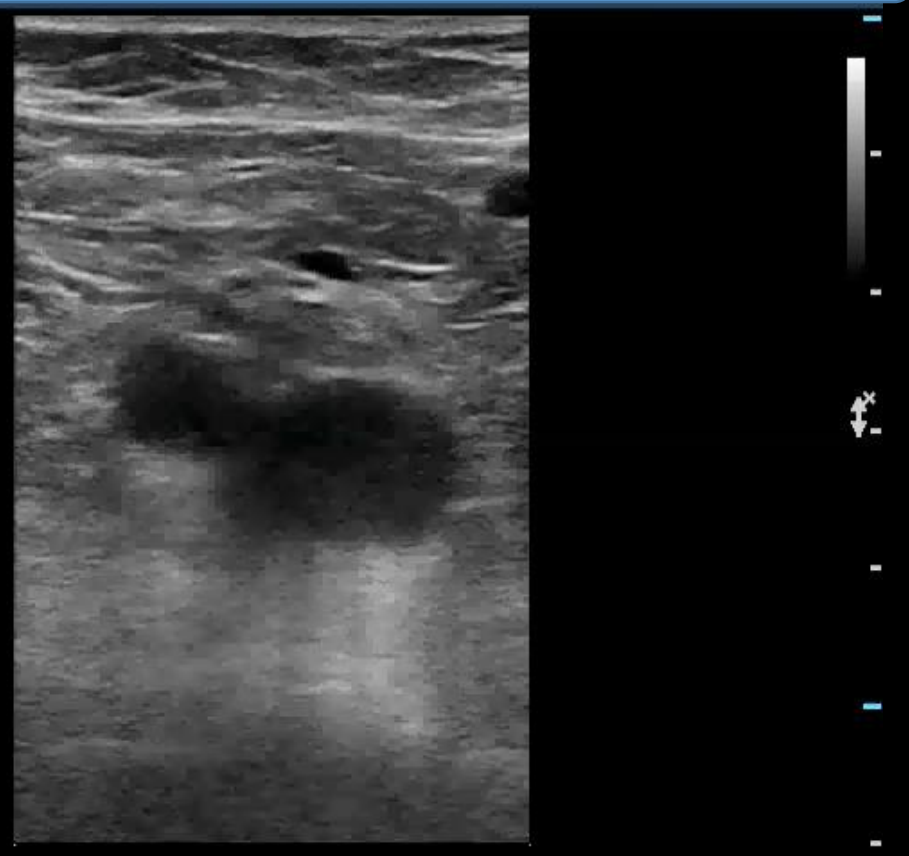




[Retour]

Membres inférieurs





Retour

Diagnostic

- Embolie pulmonaire
- A haut risque
- Compliquée de choc

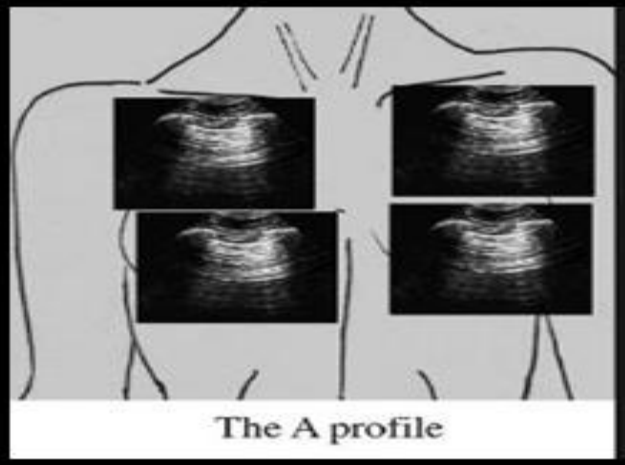
Stratégie diagnostique devant une IRA

- Association échographie pulmonaire + échographie cardiaque

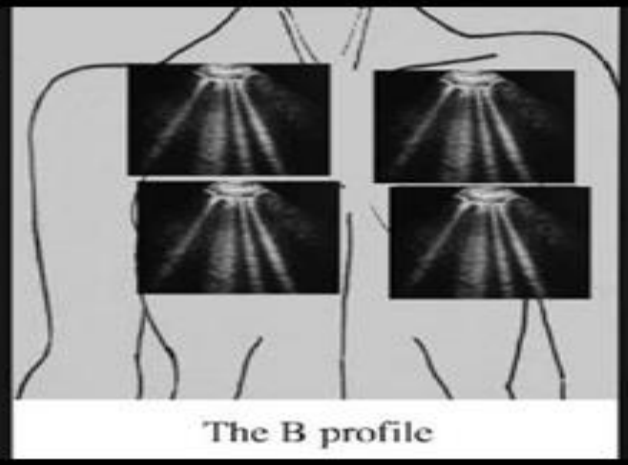
Relevance of Lung Ultrasound in the Diagnosis of Acute Respiratory Failure* The BLUE Protocol

Daniel A. Lichtenstein, MD, FCCP; and Gilbert A. Meziere, MD 2004

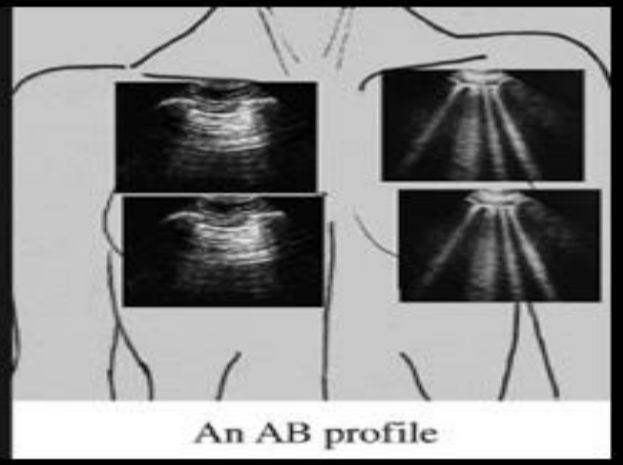
CHEST



The A profile



The B profile



An AB profile

BPCO /Asthme
EP
PNO

OAP

Pneumonie ???

Pneumonie

EP ???

Usefulness of Cardiothoracic Chest Ultrasound in the Management of Acute Respiratory Failure in Critical Care Practice

Stein Silva, MD, PhD; Caroline Biendel, MD; Jean Ruiz, MD; Michel Olivier, MD; Benoit Bataille, MD; Thomas Geeraerts, MD, PhD; Arnaud Mari, MD; Beatrice Riu, MD; Olivier Fourcade, MD, PhD; and Michele Genestal, MD

CHEST

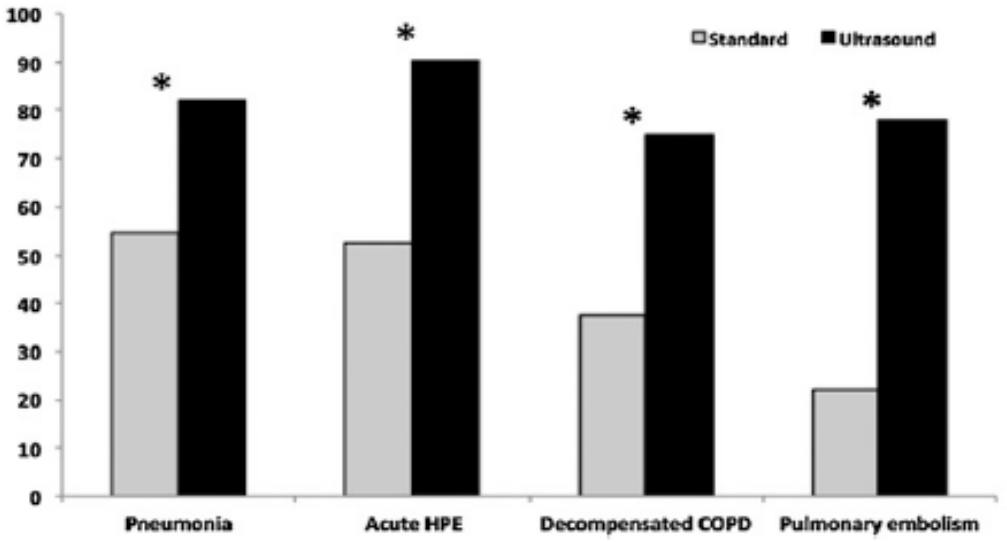


FIGURE 3. Potential therapeutic improvement related to the use of the ultrasound approach. The accuracy of the initial treatment, established with standard data, was compared with the therapeutic decisions that could have been made with the ultrasound approach. The use of general ultrasound chest data could have significantly improved the initial treatment in cases of pneumonia ($P < .05$), acute HPE ($P < .04$), decompensated COPD ($P < .009$), and pulmonary embolism ($P < .05$). *$P < .05$. HPE = hemodynamic pulmonary edema.

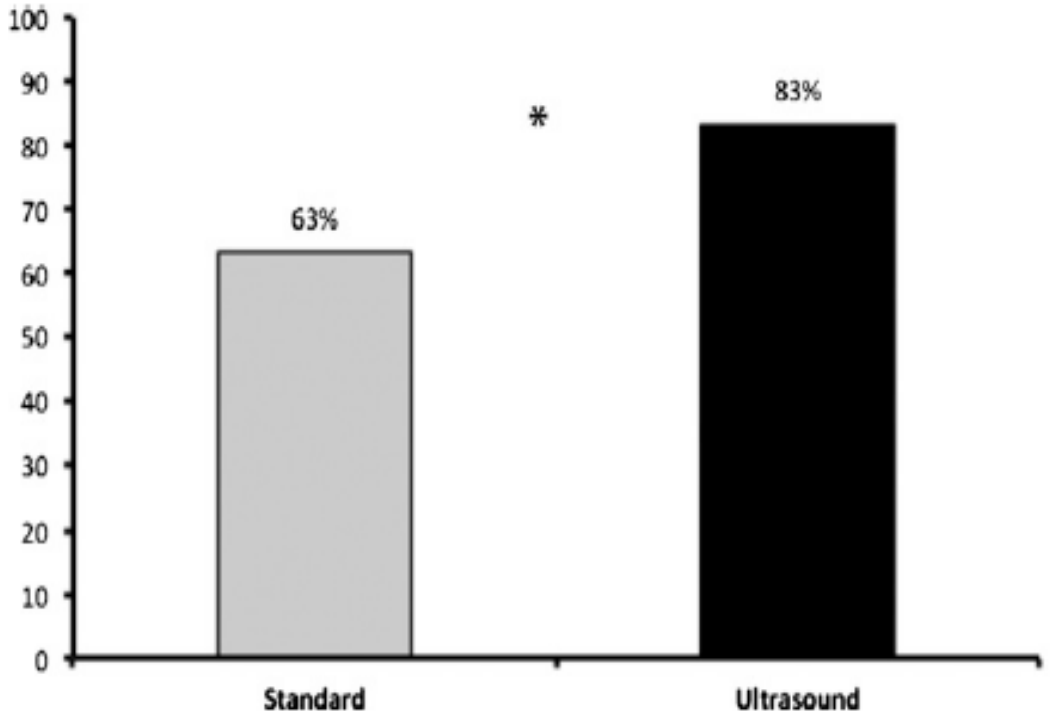


FIGURE 1. Comparative diagnostic accuracy. Each diagnostic approach (standard and ultrasound) was compared against the final diagnosis determined by a panel of experts (*$P < .05$).

Point-of-care ultrasonography in patients admitted with respiratory symptoms: a single-blind, randomised controlled trial

Christian B Laursen, Erik Sloth, Annmarie Touborg Lassen, René dePont Christensen, Jess Lambrechtsen, Poul Henning Madsen, Daniel Pilsgaard Henriksen, Jesper Rømhild Davidsen, Finn Rasmussen

THE LANCET Respiratory Medicine

4 h after admission to emergency department					
Patients with correct presumptive diagnoses	139 (88·0%; 82·8 to 93·1)	100 (63·7%; 56·1 to 71·3)	<0·0001	24·3% (15·0 to 33·1)	1·38 (1·01 to 1·31)
Appropriate treatment ordered*	123 (78%; 71·3 to 84·4)	89 (56·7%; 48·9 to 64·5)	<0·0001	21·2% (10·8 to 30·9)	1·37 (0·98 to 1·35)

The addition of point-of-care ultrasonography of the heart, lungs, and deep veins to the standard initial diagnostic tests resulted in a significantly larger proportion of patients with respiratory symptoms being given correct presumptive diagnoses 4 h after admission to the emergency department, with an absolute increase of 24% in patients who were correctly diagnosed (table 2).

Accuracy of point-of-care multiorgan ultrasonography for the diagnosis of pulmonary embolism

Peiman Nazerian MD*,

CHEST
Official publication of the American College of Chest Physicians
ONLINE FIRST

Table 3. Accuracy of lung, heart, veins and multiorgan ultrasonography for the diagnosis of PE

	Sens % (95% CI)	Spec % (95% CI)	PPV % (95% CI)	NPV % (95% CI)	+LR (95% CI)	-LR (95% CI)
Lung US	60.9% (51.1-70.1)	95.9% (92.7-98)	87% (77.4-93.6)	84.6% (79.9-88.7)	15 (8-28.1)	0.4 (0,3-0,5)
Heart US*	32.7% (24.1-42.3)	90.9% (86.6-94.2)	62.1% (48.4-74.5)	74,8% (69.5-79.7)	3.6 (2.2-5.8)	0.7 (0.6-0.8)
Veins US	52.7% (43-62.3)	97.6% (94.8-99.1)	90.6% (80.7-96.5)	82.2% (77.4-86.4)	21.7 (9.7-48.8)	0.5 (0.4-0.6)
Multiorgan US	90% (82.8-94.9)	86.2% (81.3-90.3)	74.4% (66.1-81.6)	95.1% (91.4-97.5)	6.5 (4.8-8.9)	0.12 (0.07-0.2)
Negative multiorgan US plus alternative diagnosis	100% (96.7-100)	42.9% (36.7-49.3)	43.8% (37.6-50.2)	100% (96.5-100)	1.75 (1.6-1.9)	0

+ Examen Clinique
Et Interrogatoire!!!!

Au total:

IRA

Echo P-Pulm

Plèvres

liquide

Gazeux

Parenchyme

Quelle est votre PEC immédiate?

- Remplissage?
- Thrombolyse?
- Dobutamine?
- Noradrénaline?
- Angio TDM?
- Anticoagulation?

Quelle est votre PEC immédiate?

- Remplissage
- Thrombolyse
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- Noradrénaline
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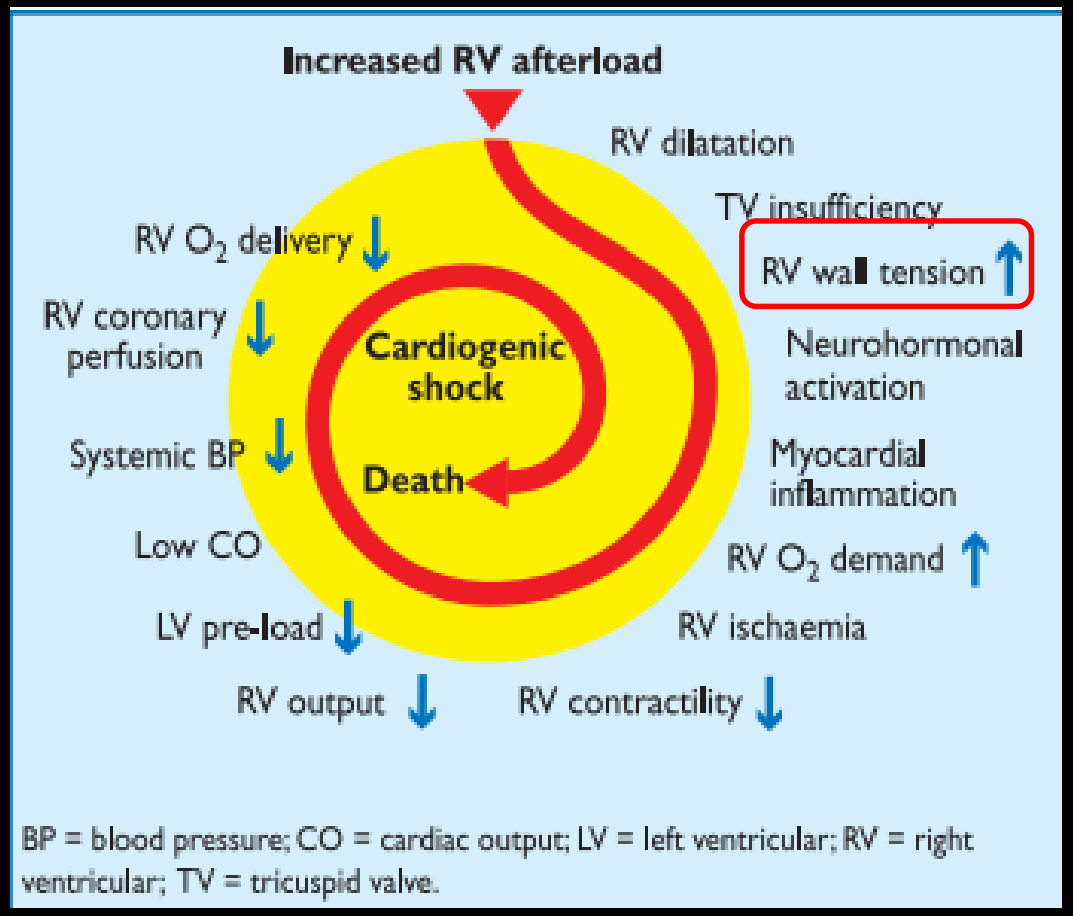
- Anticoagulation

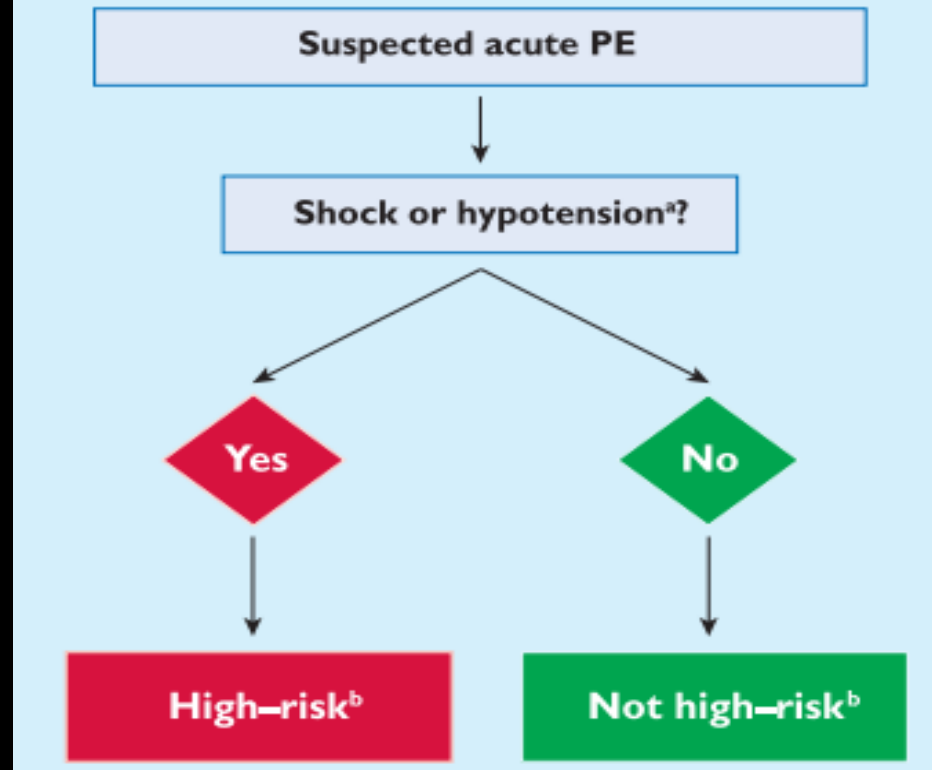
European Heart Journal (2014) **35**, 3033–3080
doi:10.1093/eurheartj/ehu283

ESC GUIDELINES

2014 ESC Guidelines on the diagnosis and management of acute pulmonary embolism



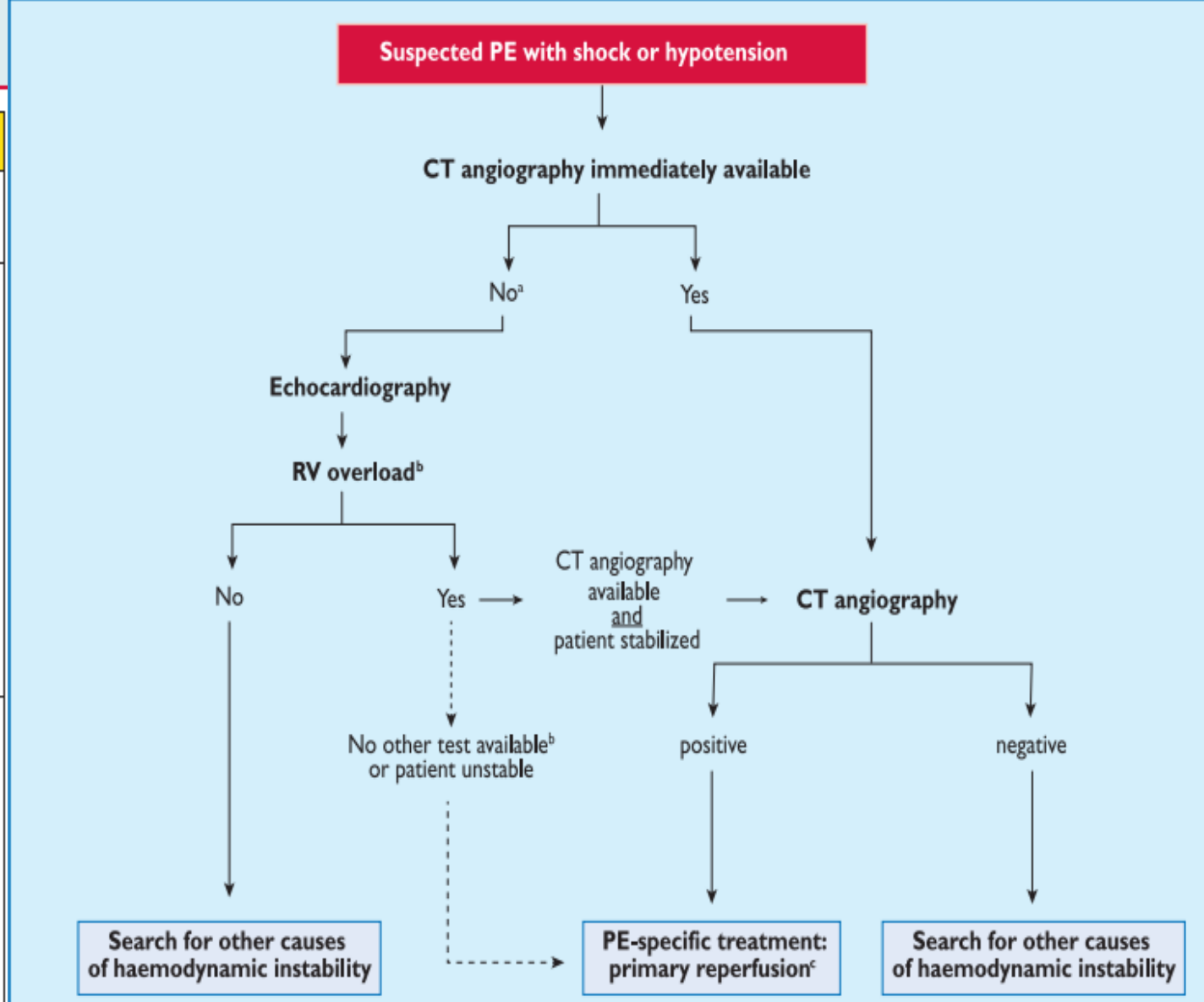
BP = blood pressure; CO = cardiac output; LV = left ventricular; RV = right ventricular; TV = tricuspid valve.



PE = pulmonary embolism.
[a]Defined as systolic blood pressure <90 mm Hg, or a systolic pressure drop by ≥40 mm Hg, for >15 minutes, if not caused by new-onset arrhythmia, hypovolaemia, or sepsis.
[b]Based on the estimated PE-related in-hospital or 30-day mortality.

Recommendations for diagnosis

Recommendations	Class[a]	Level[b]	Ref[c]
Suspected PE with shock or hypotension			
In suspected high-risk PE, as indicated by the presence of shock or hypotension, emergency CT angiography or bedside transthoracic echocardiography (depending on availability and clinical circumstances) is recommended for diagnostic purposes.	I	C	182
In patients with suspected high-risk PE and signs of RV dysfunction who are too unstable to undergo confirmatory CT angiography, bedside search for venous and/or pulmonary artery thrombi with CUS and/or TOE may be considered to further support the diagnosis of PE, if immediately available.	IIb	C	188, 189



CT = computed tomographic; PE = pulmonary embolism; RV = right ventricular.

[a]Includes the cases in which the patient's condition is so critical that it only allows bedside diagnostic tests.

[b]Apart from the diagnosis of RV dysfunction, bedside transthoracic echocardiography may, in some cases, directly confirm PE by visualizing mobile thrombi in the right heart chambers. Ancillary bedside imaging tests include transoesophageal echocardiography, which may detect emboli in the pulmonary artery and its main branches, and bilateral compression venous ultrasonography, which may confirm deep vein thrombosis and thus be of help in emergency management decisions.

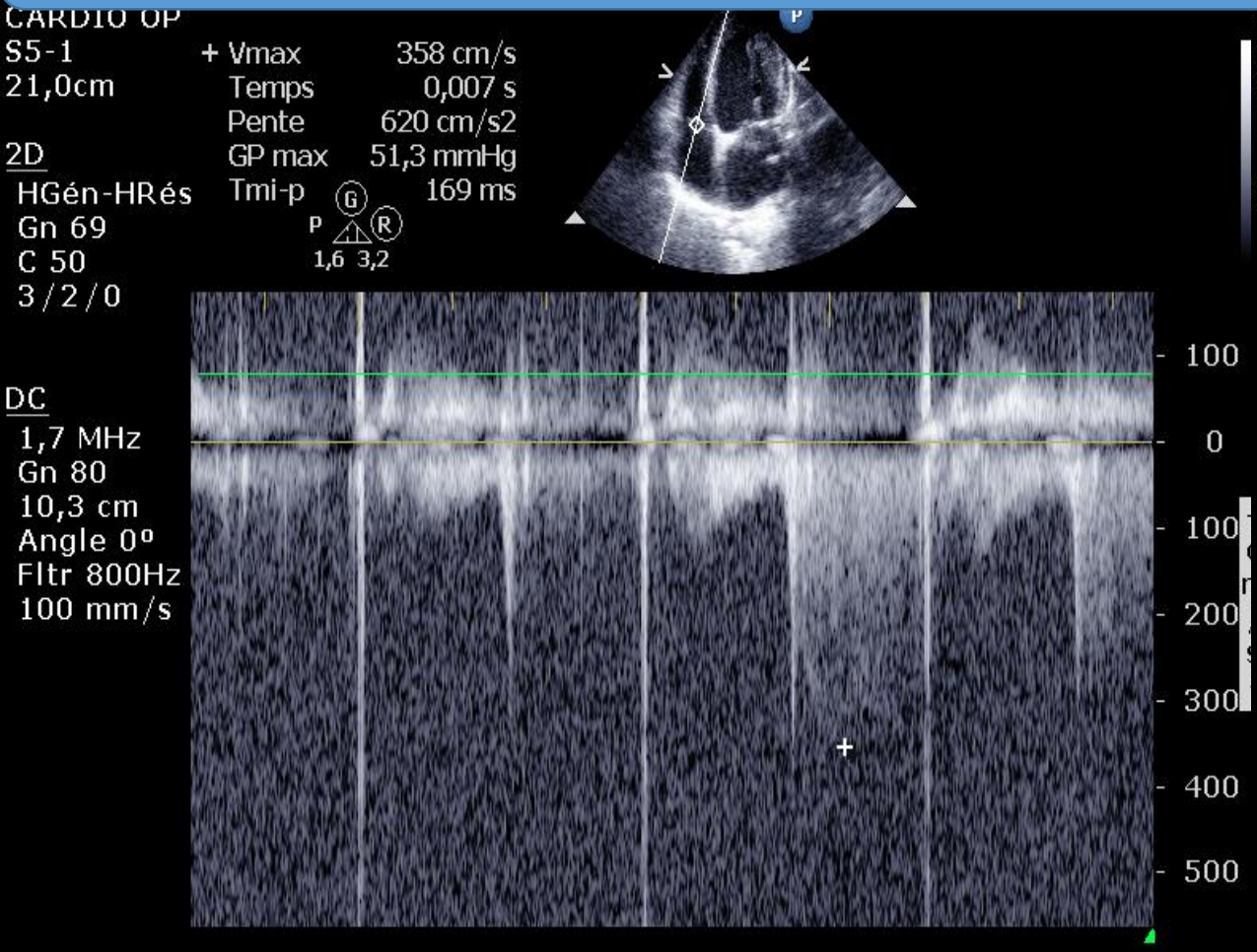
[c]Thrombolysis; alternatively, surgical embolectomy or catheter-directed treatment (Section 5).

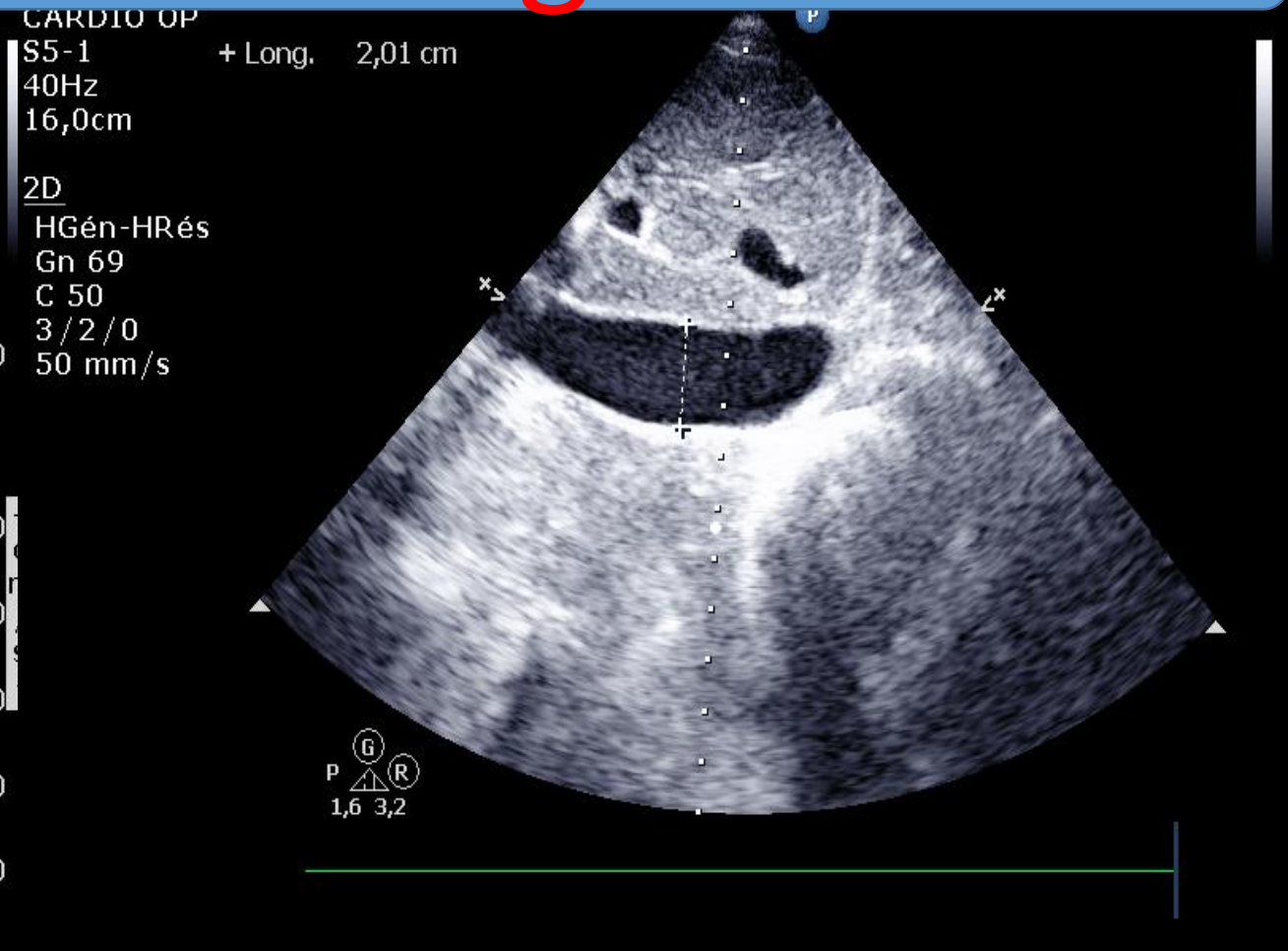
Recommendations	Class[a]	Level[b]	Ref[c]
PE with shock or hypotension (high-risk)			
It is recommended that intravenous anticoagulation with UFH be initiated without delay in patients with high-risk PE.	I	C	
Thrombolytic therapy is recommended.	I	B	168
Surgical pulmonary embolectomy is recommended for patients in whom thrombolysis is contraindicated or has failed.[d]	I	C	313
Percutaneous catheter-directed treatment should be considered as an alternative to surgical pulmonary embolectomy for patients in whom full-dose systemic thrombolysis is contraindicated or has failed.[d]	IIa	C	

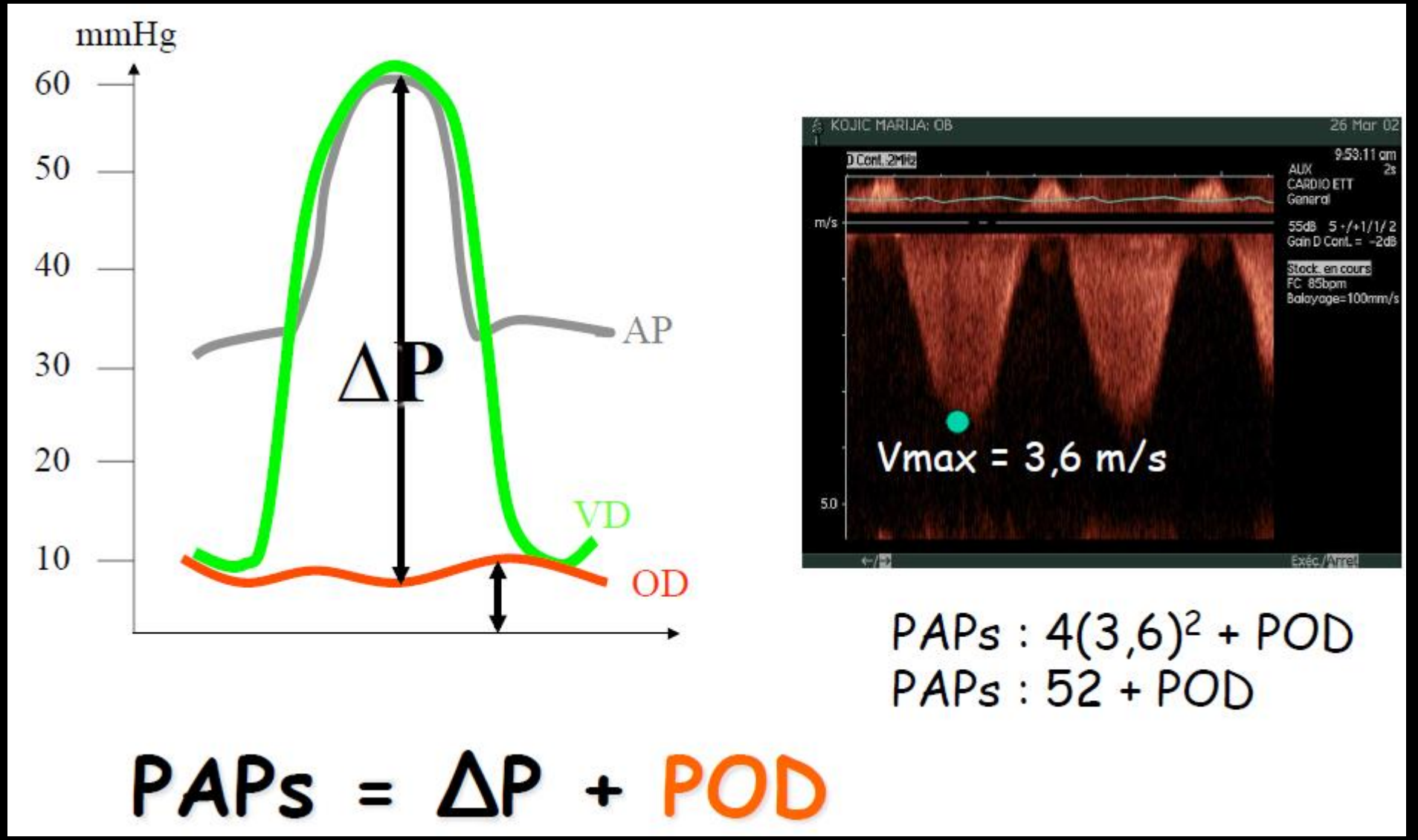
- modest (500 mL) fluid challenge may help to increase cardiac index in patients with PE, low cardiac index, and normal BP.
- Use of vasopressors is often necessary, in parallel with (or while waiting for) pharmacological, surgical, or interventional reperfusion treatment.
- Norepinephrine appears to improve RV function via a direct positive inotropic effect, while also improving RV coronary perfusion by peripheral vascular alpha-receptor stimulation and the increase in systemic BP.
- Based on the results of small series, the use of dobutamine and/or dopamine may be considered for patients with PE, low cardiac index, and normal BP; however, raising the cardiac index above physiological values may aggravate the ventilation–perfusionmismatch by further redistributing flow from (partly) obstructed to unobstructed vessels.

Quelle est la PAPS de cette patiente?

65 – 70 mmHg







Selon F. Kerbaul

Insuffisance Tricuspide

Systole
V pulm ouverte

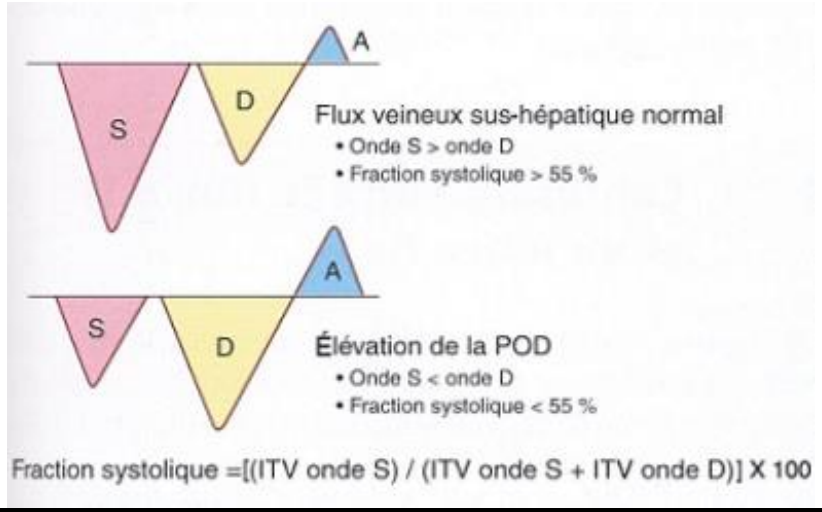
Pression VD = Pression AP

POD + Δpression = Pression VD

Guidelines for the Echocardiographic Assessment of the Right Heart in Adults: A Report from the American Society of Echocardiography:

Endorsed by the European Association of Echocardiography, a registered branch of the European Society of Cardiology, and the Canadian Society of Echocardiography

Variable	Normal (0-5 [3] mm Hg)	Intermediate (5-10 [8] mm Hg)		High (15 mm Hg)
IVC diameter	≤2.1 cm	≤2.1 cm	>2.1 cm	>2.1 cm
Collapse with sniff	>50%	<50%	>50%	<50%
Secondary indices of elevated RA pressure				



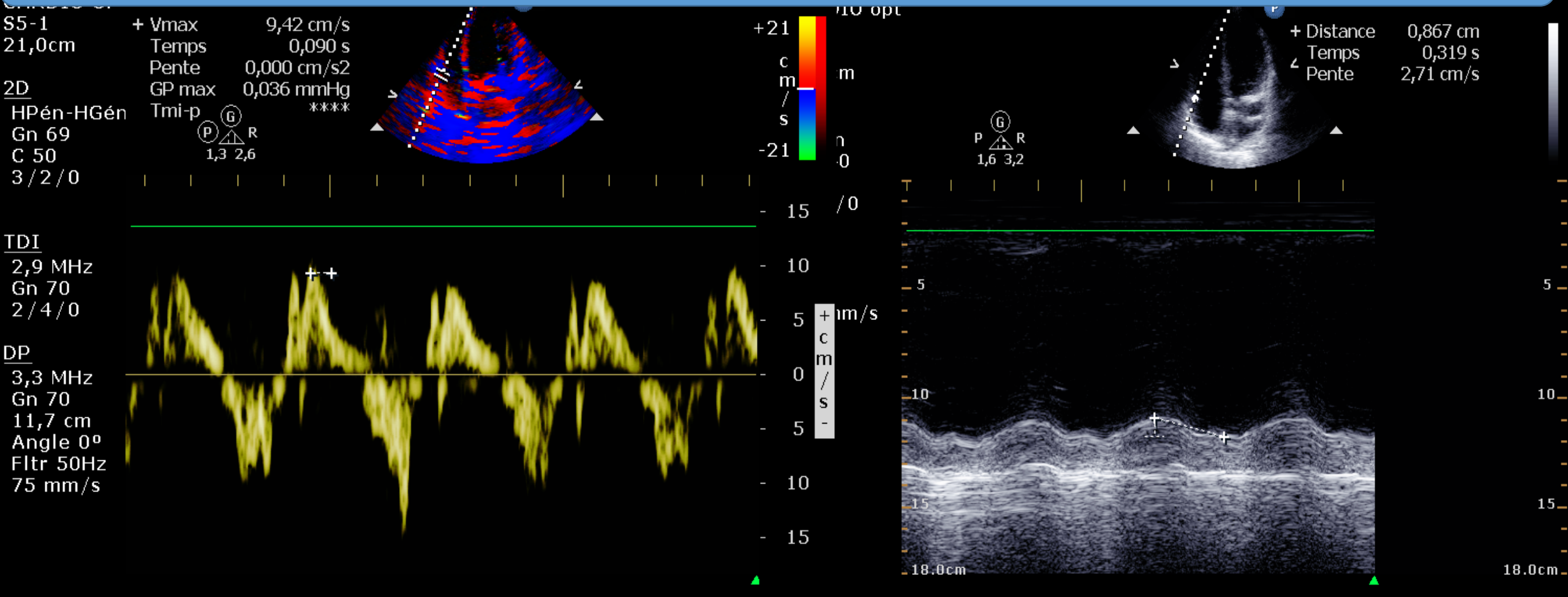
- Restrictive filling
- Tricuspid E/E' > 6
- Diastolic flow predominance in hepatic veins (systolic filling fraction < 55%)

Quelle est cette coupe?

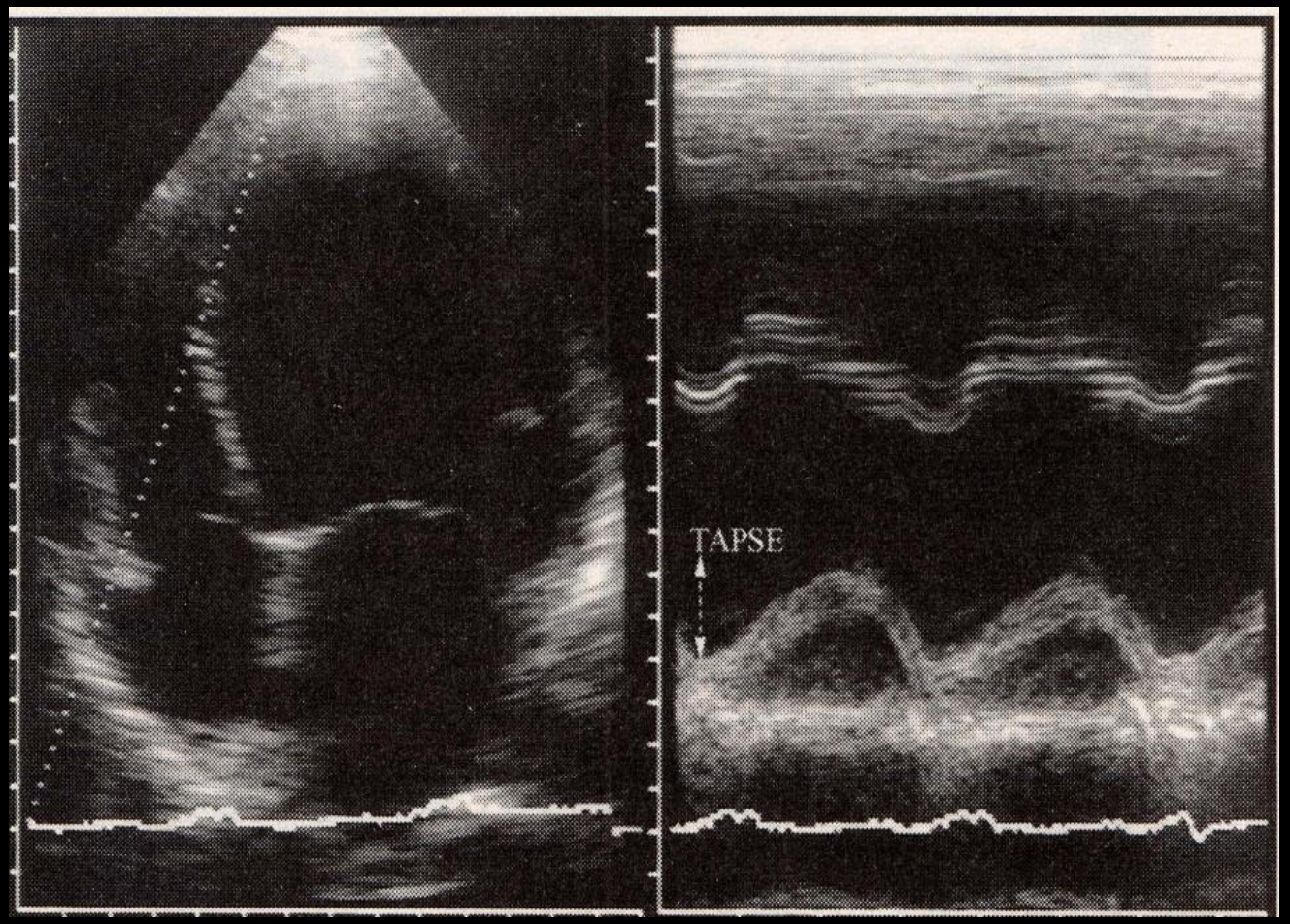
Parasternale petit axe passant par les gros vaisseaux

La fonction systolique VD est elle conservée?

Non!

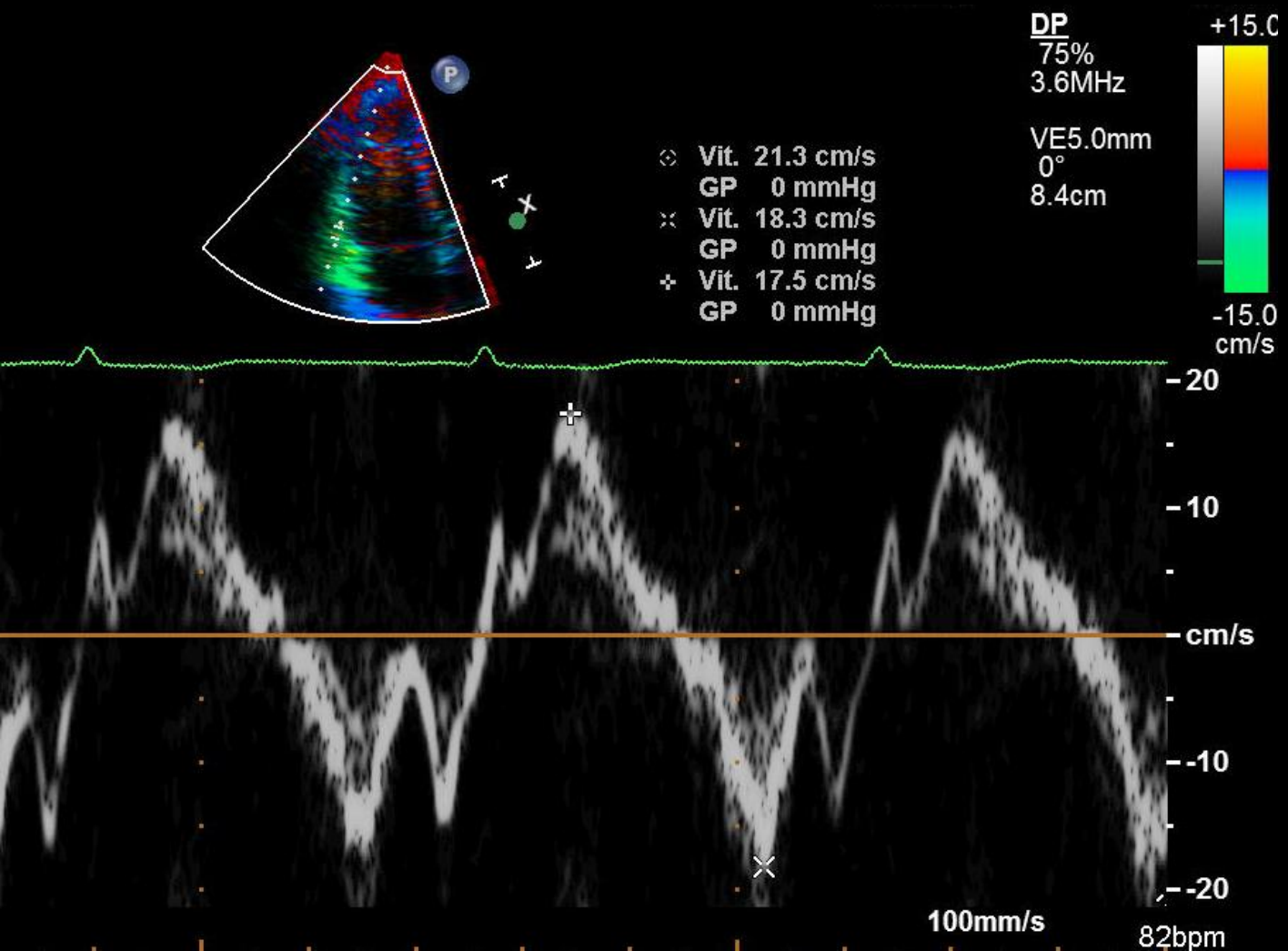


Fonction systolique du VD



Normal : 16 à 25 mm
Dysfonction VD : ≤ 12 mm
FEVD < 25 % si TEAT < 8mm

Fonction systolique du VD



V max normale = 15 ± 3 cm/s

Si Vmax < 11,5 cm/s
FEVD < 45%

Meluzin J. Eur Heart J. 2001;22:340

Voila ! ☺