Intérêt de l'échographie d'effort dans la prise en charge des valvulopathies

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TABLE 3 Evaluation of Patients With Known or Suspected VHD

Reason	Test	Indication
Initial evaluation: All patients with known or suspected valve disease	TTE*	Establishes chamber size and function, valve morphology and severity, and effect on pulmonary and systemic circulation
	History and physical	Establishes symptom severity, comorbidities, valve disease presence and severity, and presence of HF
	ECG	Establishes rhythm, LV function, and presence or absence of hypertrophy
Further diagnostic testing: Information required for equivocal symptom status, discrepancy between examination and echocardiogram, further definition of valve disease, or assessing response of the ventricles and pulmonary circulation to load and to exercise	Chest x-ray	Important for the symptomatic patient; establishes heart size and presence or absence of pulmonary vascular congestion, intrinsic lung disease, and calcification of aorta and pericardium
	TEE	Provides high-quality assessment of mitral and prosthetic valve, including definition of intracardiac masses and possible associated abnormalities (eg, intracardiac abscess, LA thrombus)
	CMR	Provides assessment of LV volumes and function, valve severity, and aortic disease
	PET CT	Aids in determination of active infection or inflammation
	Stress testing	Gives an objective measure of exercise capacity
	Catheterization	Provides measurement of intracardiac and pulmonary pressures, valve severity, and hemodynamic response to exercise and drugs

ACC guidelines Otto, J Am Coll Cardiol 2021

EE patients asymptomatiques FEVG conservée

Intervention is recommended in asymptomatic patients with severe aortic stenosis and demonstrable symptoms on exercise testing.	I	C
Intervention should be considered in asymptomatic patients with severe aortic stenosis and a sustained fall in BP (>20 mmHg) during exercise testing.	IIa	C
Intervention should be considered in asymptomatic patients with LVEF >55% and a normal exercise test if the procedural risk is low and one of the following parameters is present: • Very severe aortic stenosis (mean gradient ≥60 mmHg or V_{max} >5 m/s).[9,242] • Severe valve calcification (ideally assessed by CCT) and V_{max} progression ≥0.3 m/s/year.[164,189,243] • Markedly elevated BNP levels (>3× age- and sex-corrected normal range) confirmed by repeated measurements and without other explanation.[163,171]	IIa	B

Esc guidelines 2021

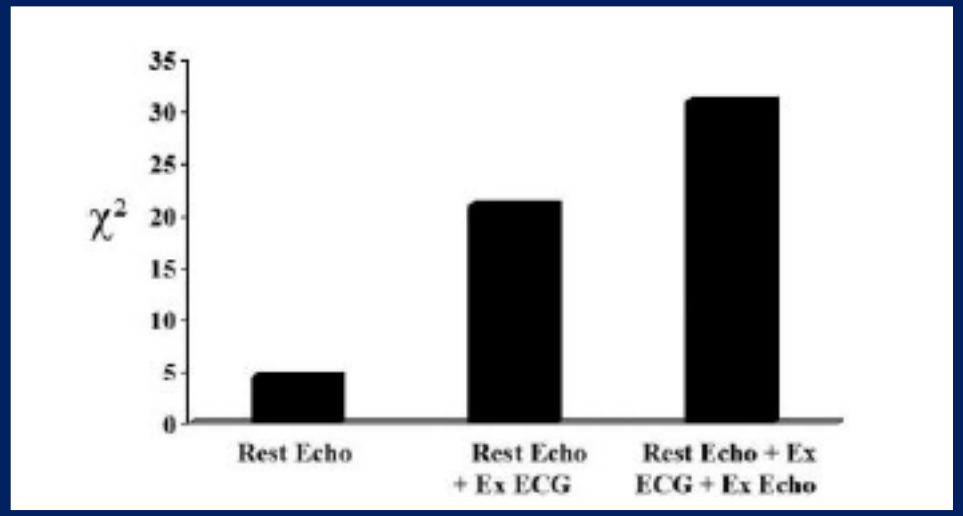
Si EE normale … validité 6 mois

2a	B-NR	6. In apparently asymptomatic patients with severe AS (Stage C1) and low surgical risk, AVR is reasonable when an exercise test demonstrates decreased exercise tolerance (normalized for age and sex) or a fall in systolic blood pressure of ≥10 mm Hg from baseline to peak exercise (13,28-30).

ACC guidelines Otto, J Am Coll Cardiol 2021

RAC avec FEVG conservée : valeur ajoutée de l'échographie d'effort?

69 patients RA C serré asymptomatiques



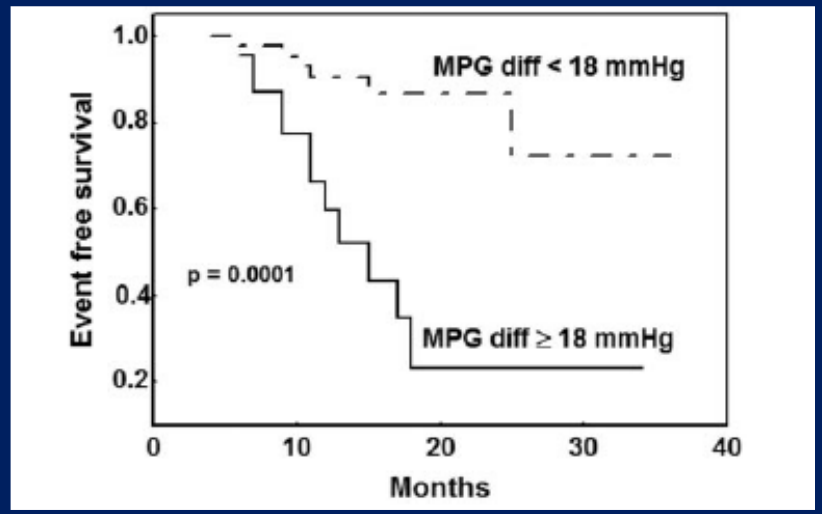


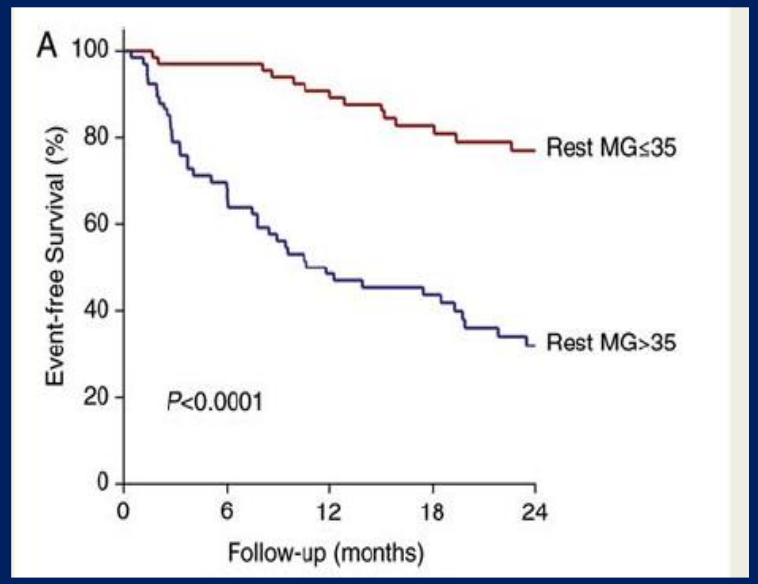
TABLE 3. Multivariate Predictors of Events

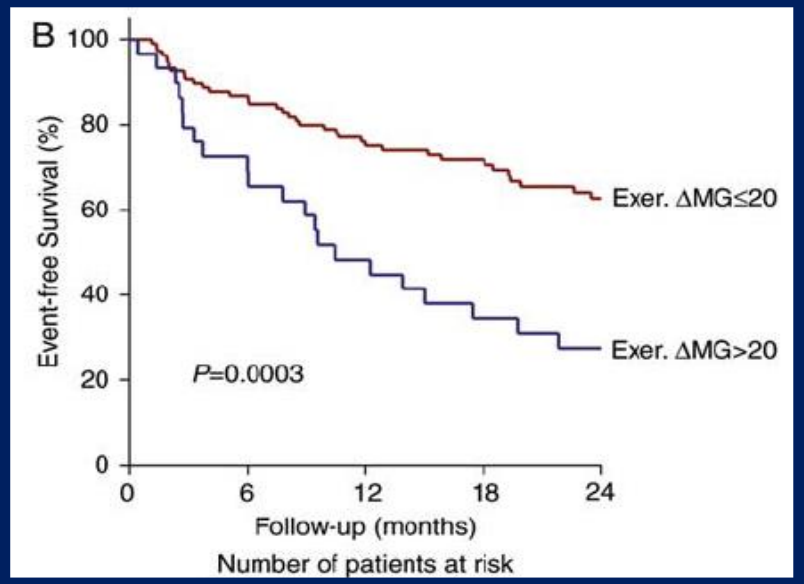
Categorical Variables	χ	*P* Value
Mean aortic pressure gradient diff ≥18 mm Hg	10	0.015
Abnormal exercise test	9.1	0.0026
Aortic valve area <0.75 cm	8.7	0.0031

Diff Indicates difference between exercise and rest.

Limitations : décision opératoire ; prise par le praticien

Lancelotti P, circulation 2005





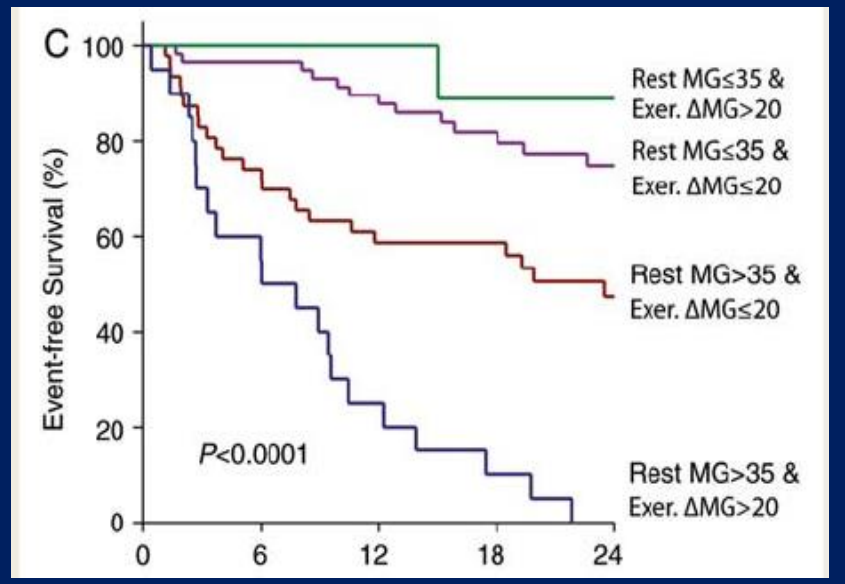


Table 4 Univariate and multivariate analysis of association between baseline variables and event risk in the whole cohort ($n = 135$) with variables entered in dichotomous format

Variables	(%) of patients with variable	Univariate analysis		Multivariate analysis	
		HR (95% CI)	*P*-value	HR (95% CI)	*P*-value
Age ≥65 years	58	2.16 (1.30–3.72)	0.003	1.96 (1.15–3.47)	0.01
Diabetes	10	2.10 (0.90–4.10)	0.08	3.20 (1.33–6.87)	0.01
Rest systolic blood pressure >135 mmHg	55	1.71 (0.78–2.85)	0.03	1.30 (0.78–2.23)	0.32
LV hypertrophy	41	1.90 (1.17–3.08)	0.009	1.96 (1.17–3.27)	0.01
Rest mean gradient >35 mmHg	50	3.70 (2.21–6.41)	<0.0001	3.60 (2.11–6.37)	<0.0001
Exercise Δ mean gradient >20 mmHg	21	2.10 (1.22–2.52)	0.008	3.83 (2.16–6.67)	<0.0001
Exercise LV ejection fraction <70%	38	1.61 (1.00–2.62)	0.05	1.61 (0.95–2.71)	0.07

Marechaux, Eur Heart J 2010

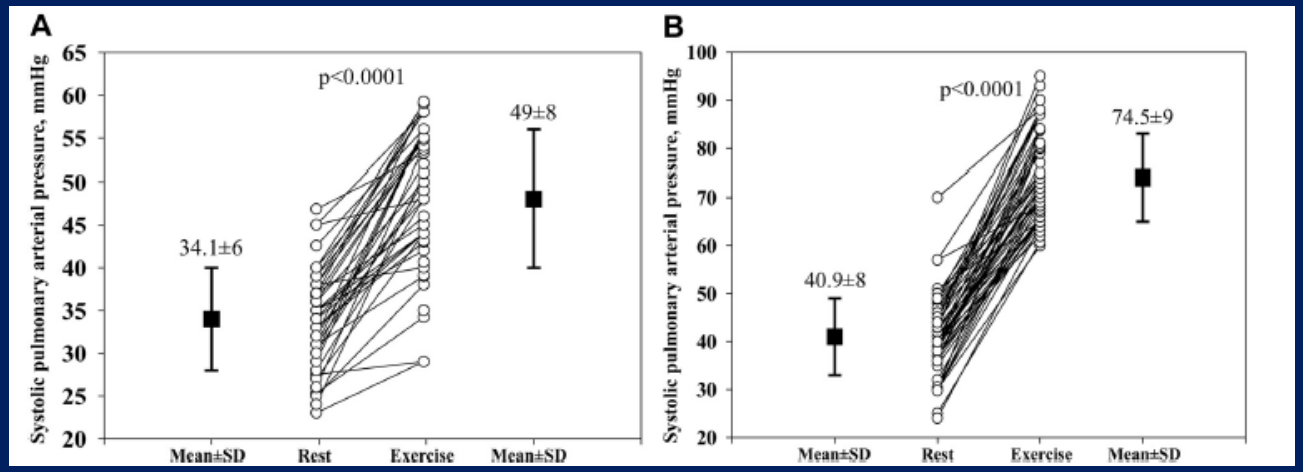
- 186 patients RAC asympto sce< 1,5cm2, 51 patients EE + exclus
- 135 patients suivi 24 mois (20± 14 mois) 67 evts
  - 58 : Symptômes puis chir : 58 pts
  - 4 : symptômes non opéré comorbidités++… 3 deces
  - 1 arrêt CR ressuscité puis opéré
  - 3 décès 20, 31 et 50 mois

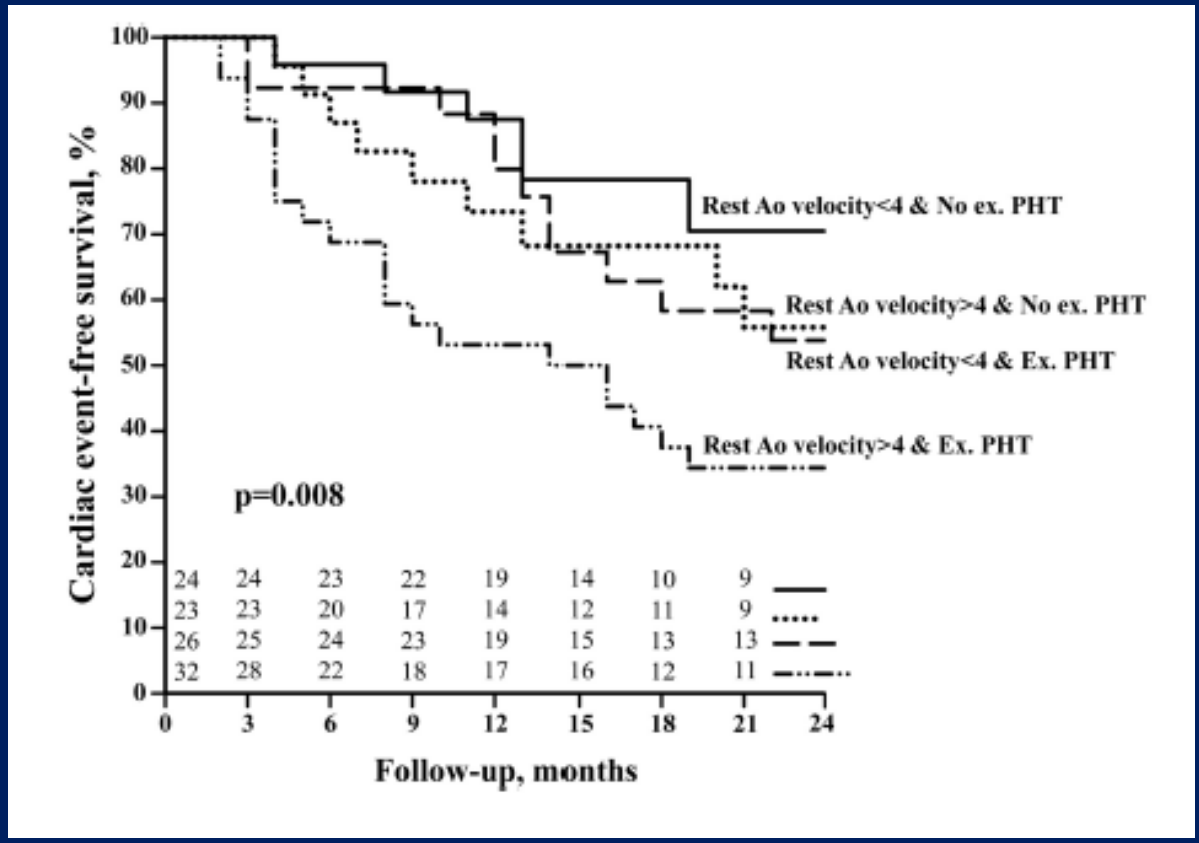
Marechaux, Eur Heart J 2010

RAC et HTAP d'effort

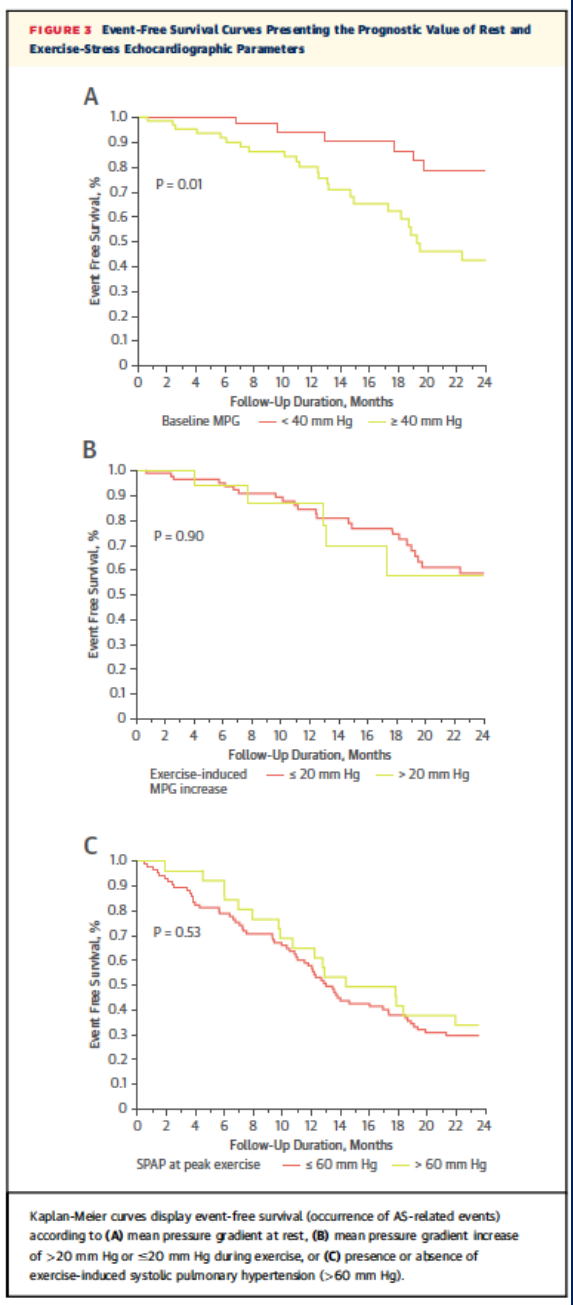
105 pts RAC <0.6cm2/m2 FEVG conservée test d'effort normal PAPs > 60 mmHg .. 58 patients

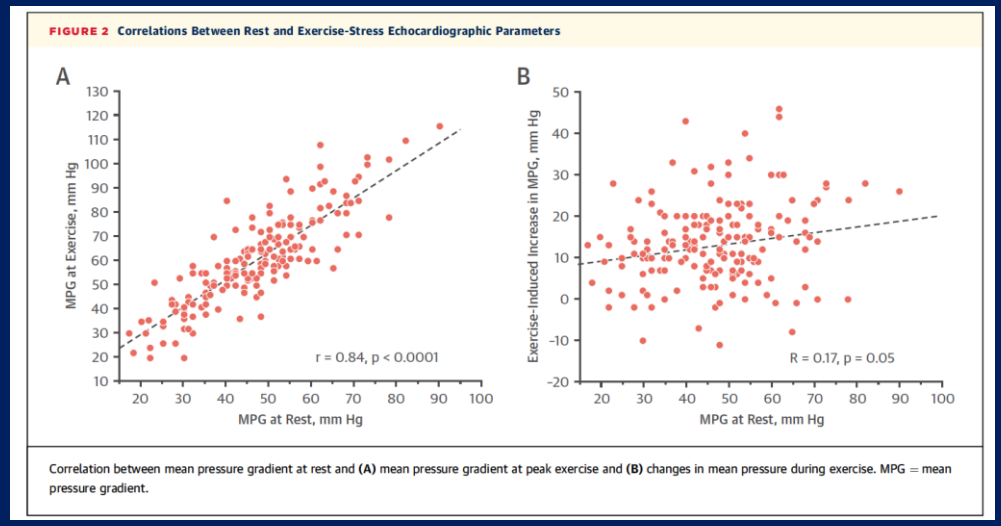
Suivi 19 mois 49 evts
7 DC….
42 apparition de symptômes





Lancelotti circulation 2012





148 patients dont 112 avec EE normale

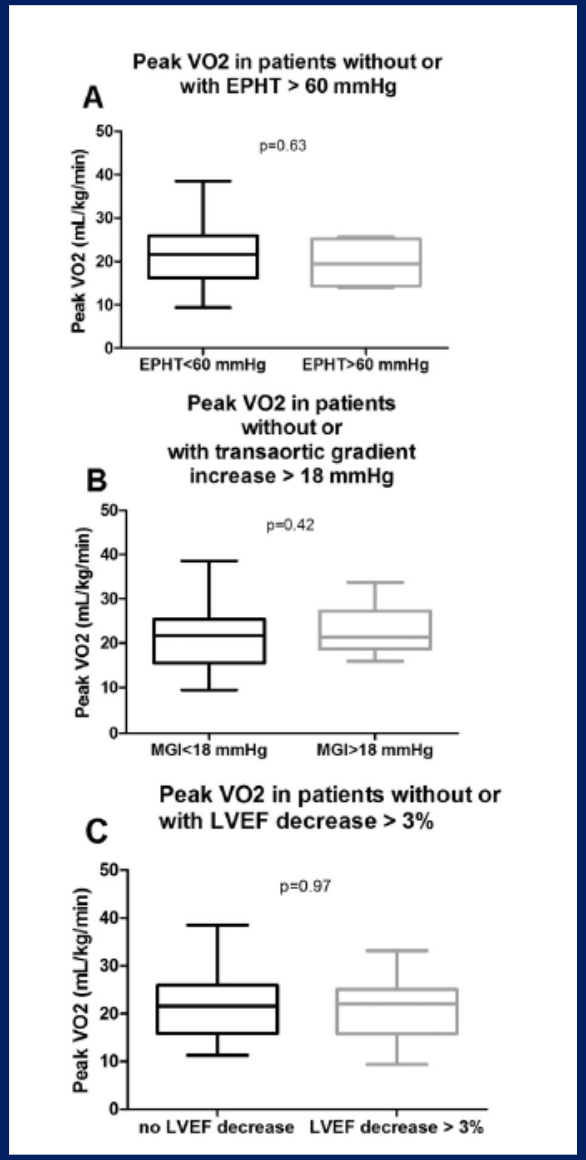
Bonne corrélation GM repos et effort
Pas de valeur pronostique
élévation du gradient >20mmhgou de la PAPs>60mmHg

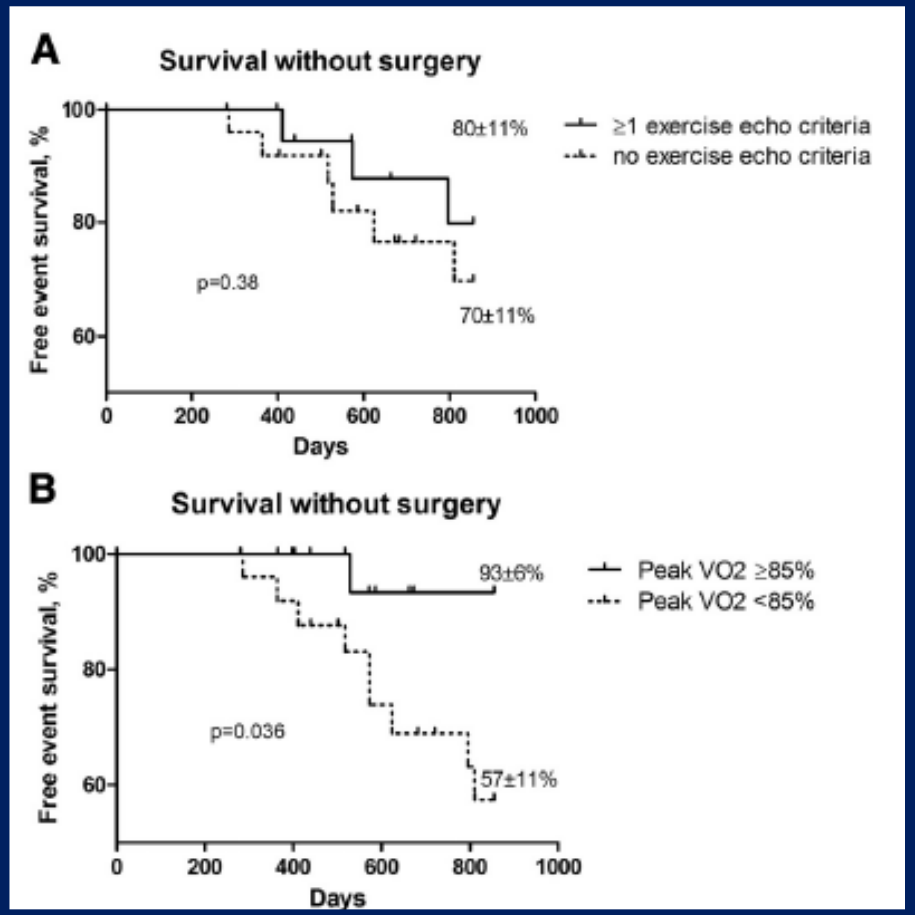
Goubelaire Meissika Zeitoun, JACC imaging 2018

RAC asymptomatique FEVG conservée

- EE+ : intervention
- EE- mais echo elevation du gradient > 18-20 mmHg ou, ou HTAP… prédictif de symptômes… surveillance rapprochée

54 pts RAC asympto FEVG>50% : CPX et echo d'effort





Domanski O, Int J Cardiol 2017

A CPET, or if unavailable an ET, should be considered in asymptomatic patients with severe aortic stenosis in order to stratify therapeutic option in case of abnormalities (reduction in VO_2 peak, exercise angina, decrease or increase of systolic blood pressure < 20 mm Hg, ST-segment depression, or ventricular arrhythmia) [18][19][20].
IIa B

A CPET, or, if unavailable, an ET should be considered when the clinical picture does not match echocardiographic findings in the context of other valvular disease than aortic stenosis.
IIa C
An ET is not recommended in symptomatic severe valvular aortic stenosis [18]
III B

Guidelines EHJ 2017

Predictors of symptom development and adverse outcomes in asymptomatic patients include clinical characteristics (older age, atherosclerotic risk factors), echocardiographic parameters (valve calcification, peak jet velocity[189,190]), LVEF, rate of haemodynamic progression,[189] increase in mean gradient >20 mmHg with exercise,[172] severe LV hypertrophy,[191] indexed stroke volume,[158] LA volume,[192] LV global longitudinal strain,[26,168,193] and abnormal biomarker levels (natriuretic peptides, troponin, and fetuin-

Guidelines EHJ 2021

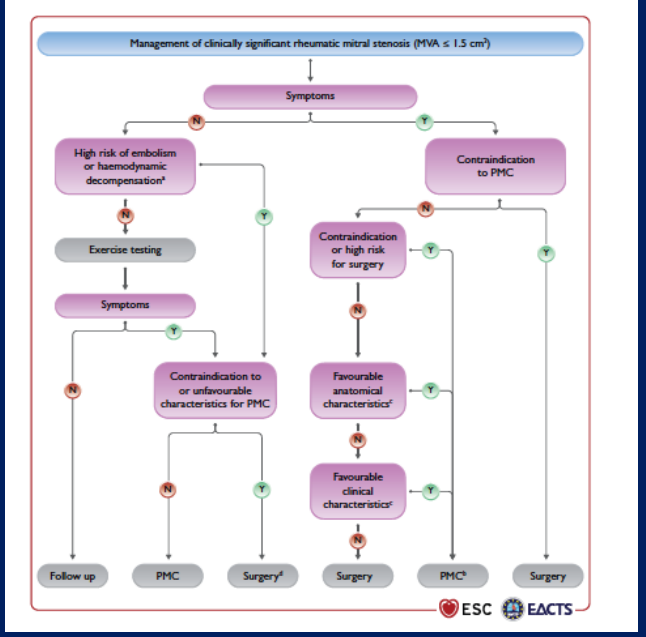
Table 7 Exercise test indications in the context of valvular diseases.	
A CPET (or, if unavailable, an ET) should be considered in asymptomatic patients with severe aortic stenosis, to orient the therapeutic decision, given the occurrence of certain abnormalities (e.g. a reduction in VO_2 peak, exercise angina, a reduction or < 20 mmHg increase in systolic BP or ventricular arrhythmia) [19–21]	IIa B
A CPET (or, if unavailable, an ET) should be considered when the clinical picture does not match echocardiographic findings in the context of valvular disease, other than aortic stenosis	IIa C
An ET is not recommended in symptomatic severe aortic stenosis [19]	III B

BP: blood pressure; CPET: cardiopulmonary exercise test; ET: exercise test.

Marcadet D, in press ACVD 2018

Rétrécissement mitral

- RM serré symptomatique : pas d'indication :
- RM serré (sce<1cm2, GM>10mmHg) et patient asymptomatique
- RM peu serré (sce 1-1,5cm2, GM 5-10 mmHg) et patient symptomatique
- Limites : grande variation de l'élévation du gradient en fonction de la Fc+++



TTE is suboptimal. Stress testing is indicated in patients with no symptoms or symptoms equivocal or discordant with the severity of mitral stenosis. Exercise echocardiography may provide objective information by assessing changes in mitral gradient and pulmonary artery pressure and is superior to DSE. Echocardiography plays an important role in the periprocedural monitoring of PMC and follow-up.

ESC/EACTS guidelines Eur Heart J 2021

COR	LOE	RECOMMENDATION
1	C-LD	1. In patients with rheumatic MS and a discrepancy between resting echocardiographic findings and clinical symptoms, exercise testing with Doppler or invasive hemodynamic assessment is recommended to evaluate symptomatic response, exercise capacity, and the response of the mean mitral gradient and pulmonary artery pressure (1-5).

ACC guidelines Otto, J Am Coll Cardiol 2021

Quel est le paramètre le plus prédictif

Leavitt JL, JACC, 1991, 17 : 1520-6

PAPS d'effort > 60 mmHg

41à 61 mmHg vs 28 à 39 mmHg

gradient moyen > 15 mmHg

9 à 17 mmhg vs 5 à 8 mmHg

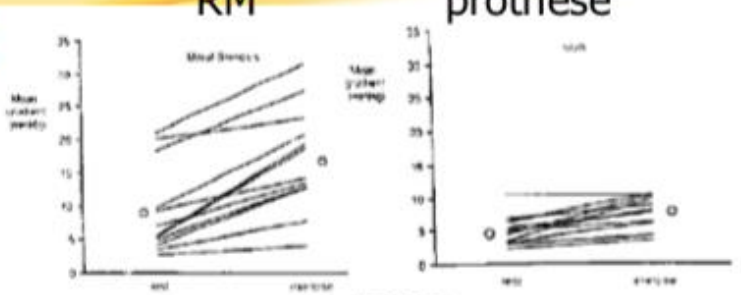
Brochet E et al JACC 2011

Evaluation à l'effort de 48 RM serrés ASF

83 % PAPS d'effort > 60 mmHg
67 % gradient moyen > 15 mmHg

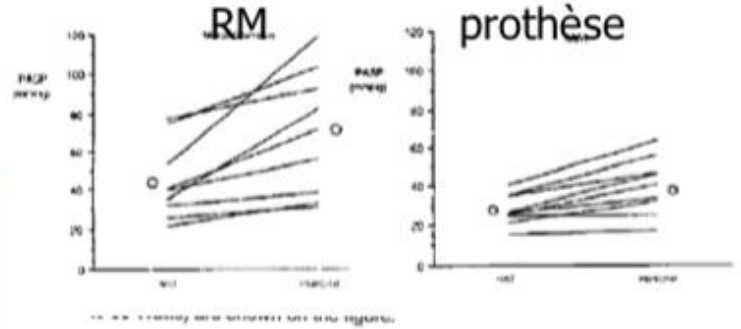
Gradient moyen

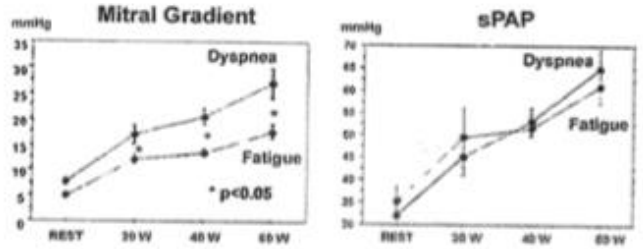
RM prothèse



PAPs

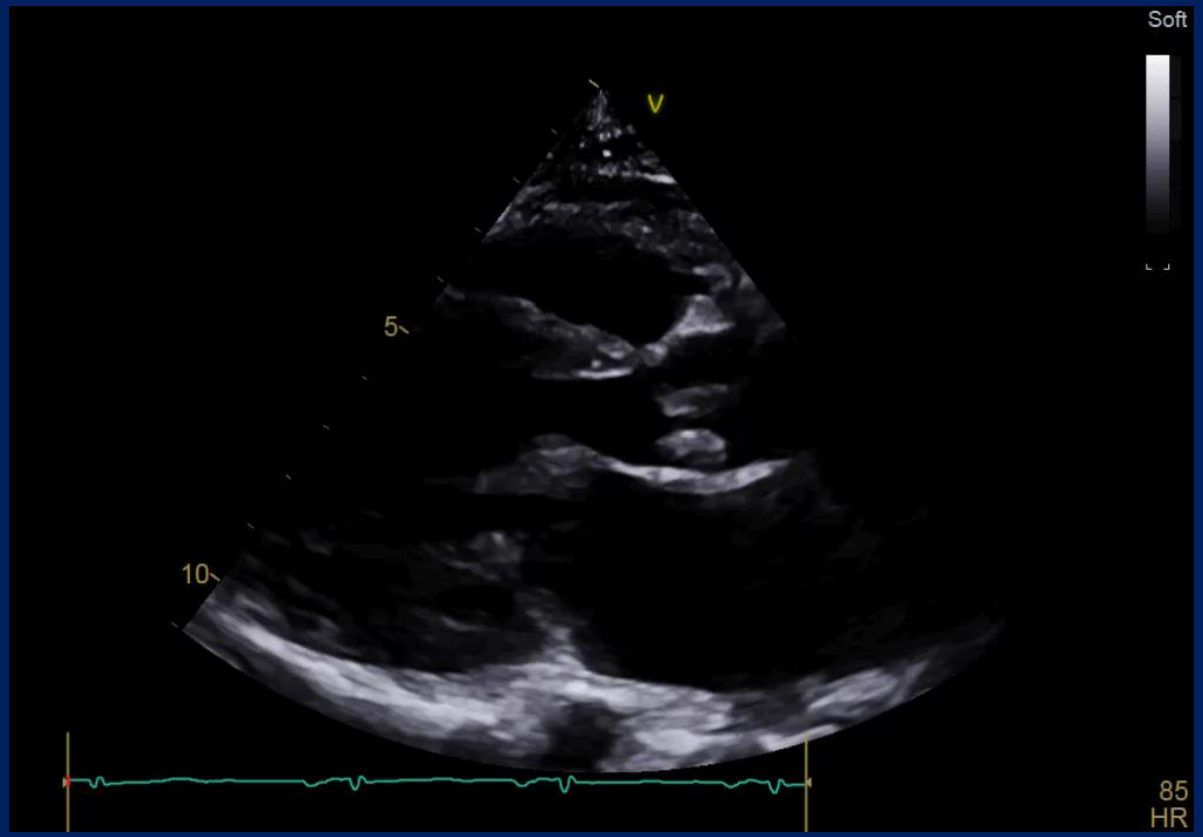
RM prothèse

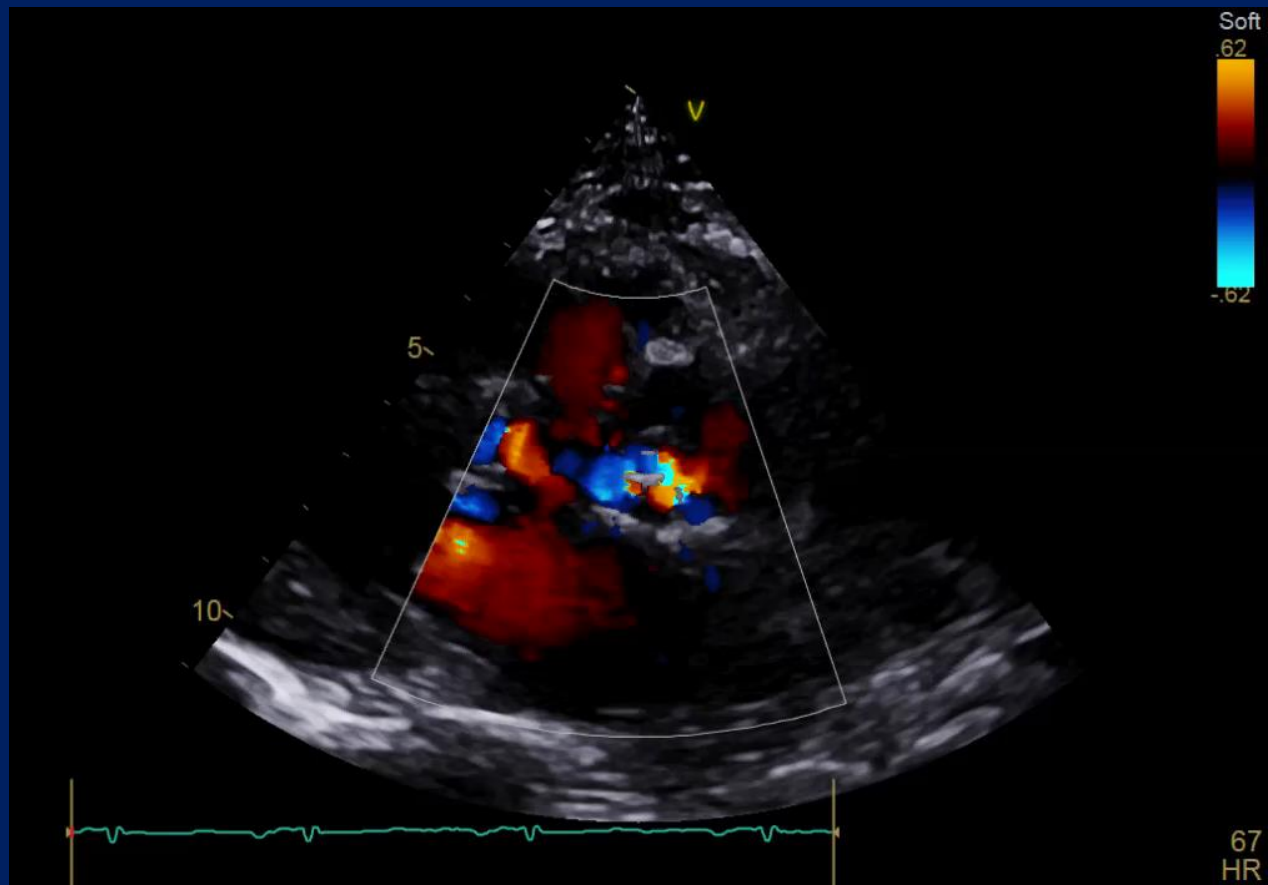


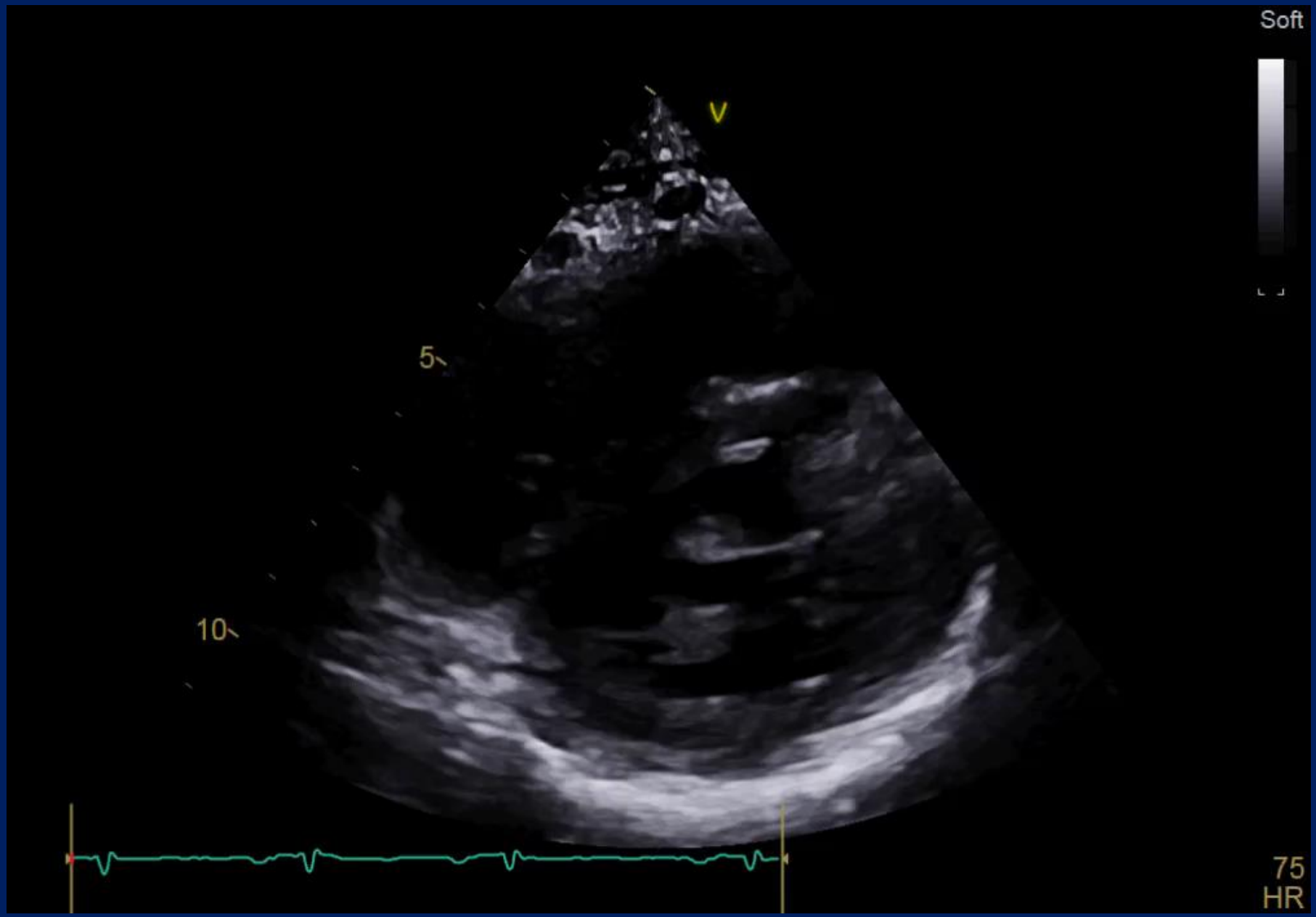


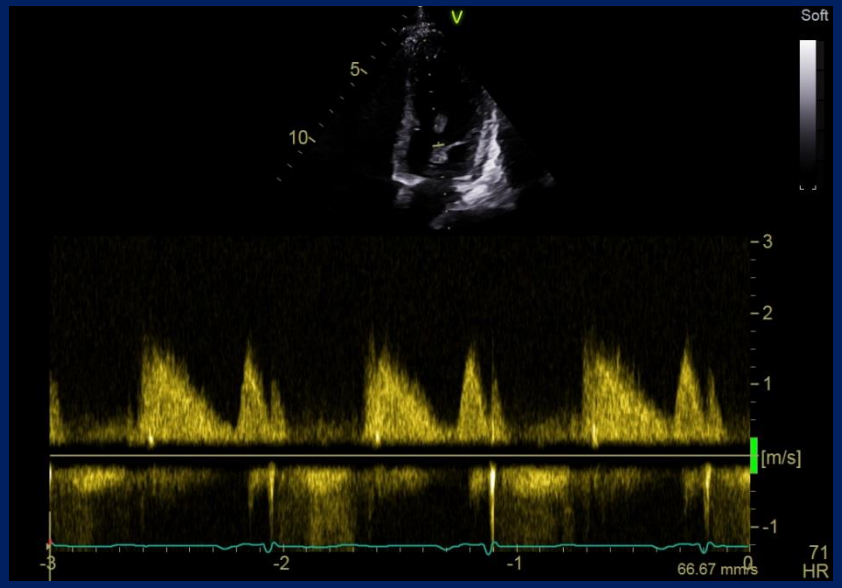
Dyspnée est + associée à l'⇗ relative de la PAPs et du GM > 90% à 60 w qu'au pic de PAPs de 60 mmHg

- Madame T 24 ans
- Atcd de RAA avec RM dilaté par voie percutanée en 2015
  - Bon résultat Sce > 1,5 cm2 Gm 4 mmHg
- Dyspnée d'effort 2 étages/ désir de grossesse

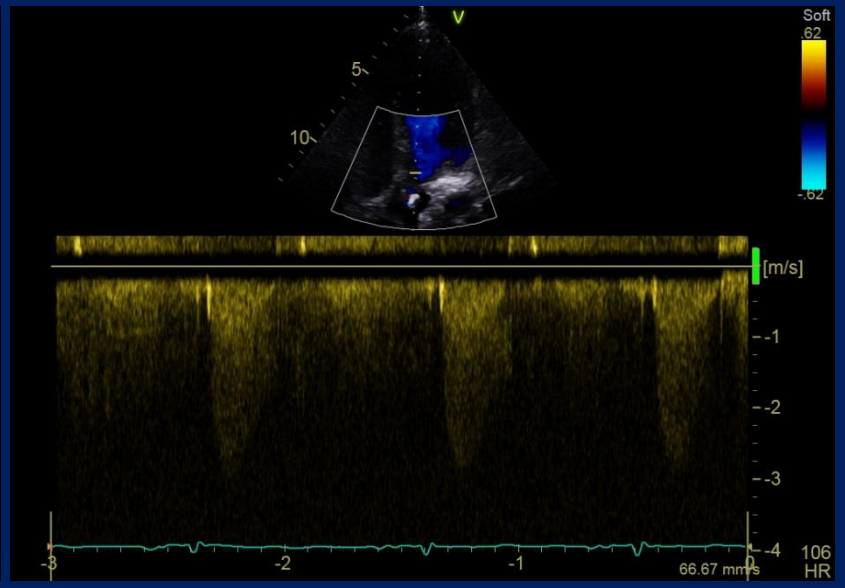

Soft
V
5
10
85
HR


Soft
.62
-.62
V
5
10
67
HR

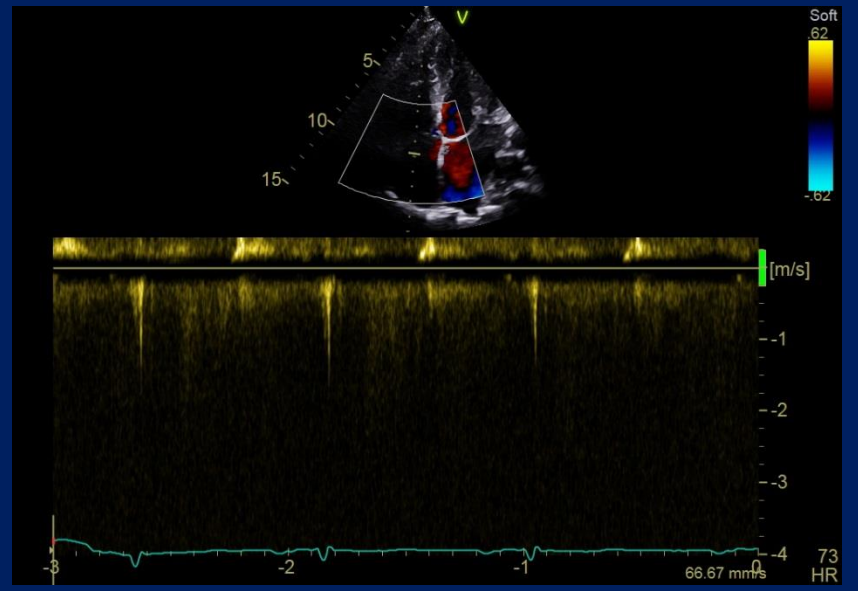

Soft
V
5
10
75
HR



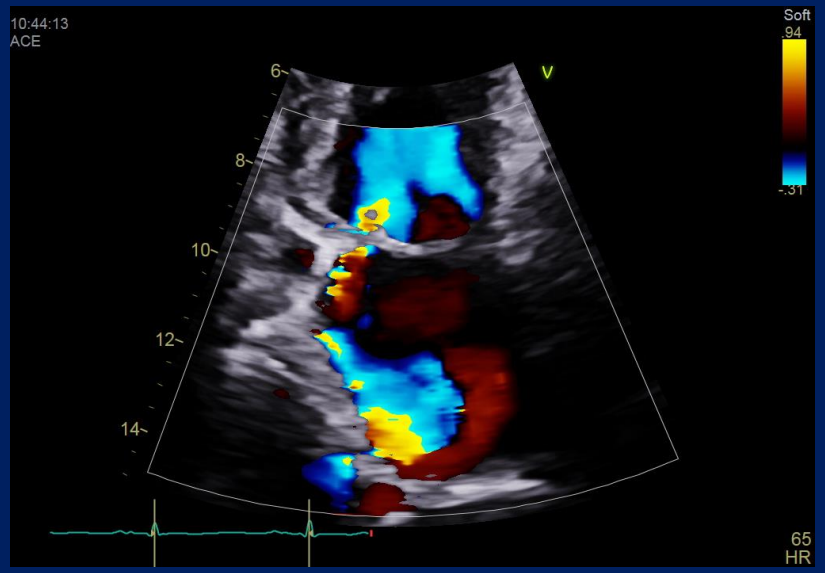
GM 5 mmHg sce 1,4cm2



GM 25 mmHg sce 1,2 cm2

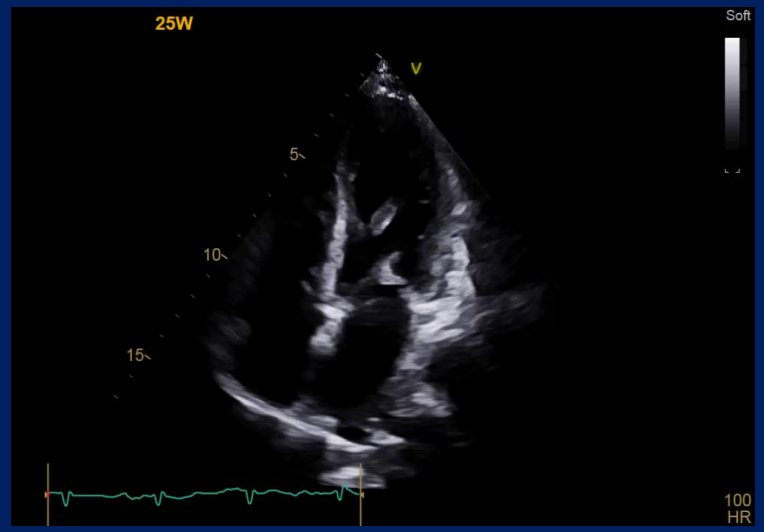


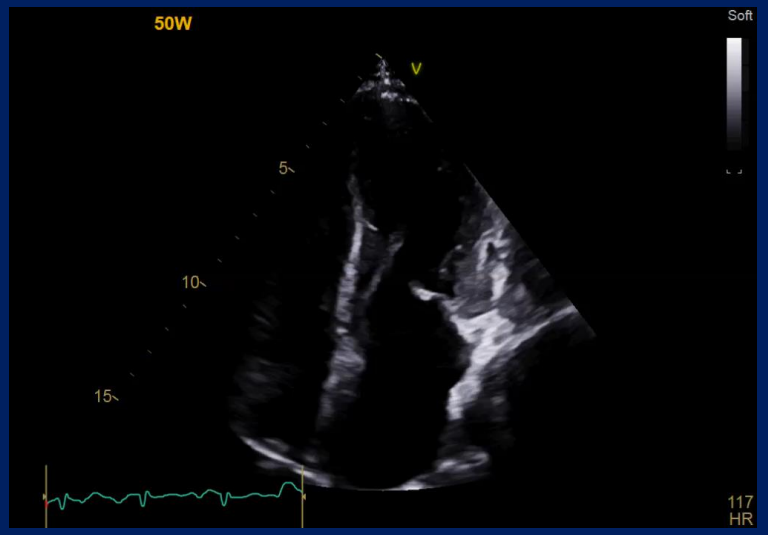
PAPs 21+10 soit 31 mmHg

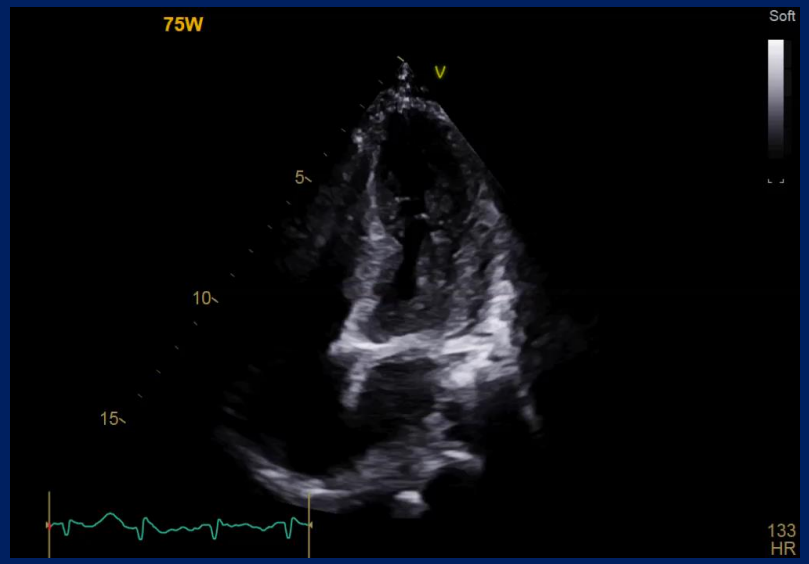


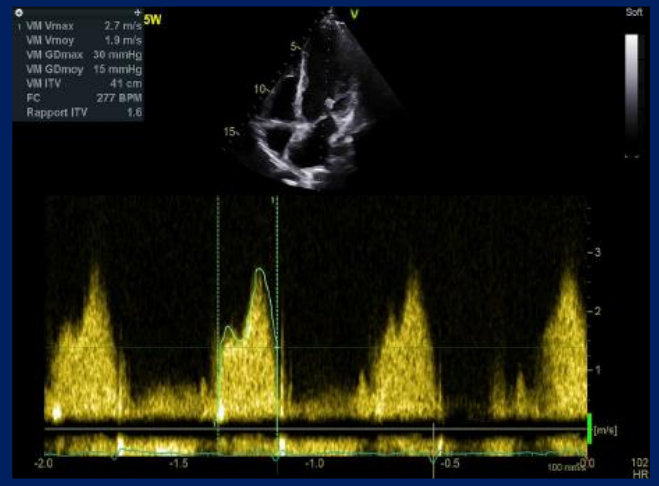
SOR 0.06cm2

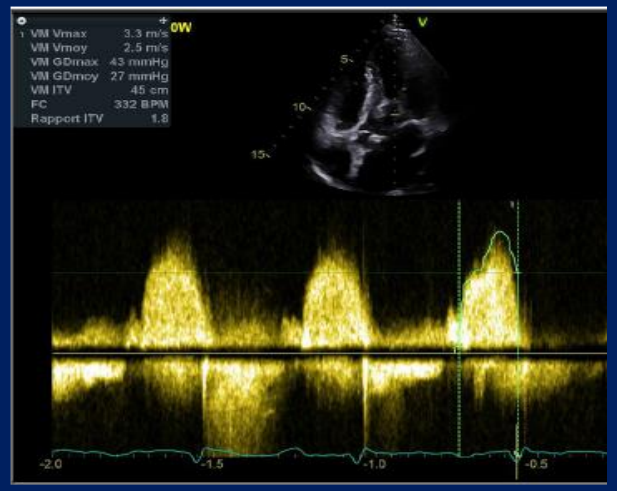
Echo d’effort

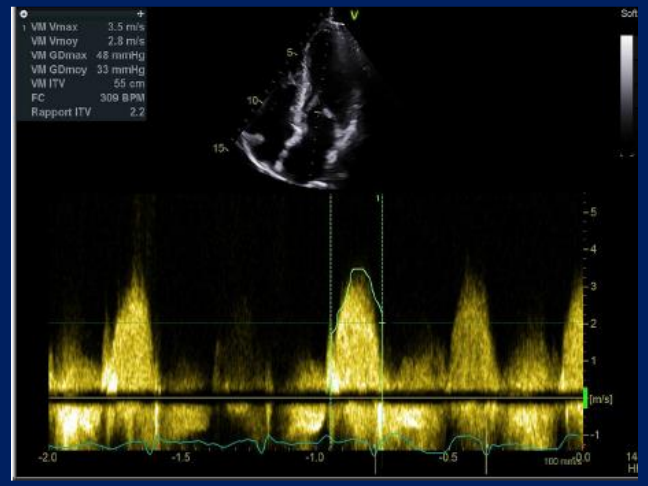












	repos	25w	50w	75w
Fc	76	100	125	148 (76% FMT)
PAS	120	140	160	
GM mitral	5	15	25	33
GM aortique	25	29	33	48
PAPs	26	33	62	67

EE stoppée pour dyspnée

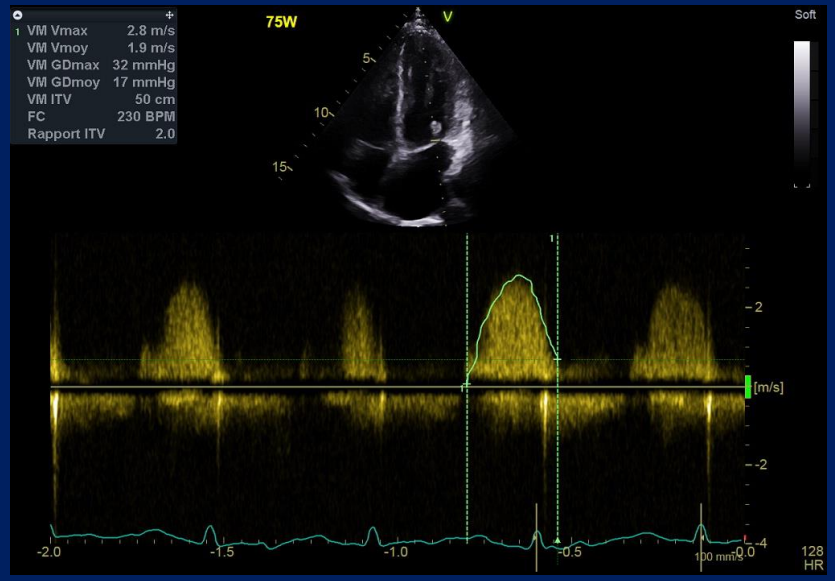
CAT

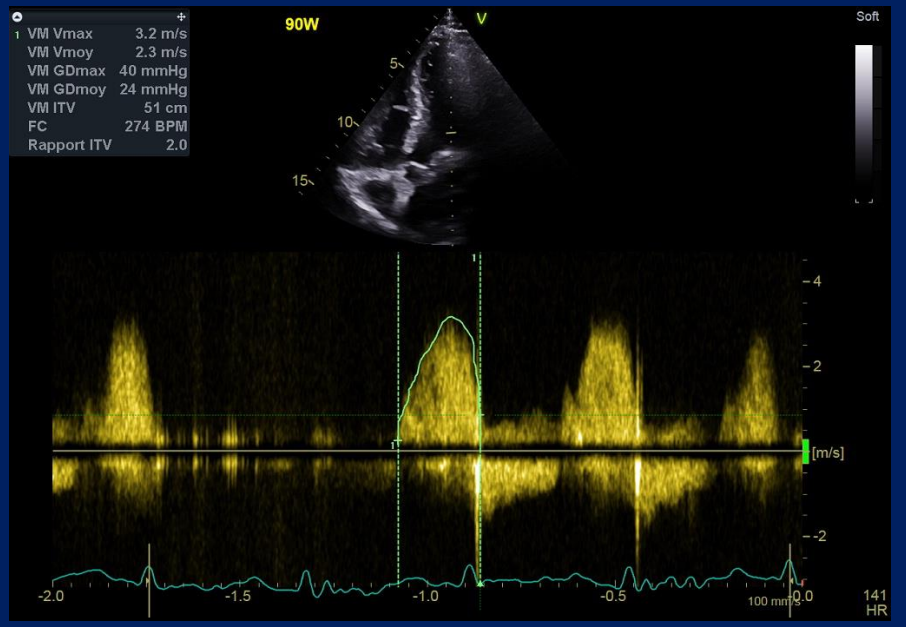
- RVM et RVAo?
- VPM per cutanée?
- Autre?

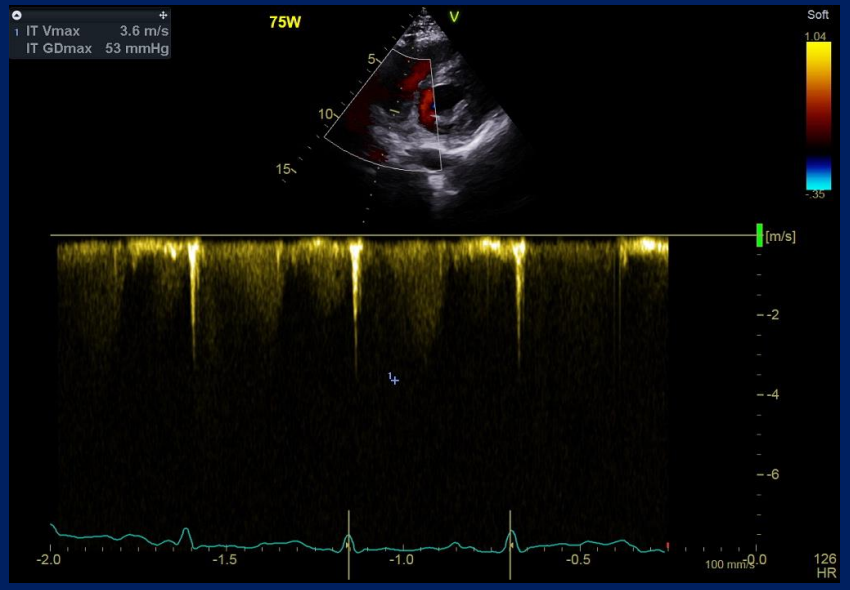
Interprétation

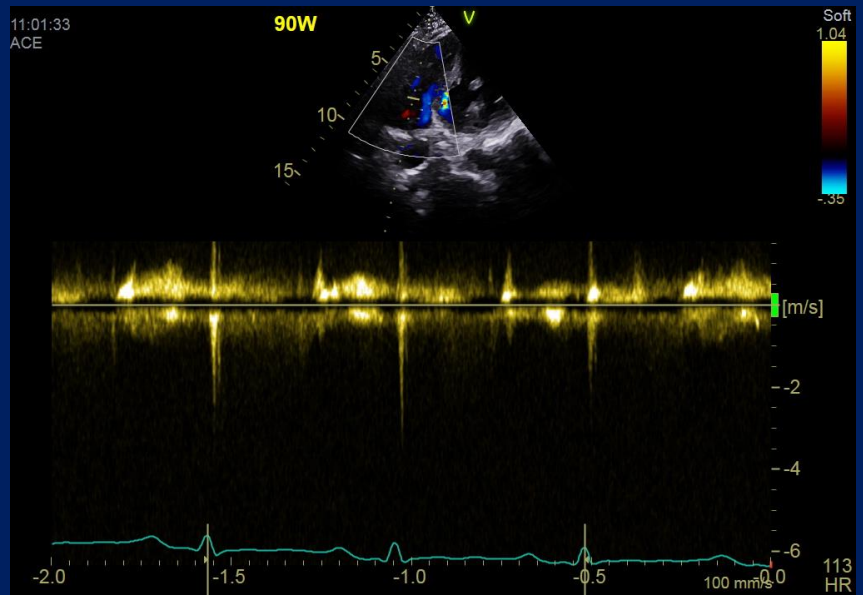
- RM lâche sans indication à une VPC ni à un RVM
- Mauvaise tolérance
  - ↑ Qc ↑ des gradients et ↑ PAPs probablement secondaire à la tachycardie
  - Bétabloquants+++
- Mise sous cardensiel 2.5 mg patiente devient asymptomatique (DE> 3 étages)

Echo d’effort sous bêtabloquant

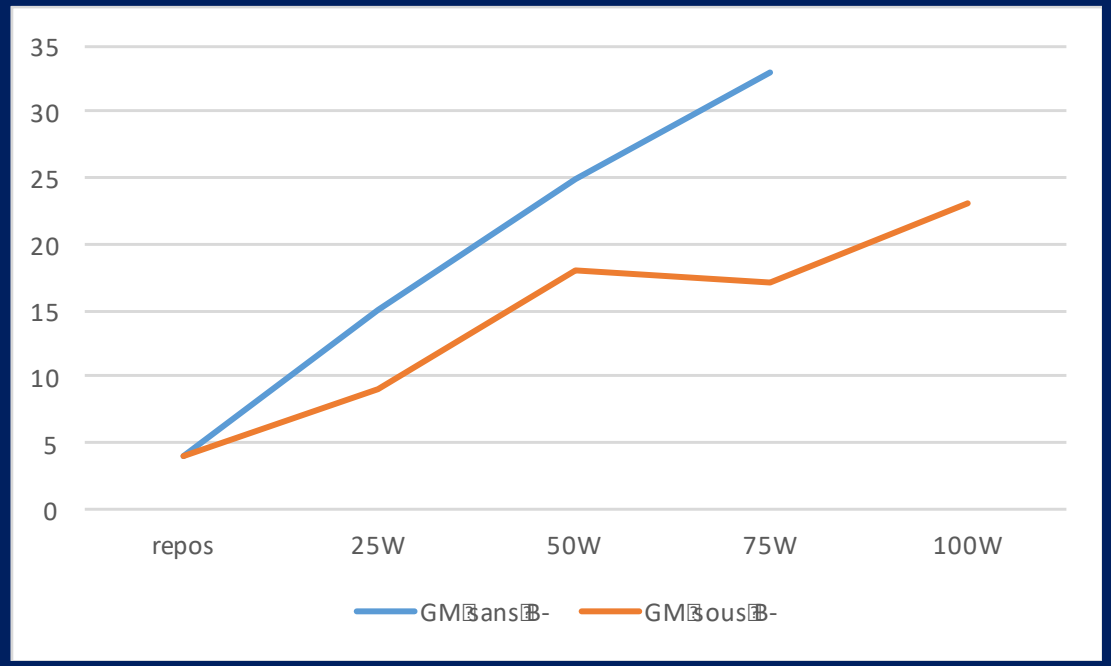


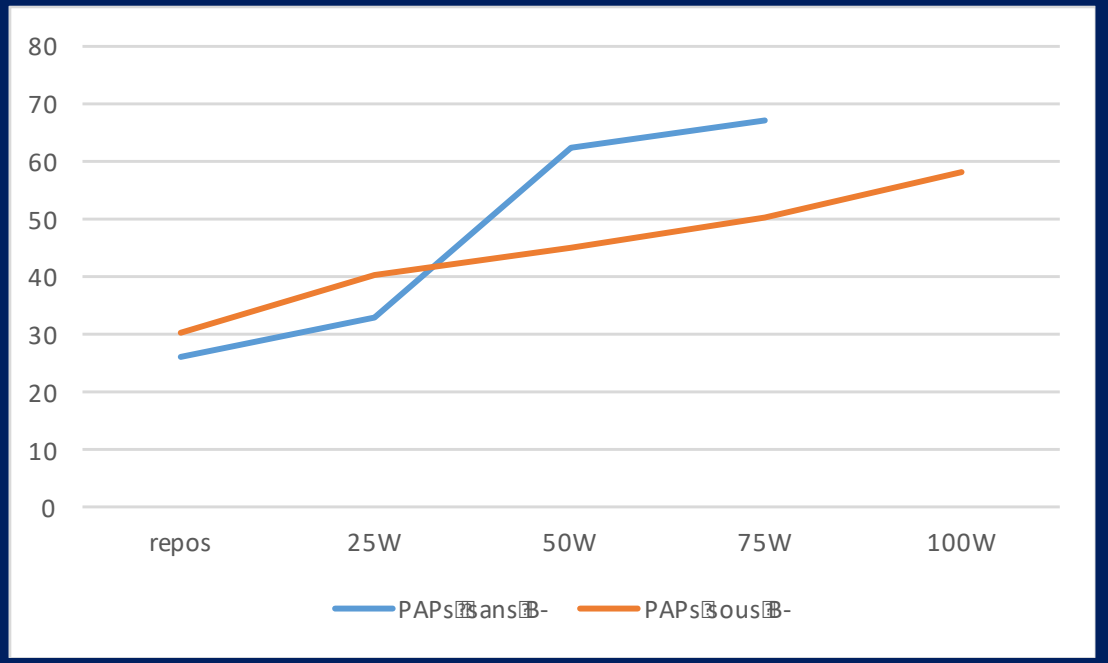






EVOLUTION DU GRADIENT ET DE LA PAPS BOUS B BLOQUANT





EE stoppée pour dl musculaires

Insuffisance mitrale primitive

Indications echo d'effort ; discordance clinique écho

- IM sévère patient asymptomatique
- IM modérée patient symptomatique

Exercise echocardiography permits evaluation of changes in mitral regurgitant volume and pulmonary pressures during peak exercise and is particularly helpful in patients with discordant symptoms and regurgitation grade at rest.[280,281] In asymptomatic patients with severe PMR and non-dilated LV and LA, low BNP values are associated with low mortality and can be useful during follow-up.[41,282]

ESC/EACTS guidelines 2021

COR	LOE	RECOMMENDATION
2a	B-NR	1. In patients with primary MR (Stages B and C) and symptoms that might be attributable to MR, hemodynamic exercise testing using Doppler echocardiography or cardiac catheterization or cardiopulmonary exercise testing is reasonable (1-4).

ACC/AHA guidelines 2021

78 patients asympto
IM Ire > 20 mm3
FEVG conservée

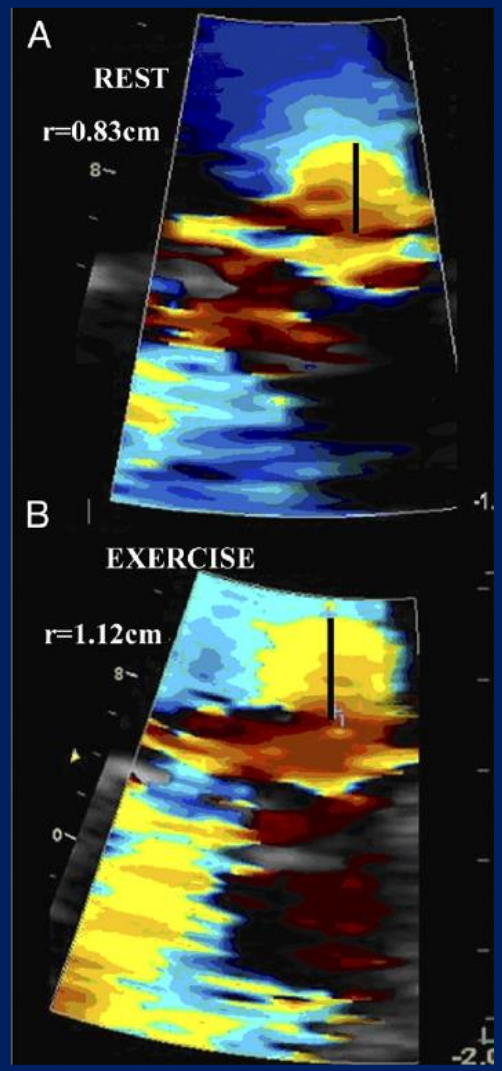
Fréquence PAPs > 60 mmHg à l'effort
= 46%

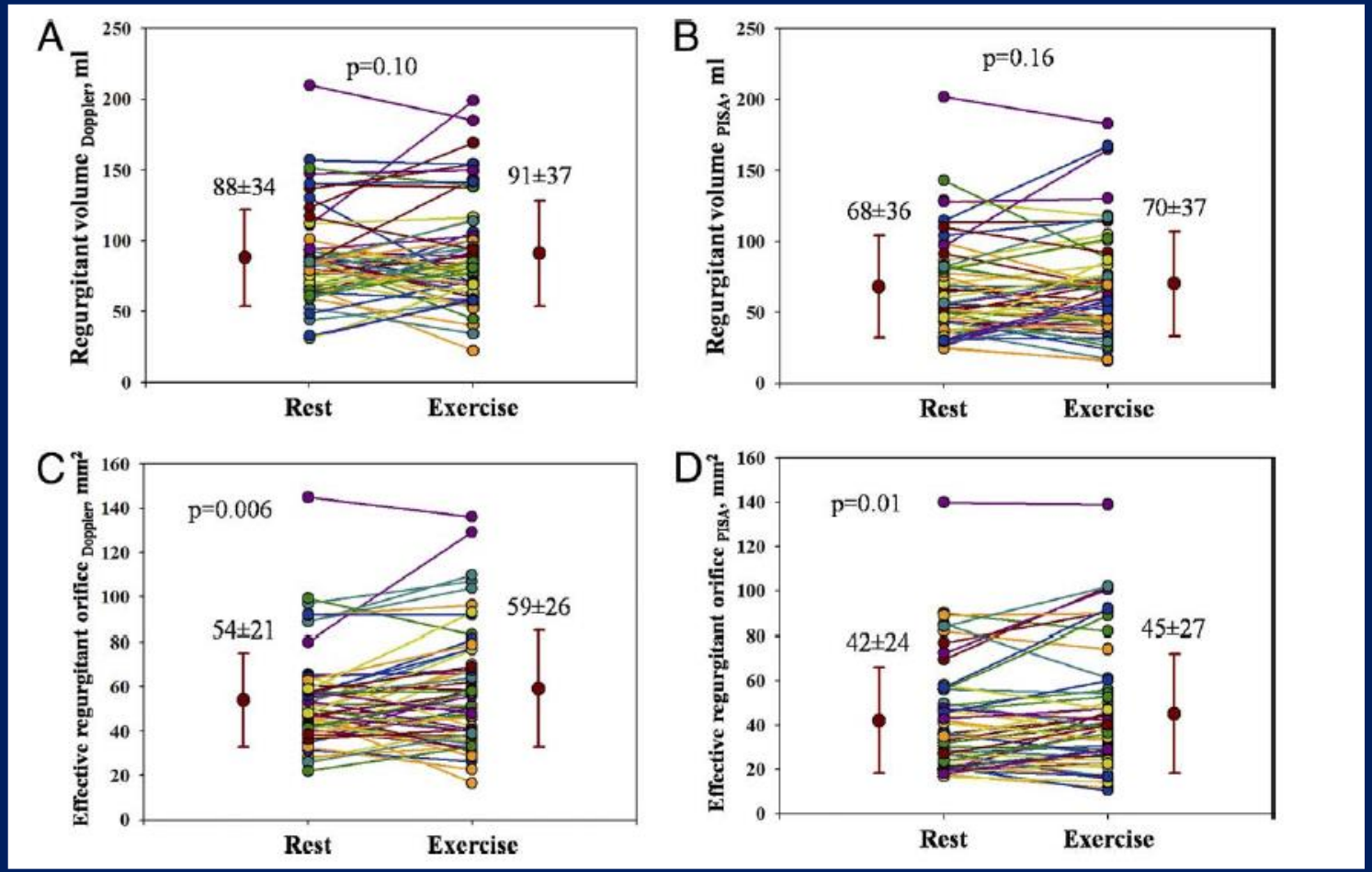
Table 2. Resting and Exercise Echocardiographic Data

Variables	All Patients (n=78)	No Exercise PHT (n=42, 54%)	Exercise PHT (n=36, 46%)	*P*
MR				
Severe MR, n (%)	47 (60)	26 (62)	21 (58)	0.93
Resting ERO, mm^2	43±20	43±23	42±16	0.83
Exercise ERO, mm^2	48±26	42±27	55±23	0.03
Resting RV, mL	71±27	73±35	69±20	0.55
Exercise RV, mL	73±36	65±39	83±28	0.03
Resting SPAP, mm Hg	39±11	33±6	46±10	<0.0001
Exercise SPAP, mm Hg	62±17	46±10	77±12	<0.0001

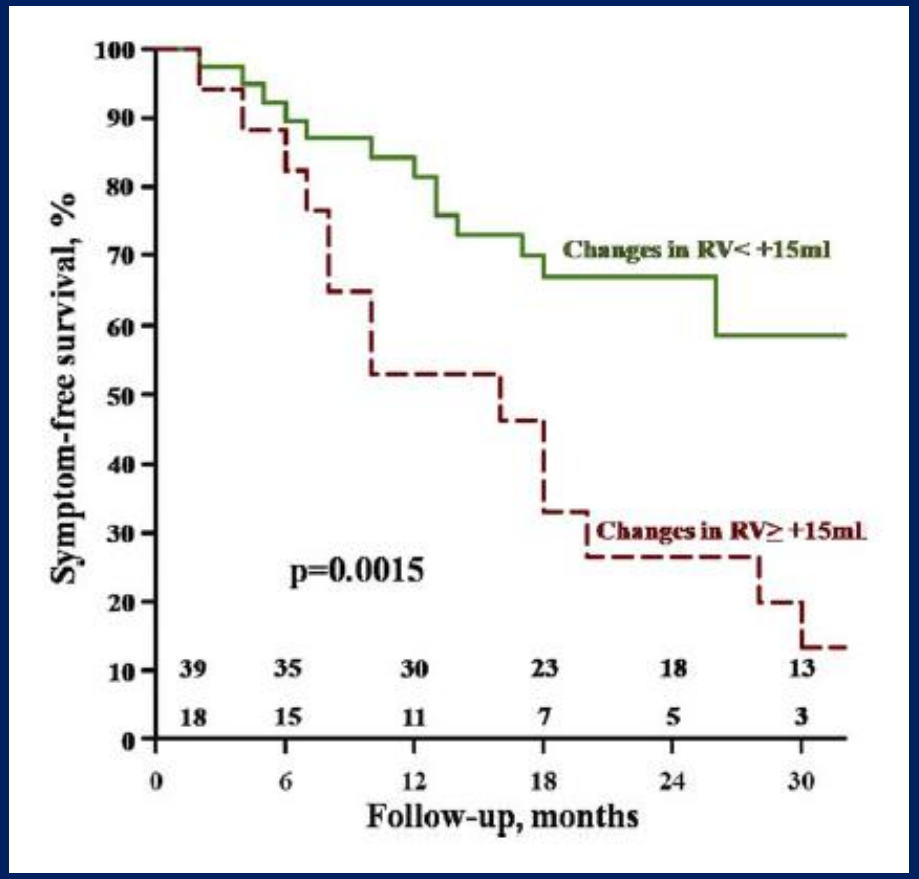
Magne circulation 2010

- 74 asymptomatiques patients, IM Ire> 20mm2 FEVG conservée
- Effort : ↑> 15ml ou 10 mm2 chez 1/3des patients

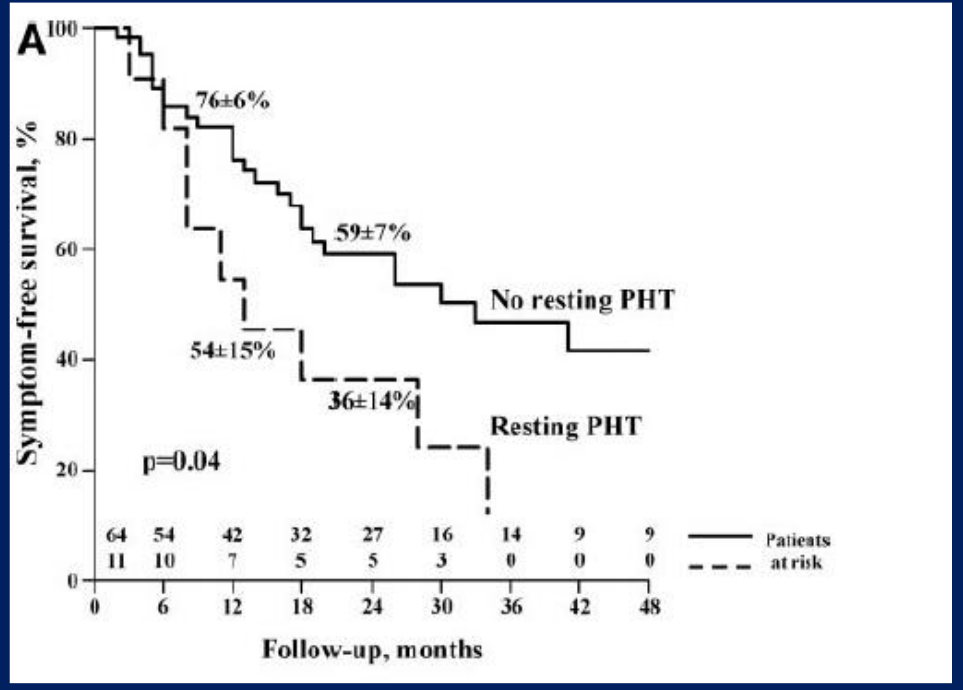


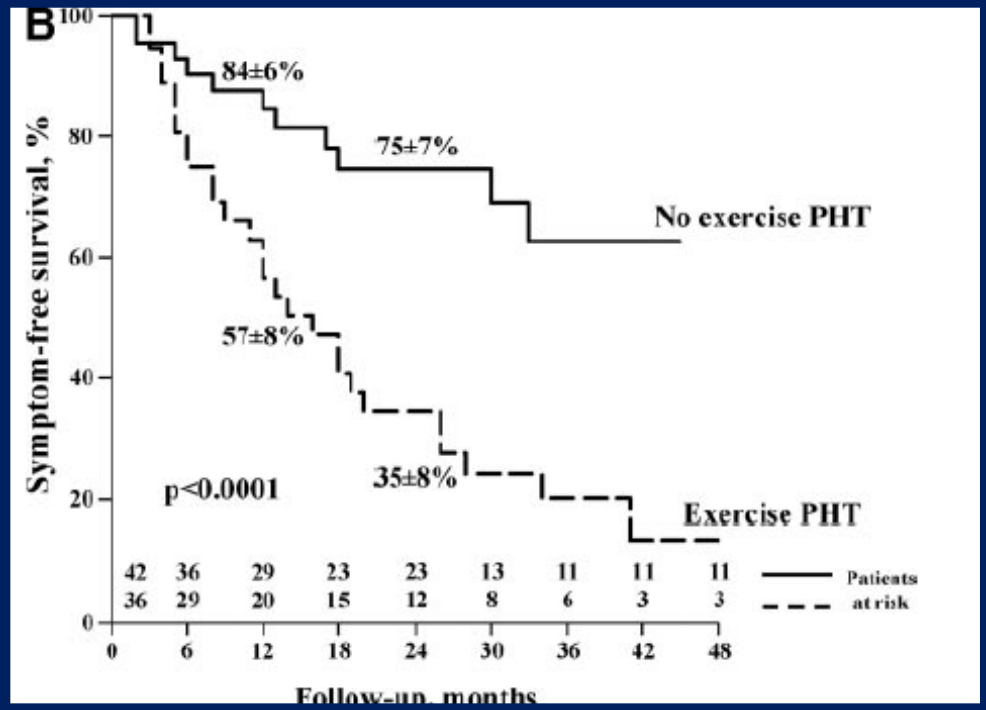


Magne J, J Am colll cardiol 2010

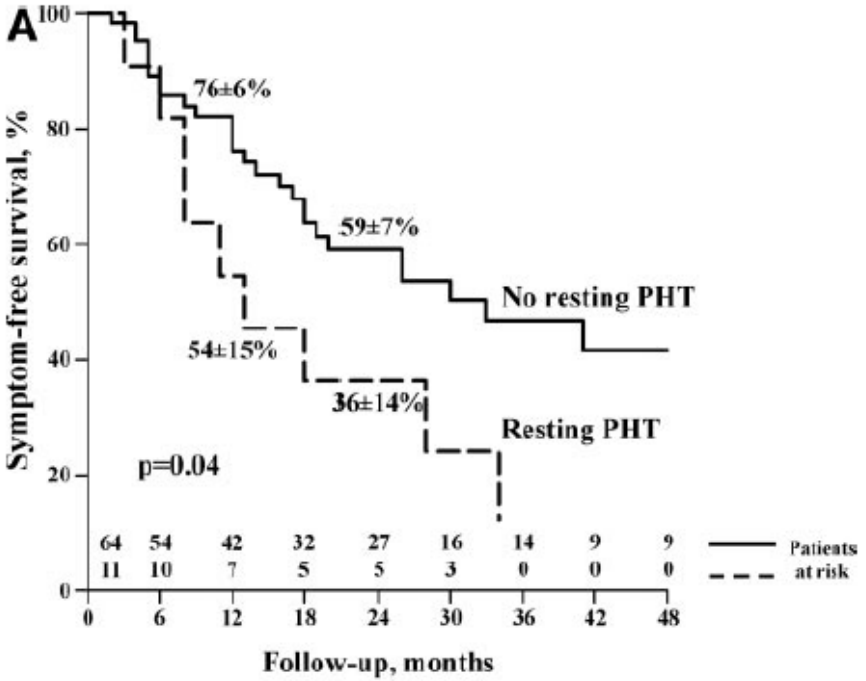


Magne J, J Am colll cardiol 2010





Magne J, circulation 2010



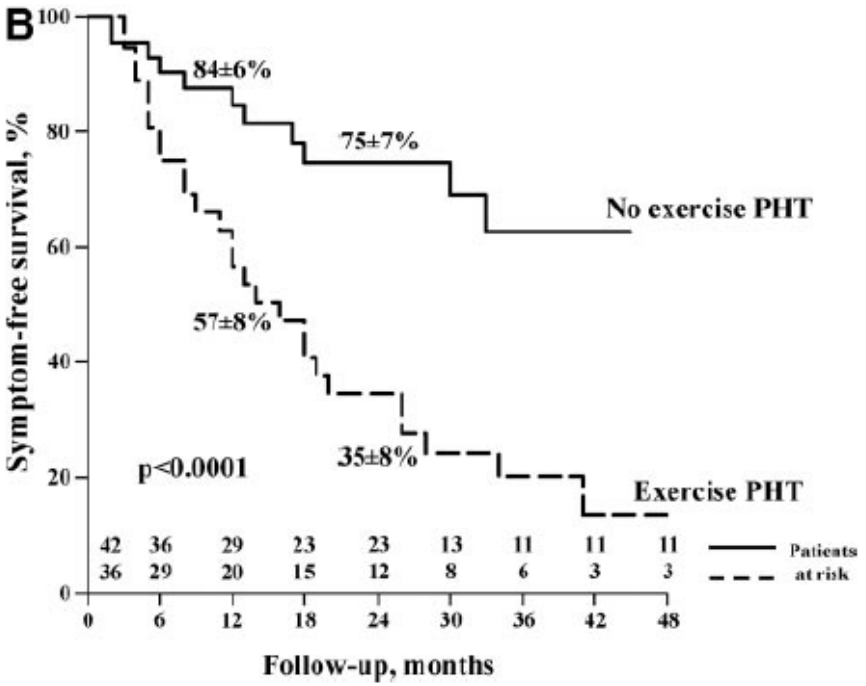


Table 6. Multivariable Logistic Regression: Prediction of Exercise Arterial PHT

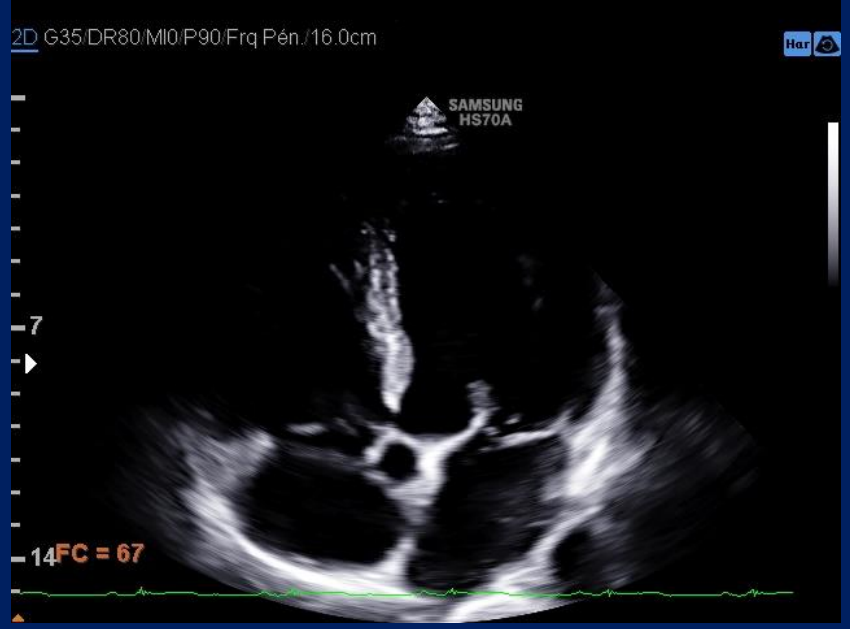
Variables	Odds Ratio	95% CI	*P*
Age	1.15	1.06–1.41	0.004
Sex	3.74	0.24–6.97	0.41
Exercise LVED volume	1.01	0.98–1.05	0.31
Resting SPAP	1.33	1.14–1.52	0.006
Exercise ERO	1.12	1.04–1.25	0.002

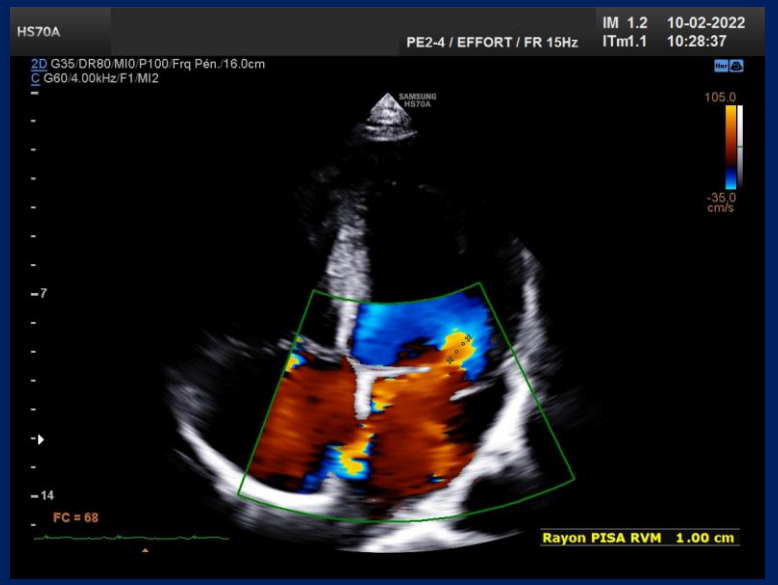
LVED indicates left ventricular end-diastolic.

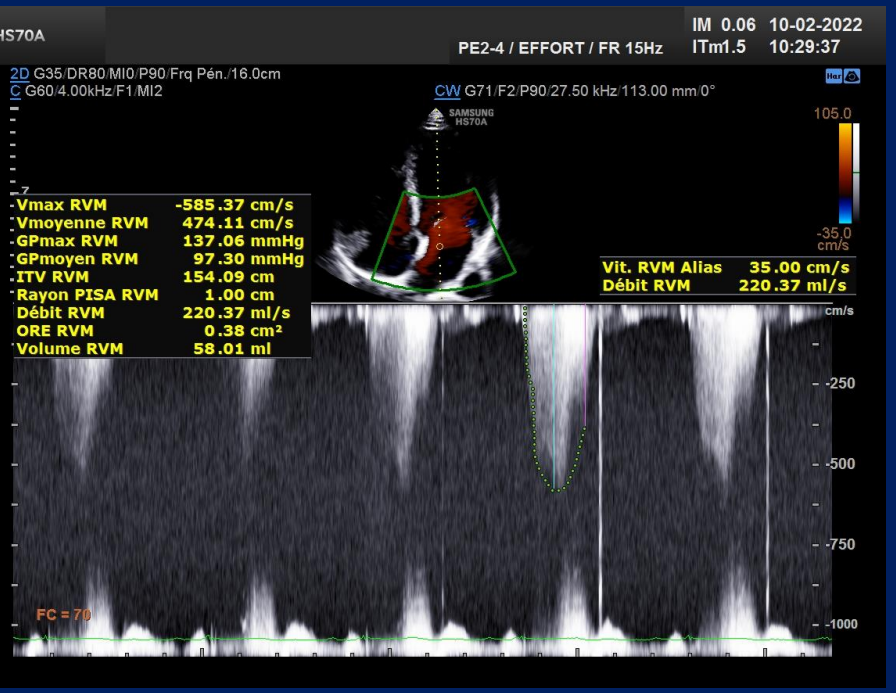
Magne circulation 2010

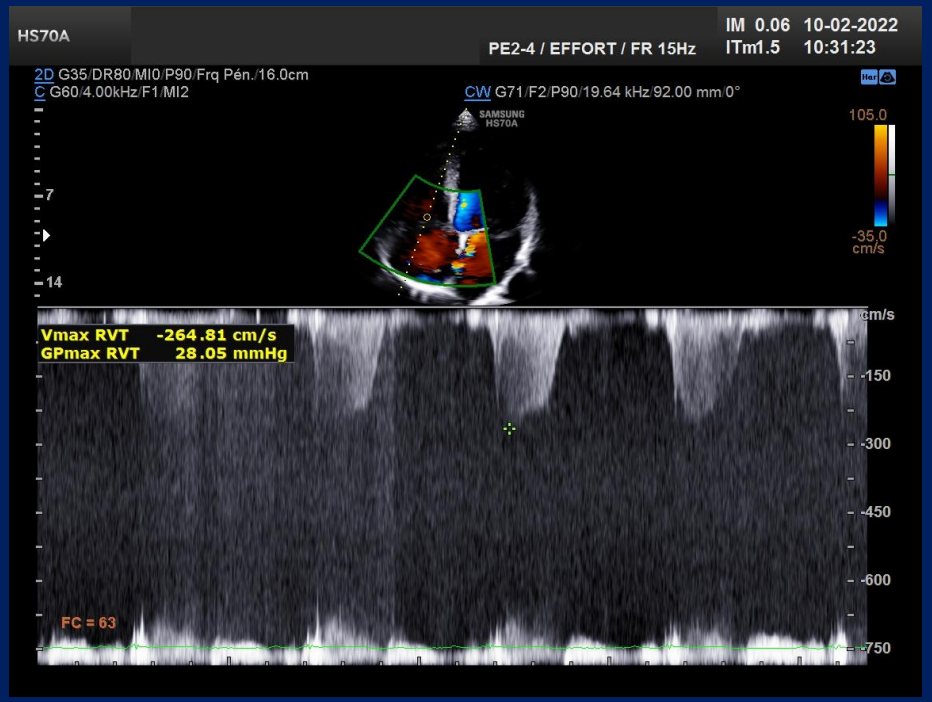
Mr D 40 ans

- Découverte d’un souffle à l’auscultation
- Asymptomatique
- VG 60/40mm IM importante prolapsus P2
- Holter RS permanent
- BNP 60 pg/ml

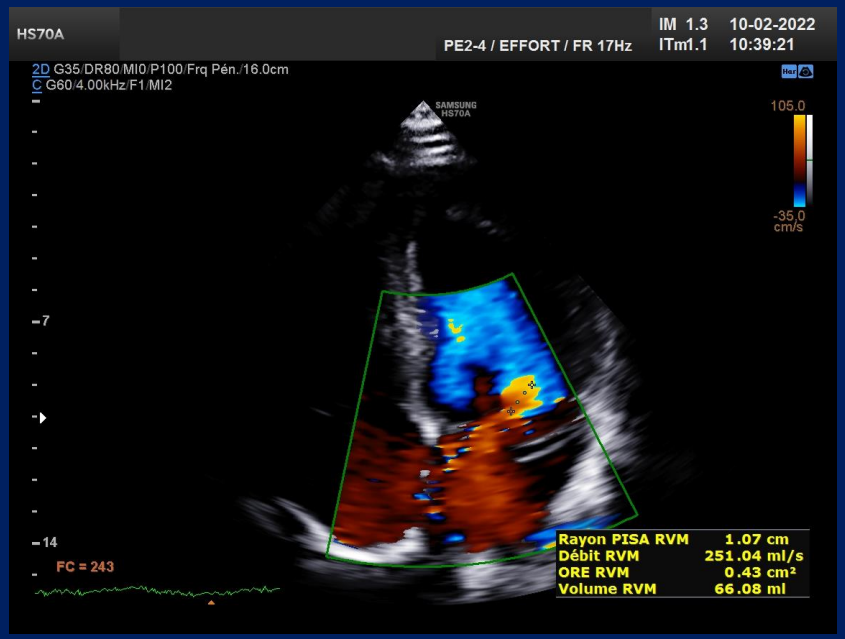

2D G35/DR80/MI0/P90/Frq Pén./16.0cm
SAMSUNG
HS70A
7
14
FC = 67

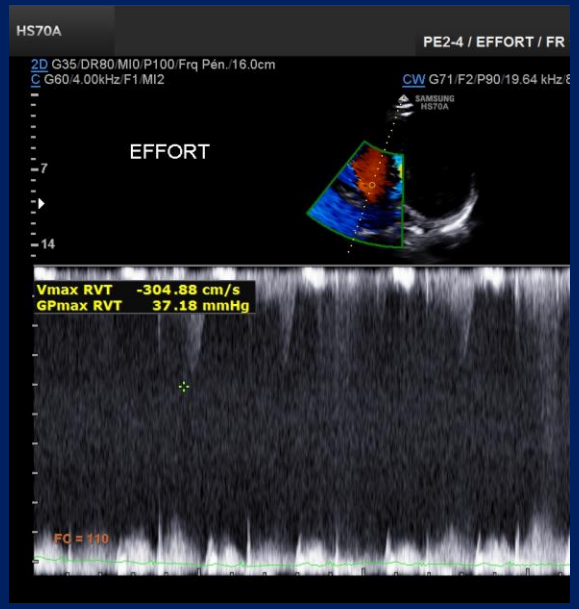

HS70A
IM 1.2 10-02-2022
PE2-4 / EFFORT / FR 15Hz ITm1.1 10:28:37
2D G35/DR80/MI0/P100/Frq Pén./16.0cm
C G60/4.00kHz/F1/MI2
105.0
-35.0
cm/s
7
14
FC = 68
Rayon PISA RVM 1.00 cm

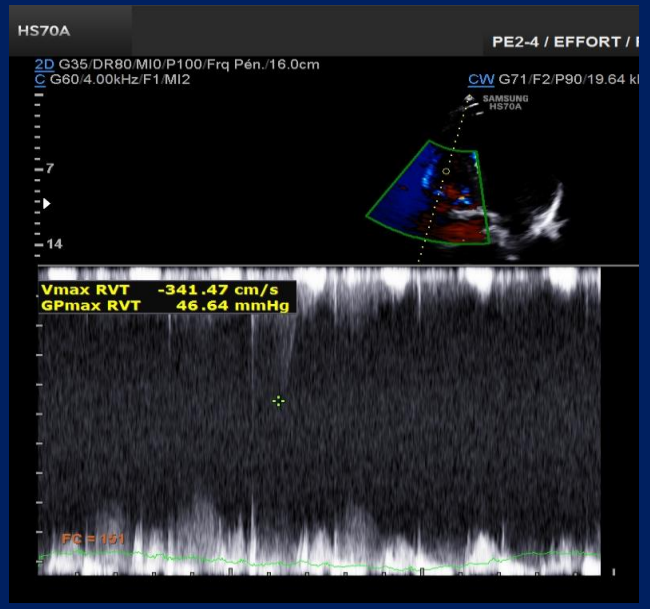

HS70A
IM 0.06 10-02-2022
PE2-4 / EFFORT / FR 15Hz ITm1.5 10:29:37
2D G35/DR80/MI0/P90/Frq Pén./16.0cm
C G60/4.00kHz/F1/MI2
CW G71/F2/P90/27.50 kHz/113.00 mm/0°
105.0
-35.0
cm/s
Vmax RVM -585.37 cm/s
Vmoyenne RVM 474.11 cm/s
GPmax RVM 137.06 mmHg
GPmoyen RVM 97.30 mmHg
ITV RVM 154.09 cm
Rayon PISA RVM 1.00 cm
Débit RVM 220.37 ml/s
ORE RVM 0.38 cm²
Volume RVM 58.01 ml
Vit. RVM Alias 35.00 cm/s
Débit RVM 220.37 ml/s
cm/s
-250
-500
-750
-1000
FC = 70

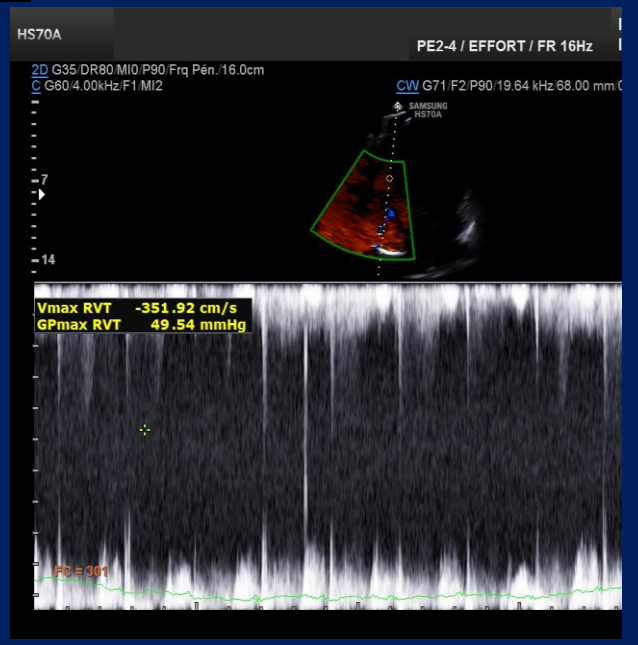

HS70A
IM 0.06 10-02-2022
PE2-4 / EFFORT / FR 15Hz ITm1.5 10:31:23
2D G35/DR80/MI0/P90/Frq Pén./16.0cm
C G60/4.00kHz/F1/MI2
CW G71/F2/P90/19.64 kHz/92.00 mm/0°
105.0
-35.0
cm/s
7
14
Vmax RVT -264.81 cm/s
GPmax RVT 28.05 mmHg
cm/s
-150
-300
-450
-600
-750
FC = 63

EE neg 240W 90% FMT





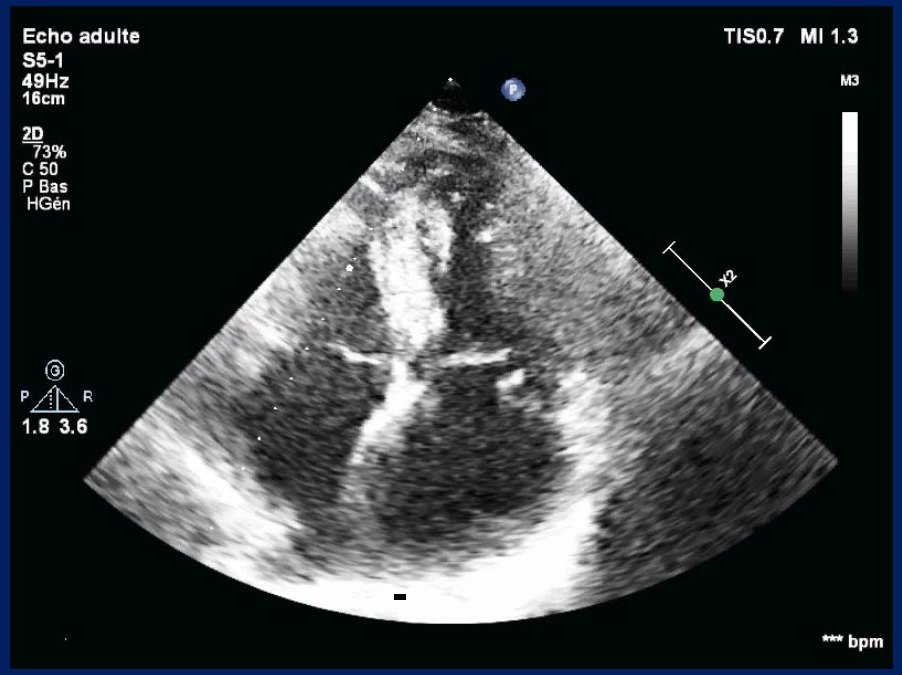


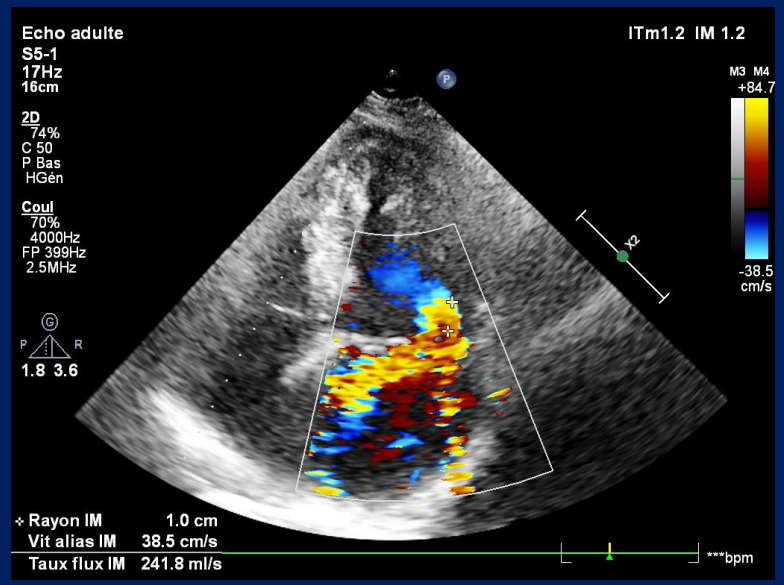


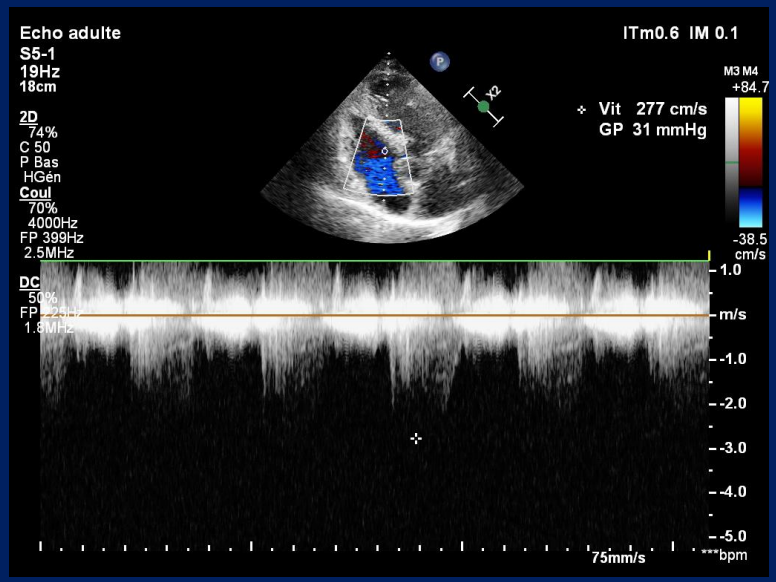
Mr G … 70 ans

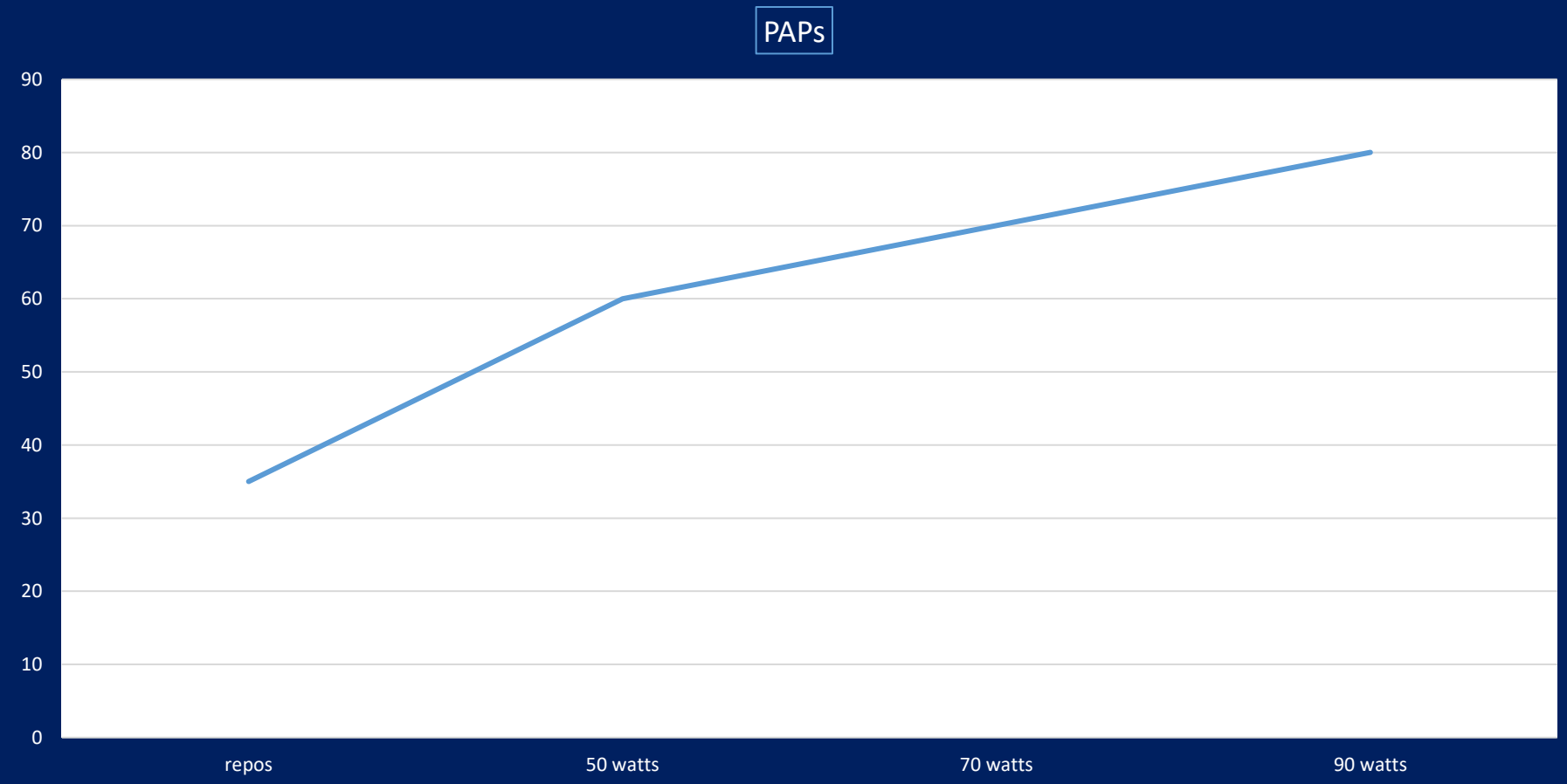
- IM prolapsus de P2 aysymptomatique VG 55/30 mm FEVG 65% Holter longue durée pas de FA OG 22cm2 BNP 70pg/ml
- « tout va bien je fais mon jardin sans pb »

SOR 0,40cm2
PAPs 35 mmHG



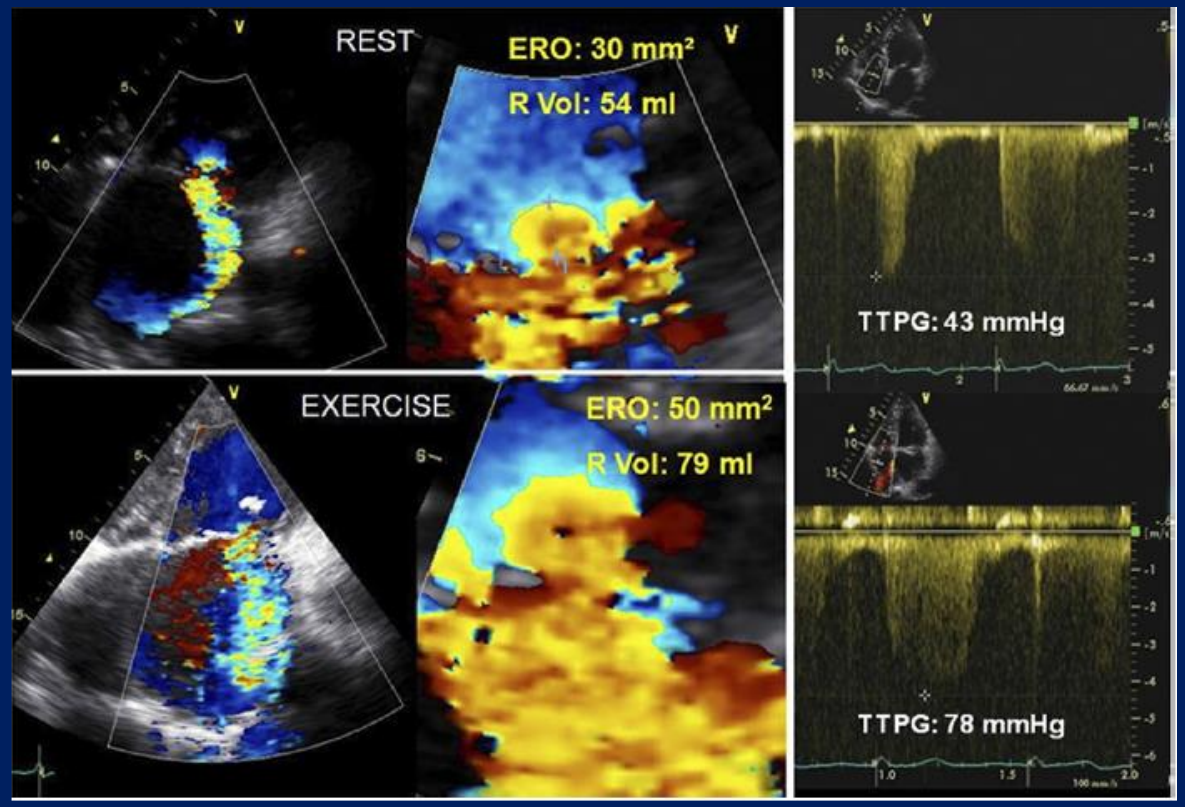


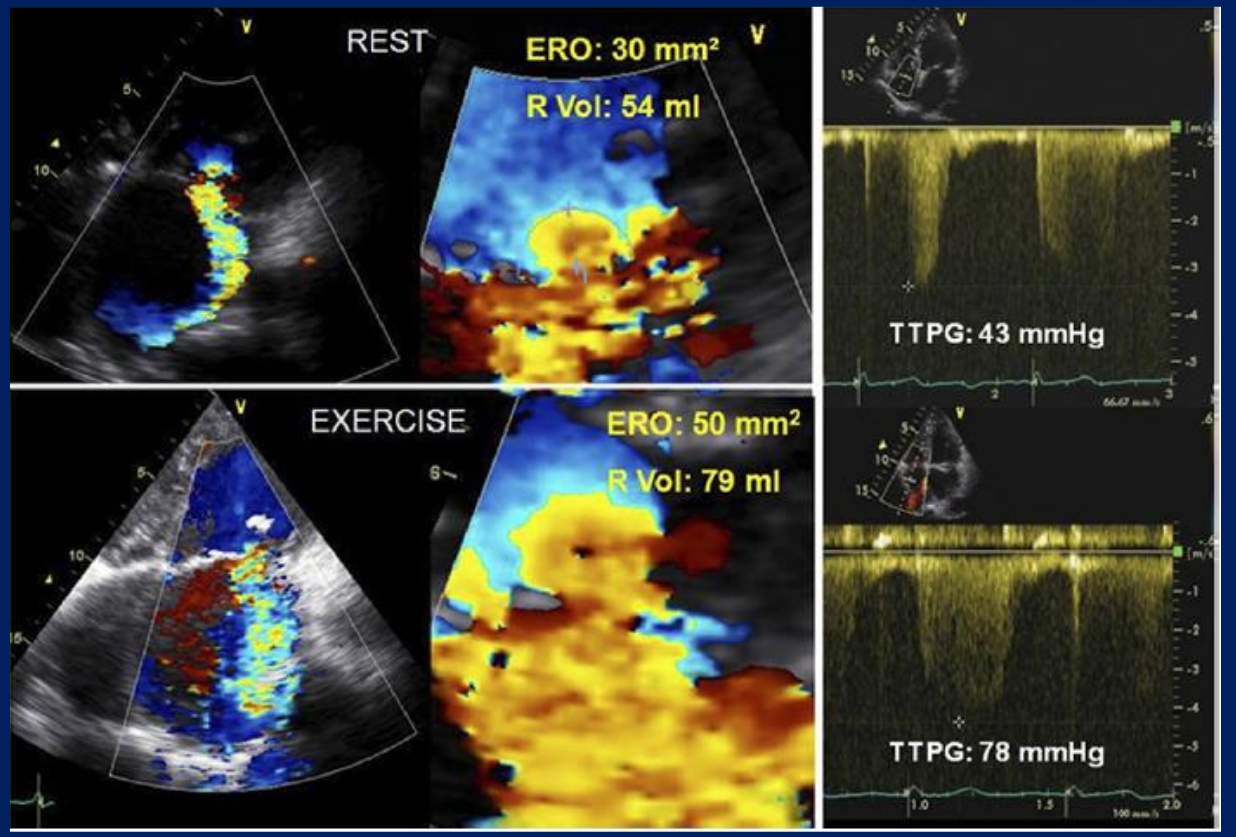




ECG ESV polymorphes des 70Watts

Insuffisance mitrale secondaire





recommandations

Recommendations on indications for mitral valve intervention in chronic severe secondary mitral regurgitation[a]

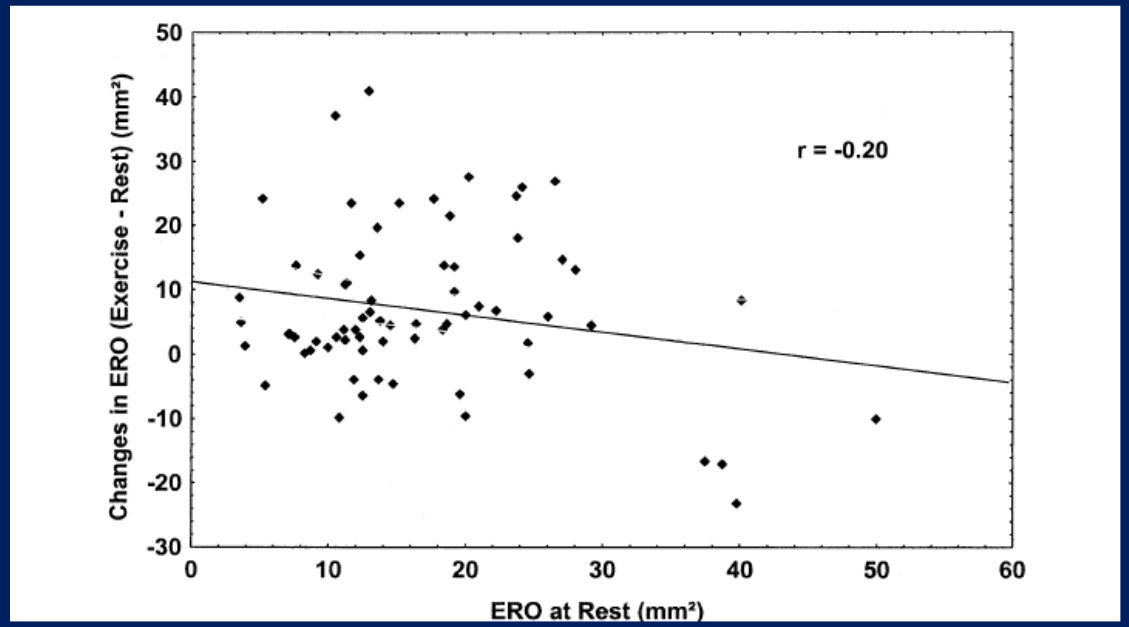
Recommendations	Class[b]	Level[c]
Valve surgery/intervention is recommended only in patients with severe SMR who remain symptomatic despite GDMT (including CRT if indicated) and has to be decided by a structured collaborative Heart Team.[247,323,336,337]	I	B
Patients with concomitant coronary artery or other cardiac disease requiring treatment		
Valve surgery is recommended in patients undergoing CABG or other cardiac surgery.[329,330,333]	I	B
In symptomatic patients, who are judged not appropriate for surgery by the Heart Team on the basis of their individual characteristics,[d] PCI (and/or TAVI) possibly followed by TEER (in case of persisting severe SMR) should be considered.	IIa	C
Patients without concomitant coronary artery or other cardiac disease requiring treatment		
TEER should be considered in selected symptomatic patients, not eligible for surgery and fulfilling criteria suggesting an increased chance of responding to the treatment.[337,338,356,357] •	IIa	B
Valve surgery may be considered in symptomatic patients judged appropriate for surgery by the Heart Team.	IIb	C
In high-risk symptomatic patients not eligible for surgery and not fulfilling the criteria suggesting an increased chance of responding to TEER, the Heart Team may consider in selected cases a TEER procedure or other transcatheter valve therapy if applicable, after careful evaluation for ventricular assist device or heart transplant.[e]	IIb	C

moderate ischaemic SMR

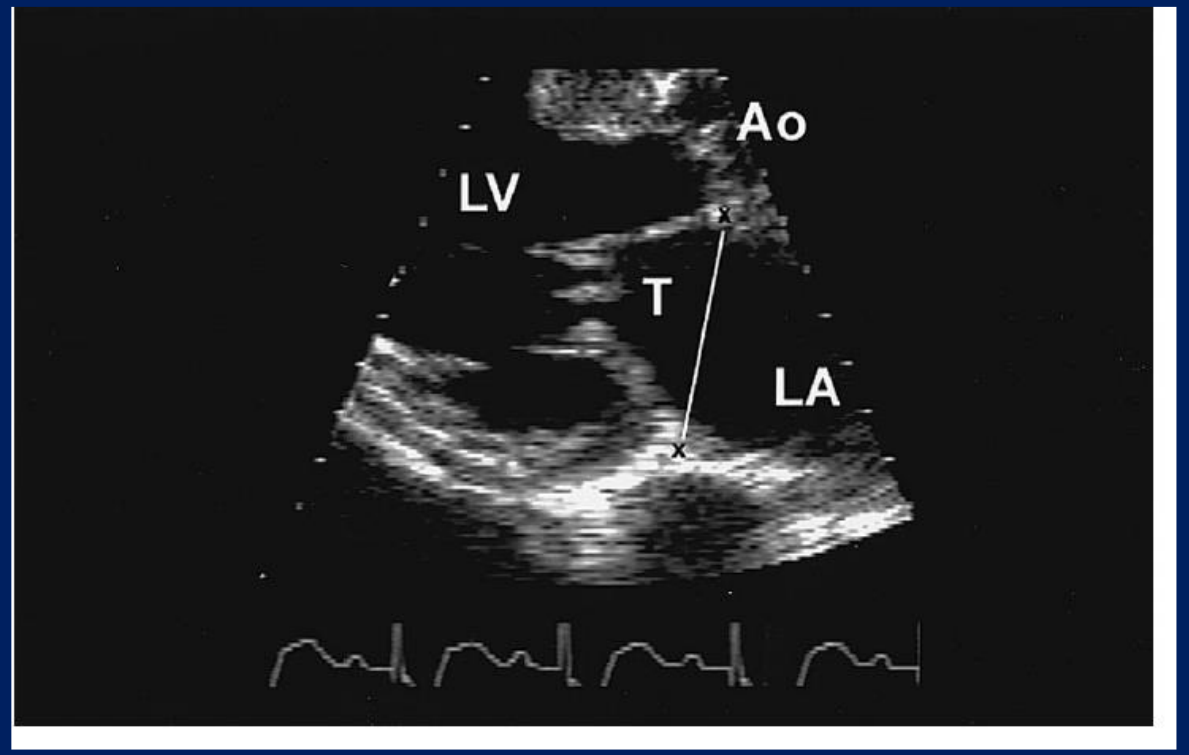
low. Exercise-induced dyspnoea and a large increase in mitral regurgitation severity and SPAP favour combined surgery.

Guidelines ESC 2021

Pas de corrélation avec
Localisation IDM
Degré de l'IM au repos
FEVG



Lancelotti JACC 2003



Tenting : déplacement systolique des feuilles mitraux
Avec défaut de coaptation

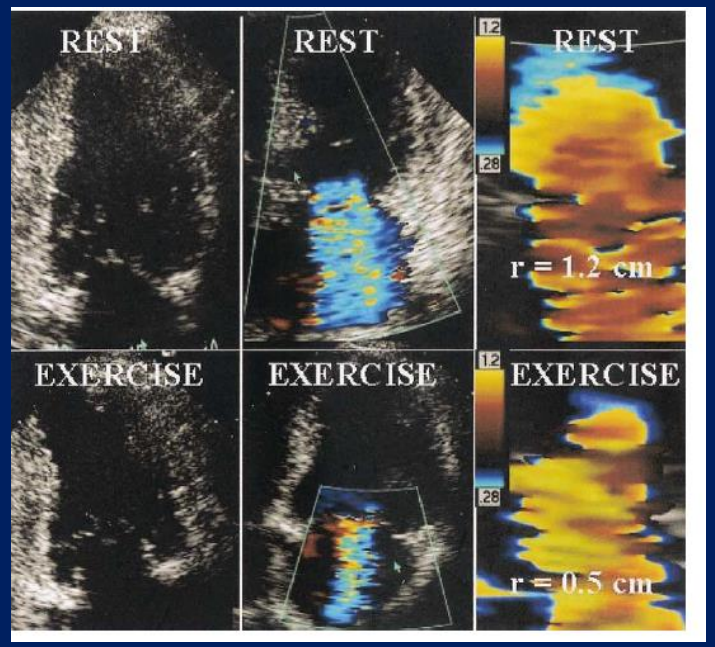
Siu F Yiu circu 2000

IM ischémiques à l'effort : mécanismes

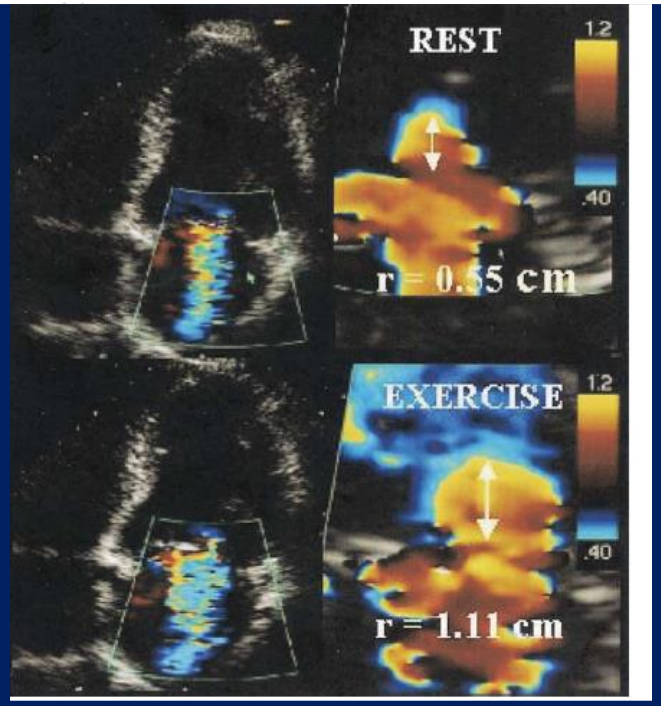
70 pts IM≥2 FEVG<45% a l'effort
↑ SOR <13 mm2 : 38 pts
↑SOR >13 mm2 : 19 pts
↓SOR : 13 pts

Table 4. Determinants of the ERO Changes During Exercise

Data	ERO at Exercise		
	Total	Anterior	Inferior
Tenting area	0.000001	—	0.000004
Coaptation height	—	0.00002	—
Systolic MA area	0.0009	0.006	0.034
WMI	0.019	—	0.009
R^2	0.79	0.85	0.86



Lancelotti JACC 2003



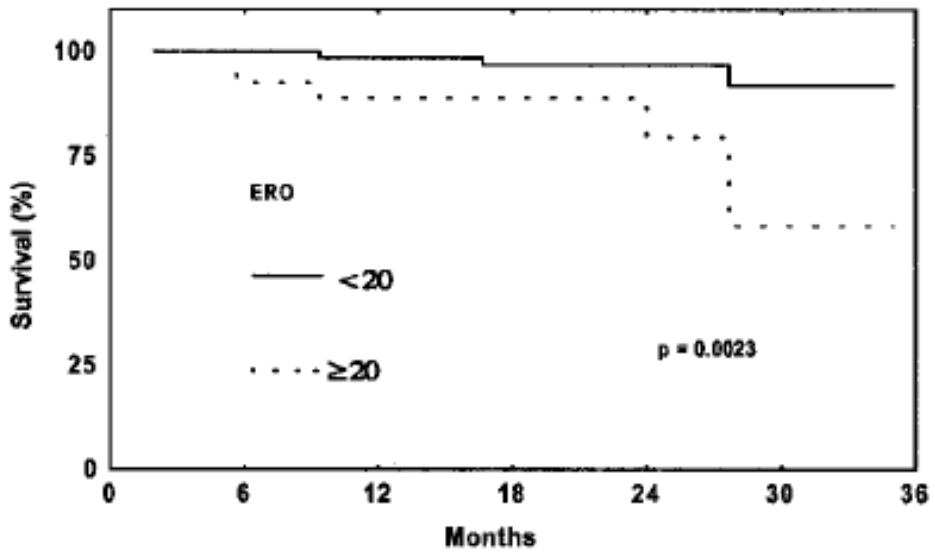
Diminution IM isch inf avec amélioration de la cinétique

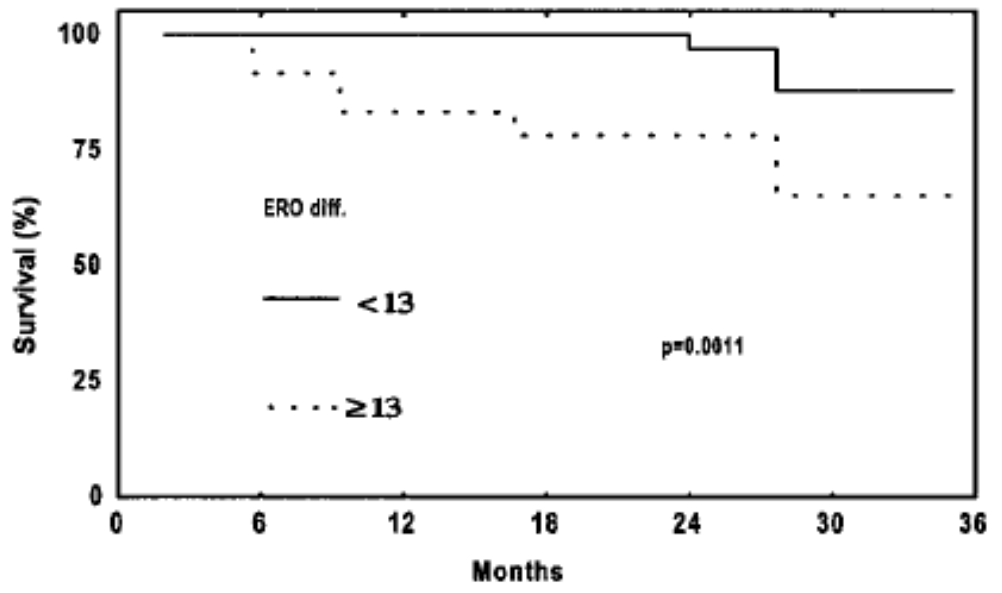
augmentation IM isch ant avec déplacement ant des feuiilets

IM ischémique à l'effort : Pronostic a court terme

TABLE 3. Multivariate Predictors of Mortality

	χ^2	*P*
ERO difference ≥13 mm²	8.1	0.0045
ERO ≥20 mm²	6.0	0.01
Mitral deceleration time	3.9	0.044

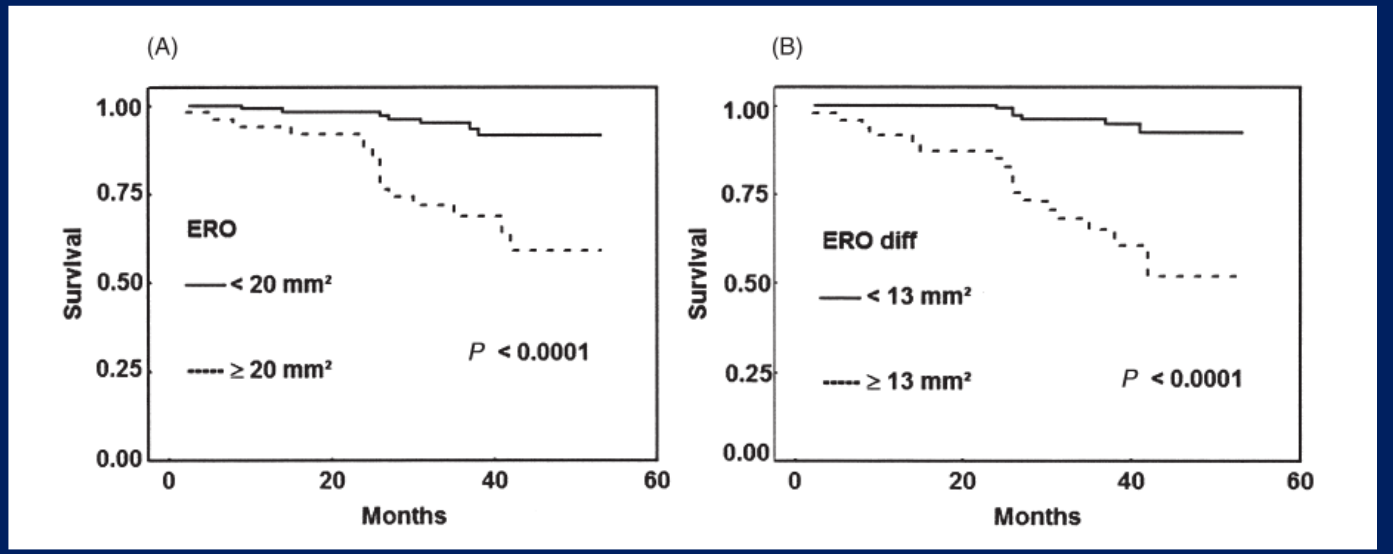


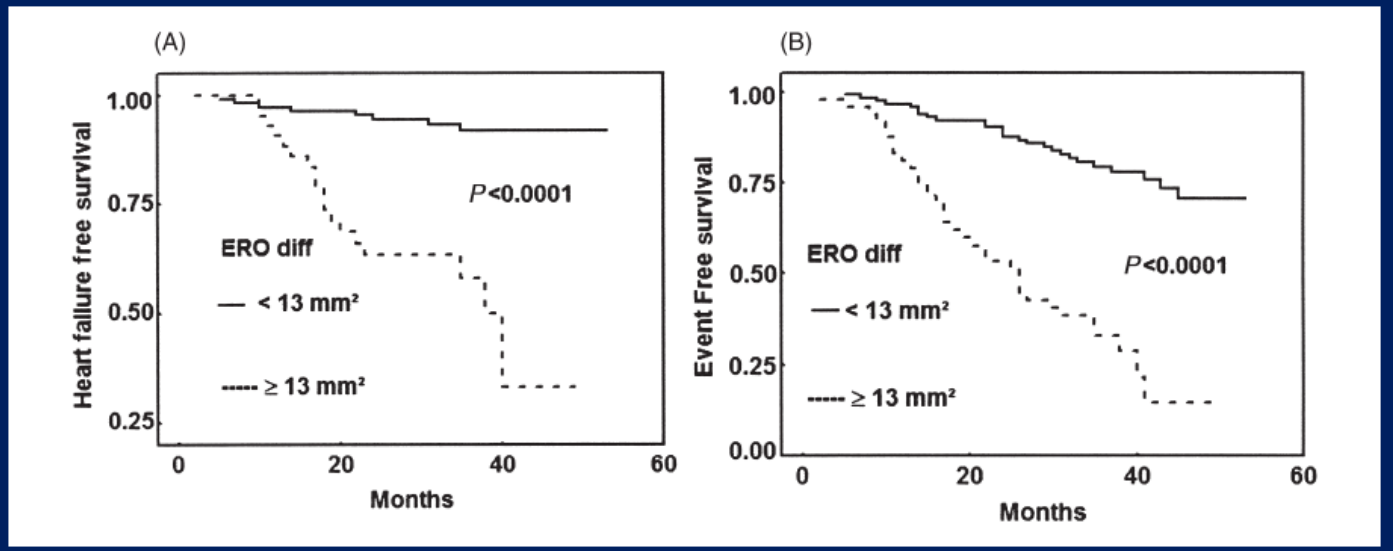


Lancelotti P circu 2003

IM ischémique à l'effort : Pronostic à long terme

Lancelotti EHJ 2005





A hosp pour IC

B evt cardiaque majeur

INDICATIONS (Lancelloti)

- Disproportion symptômes / IM et dysfonction VG
- CMI avec OAP inexpliqués
- CMI avec IM ischémique modérée avant revascularisation notamment chirurgicale

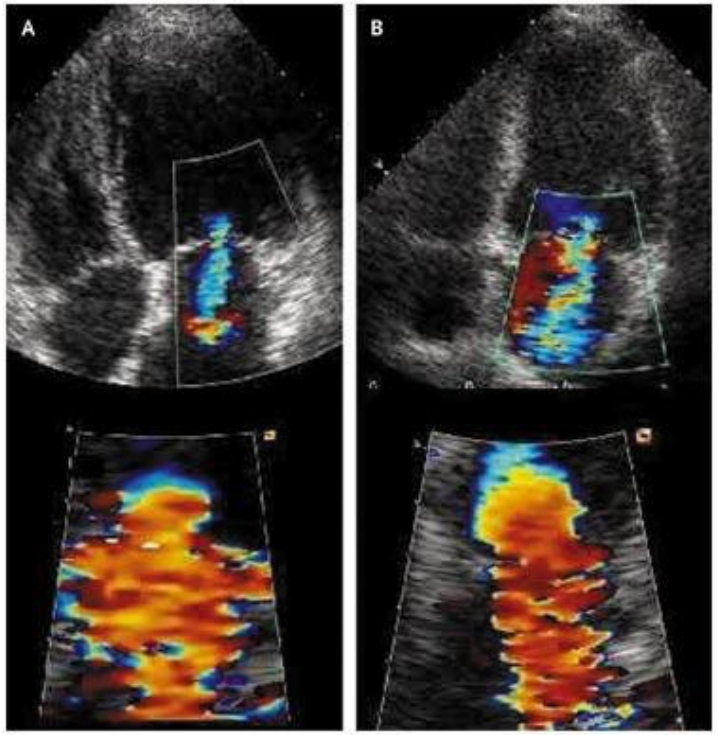
OAP ischémique

28 pts OAP ischémique/ 46 « controles »

Table 2. Exercise-Induced Changes in Hemodynamic and Doppler Echocardiographic Variables.*

Variable	Pulmonary Edema (N=28)	No Pulmonary Edema (N=46)	P Value
Systolic arterial pressure (mm Hg)	+26±19	+27±18	0.65
Heart rate (beats/min)	+39±10	+37±17	0.15
Left ventricular end-diastolic volume (ml/m²)	−0.25±20	−1.3±19	0.25
Left ventricular end-systolic volume (ml/m²)	−6.8±16	−15±19	0.06
Left ventricular ejection fraction (%)	+5.4±4.3	+9.7±7.5	0.002
Left atrial area (cm²)	+1.42±3.2	+0.96±3.7	0.57
Tenting area (cm²)	+1.5±1.4	+0.14±1.3	0.001
Left ventricular wall-motion index	−0.25±0.20	−0.30±0.20	0.02
Regurgitant volume (ml)	+26±14	+5±14	<0.001
Effective regurgitant orifice area (mm²)	+16±10	+2±9	<0.001
Transtricuspid pressure gradient (mm Hg)	+29±10	+13±11	<0.001

* Plus–minus values are means ±SD.



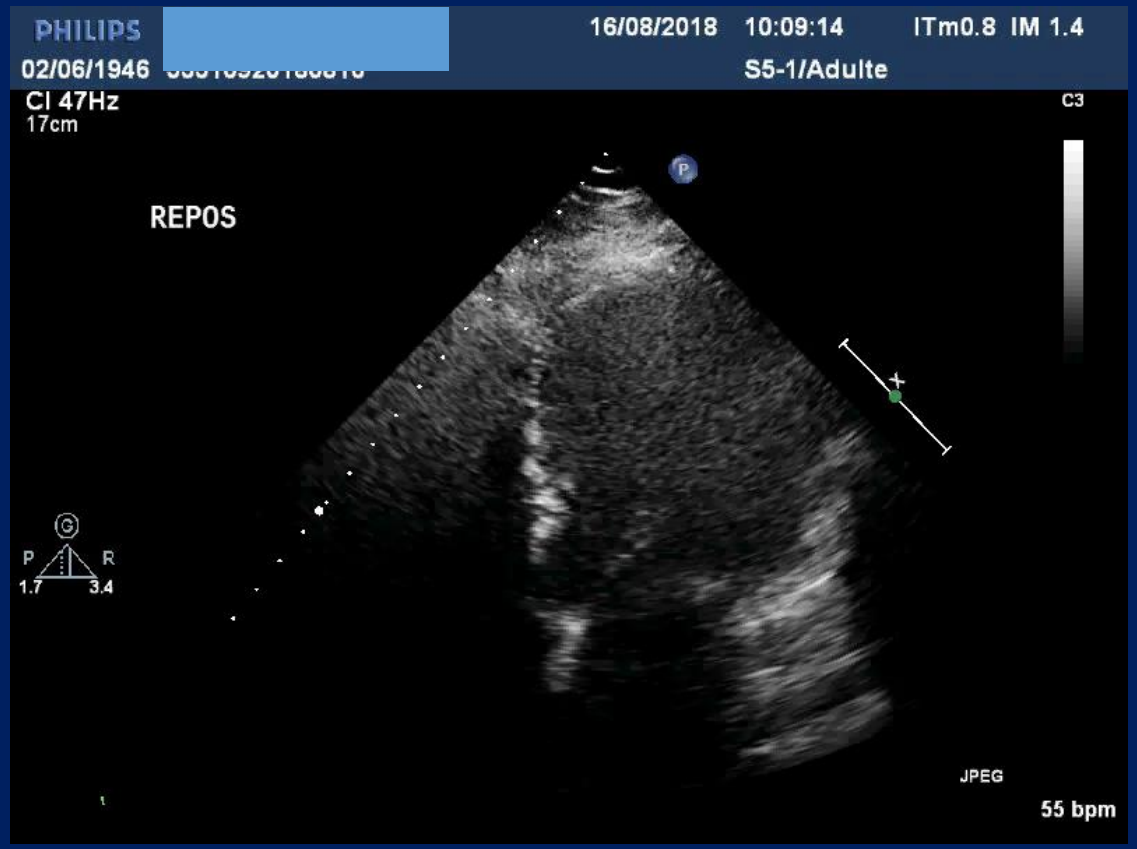
Lancelotti P, N Engl J Med 2004

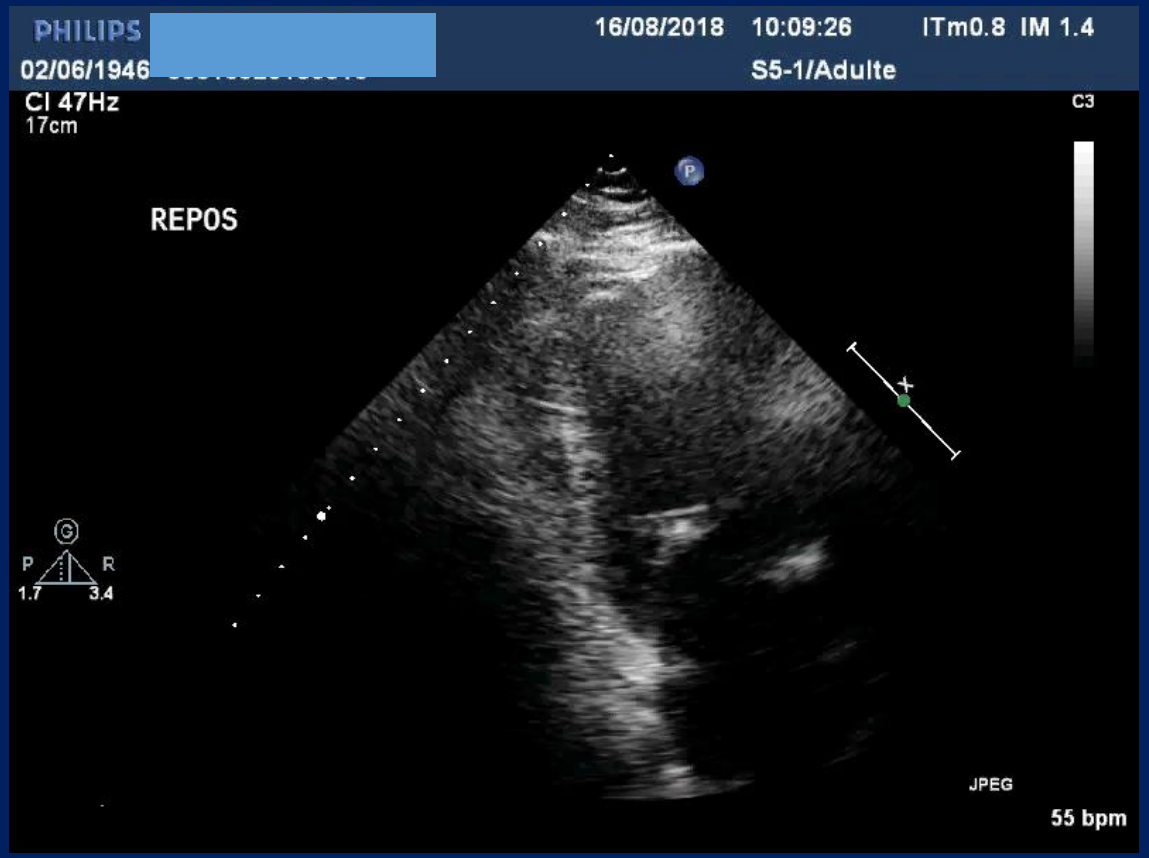
- Homme 72 ans
- CMI PAC 2008 MIG IVA-Mg occlusion rapide PAC Mg
- Ablation de FA 2016 sous cardensiel 1.25 + cordarone 1/j lasilix
- FEVG 40-45% IM ischémique modérée à moyenne
- + 10kg en 1 an
- Adressé en réadapt dyspnée Stade II+ (gêné aussi quand il fait ses lacets)
- ECG BBG BNP 400pg/ml
- EE neg 94W FC 60 à 72/min

Étiologie de dyspnée

- Surpoids
- Insuffisance chronotrope
- Insuffisance mitrale
  - IM ischémique
  - Asynchronisme

- CAT
  - Arret cordarone
  - Echo d’effort


PHILIPS
16/08/2018 10:09:14 ITm0.8 IM 1.4
02/06/1946
S5-1/Adulte
CI 47Hz
17cm
C3
REPOS
P
P R
1.7 3.4
JPEG
55 bpm


PHILIPS
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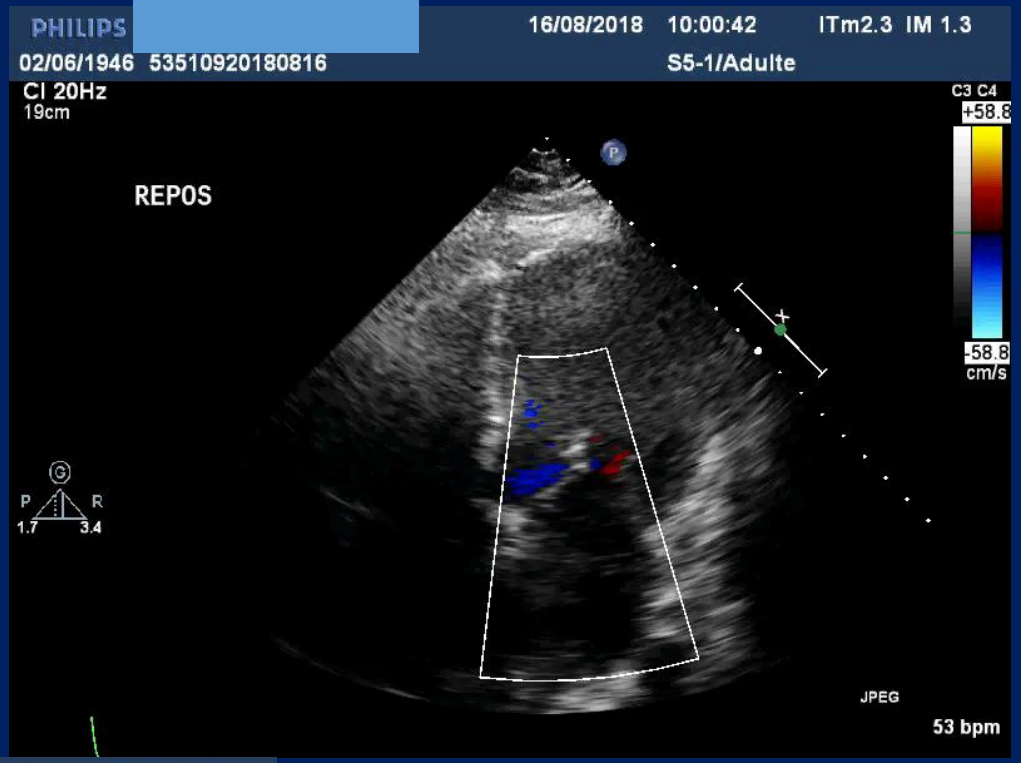
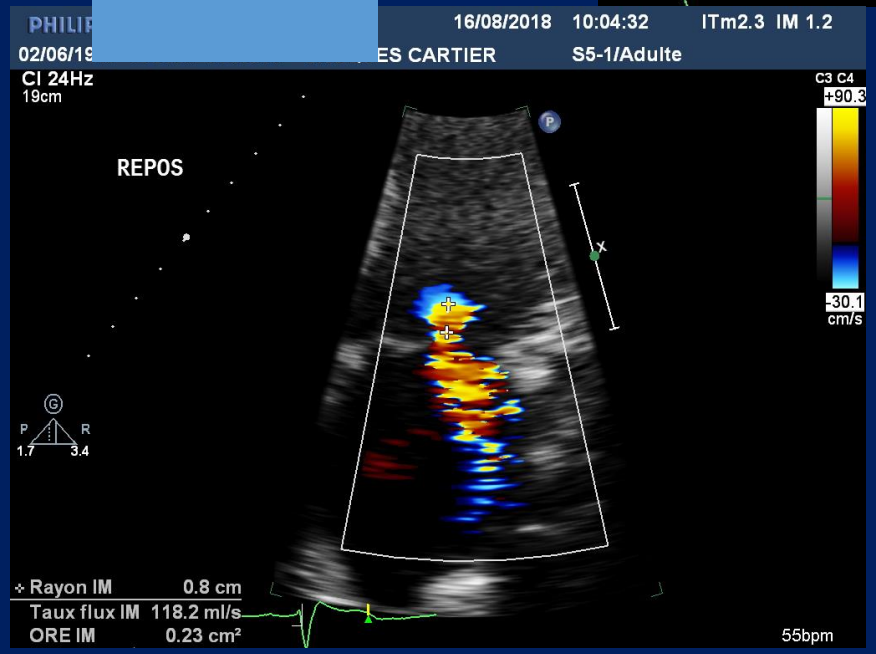
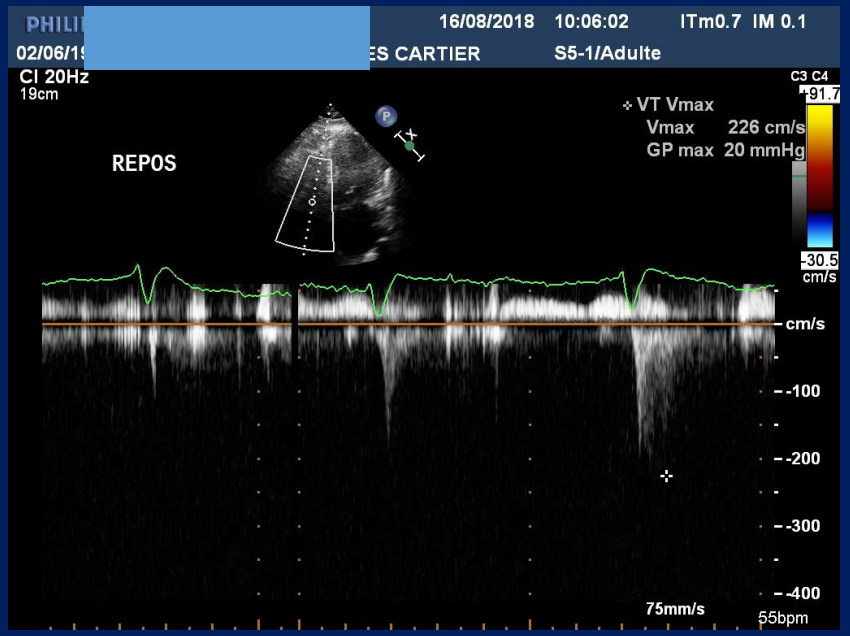
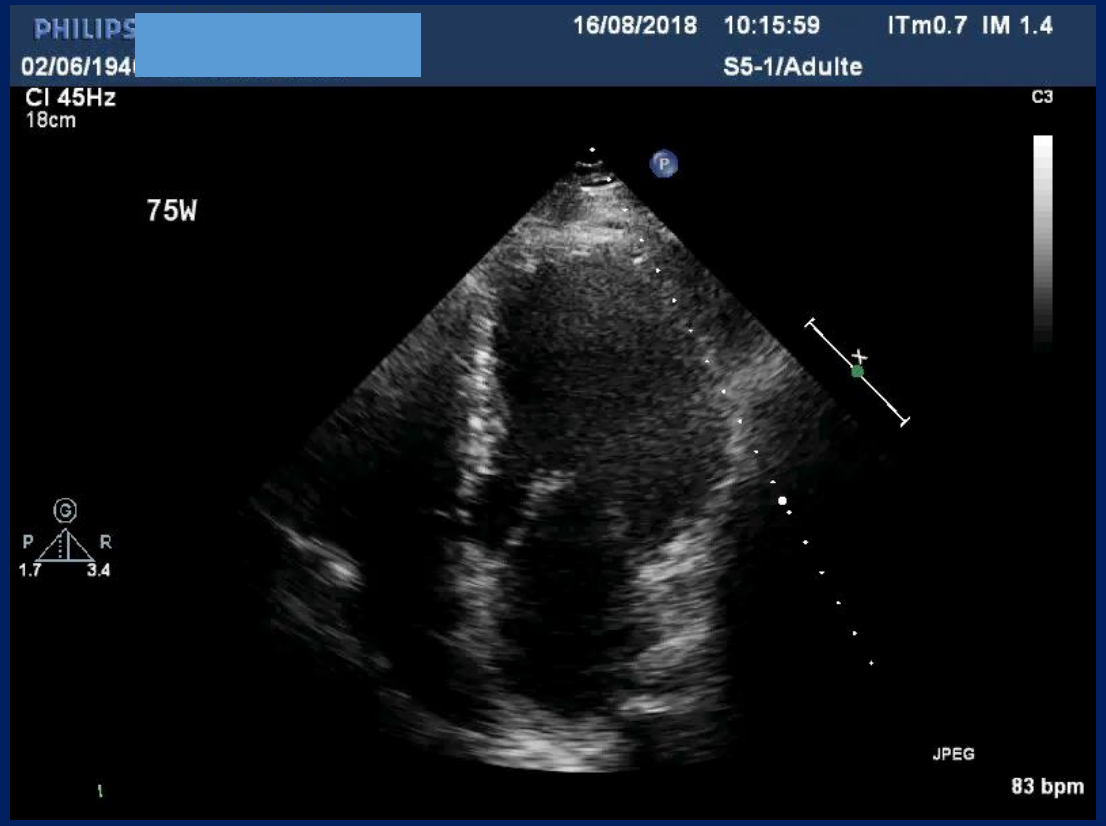
02/06/1946
S5-1/Adulte
CI 47Hz
17cm
C3
REPOS
P
P R
1.7 3.4
JPEG
55 bpm

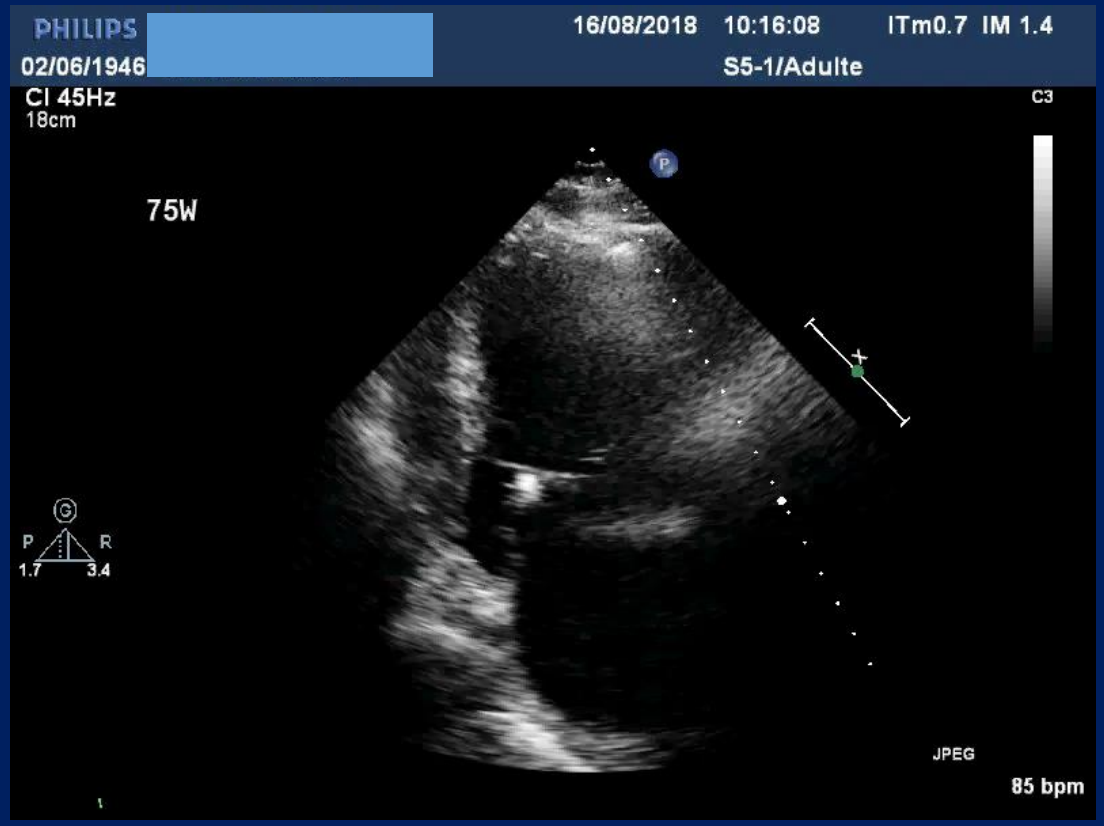

PHILIPS
16/08/2018 10:00:42 ITm2.3 IM 1.3
02/06/1946 53510920180816 S5-1/Adulte
CI 20Hz
19cm
C3 C4
+58.8
REPOS
-58.8
cm/s
P R
1.7 3.4
JPEG
53 bpm


16/08/2018 10:04:32 ITm2.3 IM 1.2
ES CARTIER S5-1/Adulte
CI 24Hz
19cm
C3 C4
+90.3
REPOS
-30.1
cm/s
P R
1.7 3.4
Rayon IM 0.8 cm
Taux flux IM 118.2 ml/s
ORE IM 0.23 cm²
55bpm

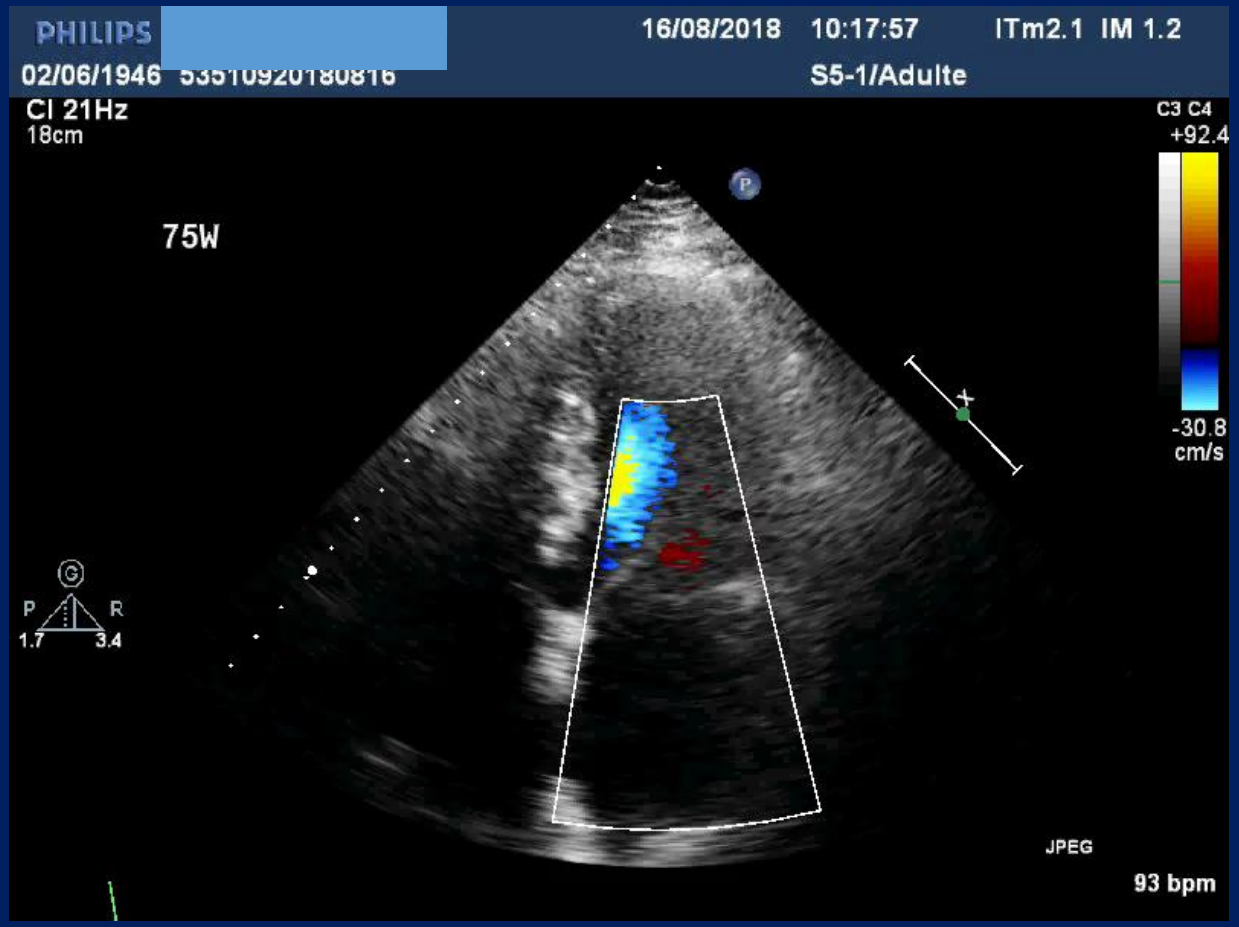

16/08/2018 10:06:02 ITm0.7 IM 0.1
ES CARTIER S5-1/Adulte
CI 20Hz
19cm
C3 C4
+91.7
VT Vmax
Vmax 226 cm/s
GP max 20 mmHg
REPOS
-30.5
cm/s
cm/s
-100
-200
-300
-400
75mm/s
55bpm

Echo d'effort





EE neg 75W 63% de la FMT (Fc max 93/min) Pas max 150 mmHg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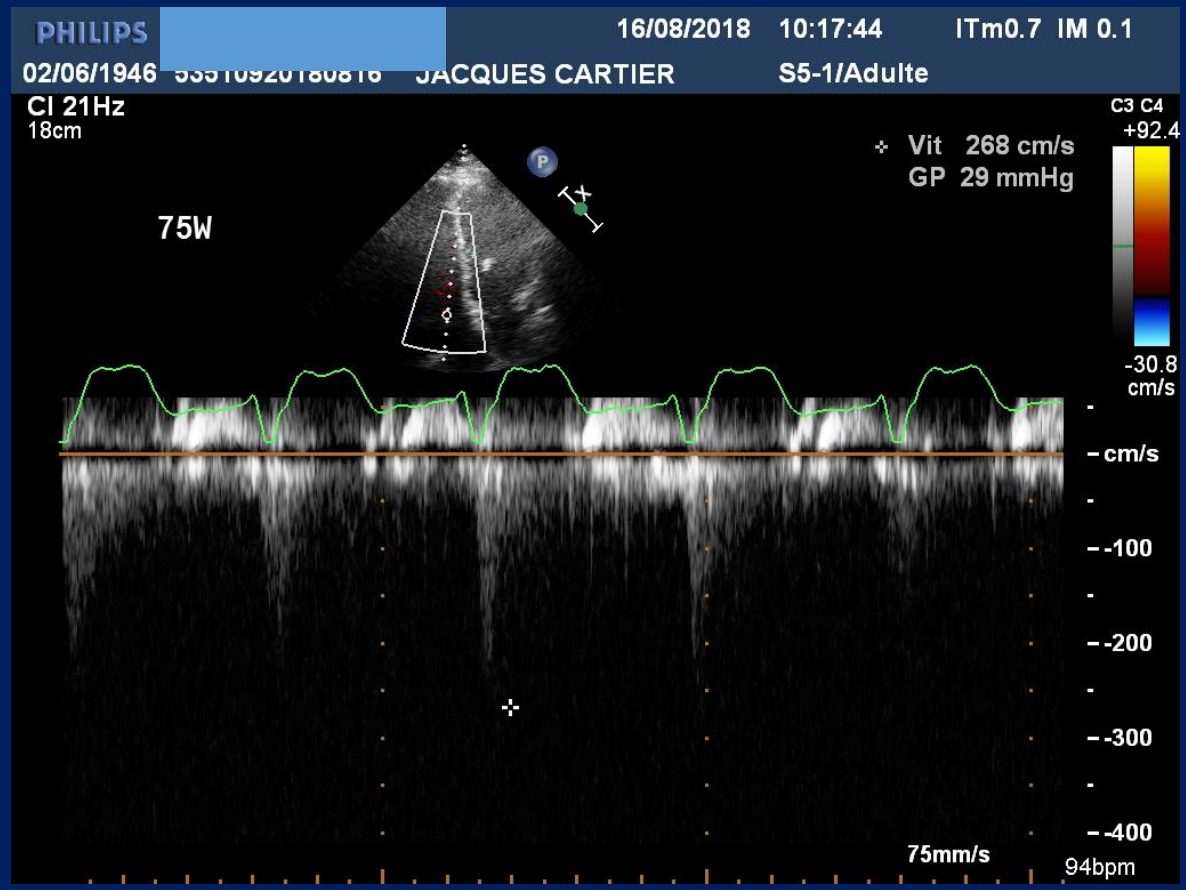
02/06/1946
S5-1/Adulte
CI 21Hz
18cm
C3 C4
+92.4
75W
-30.8
cm/s
P
R
1.7
3.4
JPEG
93 bpm


PHILIPS
16/08/2018 10:17:44 ITm0.7 IM 0.1
02/06/1946
JACQUES CARTIER
S5-1/Adulte
CI 21Hz
18cm
C3 C4
+92.4
Vit 268 cm/s
GP 29 mmHg
75W
-30.8
cm/s
cm/s
-100
-200
-300
-400
75mm/s
94bpm

Evolution

- Perte de 3kg pendant le séjour amélioration de la réserve chronotrope
- Amélioration fonctionnelle

conclusion

- Valvulopathie aortique
  - IA pas d'indication
  - RAC pas de valeur ajoutée echo d'effort /EE (VO2)

- Valvulopathie mitrale
  - RM discordance clinique/symptomes
  - IM primitive discordance clinique/symptomes
  - IM secondaire
    - discordance clinique/symptomes
    - Avant revascularisation
    - OAP flash