Amicale des Cardiologues de la Côte d'Azur

A.C.C.A.

Comment rechercher l'obstruction dans la cardiomyopathie hypertrophique?

F Levy

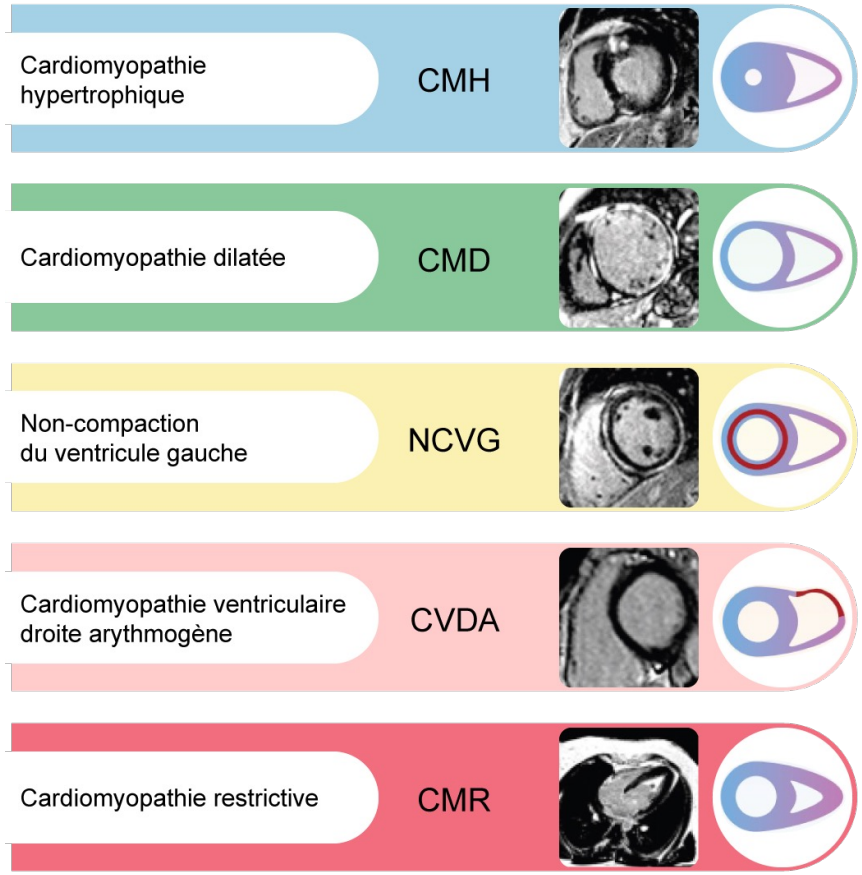
6 janvier 2026

Nice

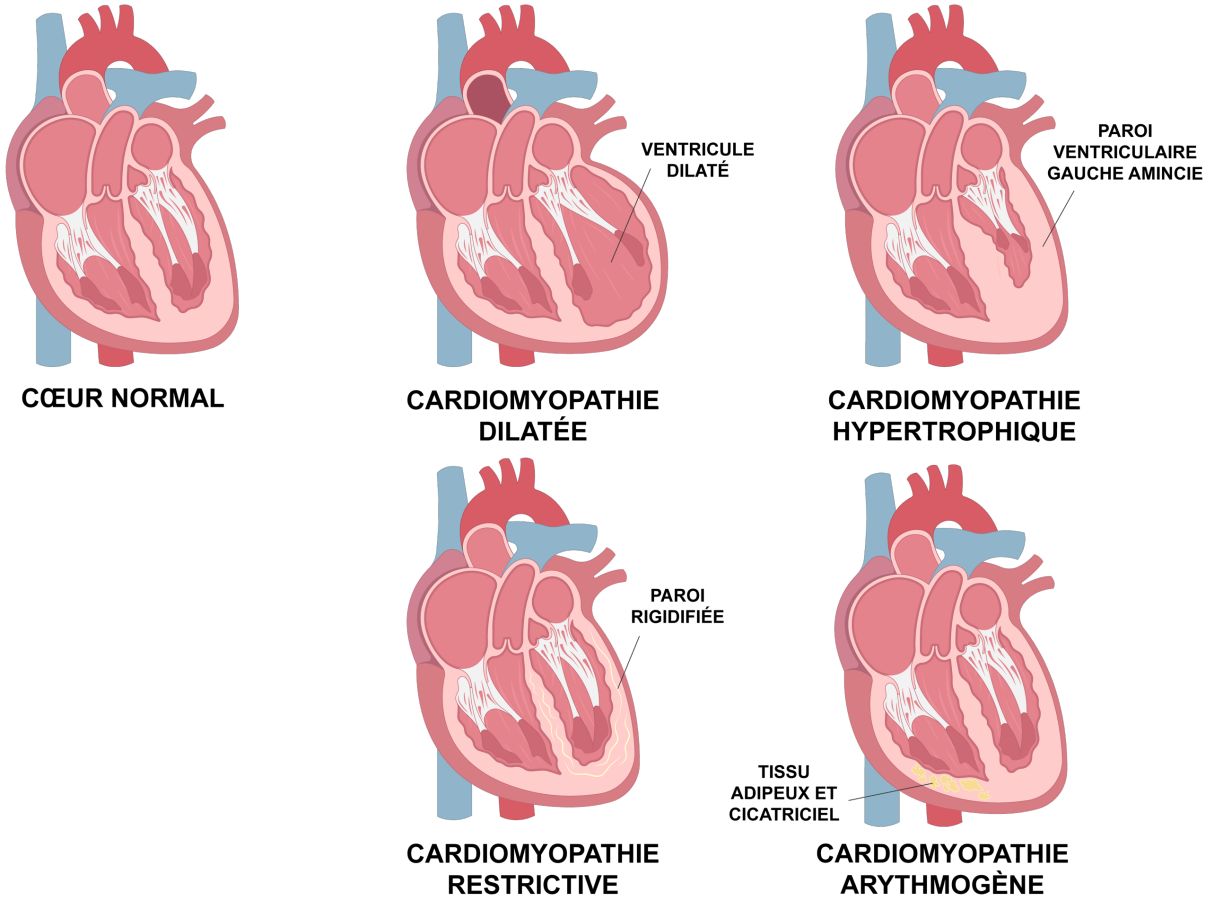
Sommaire

- Classification des cardiomyopathies
- Définition de l’obstruction intra-Ventriculaire Gauche (intra-VG)
- Méthodes de recherche de l'obstruction, de provocation
- Conclusion

Classification des cardiomyopathies



Classification par phénotype

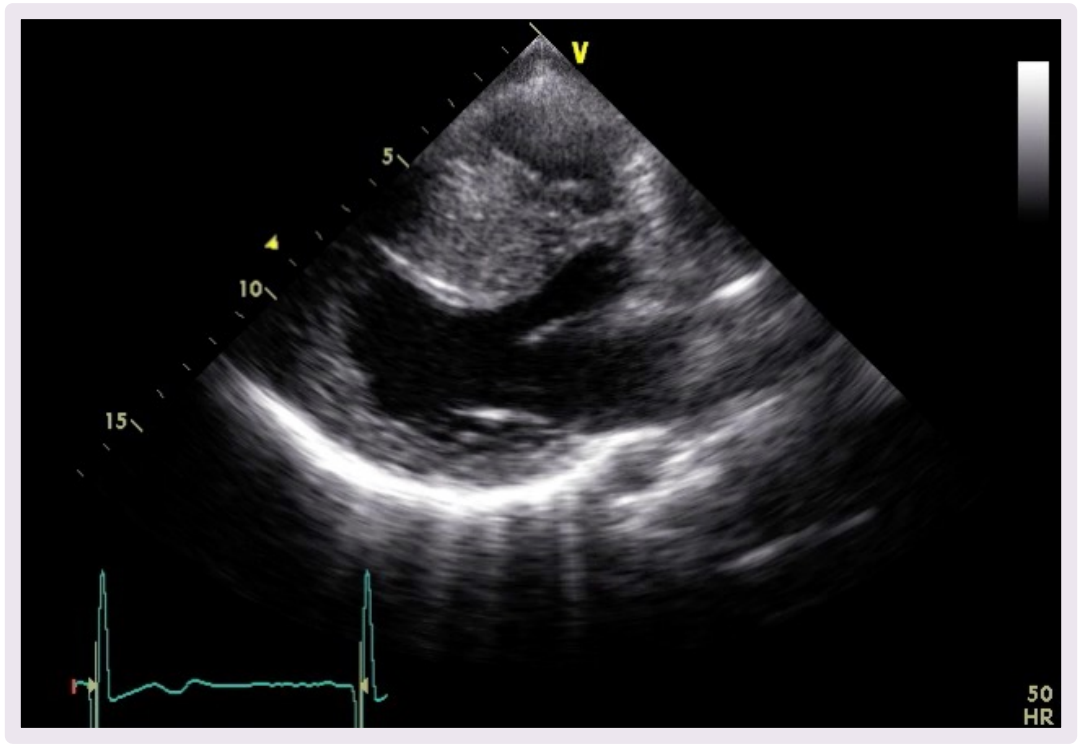


Classification par sous-types morphologiques de cardiomyopathies héréditaires

1. Arbelo E *et al.* European Heart Journal 2023 ESC Guidelines for the management of cardiomyopathies. **2.** Richard *et a*l. traité EMC cardiologie volume 13 août 2018.

Définition de la CMH

La CardioMyopathie Hypertrophique (CMH) est caractérisée par un épaississement anormal des parois du cœur d'origine primitive sans cause clinique décelable (HTA sévère, de sténose aortique serrée, de maladie de surcharge…) capable de produire l'hypertrophie



HTA : Hypertension Artérielle

3. Protocole National de Diagnostic et de Soins (PNDS) Cardiomyopathie Hypertrophique 2021.

Épidémiologie de la CMH

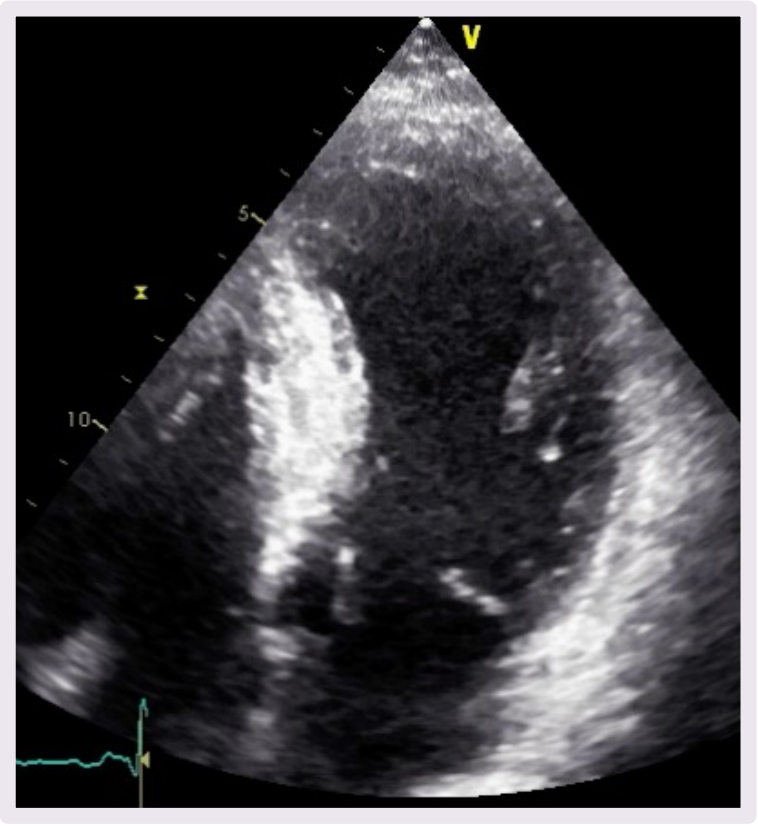
- **Prévalence estimée :** 1/200 à 1/500
- **Cause principale de mort subite** chez les jeunes notamment chez le sportif de moins de 35 ans
- **Mutation génétique** retrouvée dans 40 à 60% des cas

  - 42 % sur le gène MYBPC3
  - 40 % sur MYH7
  - Forme familiale **Autosomique Dominante (AD)** dans la majorité des cas
  - **Pénétrance incomplète liée à l'âge :**

    - 55 % avant 30 ans

    - 75 % entre 30 et 50 ans

    - 95 % après 50 ans



1. Arbelo E *et al.* European Heart Journal 2023 ESC Guidelines for the management of cardiomyopathies. **2.** Richard *et al.* traité EMC cardiologie volume 13 août 2018.
3. Protocole National de Diagnostic et de Soins (PNDS) Cardiomyopathie Hypertrophique 2021. **4.** Barfield *et al.* J Mol Biomark Diagn. 2016 November ; 7(6).
5. T Hershkovitz et al. Am J Med Genet. 2019;179A:365–372.

Définition de l'Hypertrophie Ventriculaire Gauche (HVG)

Cardiomyopathie hypertrophique (CMH) sarcomérique

Cut-off de l'HVG

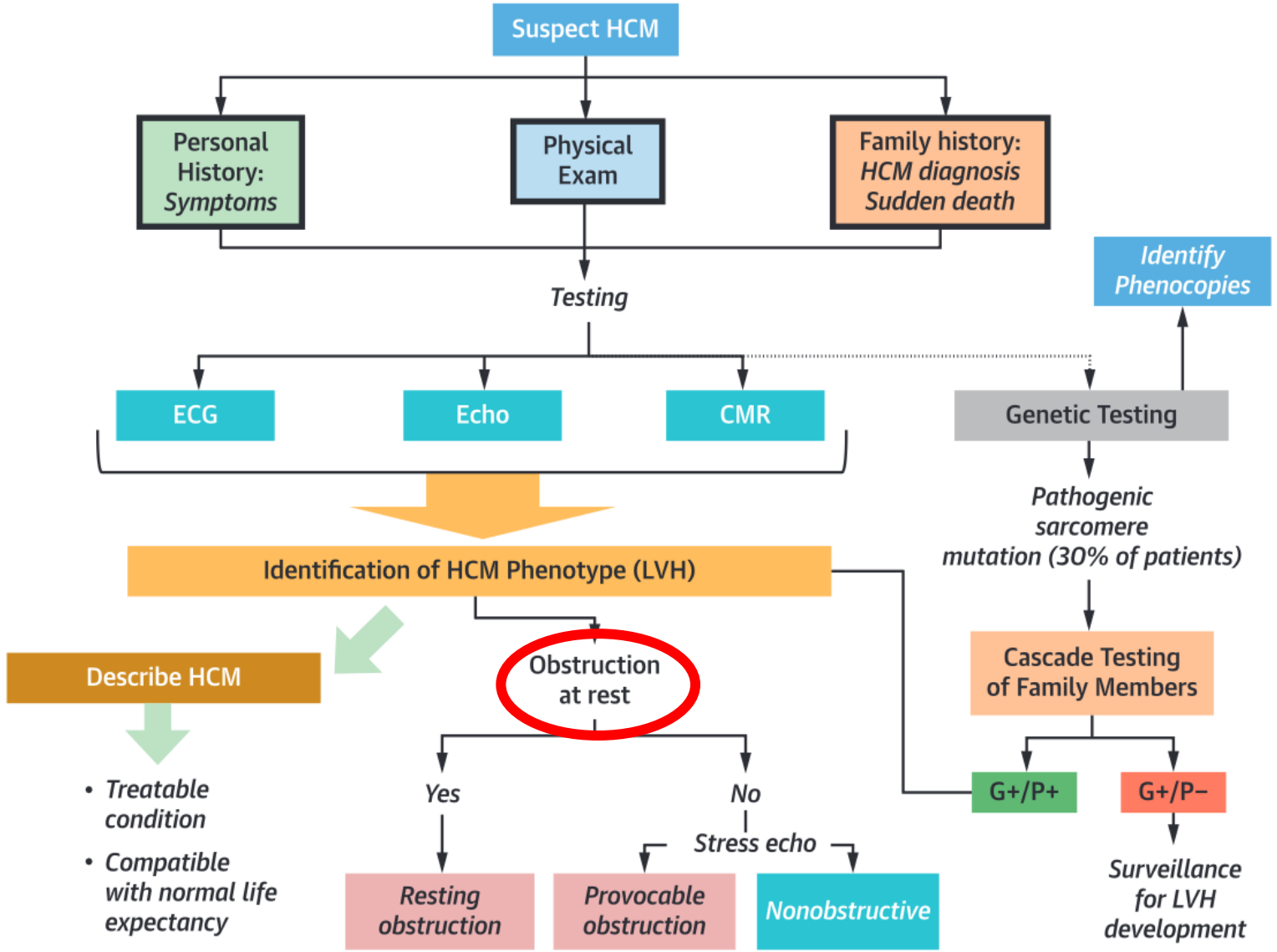
- Dans les formes sporadiques : ≥ 15 mm
- Dans les formes familiales : ≥ 13 mm

Amylose et Fabry

Cut-off de l'HVG

- 12 mm chez l'homme
- 11 mm chez la femme

3. Protocole National de Diagnostic et de Soins (PNDS) Cardiomyopathie Hypertrophique 2021. **7.** Yeung *et al.* Journal of the American Society of Echocardiography June 2018.
8. Aimo *et al.* European Journal of Heart Failure (2023) 25, 510–514.

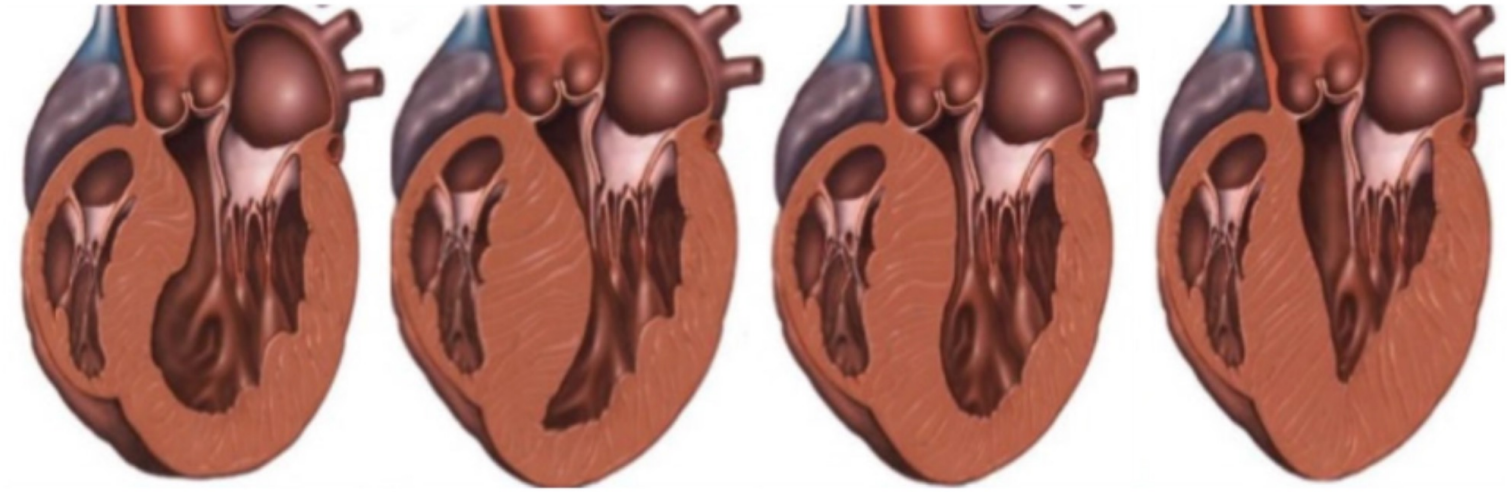


Maron, B.J. et al. J Am Coll Cardiol. 2022;79(4):372-389.

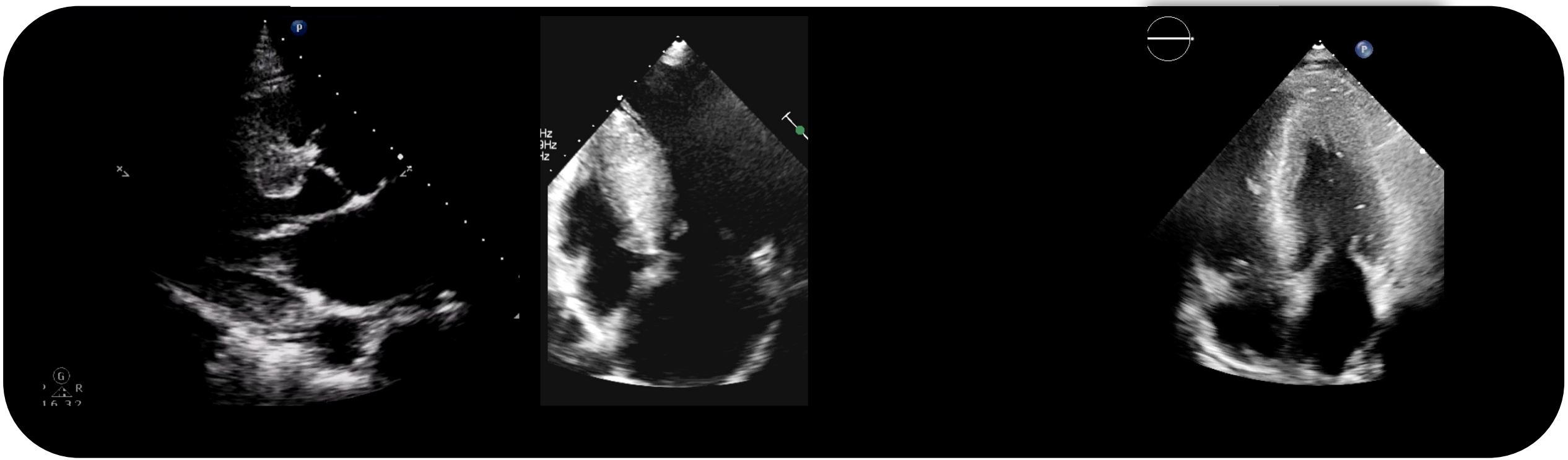
Ref :

Cardiomyopathy phenotype	
HCM	Sarcomeric
	Anderson–Fabry
	Danon
	TTR amyloidosis
	RASopathy
	Friedreich ataxia
	Mitochondrial
	Mitochondrial DNA
	Nuclear DNA

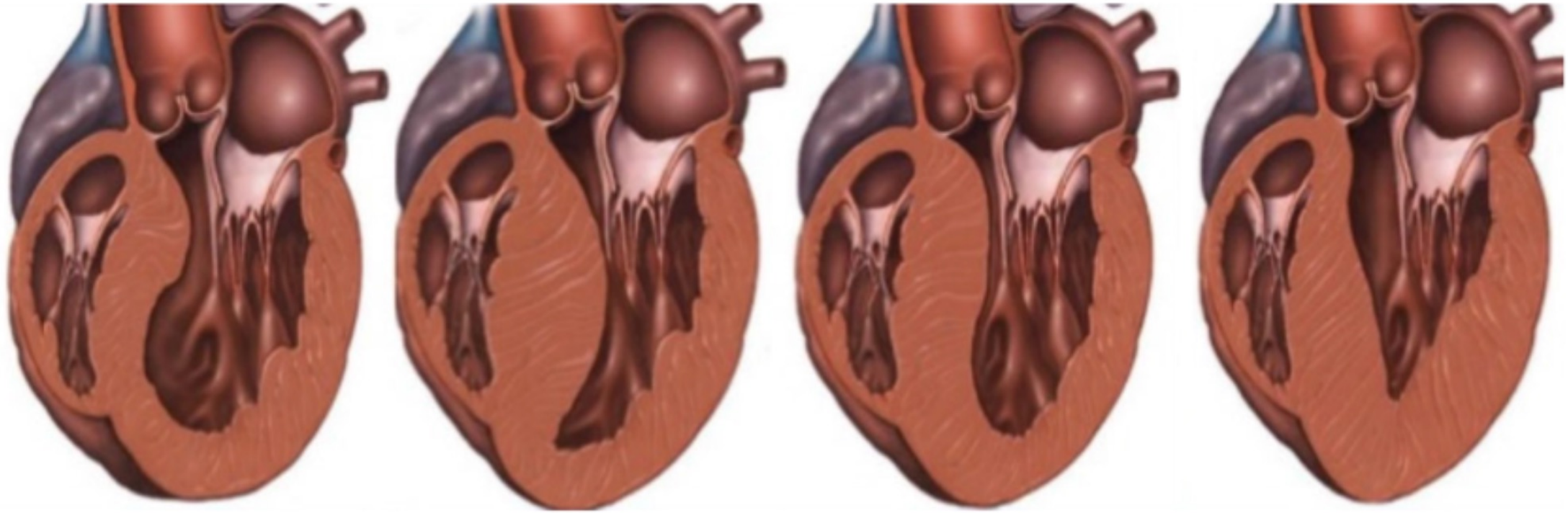
Cardiomyopathy phenotype	
HCM	Sarcomeric
	Anderson–Fabry
	Danon
	TTR amyloidosis
	RASopathy
	Friedreich ataxia
	Mitochondrial
	Mitochondrial DNA
	Nuclear DNA
DCM	*LMNA*
	RBM20
	Sarcomeric
	Dystrophin
	Emerin
	Barth syndrome
	Mitochondrial
	Mitochondrial DNA
	Nuclear DNA
NDLVC	*LMNA*
	DES
	FLNC
	PLN
	TMEM43
	RBM20
ARVC	*PLN*
	Desmosomal
	TMEM43
RCM	Sarcomeric
	DES
	FLNC
	BAG3
	RASopathy



Sigmoid Reverse curve Neutral Apical

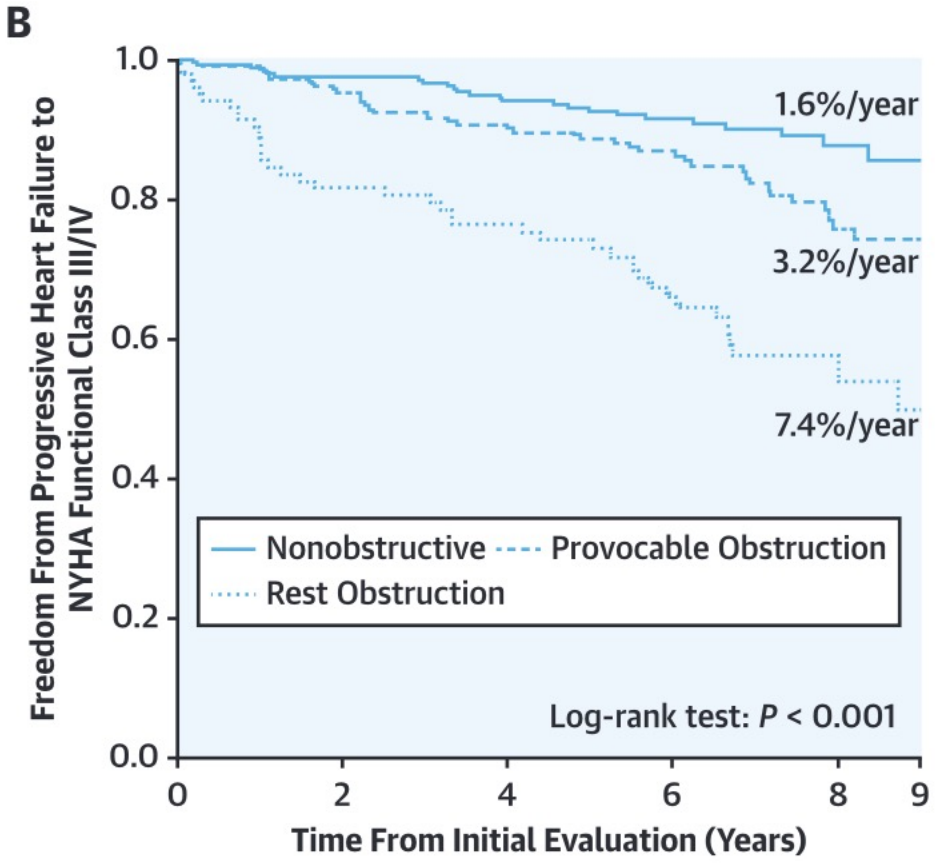


Variants/septal morphology



Sigmoid **Reverse curve** **Neutral** **Apical**

Rôle pronostic de l’obstruction

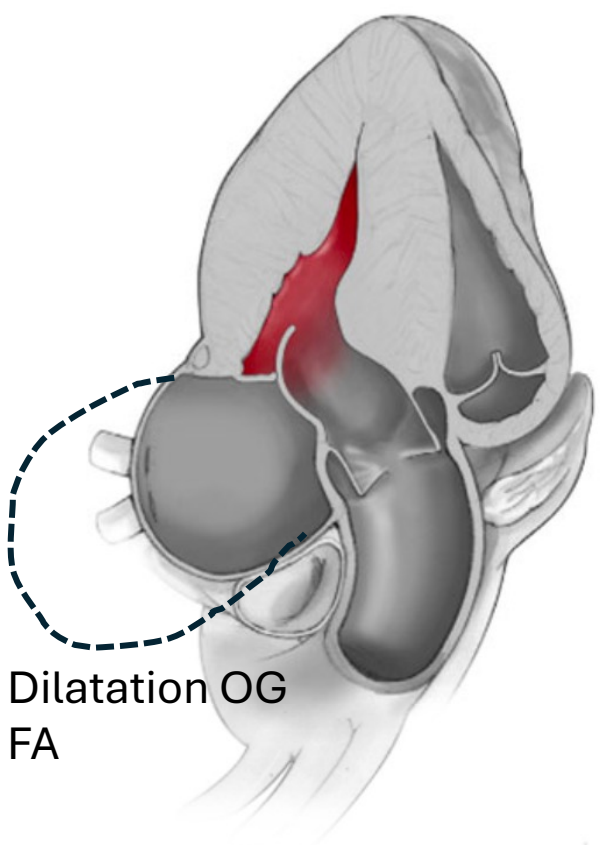


J Am Coll Cardiol 2022;79:372–389)

Conséquences de l'HVG

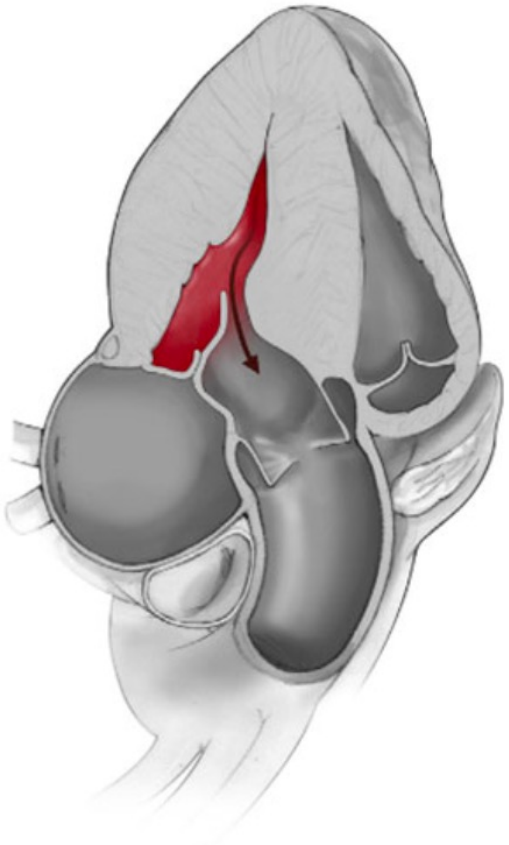
- 4 problèmes :

Remplisssage VG

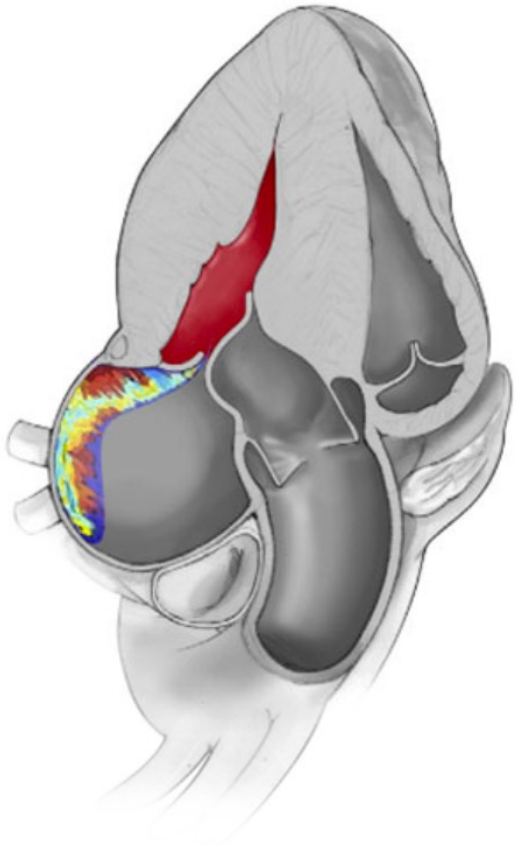


Dilatation OG
FA

Obstruction



Fuite mitrale



A.C.C.A.

CMH

Rythme

Malaises à l'effort

Dyspnée

OBSTRUCTION (iM)

AVC

FA

IC

Diastolique

Systolique

Attention aux formes évoluées (end stage)

End-Stage HCM: LVEF <50%

ASE2023

- End stage HCM defined as EF < 50%.
  - ~3-5% of HCM population.
    - Younger at dx, family hx, *MYH7*
  - ~15-20% on long term f/up (SHaRe Registry)

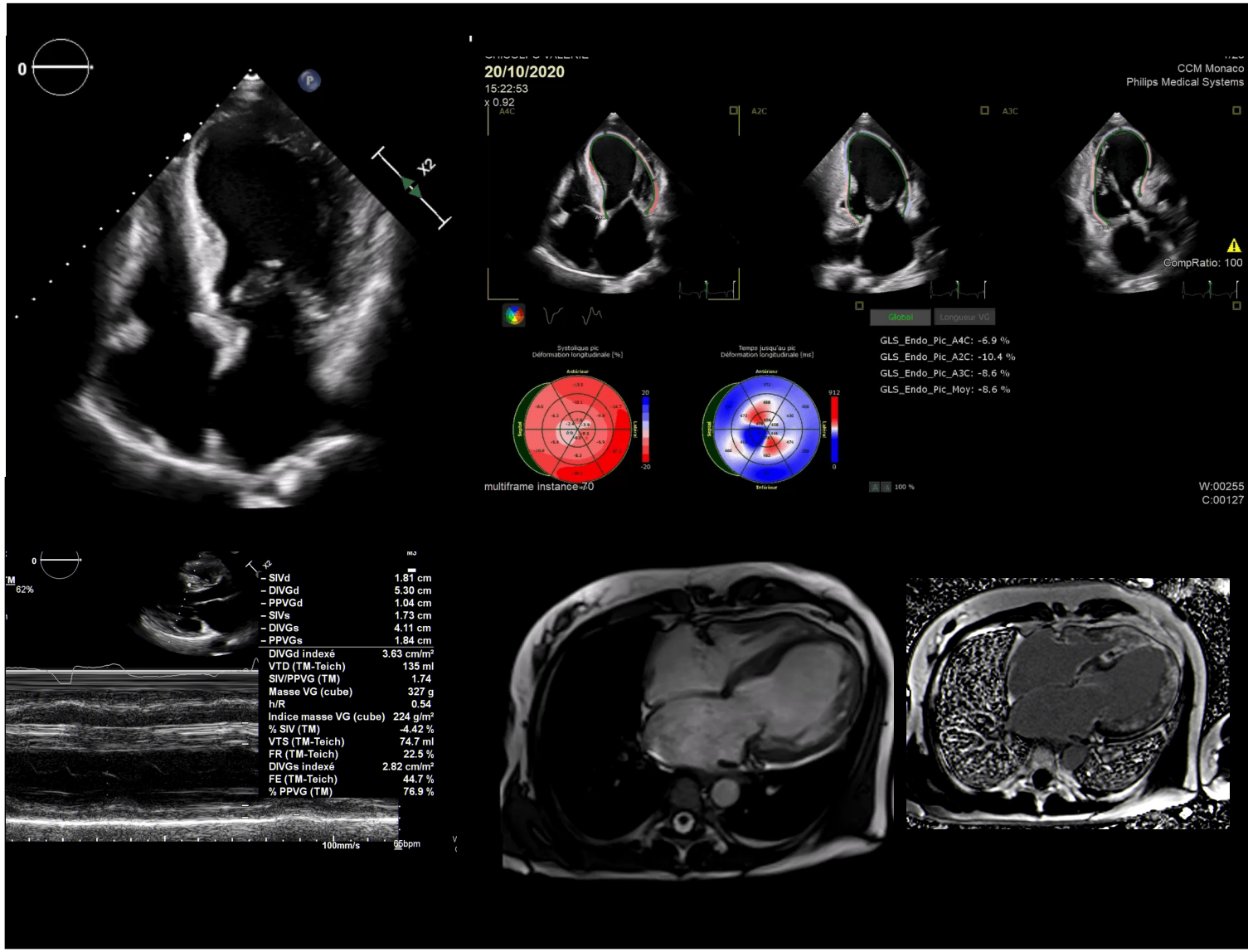
Harris KM, et al. *Circulation* 2006; Marstrand P et al. *Circulation* 2020; 141:1371-1383.
Ho CY et al, *Circulation* 2018

#ASE2023 ASEScientificSessions.org

Extensive LGE

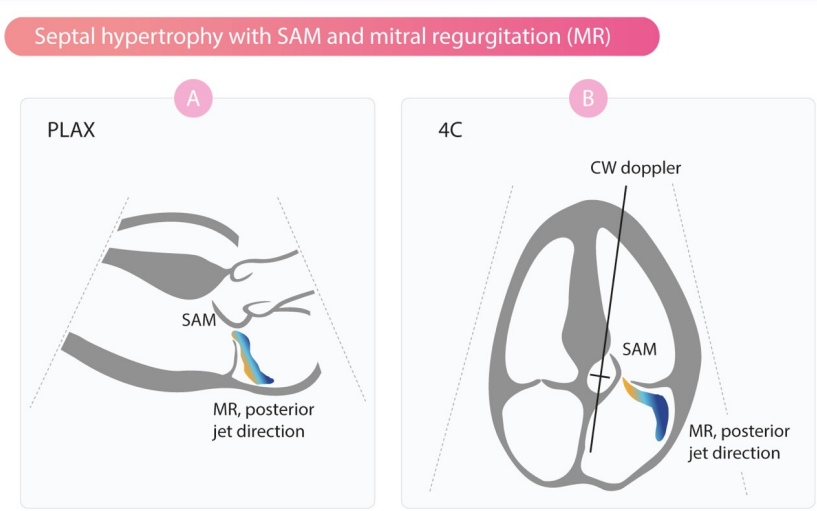
- HCM a fibrotic disease:
  - Interstitial fibrosis in hypertrophied segments
- LGE present in >50% of HCM patients.
  - Progressive: avg ↑ 0.5% / year
- Quantifiable: validated using 5-6 SD or "full width half-maximum" methods.

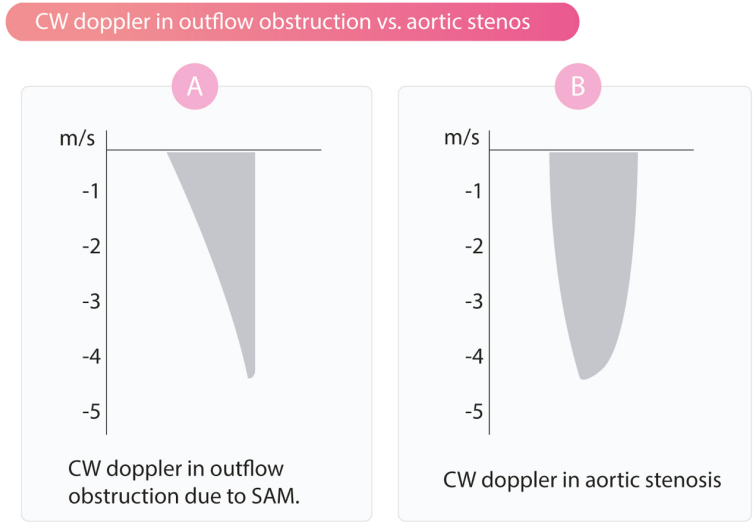
Habib M et al, *JACC Cardiovasc Imaging* 2021

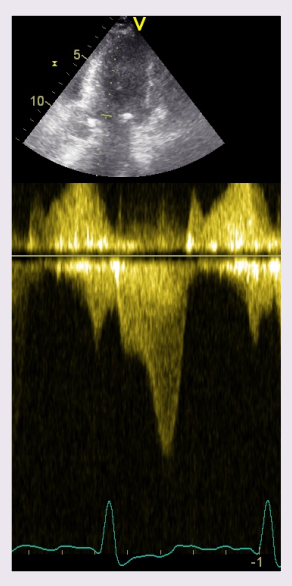


Définition de l'obstruction intra-VG

- **Échocardiographie de repos :** Doppler pulsé, couleur et continu ++ (cc VG++, apex, chambre de chasse VD), SAM ? En TM
- **Gradient max > 30 mmHg** (au repos) en Doppler continu
- Mais… phénomène labile, dynamique







Qu’est-ce qu’une obstruction significative?

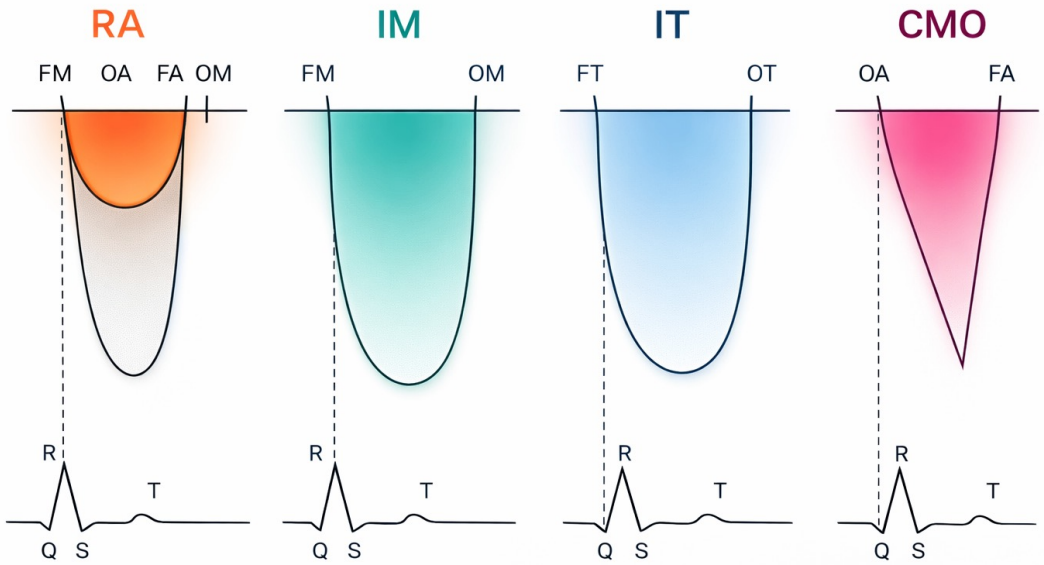
What is significant obstruction?

Obstructive HCM

Peak Gradient > 30 at rest

Sufficient to result in symptoms

Peak Gradient >40-50


RA
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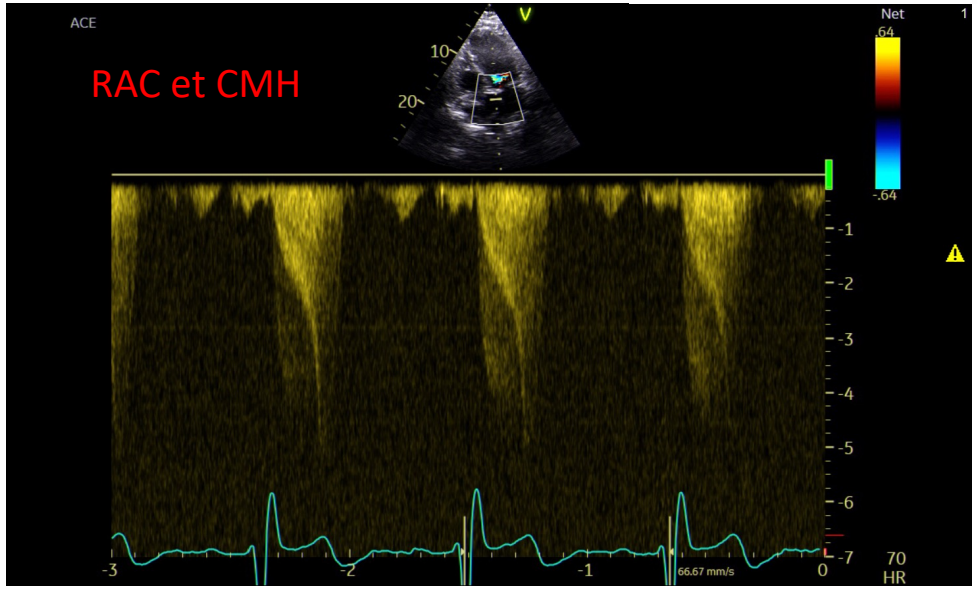
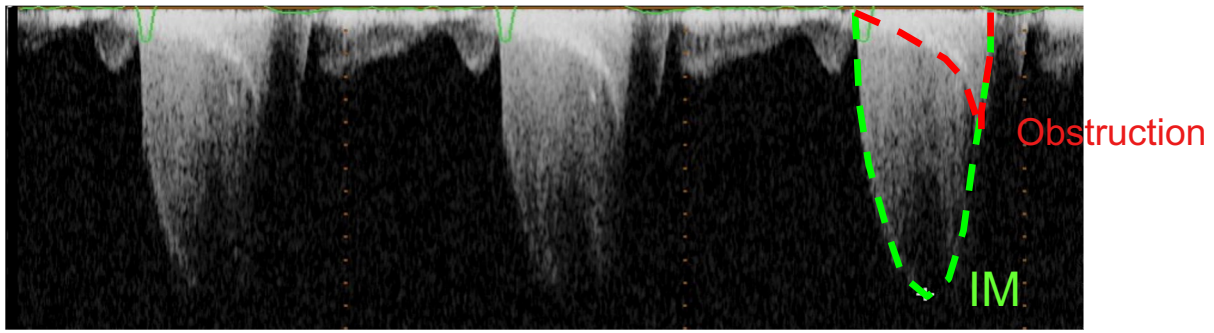
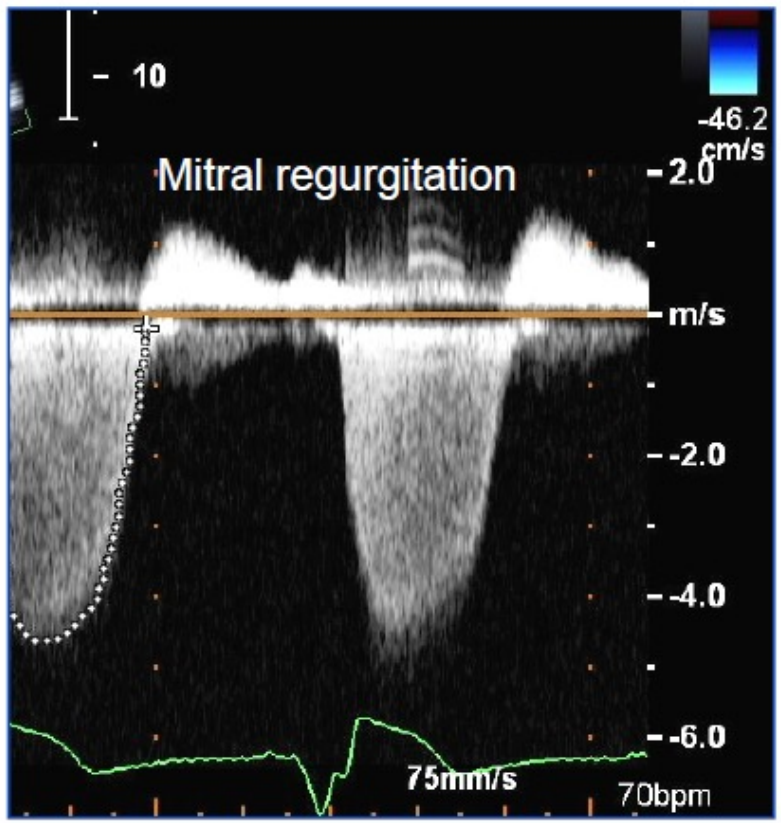
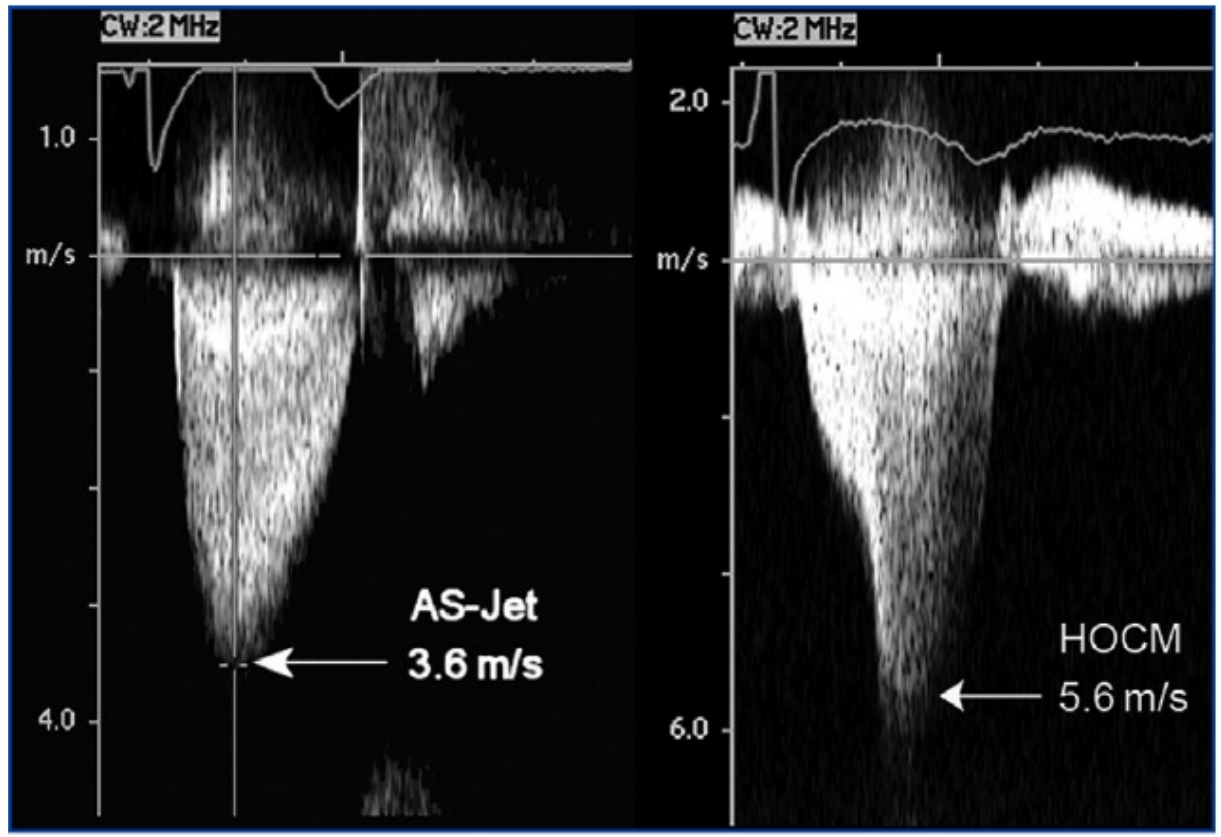
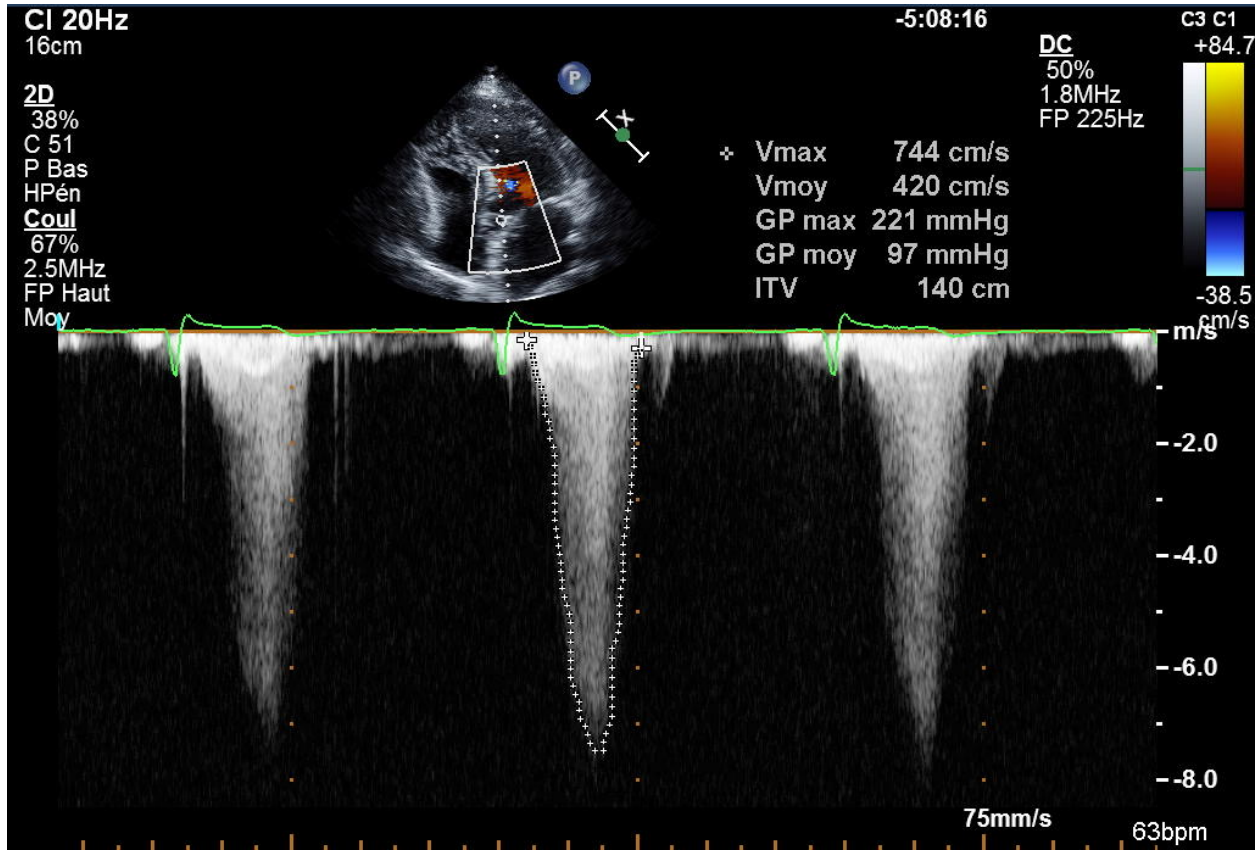

ACE
RAC et CMH
V
10
20
Net
64
-64
-1
-2
-3
-4
-5
-6
-7
-3
-2
-1
66.67 mm/s
0
70
HR

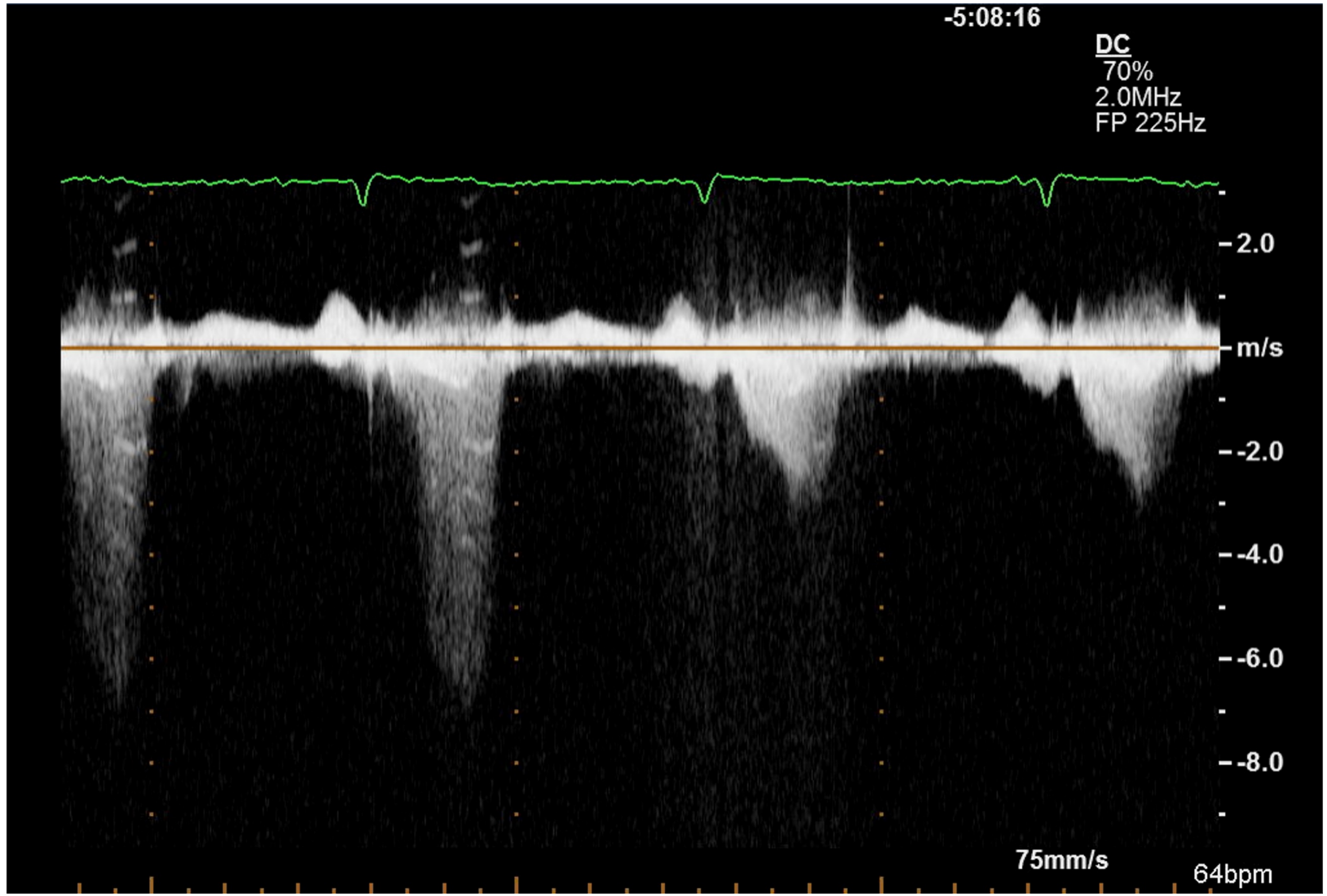

Obstruction
IM

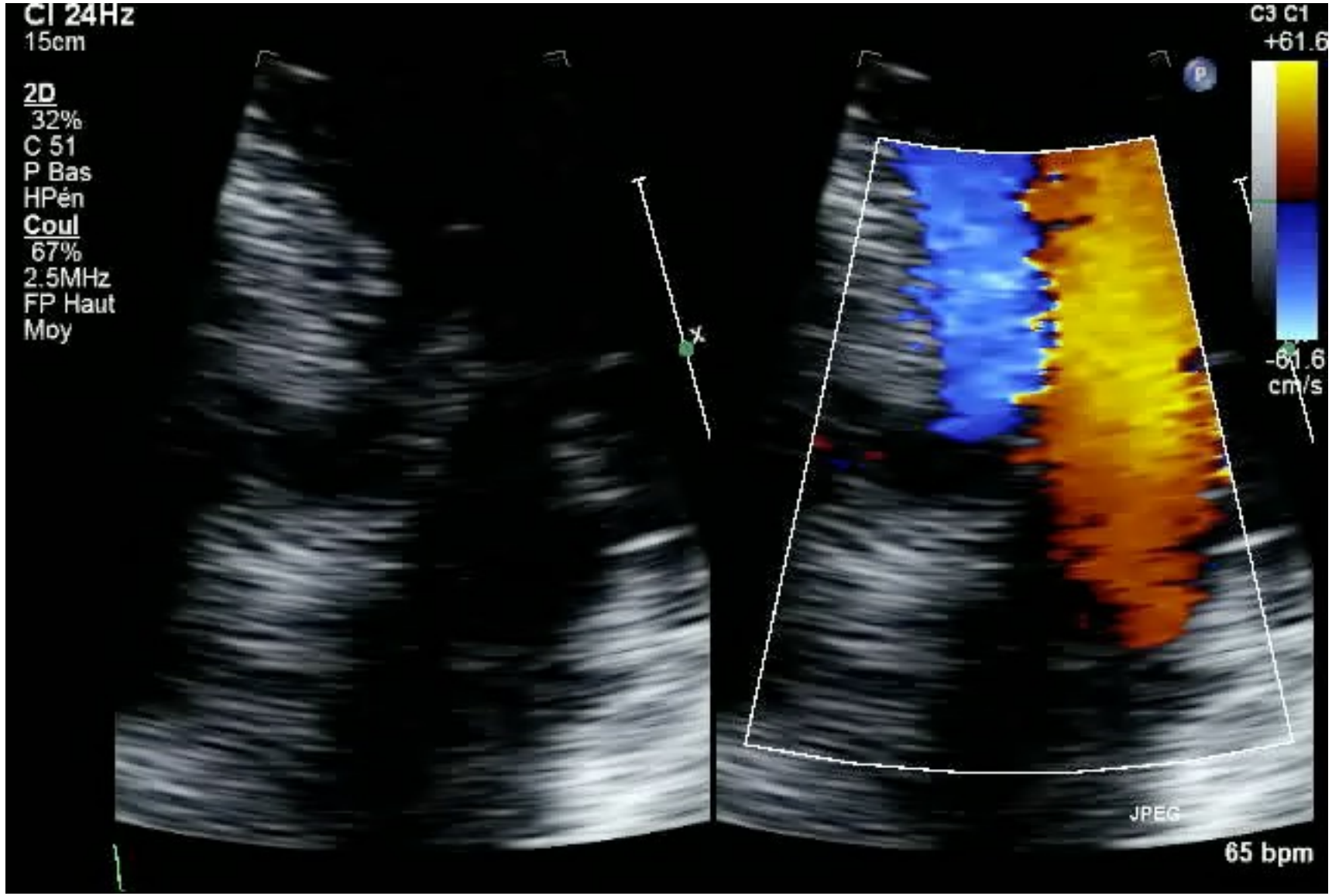

10
-46.2
cm/s
Mitral regurgitation
2.0
m/s
-2.0
-4.0
-6.0
75mm/s
70bpm

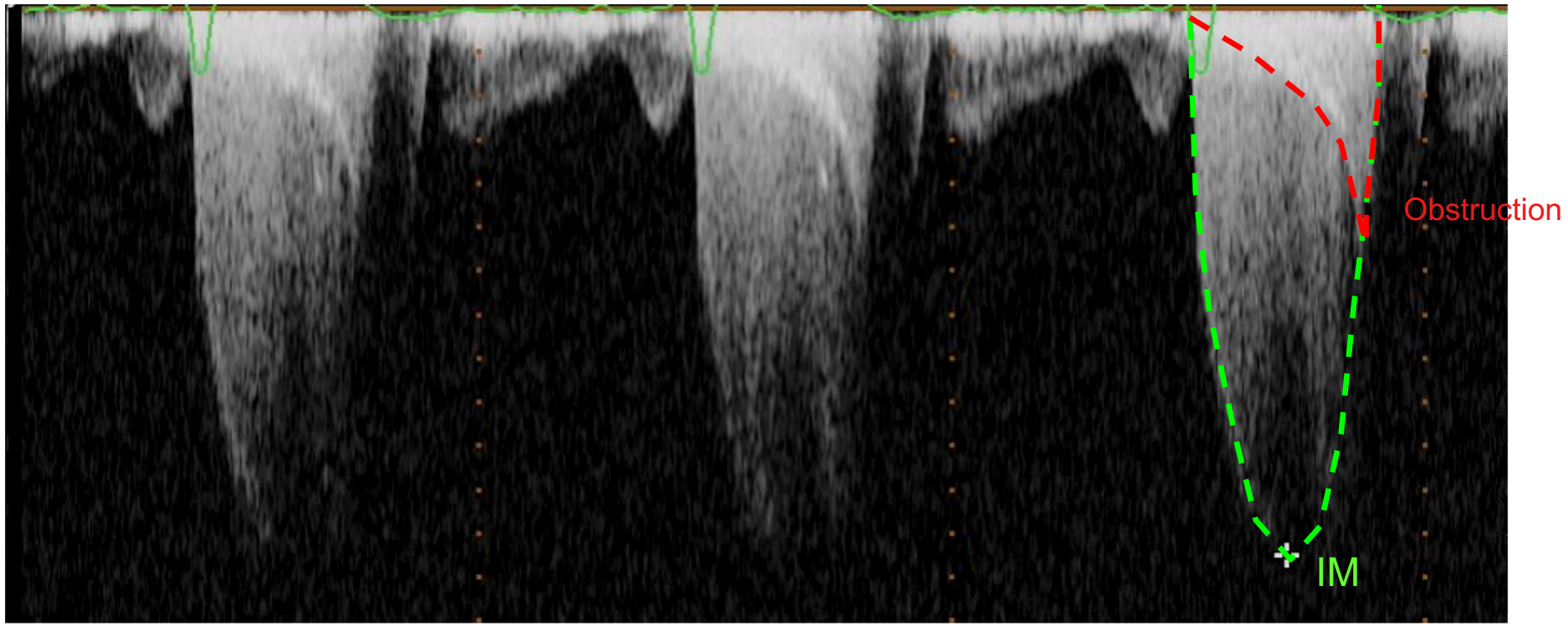

CW:2 MHz
1.0
m/s
4.0
AS-Jet
3.6 m/s
CW:2 MHz
2.0
m/s
6.0
HOCM
5.6 m/s


JPEG


CI 20Hz
16cm
2D
38%
C 51
P Bas
HPén
Coul
67%
2.5MHz
FP Haut
Moy
-5:08:16
DC
50%
1.8MHz
FP 225Hz
C3 C1
+84.7
-38.5
cm/s
Vmax 744 cm/s
Vmoy 420 cm/s
GP max 221 mmHg
GP moy 97 mmHg
ITV 140 cm
m/s
-2.0
-4.0
-6.0
-8.0
75mm/s
63bpm


-5:08:16
DC
70%
2.0MHz
FP 225Hz
2.0
m/s
-2.0
-4.0
-6.0
-8.0
75mm/s
64bpm


C1 24Hz
15cm
2D
32%
C 51
P Bas
HPén
Coul
67%
2.5MHz
FP Haut
Moy
C3 C1
+61.6
-61.6
cm/s
JPEG
65 bpm


Obstruction
IM

Physiopathologie : un mécanisme complexe

Hypertrophie septale

Protrusion septale

Force de poussée

Relâchement des feuillets mitraux dans le flux

Phase systole précoce

Longueur valve mitrale

Muscles papillaires

Anomalies mitrales

Effet Venturi

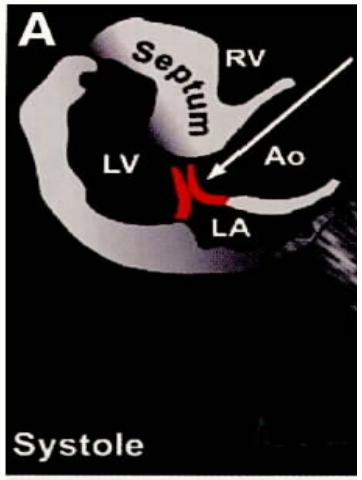
SAM*

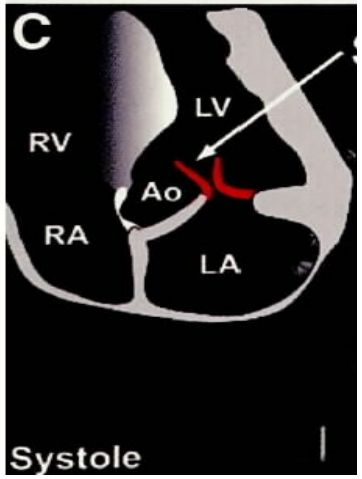
Obstruction de la chambre de chasse

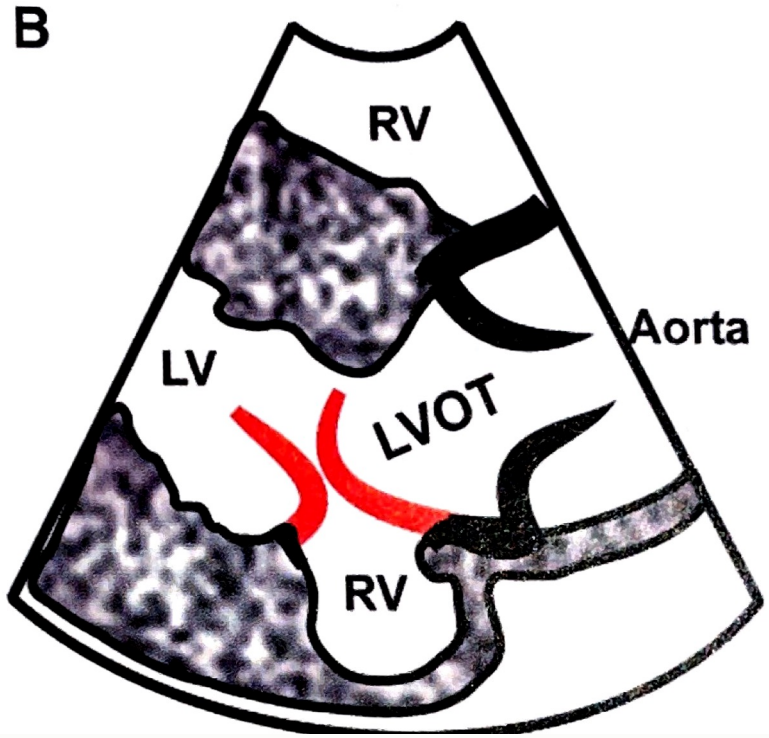
Phase mi-systole

* SAM : Systolic Anterior Motion = Mouvement Systolique Antérieur.

11. Abbasi M *et al.* J Am Soc Echocardiogr 2024;37:613-25.







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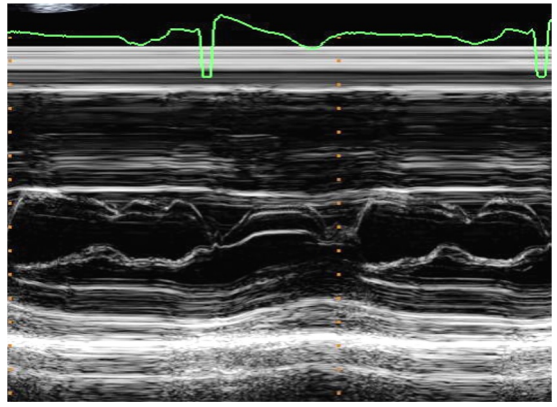
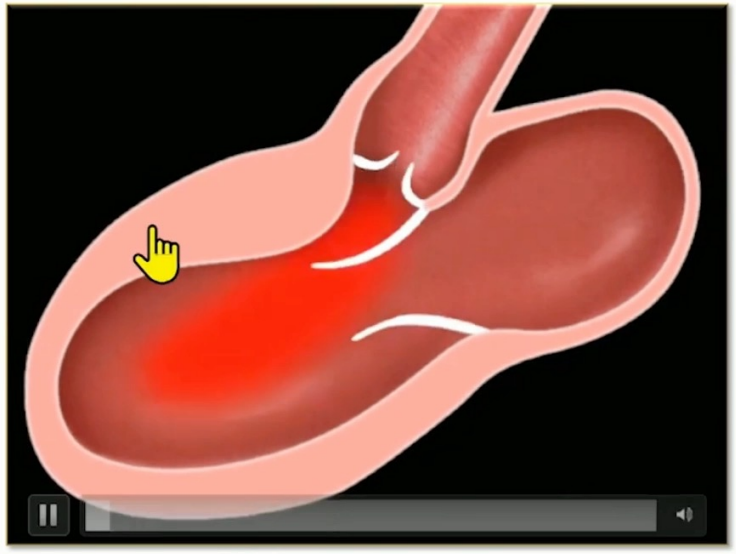


Obstruction



Le SAM un excès de longueur des valves ?

A.C.C.A.

La majorité des patients avec CMHO ont des feuillets ant et post mitraux allongés :

Feuillet ant 34mm vs 24mm chez les patients normaux

Signe du bonnet de nuit

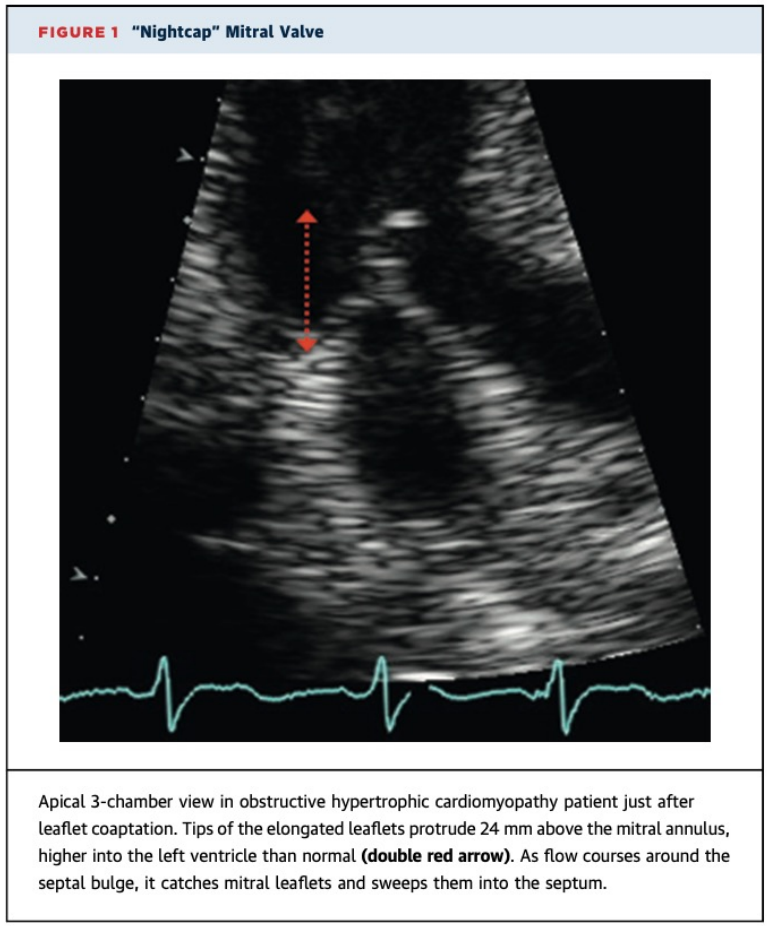
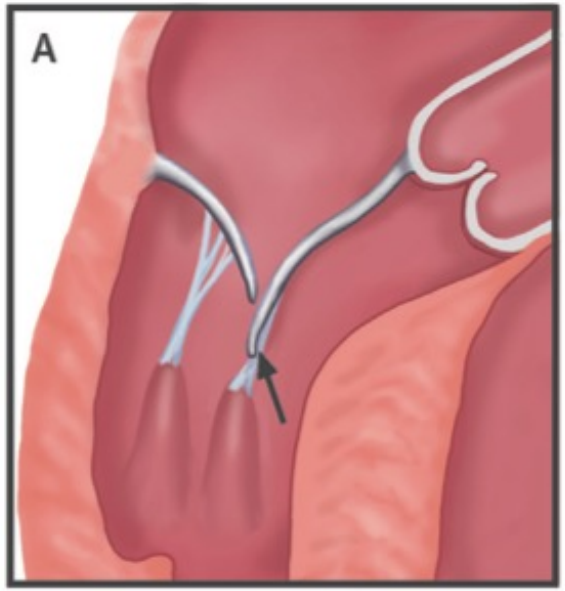


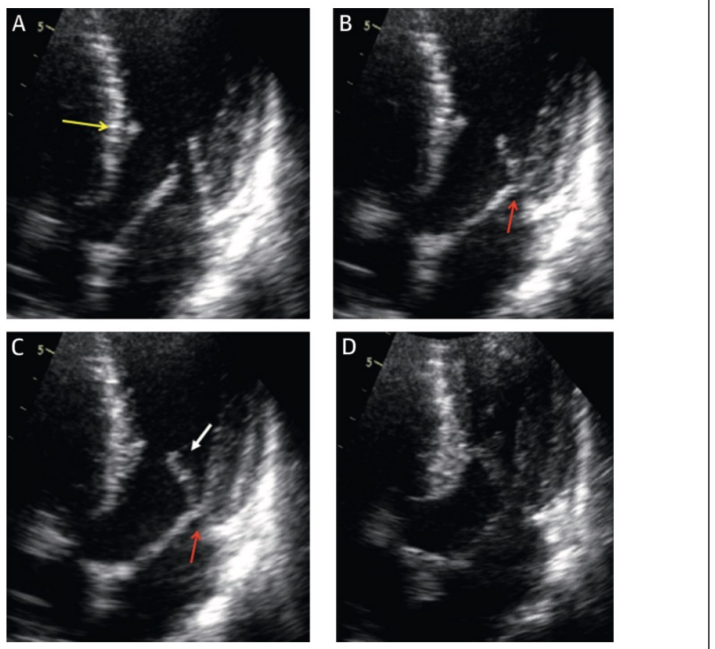
FIGURE 1 "Nightcap" Mitral Valve

Apical 3-chamber view in obstructive hypertrophic cardiomyopathy patient just after leaflet coaptation. Tips of the elongated leaflets protrude 24 mm above the mitral annulus, higher into the left ventricle than normal **(double red arrow)**. As flow courses around the septal bulge, it catches mitral leaflets and sweeps them into the septum.

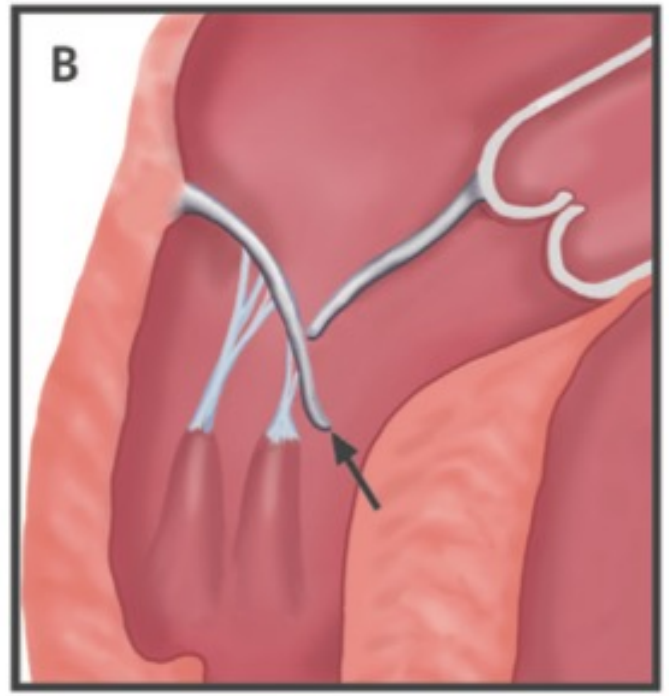


La posterieure aussi peut être très longue

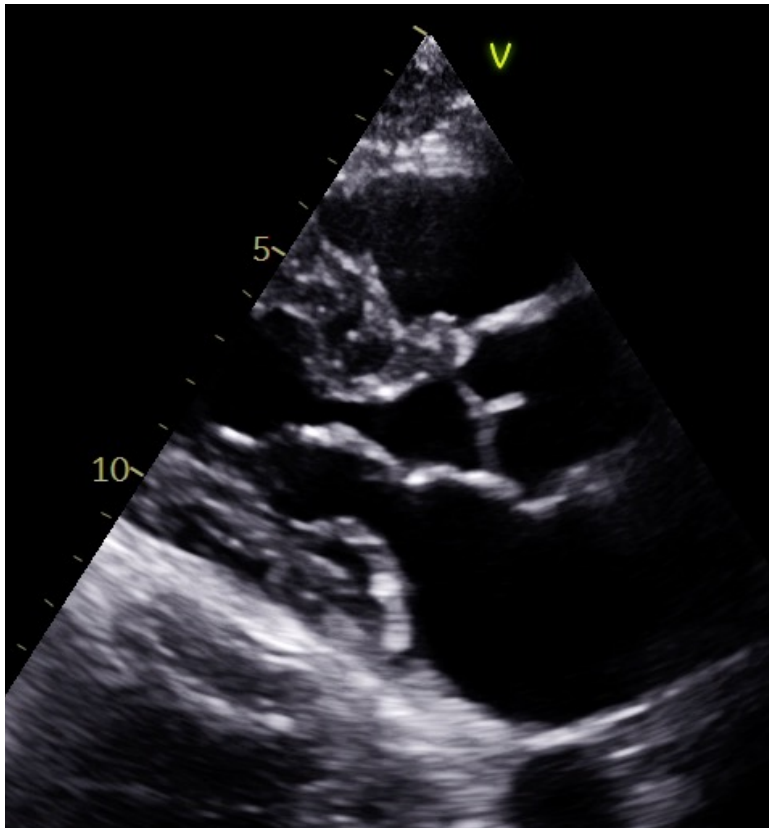
FIGURE 10 Posterior Leaflet SAM, Mitral-Septal Contact, and Severe LVOT Obstruction

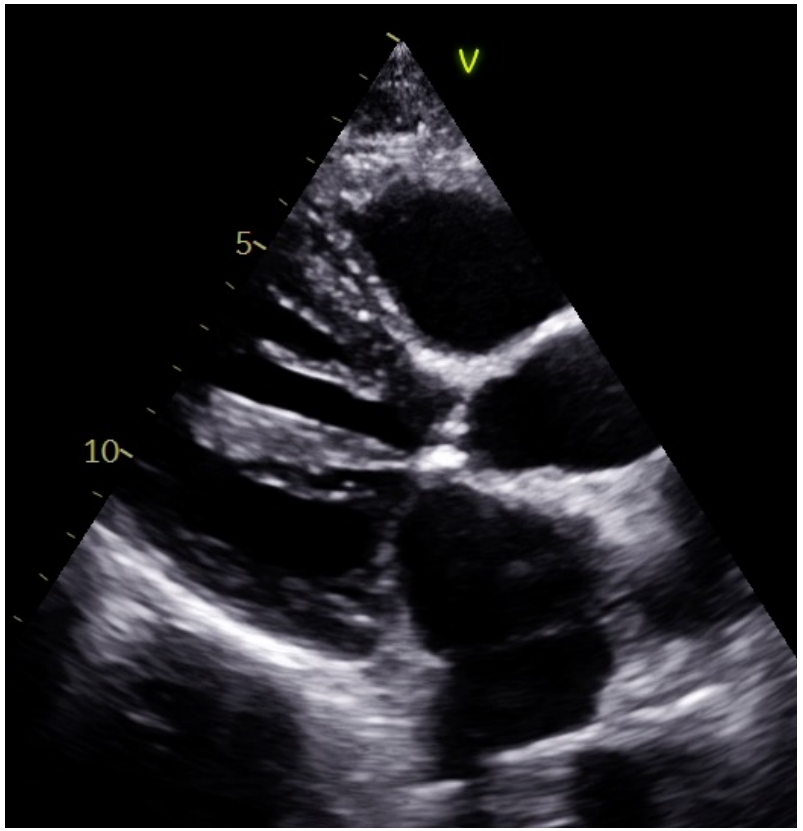


Apical transthoracic 5-chamber view. **(A)** Late diastole. Posterior leaflet is longer than the anterior leaflet. Friction lesion (from chronic mitral-septal contact) on septum is indicated by the **yellow arrow**. **(B)** Moment of coaptation. There is a long residual leaflet from the posterior leaflet that extends far past the anterior leaflet. Point of coaptation is indicated by the **red arrow**. **(C)** Next frame in systole showing coaptation point with a **red arrow** and **white arrow** showing residual leaflet. **(D)** Posterior leaflet mitral-septal contact on septum at friction lesion. Resting LVOT gradient was 80 mm Hg. Online Video 6 shows apical 3-chamber views from this patient. LVOT = left ventricular outflow tract; SAM = systolic anterior motion.



J Am Coll Cardiol 2016;67:1846–58


V
5
10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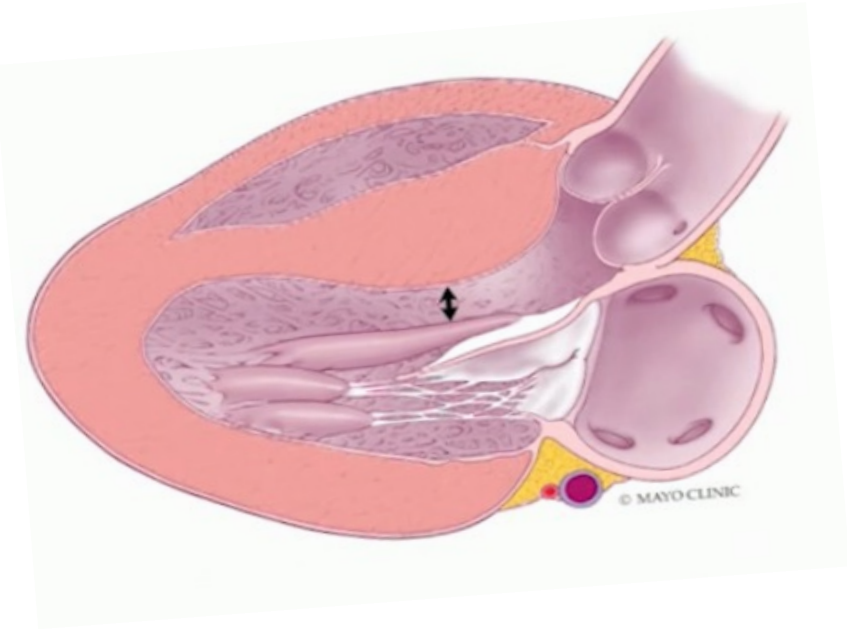
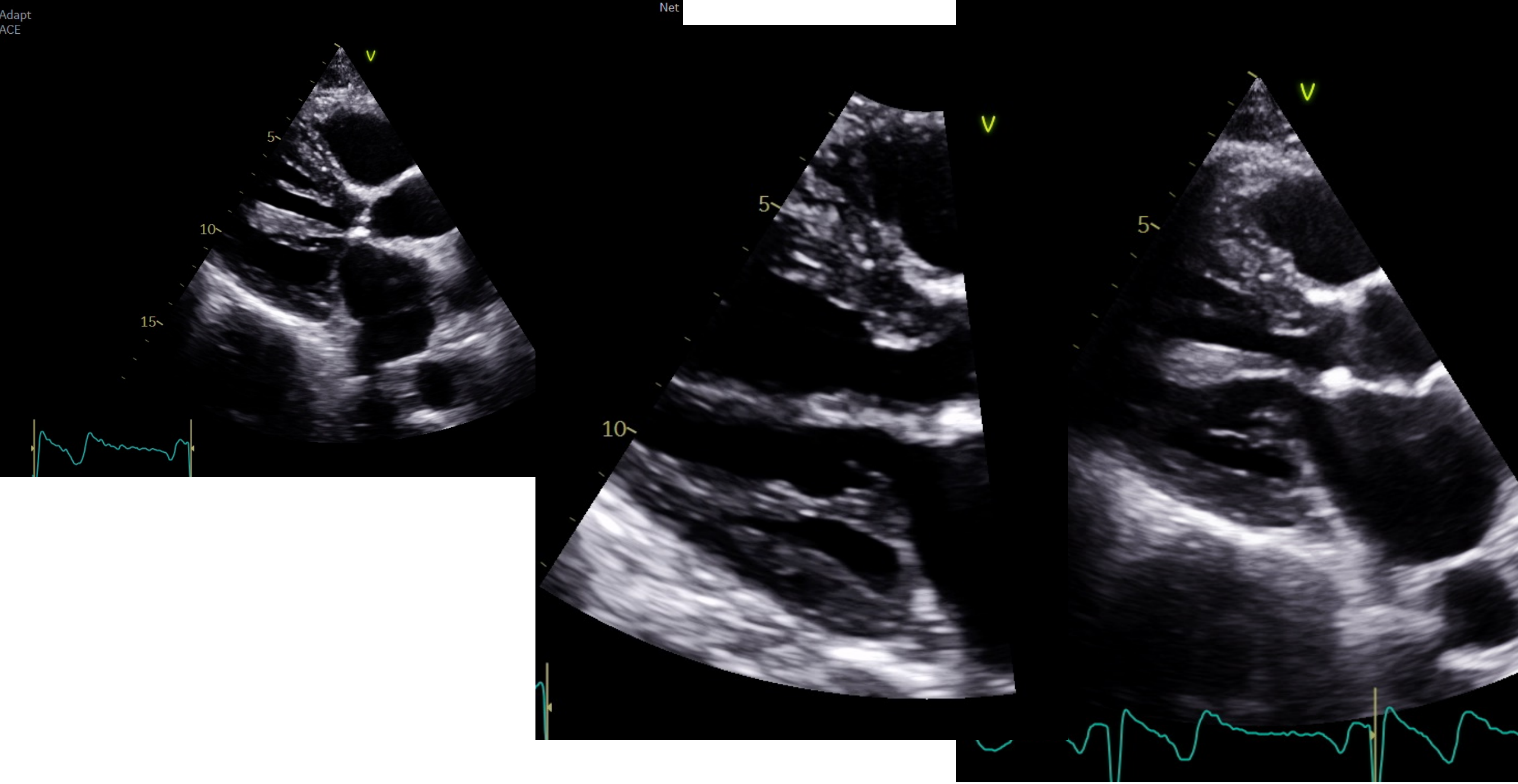

© MAYO CLINIC

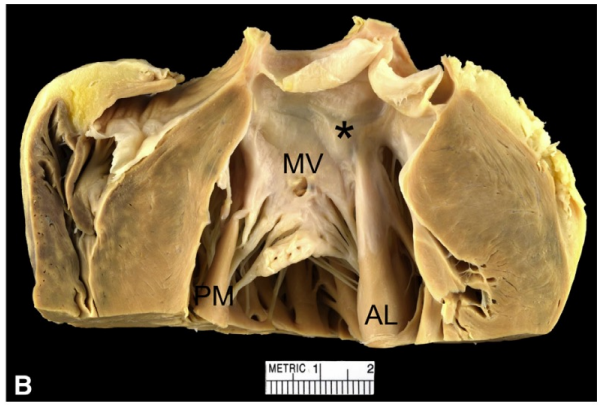

Adapt
ACE
Net
5
10
15
5
10
5

Anomalies d'insertion du pilier sur la valve mitrale

A.C.C.A.

Anomalous papillary muscles—Implications in the surgical treatment of hypertrophic obstructive cardiomyopathy

Juliano Lentz Carvalho, MD,[a] Hartzell V. Schaff, MD,[a] Catherine S. Morris, MD,[b] Rick A. Nishimura, MD,[c] Steve R. Ommen, MD,[c] Joseph J. Maleszewski, MD,[b] and Joseph A. Dearani, MD[a]



Type 1

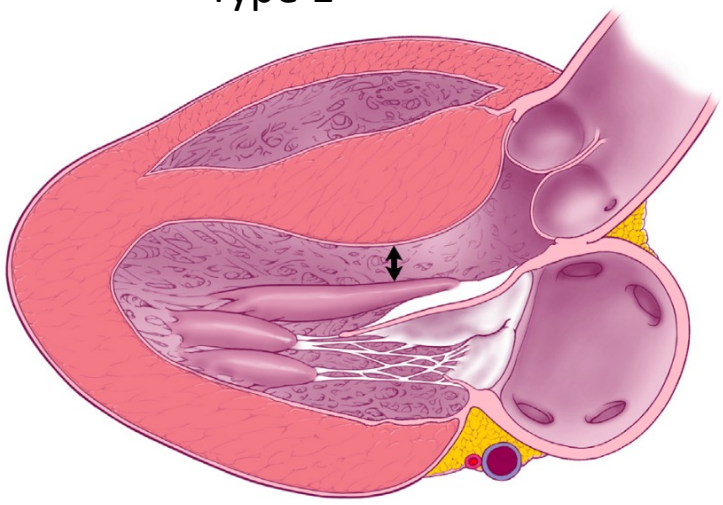


FIGURE 1. Long-axis view of a type I anomalous PM. The *arrow* indicates the site of LVOT obstruction between the hypertrophied interventricular septum and the anomalous PM.

Type 2

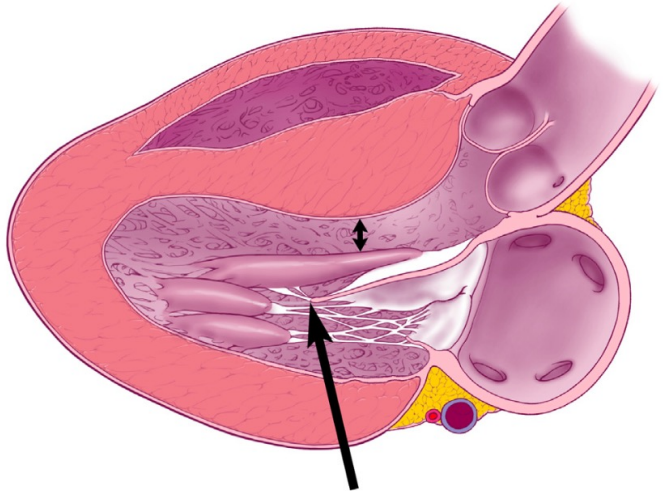


FIGURE 2. Long-axis view of a type II anomalous PM. The *short arrow* indicates the site of LVOT obstruction between the hypertrophied interventricular septum and the anomalous PM. In contrast to the type I anomalous PM, this morphologic subtype has chordal attachments to the free edge of the anterior MV leaflet (*long arrow*), which lend support to the valve.

Type 3

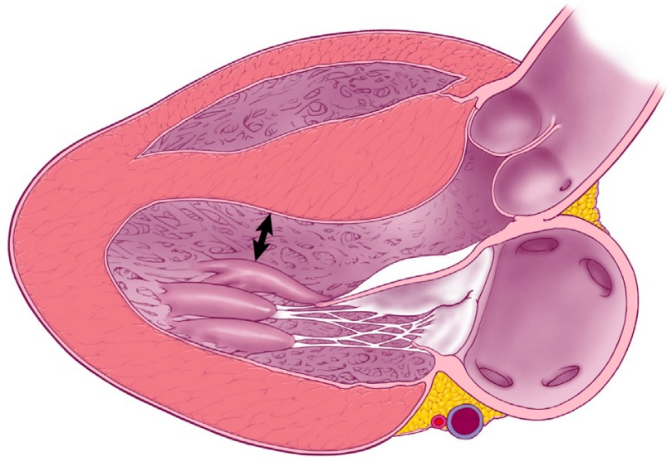
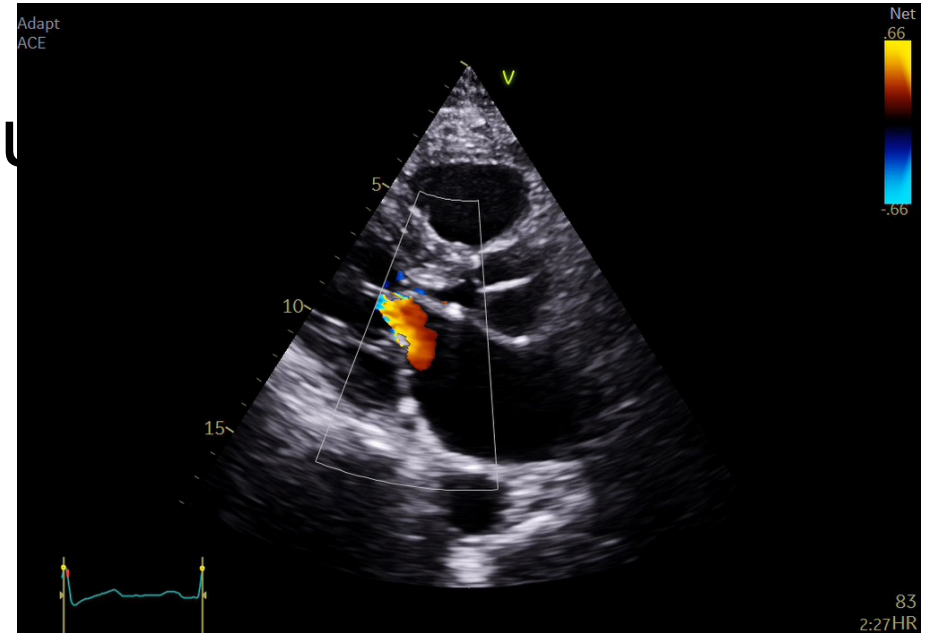
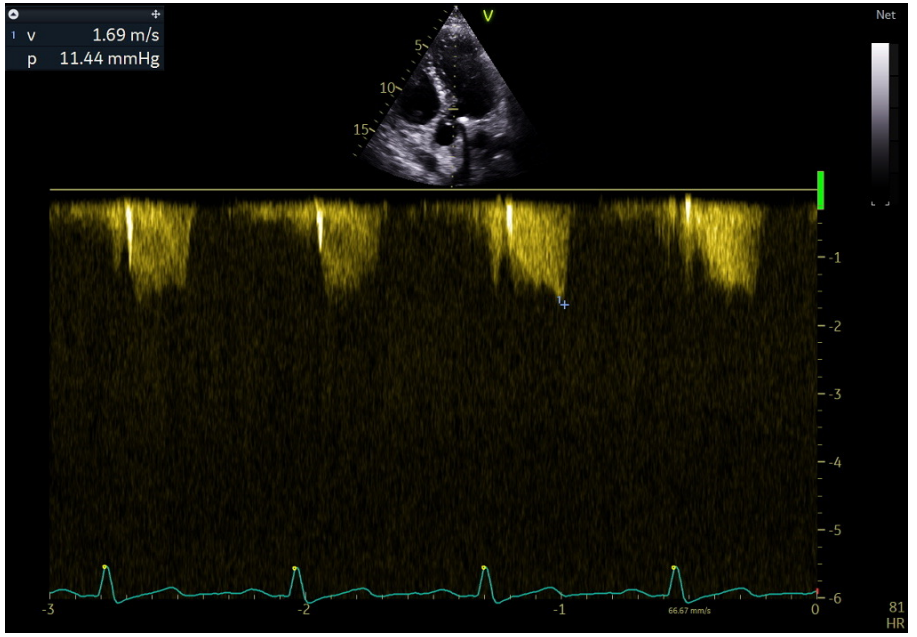
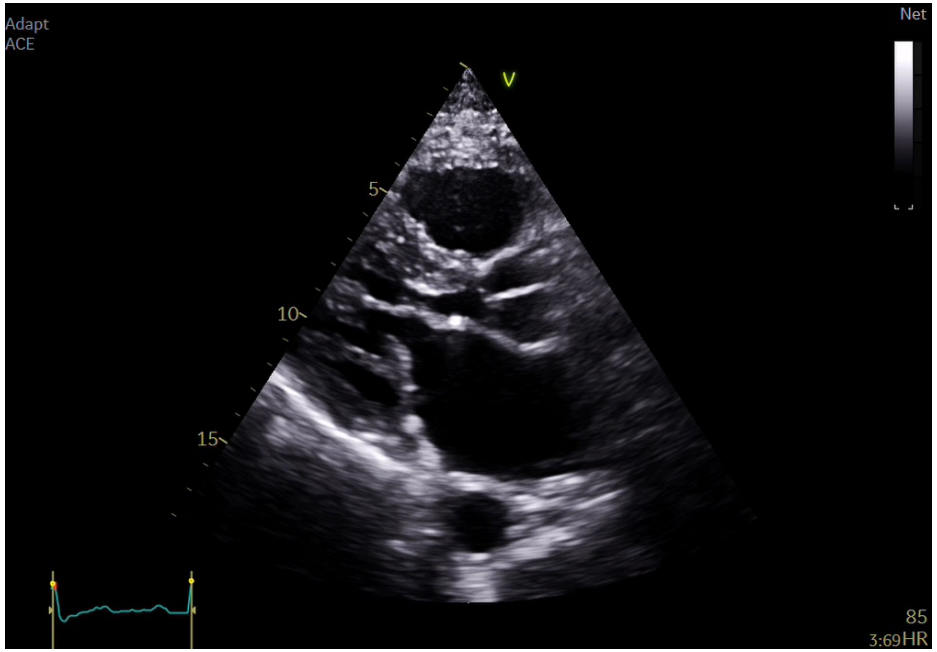


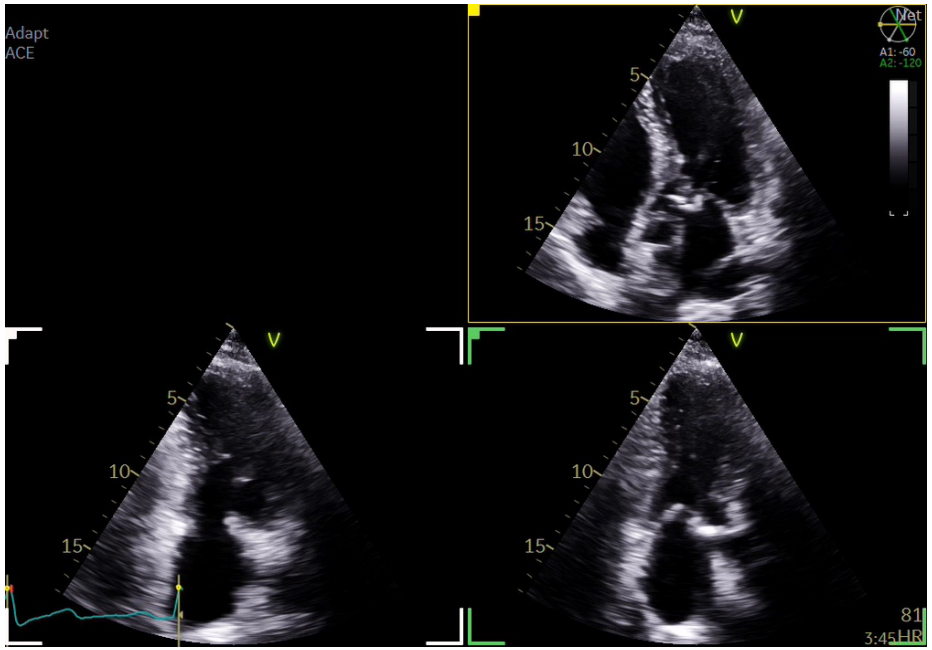
FIGURE 3. Long-axis view of a type III anomalous PM. This variant does not cause subaortic obstruction but may contribute to midventricular obstruction at the level indicated by the *arrow*.

Su


Adapt
ACE
Net
.66
-.66
V
5
10
15
83
2:27HR

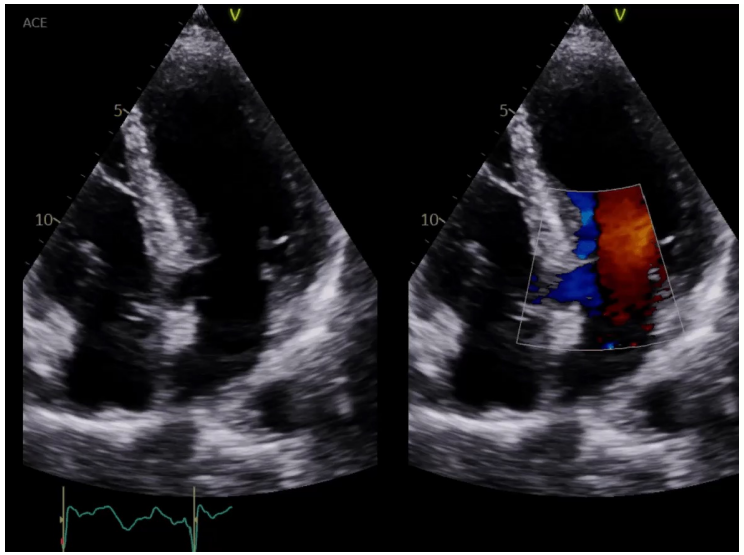

v 1.69 m/s
p 11.44 mmHg
Net
V
5
10
15
-1
-2
-3
-4
-5
-6
-3
-2
-1
0
81
HR

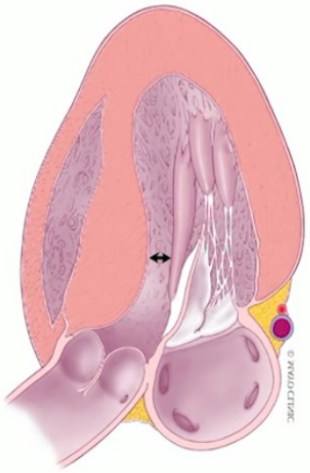

Adapt
ACE
Net
V
5
10
15
85
3:69HR


Adapt
ACE
Net
A1: -60
A2: -120
V
5
10
15
81
3:45HR

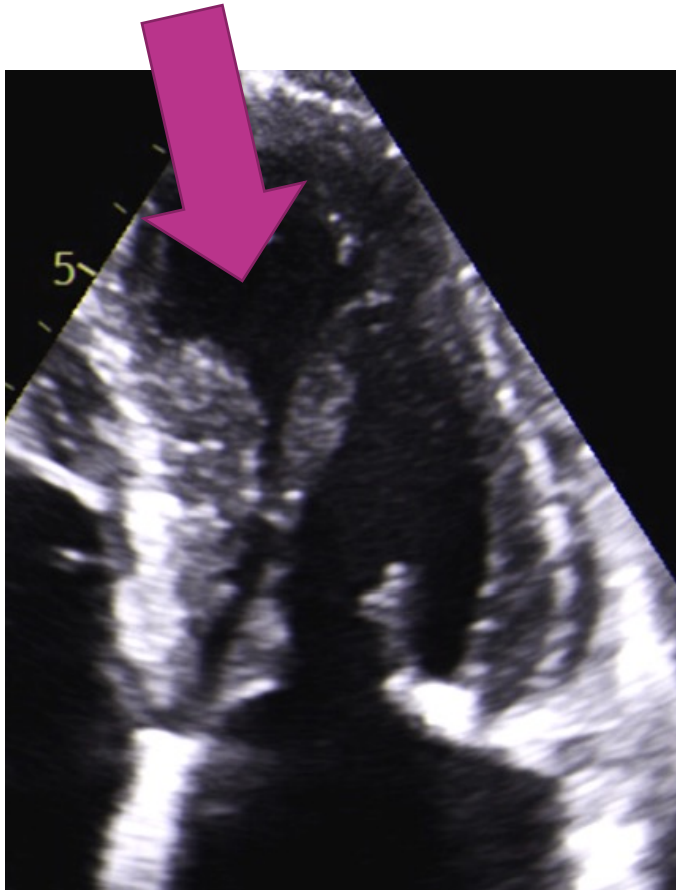
Role des piliers dans l'obstruction

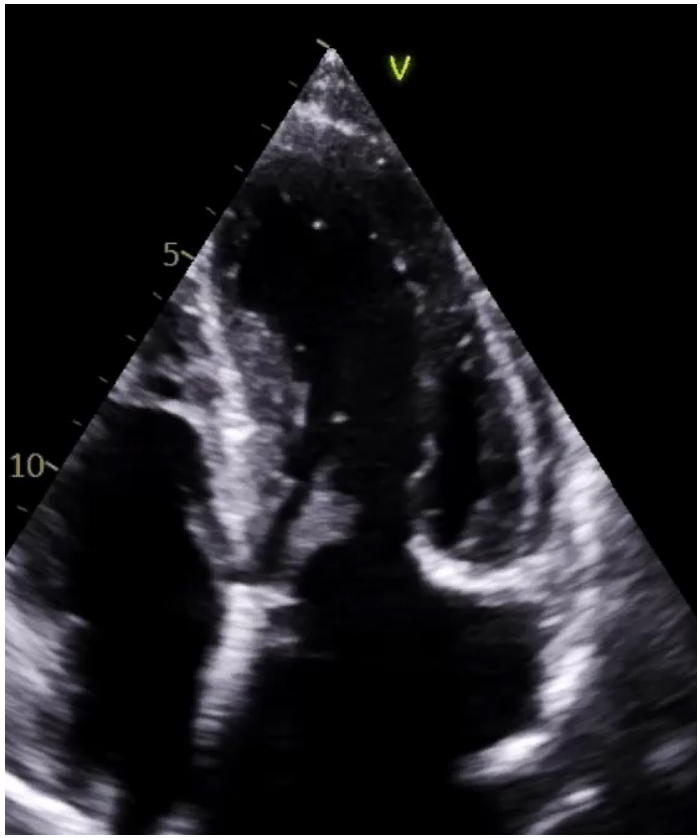
A.C.C.A.





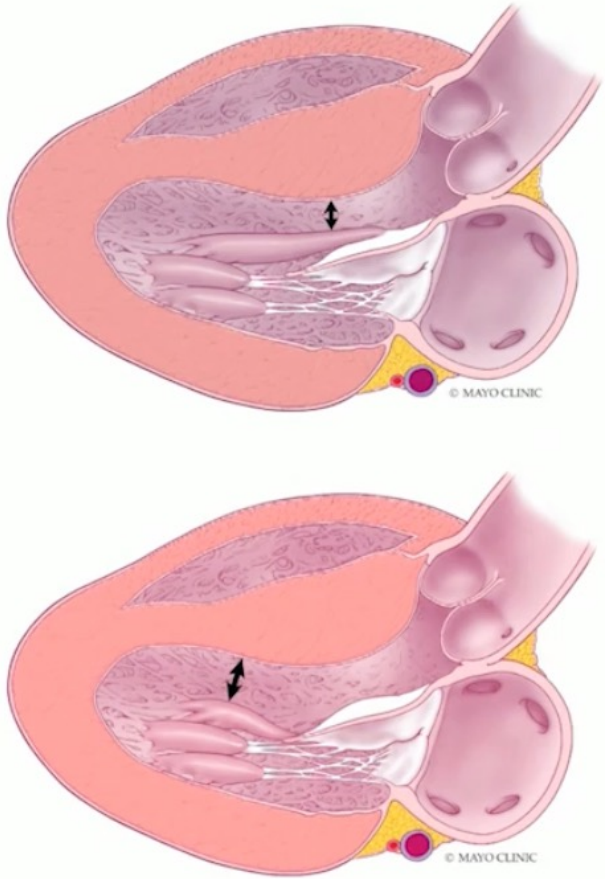
Pas de pilier

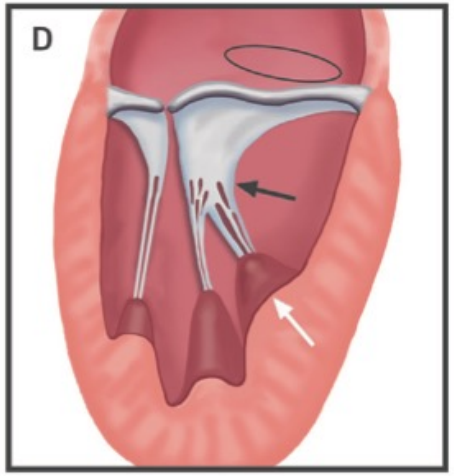




Mitral Valve Abnormalities in HCM

- Anterior/apical displacement of papillary muscle
- Hypertrophy of papillary muscles
- False chordae, muscle bundles
- Abnormal insertion of papillary muscle
- Elongation of leaflets and chordae





Insertion ant du pilier qui est bifide

Est-ce fréquent ?

- Abnormal PM insertion : 4 à 13% des CMHO

On ne trouve que ce que l'on cherche

On ne cherche que ce que l'on connaît

A.C.C.A.

Anomalous papillary muscles—Implications in the surgical treatment of hypertrophic obstructive cardiomyopathy

Check for updates

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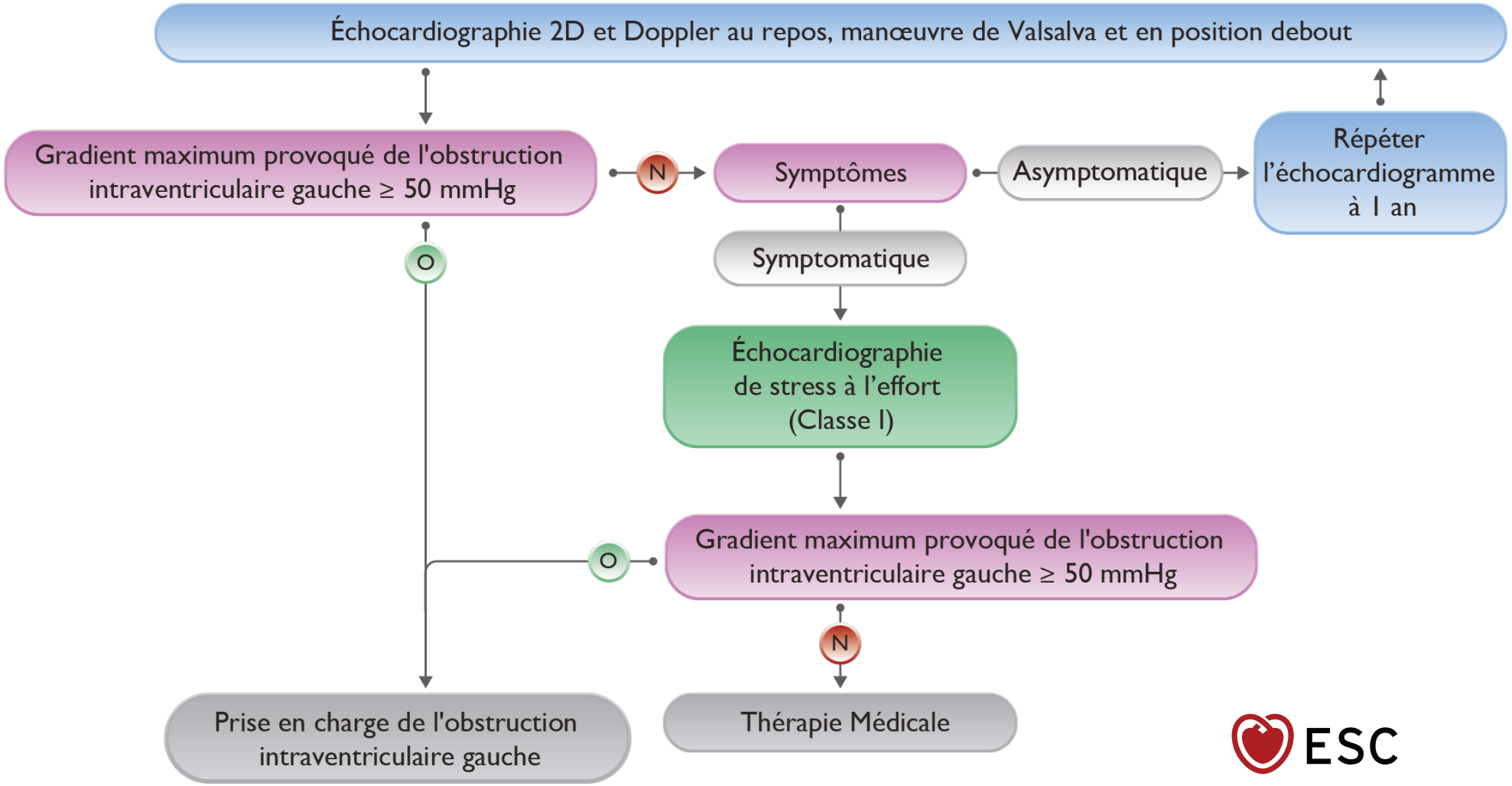
The anomalous papillary muscle was detected on
preoperative transthoracic echocardiography in 11% of patients and
by intraoperative transesophageal echocardiography in 27.4% of patients.

J Thorac Cardiovasc Surg 2022;163:83-89

Quand rechercher l'obstruction intra-VG ?



1. Arbelo E *et al.* European Heart Journal 2023 ESC Guidelines for the management of cardiomyopathies.

Méthodes de provocation

- **Échocardiographie de repos + Valsalva** ± lors de la mise en **orthostatisme**

➡ **Obstruction significative si gradient max (DC) > 50 mmHg**

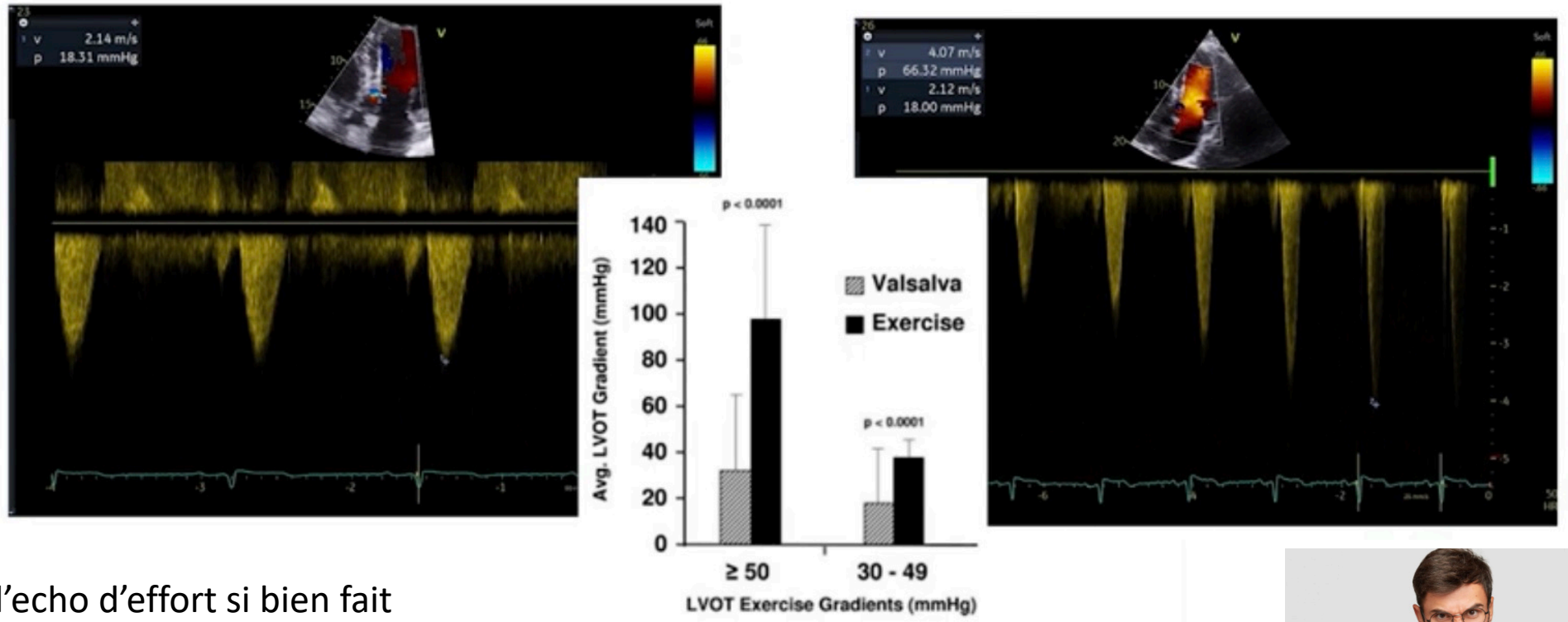
- **Valsalva :** à faire mais insuffisant si patient symptomatique et négatif
- Selon Maron, **sensibilité de 40 %** pour prédire l'obstruction à l'effort
- Réalisation en **post-prandial ++++**

1. Arbelo E *et al.* European Heart Journal 2023 ESC Guidelines for the management of cardiomyopathies. **9.** Maron MS *et al.* Circulation 2006;114;2232-9.
11. Abbasi M *et al.* J Am Soc Echocardiogr 2024;37:613-25.

Manoeuvre de Valsalva

A.C.C.A.

Détection du gradient par la manœuvre de Valsalva



Proche de l'echo d'effort si bien fait

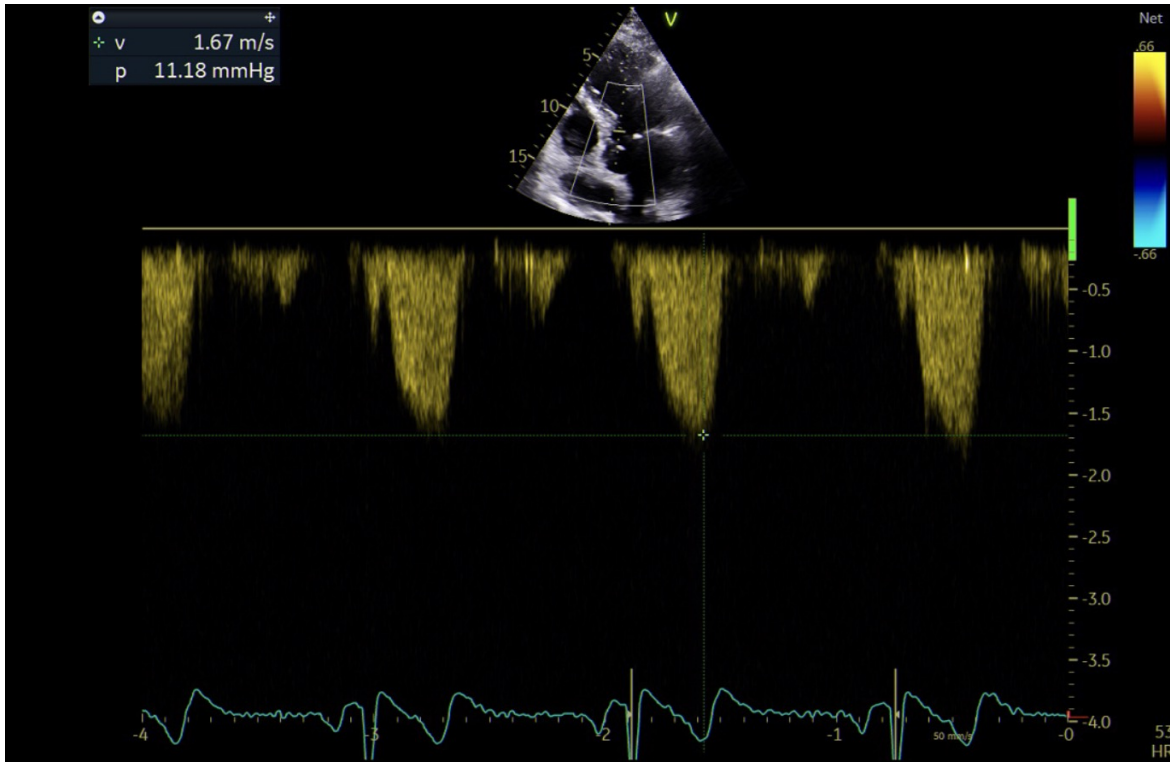
Attention :
Le Valsalva nécessite expertise et précision

Ne pas trop gonfler les poumons

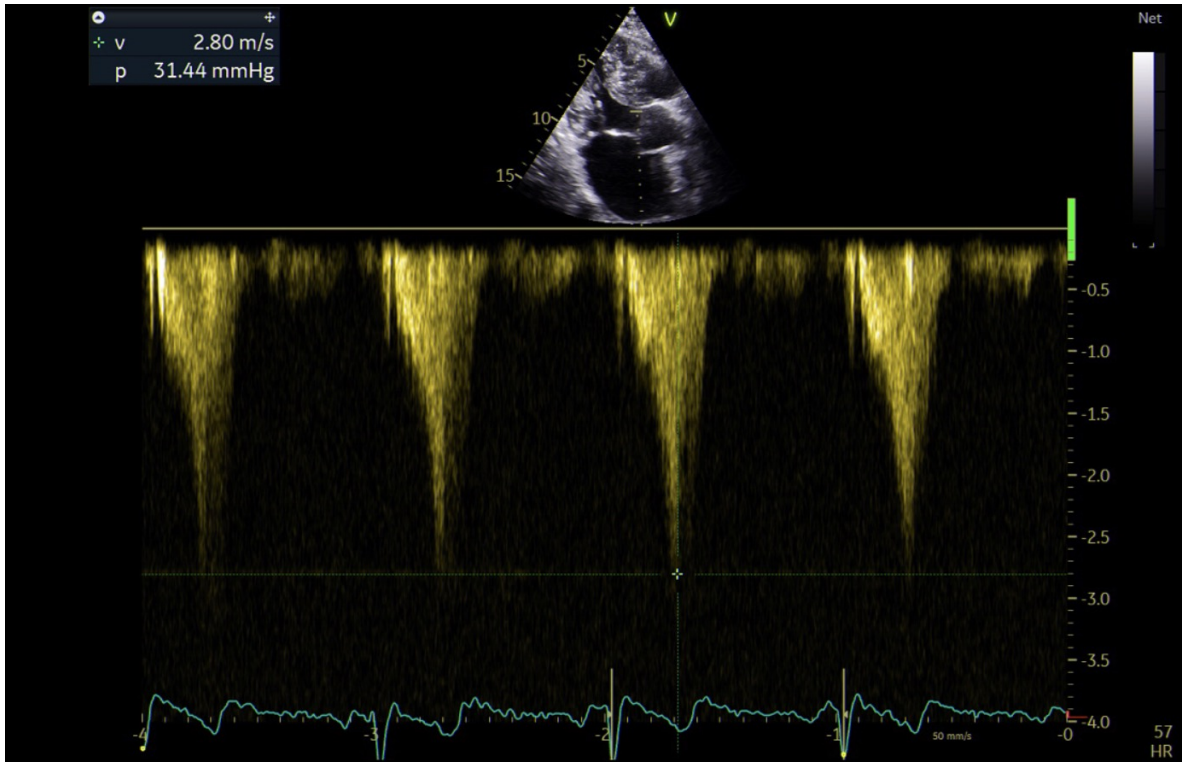
Manoeuvre de valsalva

A.C.C.A.

Respiration libre



Manoeuvre de Valsalva



ESC European Society of Cardiology
European Heart Journal - Case Reports (2023) **7**, 1–2
https://doi.org/10.1093/ehjcr/ytad156

CARDIOVASCULAR FLASHLIGHT
Inherited cardiac conditions/cardiomyopathies

Left ventricular outflow tract obstruction induced by party balloon inflation manoeuvre in transthoracic echocardiography

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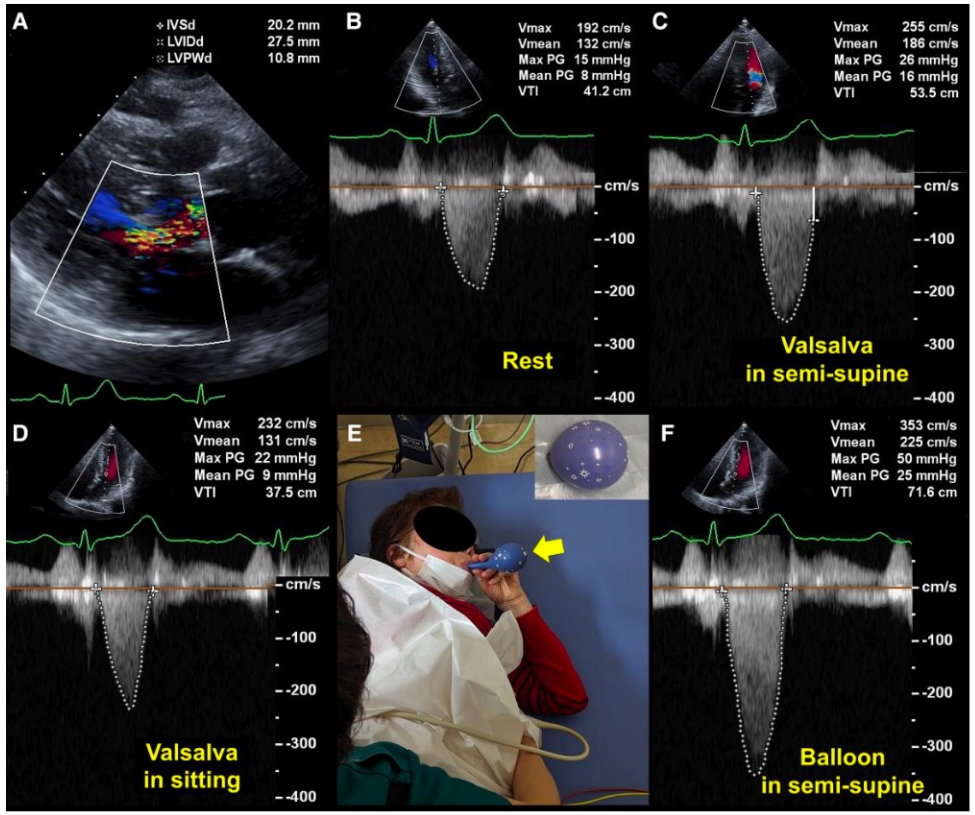
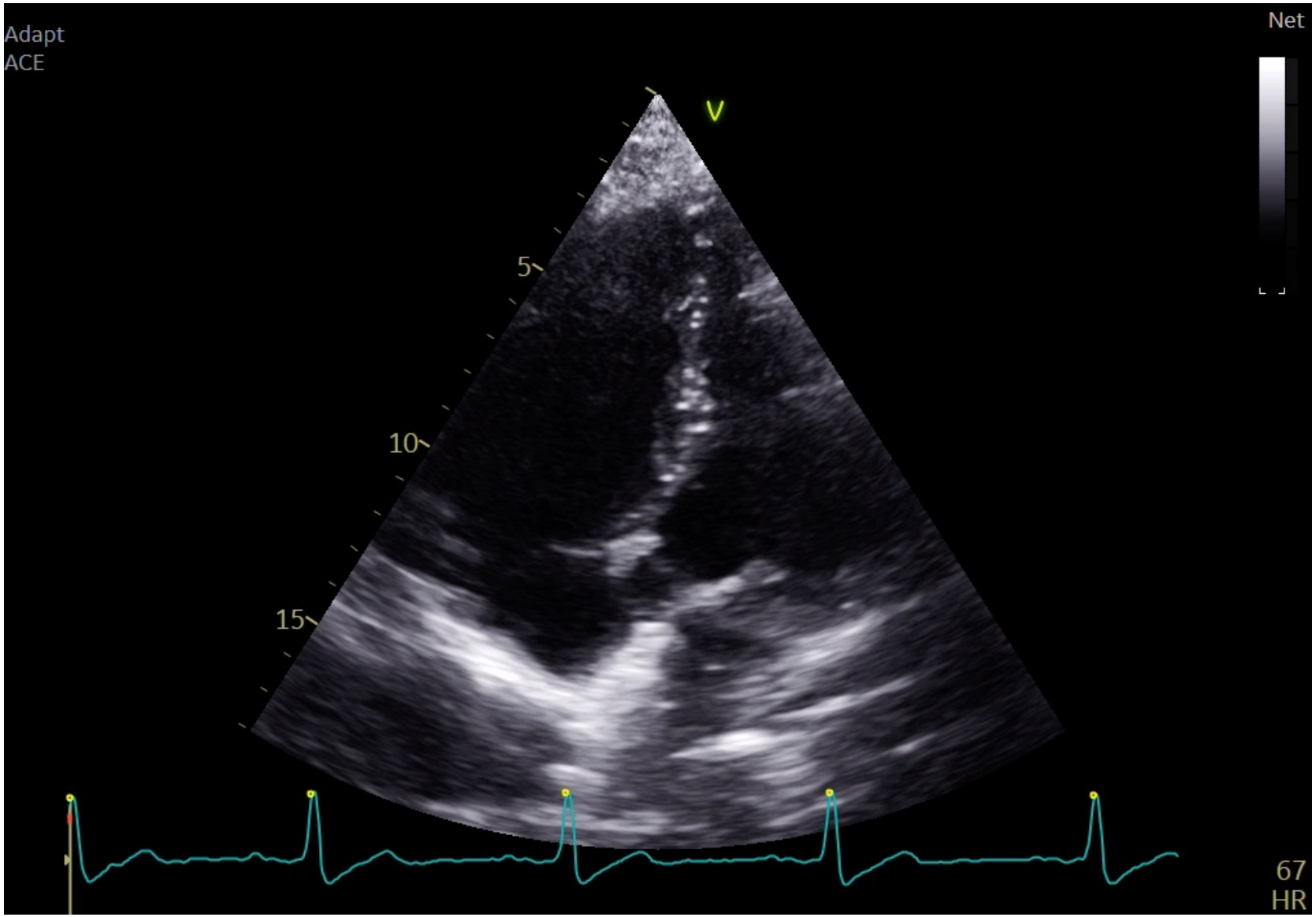
Received 8 February 2023; first decision 16 February 2023; accepted 31 March 2023; online publish-ahead-of-print 3 April 2023



A.C.C.A.

Balloon inflation provided 20–25 mmHg positive end-expiratory pressure to the patient's airway, increasing intrathoracic pressure and decreasing venous return, leading to narrowed left ventricular cavity and exacerbation of SAM, which finally increased the LVOT pressure gradient.

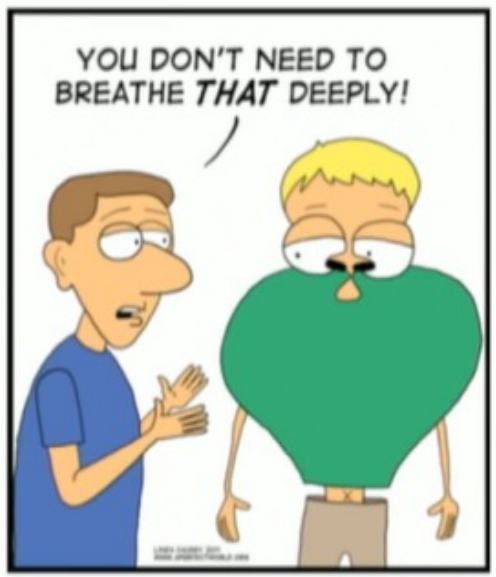
Compared to conventional loading methods, this novel manœuvre is easier to understand and objectively assesses the performance;


Adapt
ACE
Net
V
5
10
15
67
HR

A.C.C.A.

Instructed Valsalva

- Unable to measure efficacy
- Variability in description
- Image degradation



Source: Linda Causey 2011

Goal Directed Valsalva

CARDIAC HEMODYNAMIC ASSESSMENTS

Standardized Goal-Directed Valsalva Maneuver for Assessment of Inducible Left Ventricular Outflow Tract Obstruction in Hypertrophic Cardiomyopathy

Suwen Kumar, MD, Grace Van Ness, MPH, Aron Bender, MD, Mrinal Yadava, MD, Jessica Minnier, PhD, Sriram Ravi, MD, Lidija McGrath, MD, Howard K. Song, MD, PhD, and Stephen B. Heitner, MD,
Portland, Oregon

Standardized Goal-Directed Valsalva Maneuver for Assessment of Inducible Left Ventricular Outflow Tract Obstruction in Hypertrophic Cardiomyopathy

A.C.C.A.

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Portland, Oregon

Methods of Provocation

Routine clinical practice at our HCM center includes the use of the Valsalva maneuver and postprandial exercise for provocation of LVOTO. The GDV was additionally performed as a part of the study.

Self-Directed Valsalva Maneuver. While lying in the left lateral decubitus position for echocardiography, patients were instructed to "bear down" or "strain as if attempting to move your bowels." Patients were encouraged to hold the strain phase of the maneuver for as long as they could tolerate.

Goal-Directed Valsalva Maneuver. To measure intraoral pressure, an aneroid manometer was connected to a disposable 10-mL syringe (plunger removed) with rubber tubing (Figure 1). While lying in the left lateral decubitus position for echocardiography, patients were instructed by the sonographer to blow into the syringe and maintain a pressure of >40 mm Hg for >10 sec.

Exercise. Postprandial HSE was performed with an upright treadmill exercise per standard Bruce protocol. Subjects taking cardiac medications (β-blockers, calcium channel blockers, and/or disopyramide) were instructed to continue their medications as prescribed and asked to eat a hearty meal 2 hours before the test. Echocardiographic and Doppler data on LVOTO were acquired at rest and immediately following peak exercise.

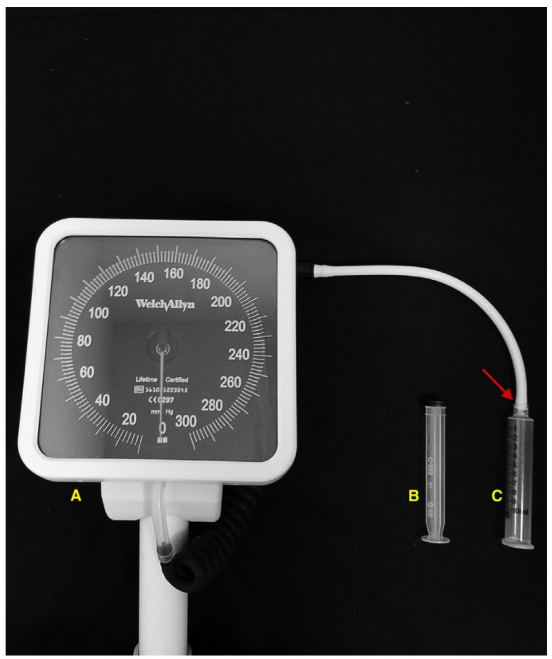


Figure 1 Apparatus to conduct the GDV. Aneroid manometer **(A)** connected to a 10-mL syringe **(C)** through the tubing (*arrow*) after removing the plunger **(B)**.

J Am Soc Echocardiogr 2018;31:791-8.)

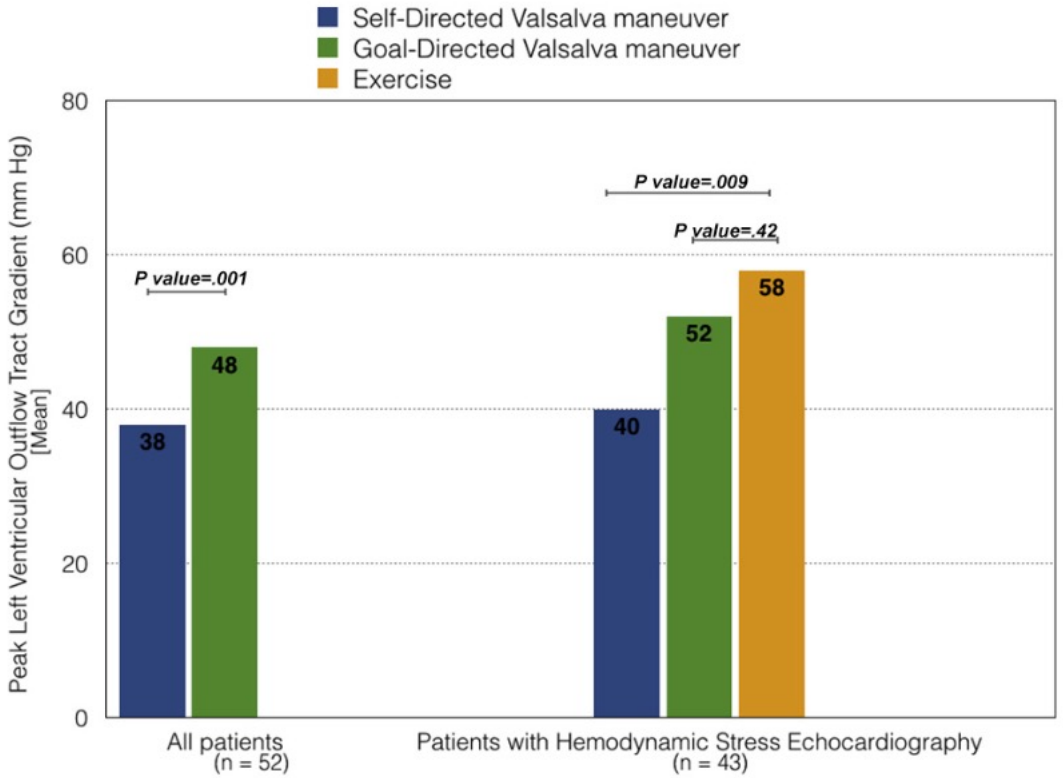
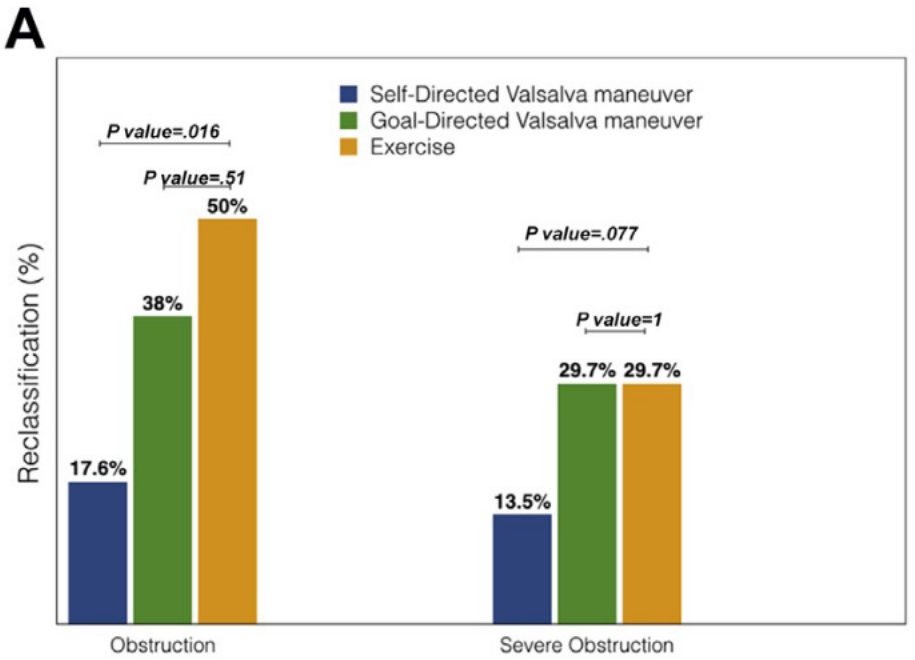


Figure 2 Comparison of pLVOTG with SDV, GDV, and exercise. GDV had significantly higher pLVOTG compared with SDV (P = .001) but was similar to exercise (P = .042). Similarly, exercise had higher pLVOTG compared with SDV (P = .009).

HIGHLIGHTS

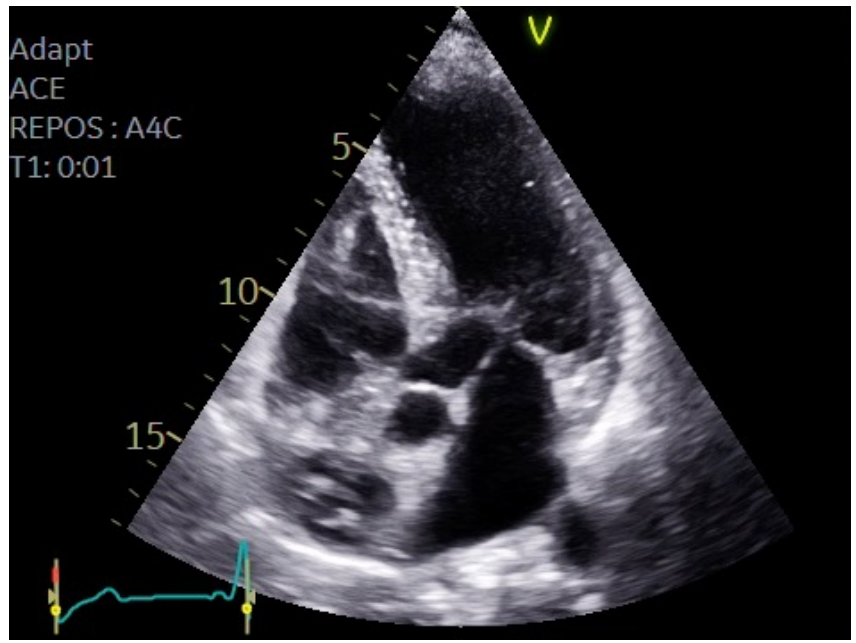
- The Valsalva maneuver is widely used to provoke outflow tract gradient in obstructive HCM.
- It is performed subjectively, introducing wide variability and inconsistency.
- A goal-directed method using intraoral pressure >40 mm Hg for 10 sec can standardize this maneuver.
- GDV is more effective in provoking outflow tract gradient than SDV.
- GDV can significantly alter patient management by reclassifying disease severity.

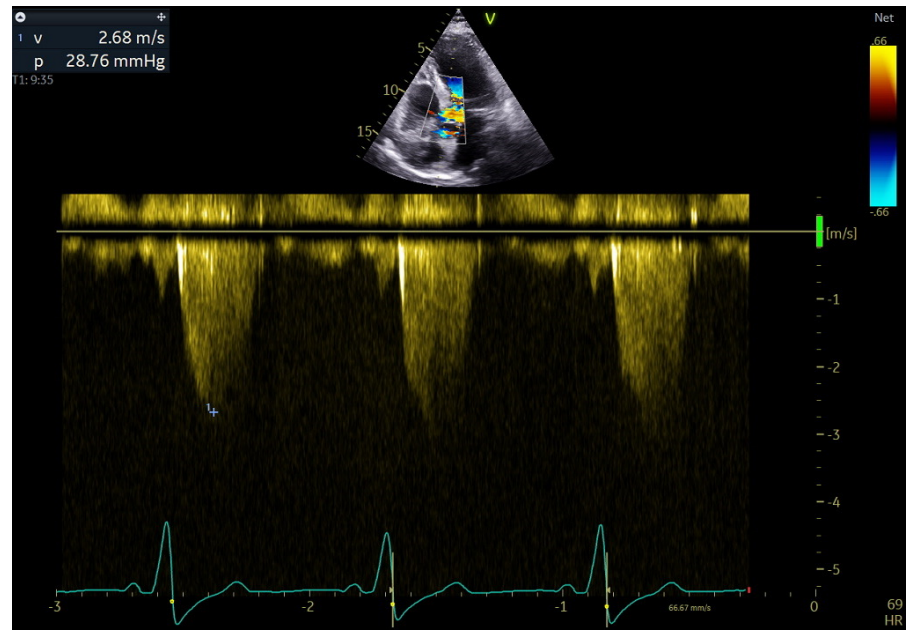


Cas de Mr X, 50 ans

- Dyspnée d’effort (NYHA II)
- CMH asymétrique découverte récemment

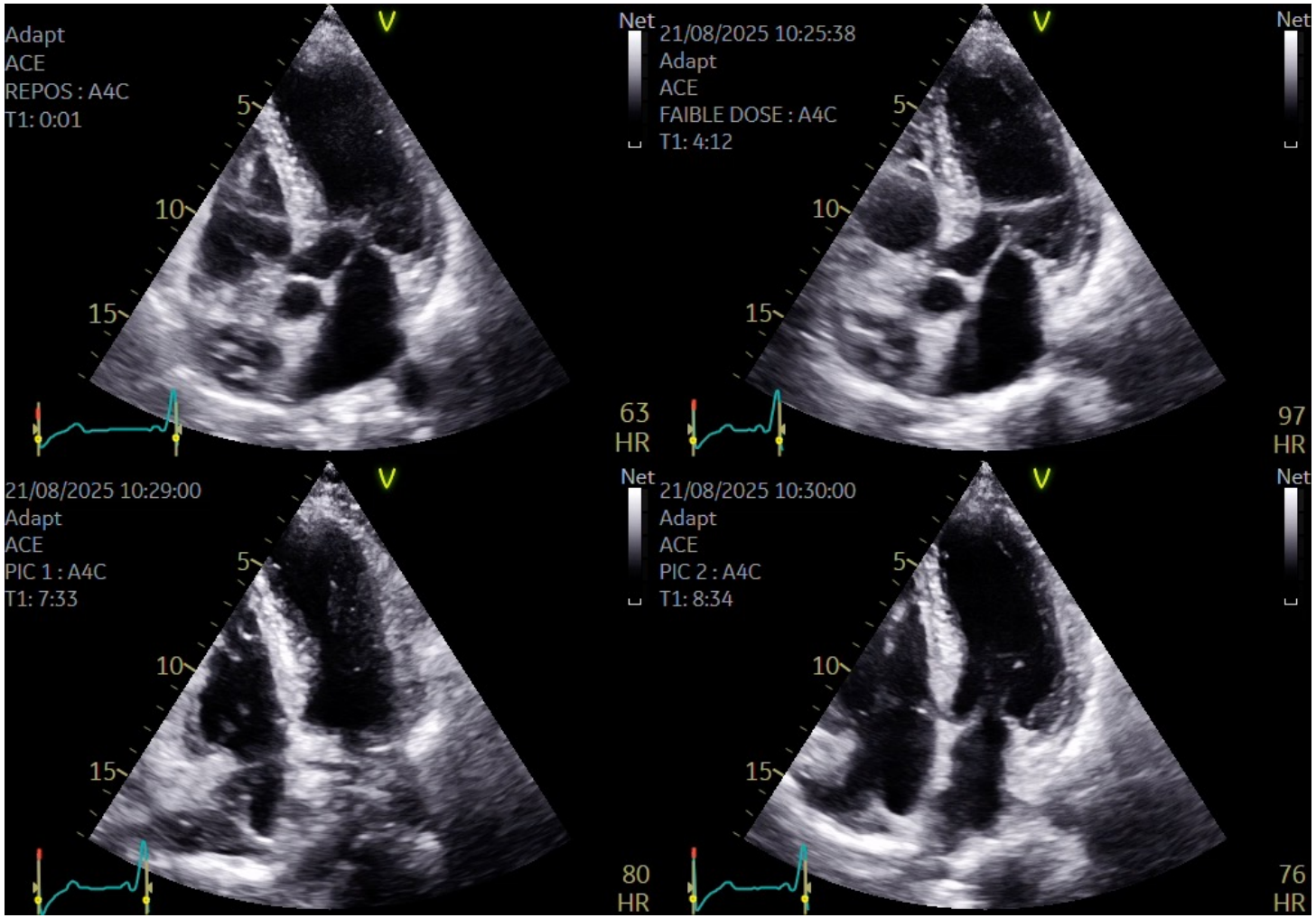
A.C.C.A.


Adapt
ACE
REPOS : A4C
T1: 0:01
5
10
15


v 2.68 m/s
p 28.76 mmHg
T1: 9:35
Net
.66
-.66
[m/s]
-1
-2
-3
-4
-5
-3
-2
-1
0
66.67 mm/s
69
HR

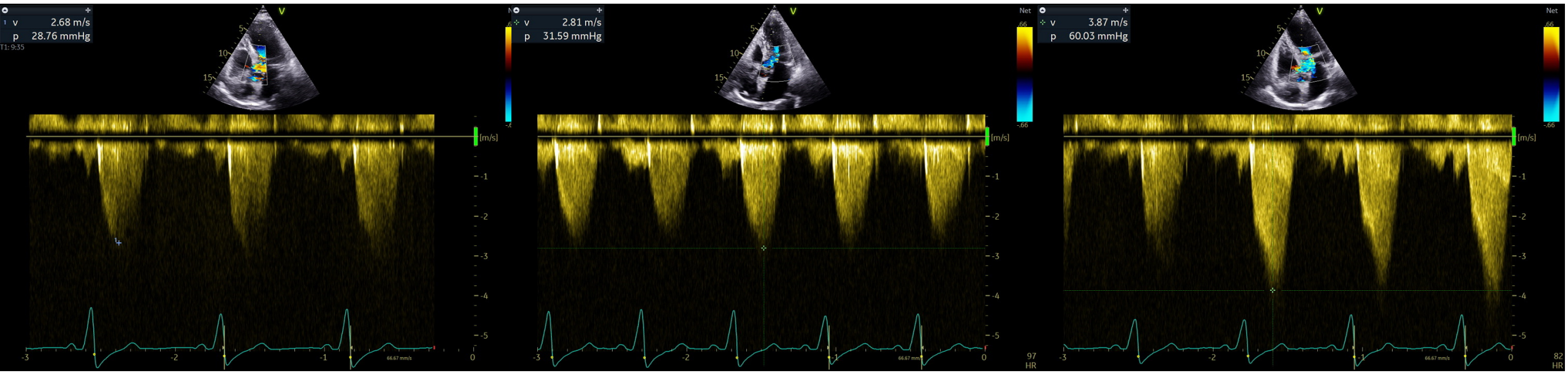
Ref :

A.C.C.A.


Adapt
ACE
REPOS : A4C
T1: 0:01
Net
21/08/2025 10:25:38
Adapt
ACE
FAIBLE DOSE : A4C
T1: 4:12
Net
63
HR
97
HR
21/08/2025 10:29:00
Adapt
ACE
PIC 1 : A4C
T1: 7:33
Net
21/08/2025 10:30:00
Adapt
ACE
PIC 2 : A4C
T1: 8:34
Net
80
HR
76
HR

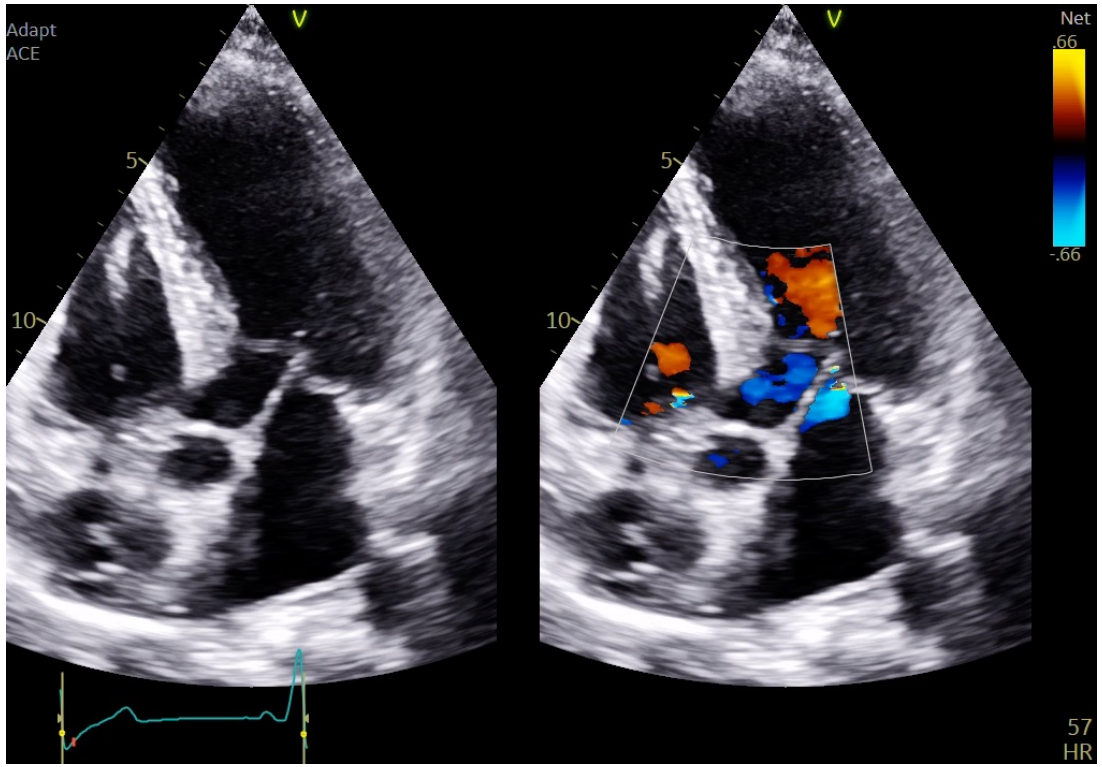
Ref :

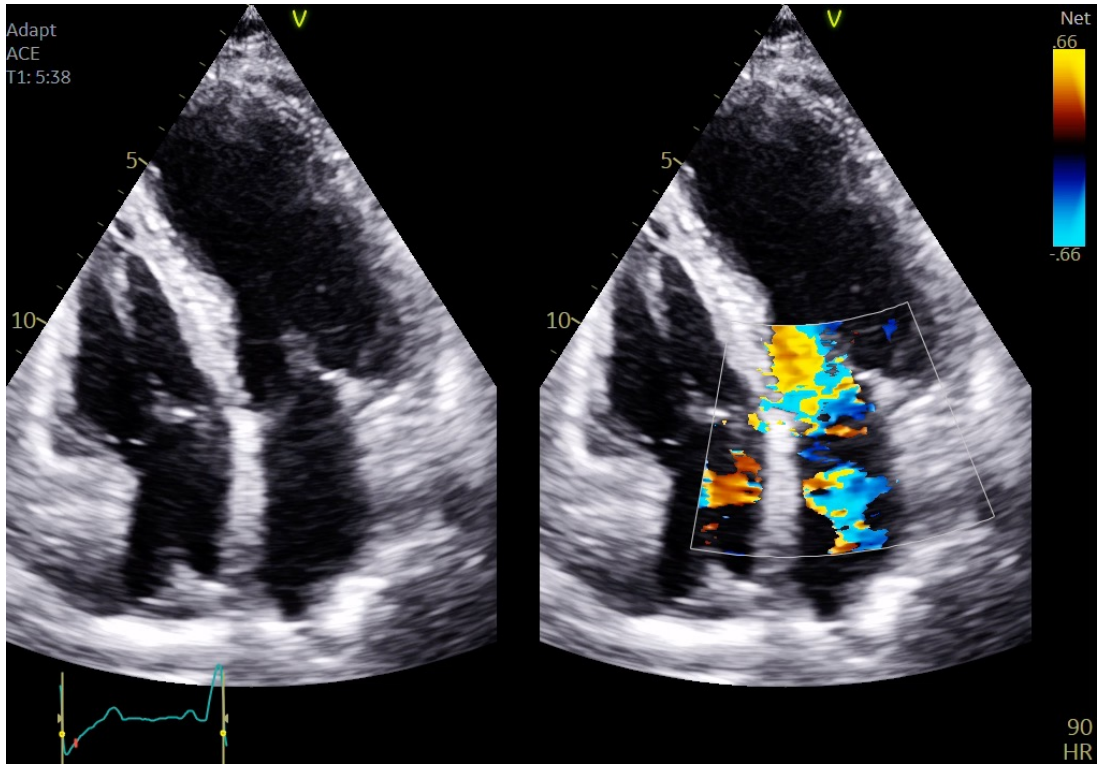
A.C.C.A.


v 2.68 m/s
p 28.76 mmHg
v 2.81 m/s
p 31.59 mmHg
v 3.87 m/s
p 60.03 mmHg
[m/s]
Net
97 HR
82 HR

Ref :

A.C.C.A.


Adapt
ACE
V
V
Net
.66
-.66
5
10
5
10
57
HR


Adapt
ACE
T1: 5:38
V
V
Net
.66
-.66
5
10
5
10
90
HR

Ref :

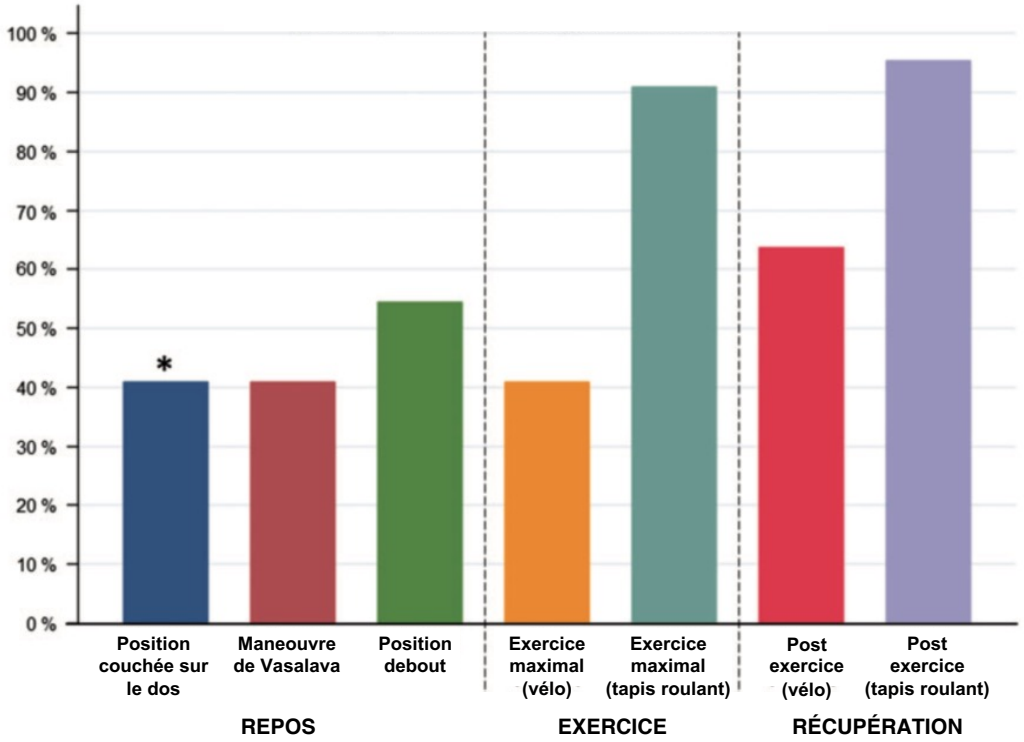
Provocation par l'effort physique

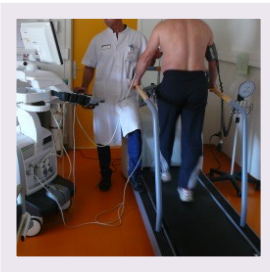
- **A l'effort : échocardiographie d'effort**
- Per-effort ++++ et post-effort
- **Vélo assis+++, le plus vertical possible**
- Impact du retour veineux à prendre en compte

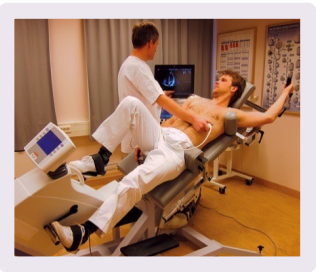
Impact de la position sur la provocation de l'obstruction

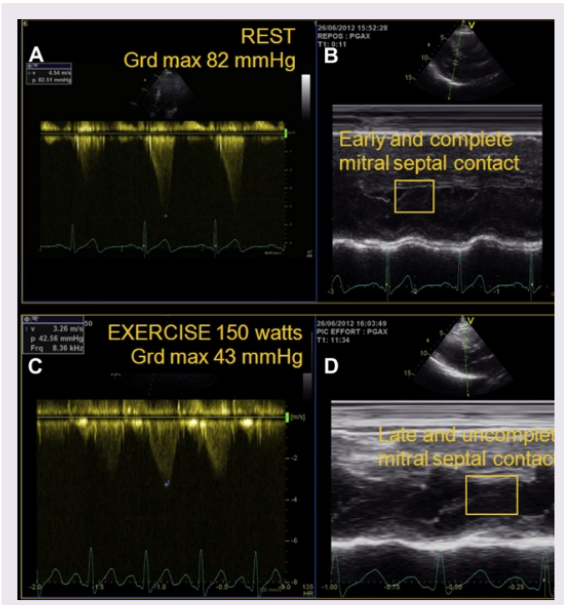
Étude pilote prospective 22 patients CMH NYHA II

Pourcentage de patients CMH
avec gradient max sous-aortique ≥ 50 mmHg









Upright treadmill vs. semi-supine bicycle exercise echocardiography to provoke obstruction in symptomatic hypertrophic cardiomyopathy: a pilot study

Patricia Reant[1,2,3,4]*, Maxence Dufour[1,2], Jerome Peyrou[1,2], Amelie Reynaud[1,2,3], Caroline Rooryck[1,2], Marina Dijos[1,2,3], Cecile Vincent[1,2], Claire Cornolle[1,2,3], Raymond Roudaut[1,2,3], and Stephane Lafitte[1,2,3]

Cardiomyopathy

Paradoxical Response to Exercise in Asymptomatic Hypertrophic Cardiomyopathy

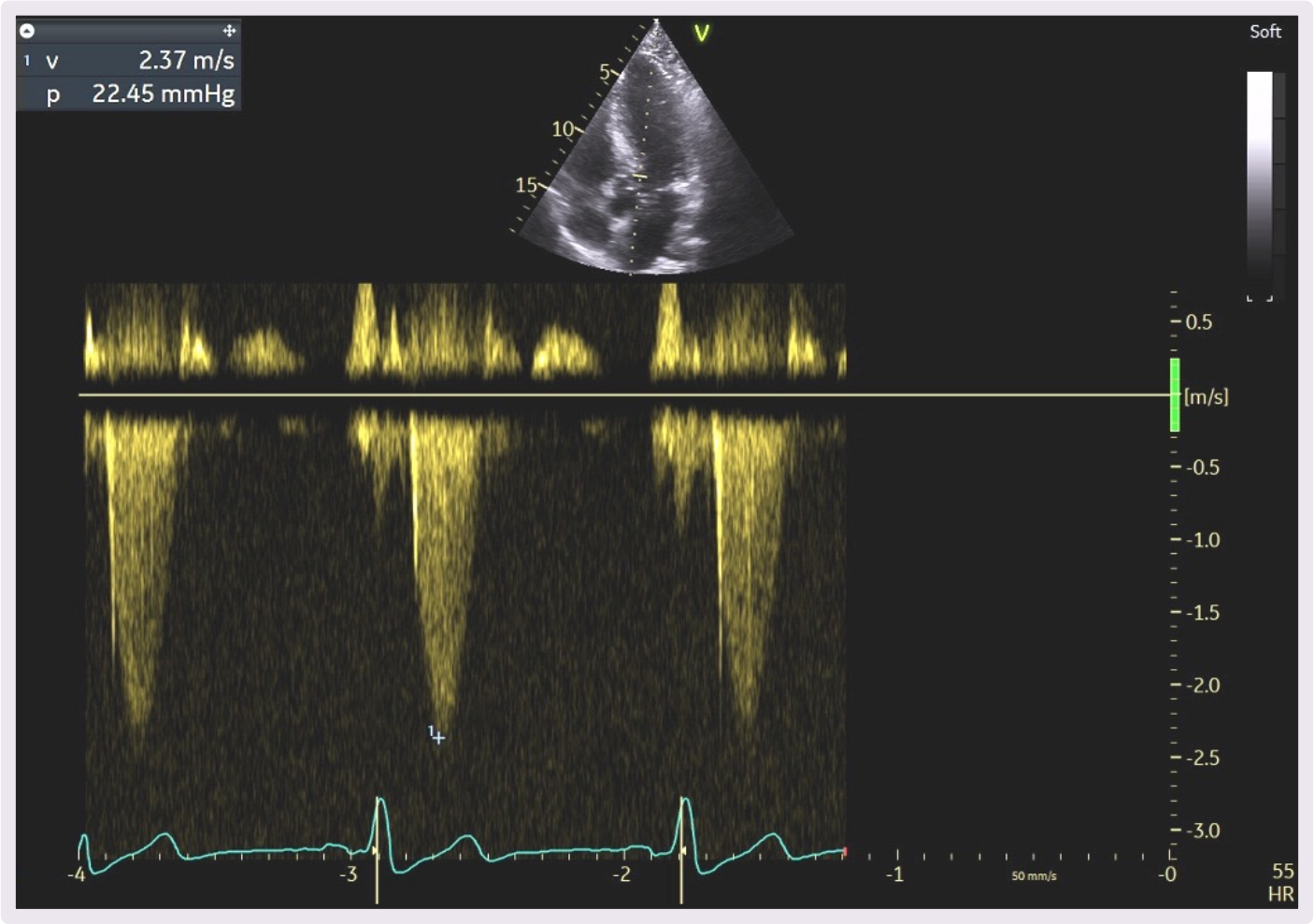
A New Description of Outflow Tract Obstruction Dynamics

Stéphane Lafitte, MD, PHD,* Patricia Reant, MD, PHD,* Cecile Touche, MD,* Xavier Pillois, PHD,* Marina Dijos, MD,* Florence Arsac, MD,* Jerome Peyrou, MD,* Michel Montaudon, MD, PHD,* Philippe Ritter, MD,* Raymond Roudaut, MD,* Anthony DeMaria, MD, PHD†

Bordeaux, France; and San Diego, California

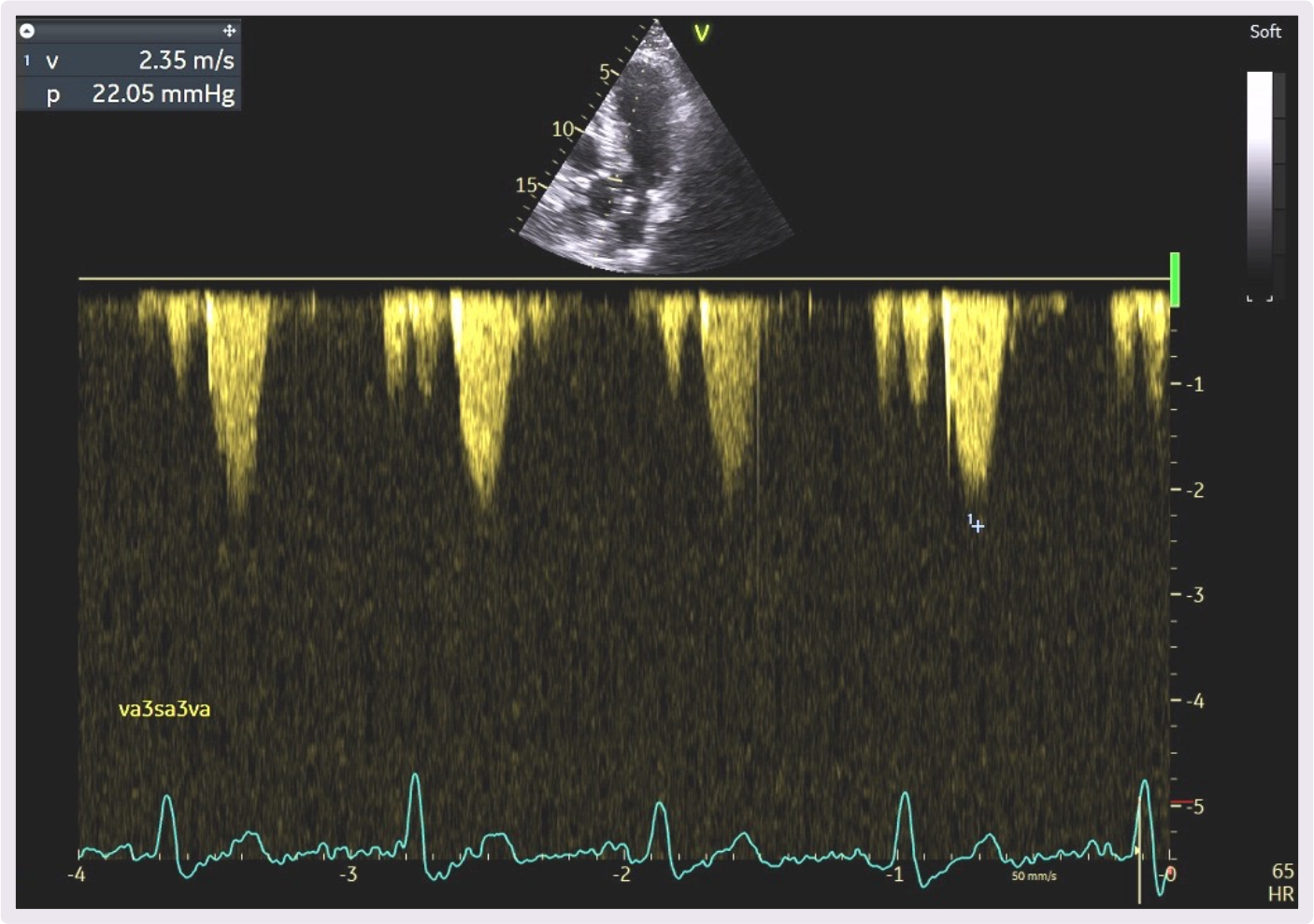
10. Réant P. *et al.* Eur Heart J Cardiovasc Imaging 2018;19:31- 38. JACC 2013. **12.** Laffite S *et al.* J Am Coll Cardiol 2013;62:842–50.

Recherche de l’obstruction



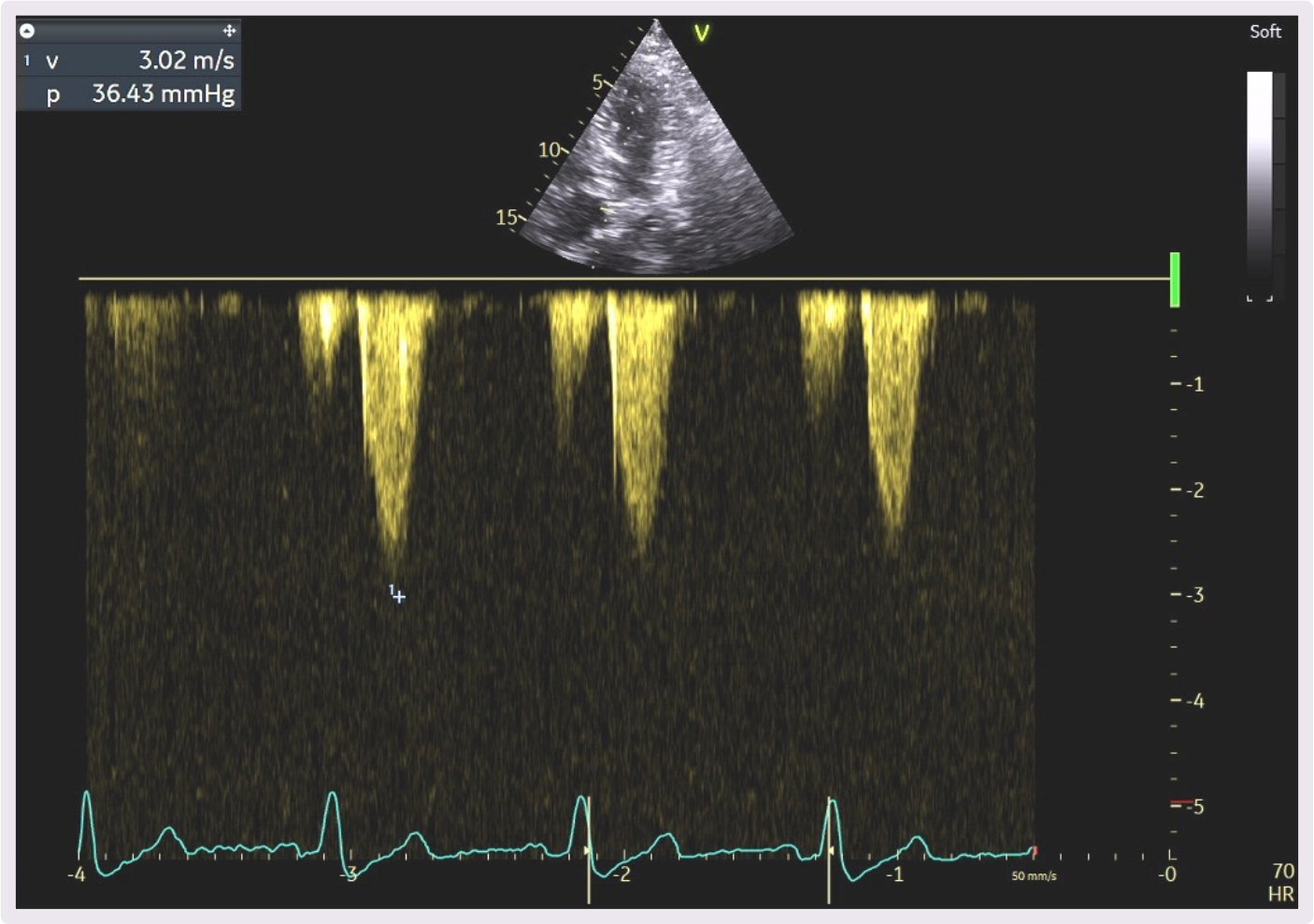
Repos couché

Recherche de l’obstruction



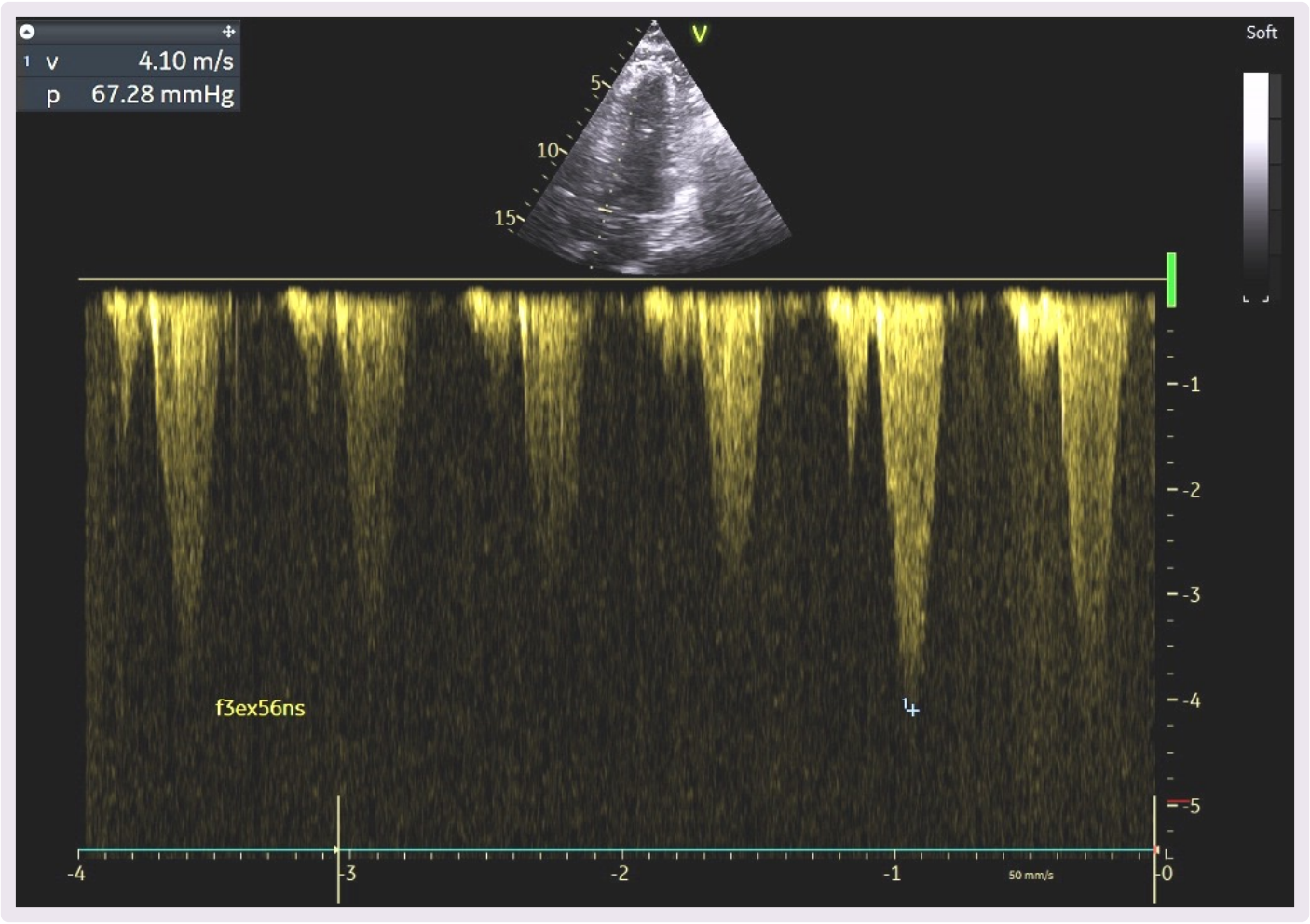
Valsalva

Recherche de l’obstruction



Après mise à l’orthostatisme

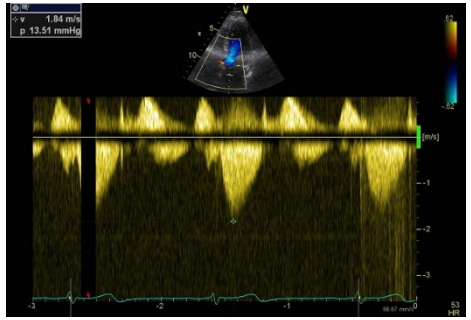
Recherche de l’obstruction



Après
10 flexions

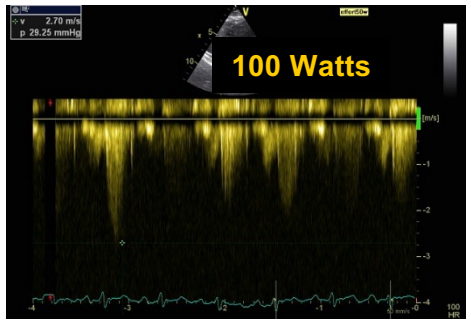
Exemple d'effet de la position

Évaluation au repos, position couchée



Gradient max sous-aortique = 13 mmHg

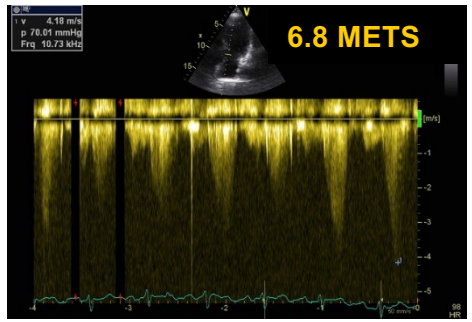
Effort sur bicyclette semi-inclinée



Gradient max sous-aortique = 29 mmHg

Stop pour dyspnée

Effort sur tapis
Protocole Bruce modifié



Gradient max sous-aortique = 70 mmHg

OBSTRUCTION LATENTE

- Manœuvres hémodynamiques
  - VALSALVA
  - SQUAT
- CHANGEMENT DE POSITION
- ECHO D'EFFORT
  - VELO
  - TAPIS

Manœuvres hémodynamiques

VALSALVA + SQUAT

Repetitive Squat-to-Stand Provocation of Dynamic Left Ventricular Outflow Tract Obstruction in Hypertrophic Cardiomyopathy

Journal of the American Society of Echocardiography
Volume 35 Number 3

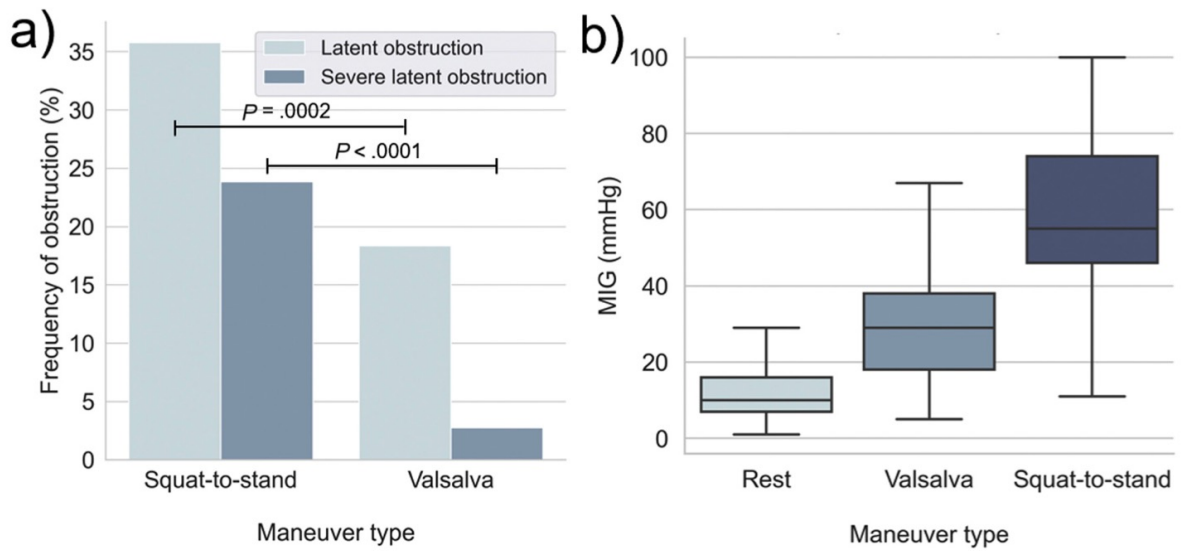
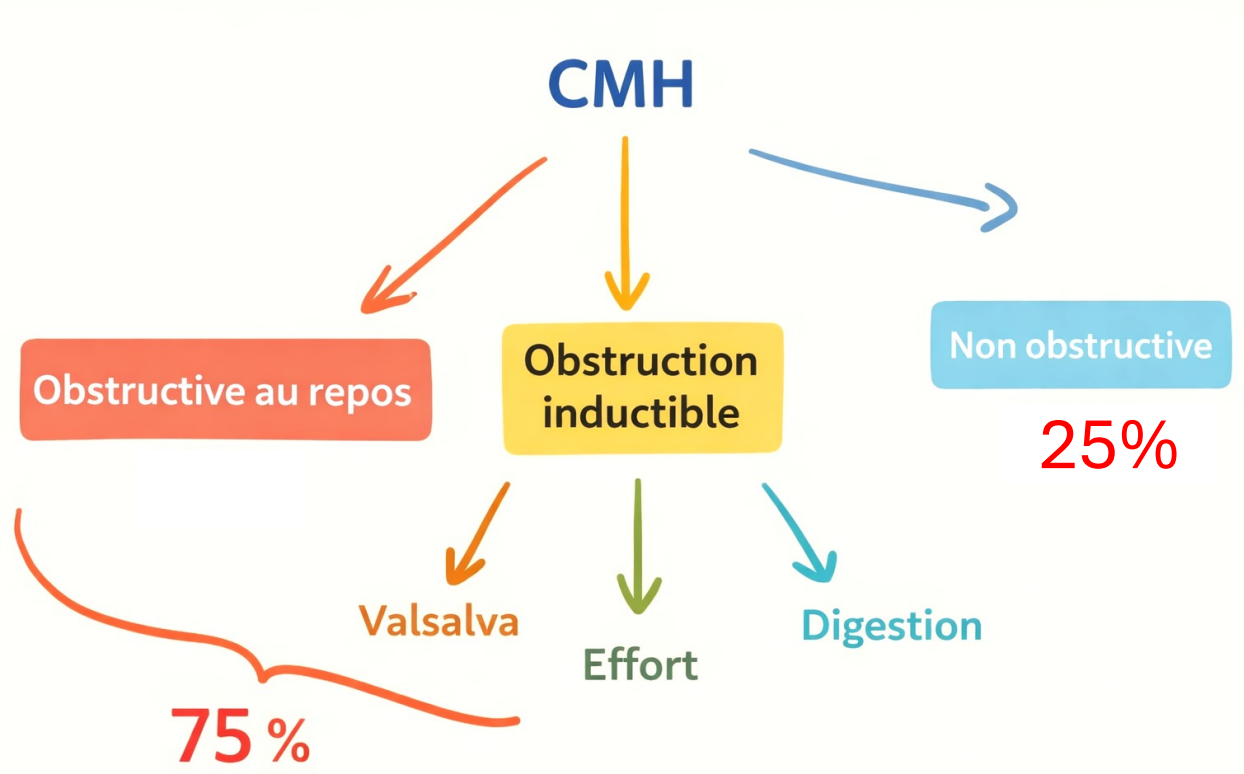


Figure 1 **(A)** Frequency of obstruction and severe obstruction provoked by each technique. The squat-to-stand maneuver elicited latent obstruction and severe latent obstruction in a higher proportion of patients (36.1% and 25.2%, respectively) than the Valsalva maneuver (18.3% and 2.8%, respectively). **(B)** Maximal instantaneous gradient (MIG) by provocation techniques. MIG (median and interquartile range) at rest, with Valsalva maneuver, and with squat-to-stand maneuver among patients with latent obstruction who performed both the Valsalva and squat-to-stand maneuvers (n = 41). The squat-to-stand maneuver elicited a higher median MIG (55 mm Hg) than the Valsalva maneuver (29 mm Hg).

JASE march 2022

En synthèse:

- 75% (3/4) des cmh sont obstructives spontanément ou après provocation
- 33% sont obstructives spontanément au repos (1/3)
- Mais labile +++



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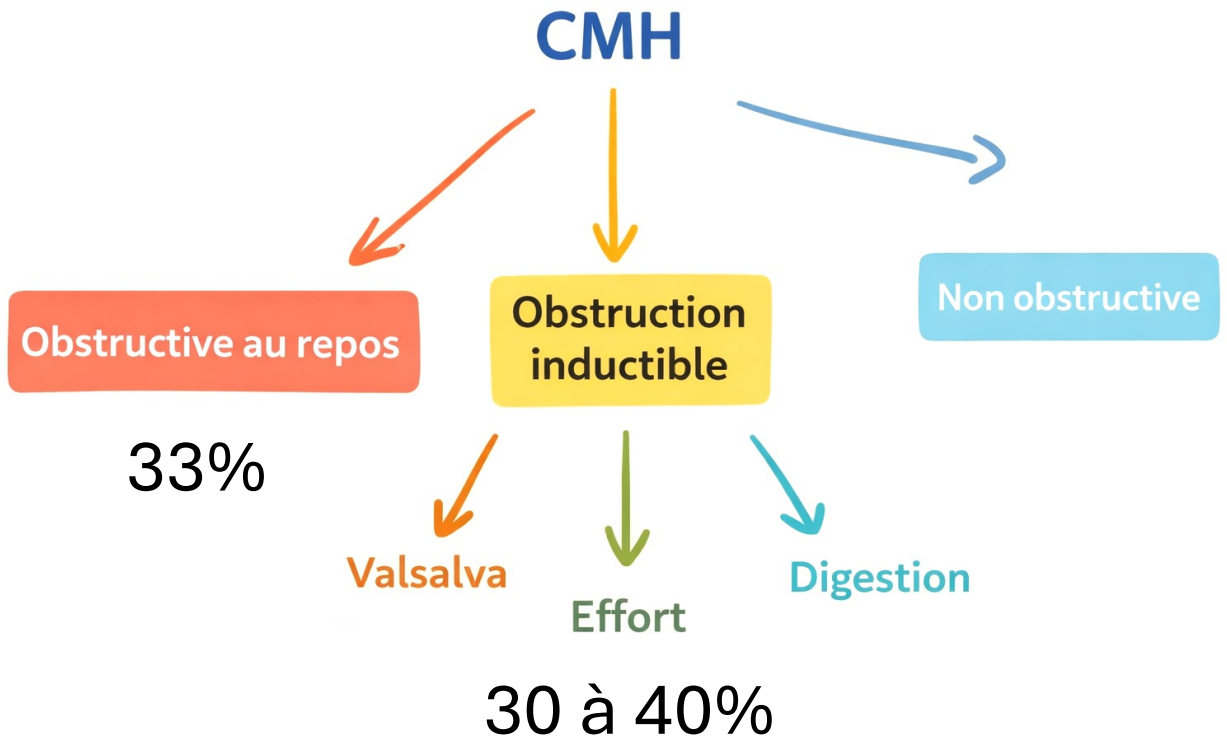


phénotypes de CMH

- Obstruction sous aortique
- Médio ventriculaire
- Les deux

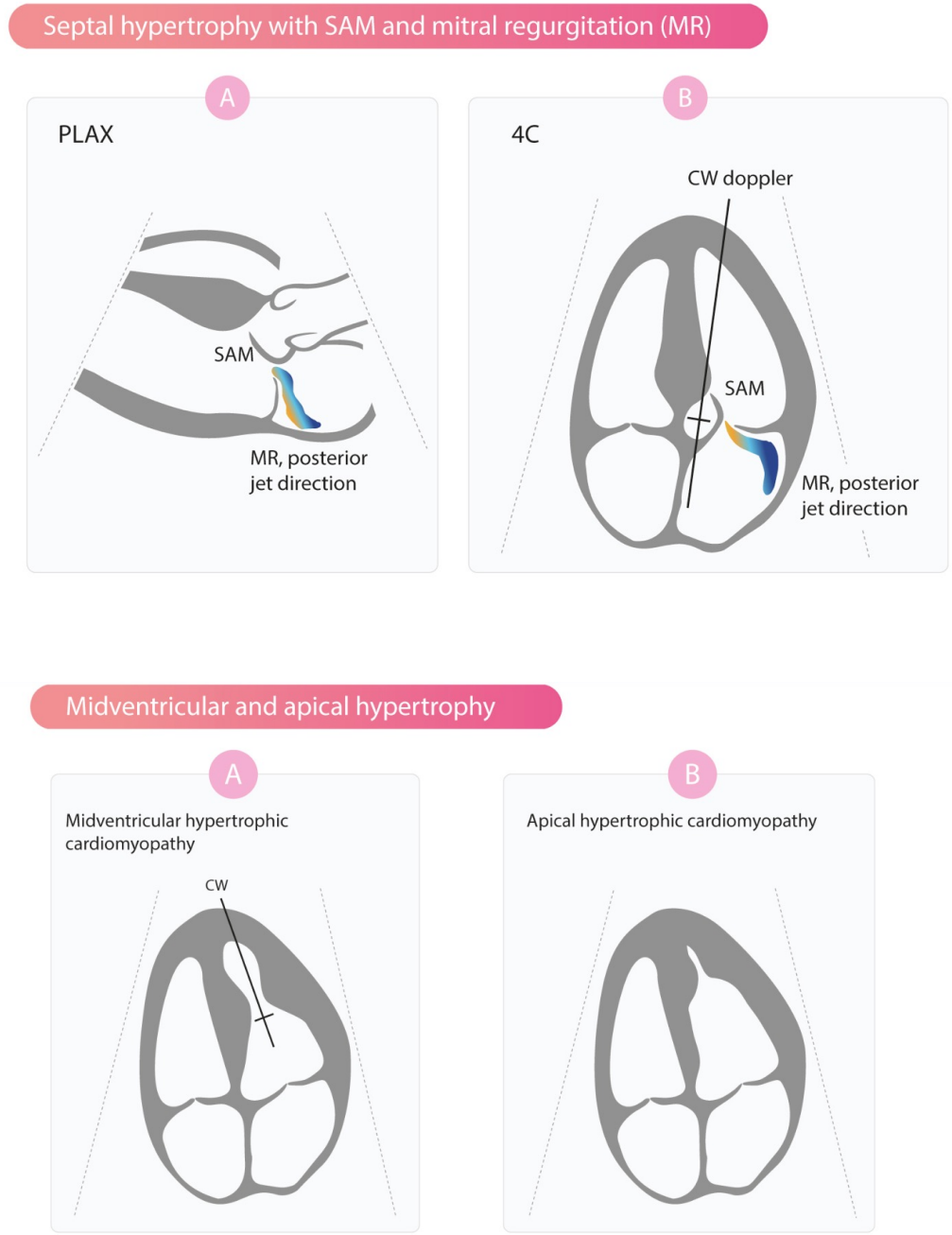
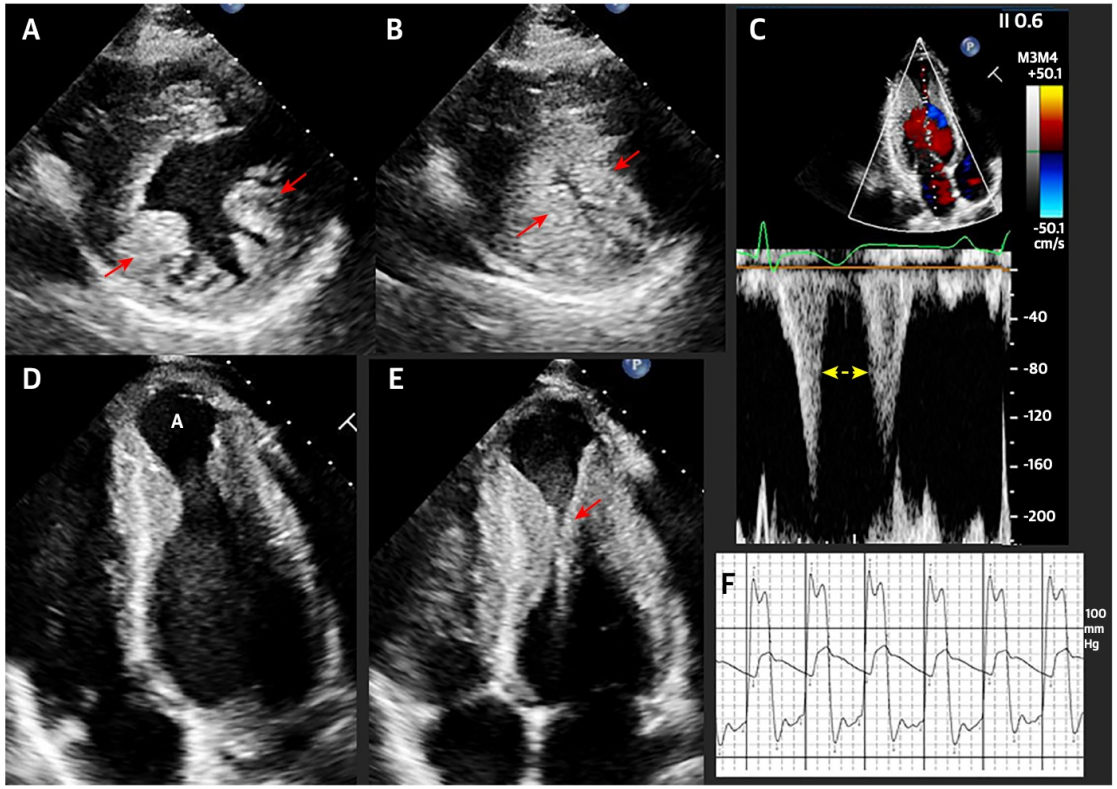
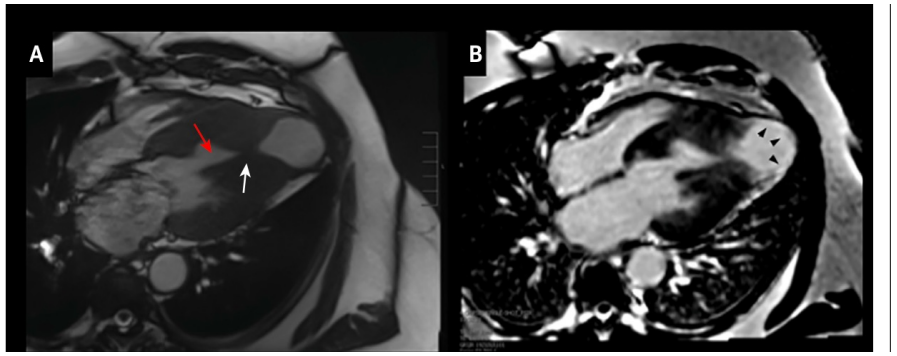


Figure 4. Cardiomyopathie hypertrophique apicale et médio-ventriculaire.

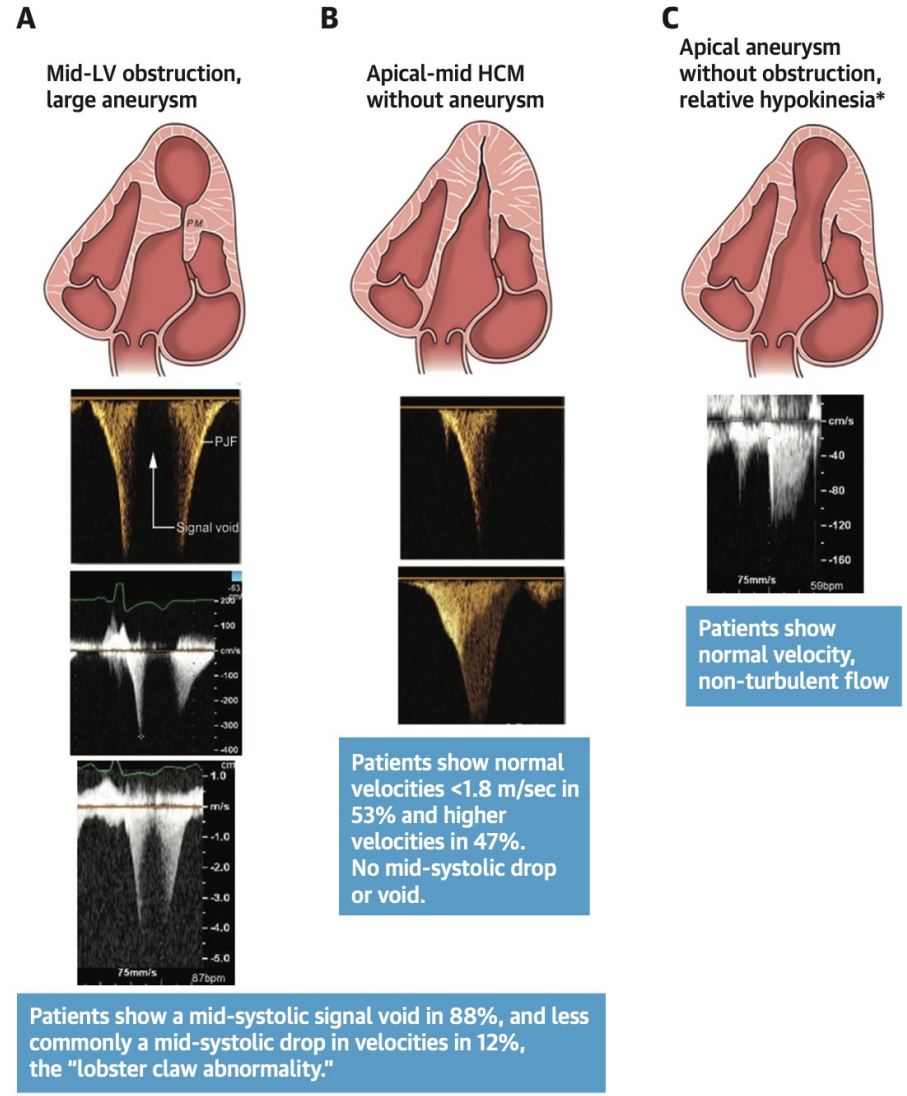
FIGURE 1 Mid-LV Obstruction and Large Aneurysm



Short-axis views in **(A)** diastole and **(B)** systole and 4-chamber views in **(D)** diastole and **(E)** systole show complete systolic emptying of the mid-left ventricle at the papillary muscle (PM) level. The PMs are hypertrophied and contribute to complete emptying **(red arrows)**. **(C)** Pulsed wave Doppler at the level of obstruction shows a midsystolic signal void caused by complete cessation of flow **(double yellow arrow)**. **(F)** Presurgical catheterization shows a gradient of 65 mm Hg between the apical left ventricle and the ascending aorta despite consistently low velocities across the mid-LV. Doppler underestimates the prevalence and magnitude of gradients.[10,11]
A = aneurysm; LV = left ventricular.



CENTRAL ILLUSTRATION Comparison of 3 Apical-Mid Hypertrophic Cardiomyopathy Phenotypes in Systole



Sherrid MV, et al. J Am Coll Cardiol Img. 2023;16(5):591-605.

Le « PIZZA test »

Ne pas dépasser la dose prescrite…

Le « PIZZA test »

A.C.C.A.

L alcool et le gras augmentent l’obstruction…

Hypovolémie relative…

Avez-vous des symptômes plus intenses en post prandial?

Hydratation?

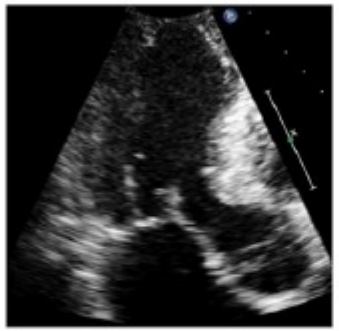
Rendez vous à 14h après un repas un peu lourd….

Le « pizza test »

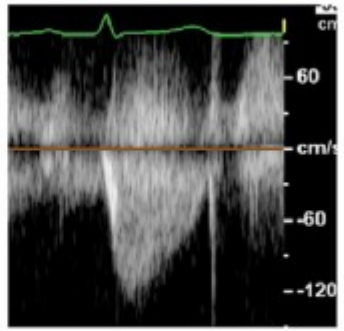
Unmasking Obstruction in Hypertrophic Cardiomyopathy With Postprandial Resting and Treadmill Stress Echocardiography

Daniele Massera, MD, MSc, Clarine Long, MD, Yuhe Xia, MS, Les James, MD, MPH, Elizabeth Adlestein, BA, Isabel C. Alvarez, BS, MPH, Woon Y. Wu, FNP, Maria C. Reuter, AGACNP, Milla Arabadjian, PhD, Eugene A. Grossi, MD, Muhamed Saric, MD, PhD, and Mark V. Sherrid, MD, *New York and Mineola, New York*

J Am Soc Echocardiogr 2024

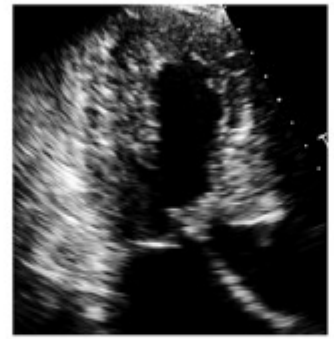


SAM without mitral-septal contact under fasting conditions

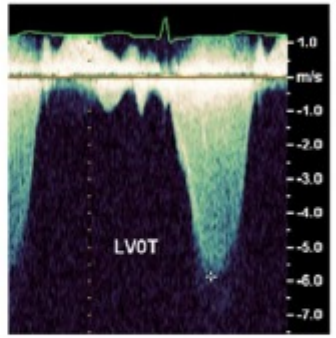


No dynamic LVOT gradient

Postprandial resting / stress echocardiogram



SAM with mitral-septal contact



LVOT gradient 138 mmHg

252 patients

# of patients referred for evaluation of HCM without LVOTO

Routine echo
49 (19.4%)

# of patients with LVOT gradient ≥50 mmHg on routine echo (rest or provocation)

All postprandial
90 (35.7%)
Exercise only
38 (15.1%)

# of patients with LVOT gradient ≥50 mmHg only on postprandial echo (rest, provocation or exercise) or only with exercise

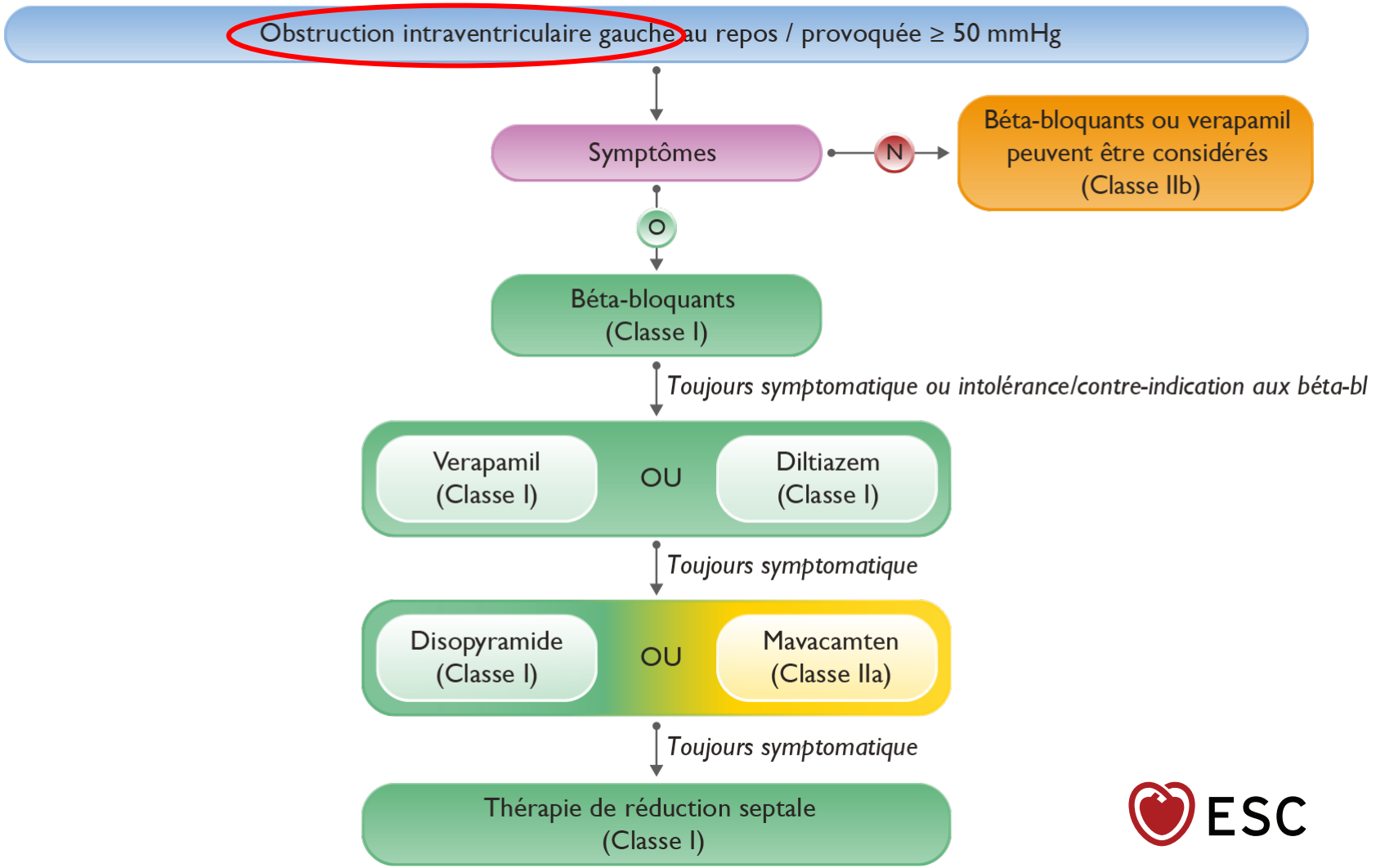
Advanced interventions
40 (56.3%)

# of patients treated with invasive or enhanced drug therapies and who only had postprandial LVOTO ≥50 mmHg

Central Illustration Postprandial resting and treadmill stress echocardiography unmasked LVOTO (gradient ≥50 mm Hg) in 35.7% of patients who did not have high gradients under routine conditions, with 15.1% achieving it only on postprandial stress echo. More than half of patients who were treated with invasive or enhanced drug therapies (surgical myectomy, alcohol septal ablation, disopyramide, and myosin inhibitors) only had postprandial LVOTO ≥50 mm Hg.

Quel traitement ?

Algorithme thérapeutique CMHo recommandations 2023



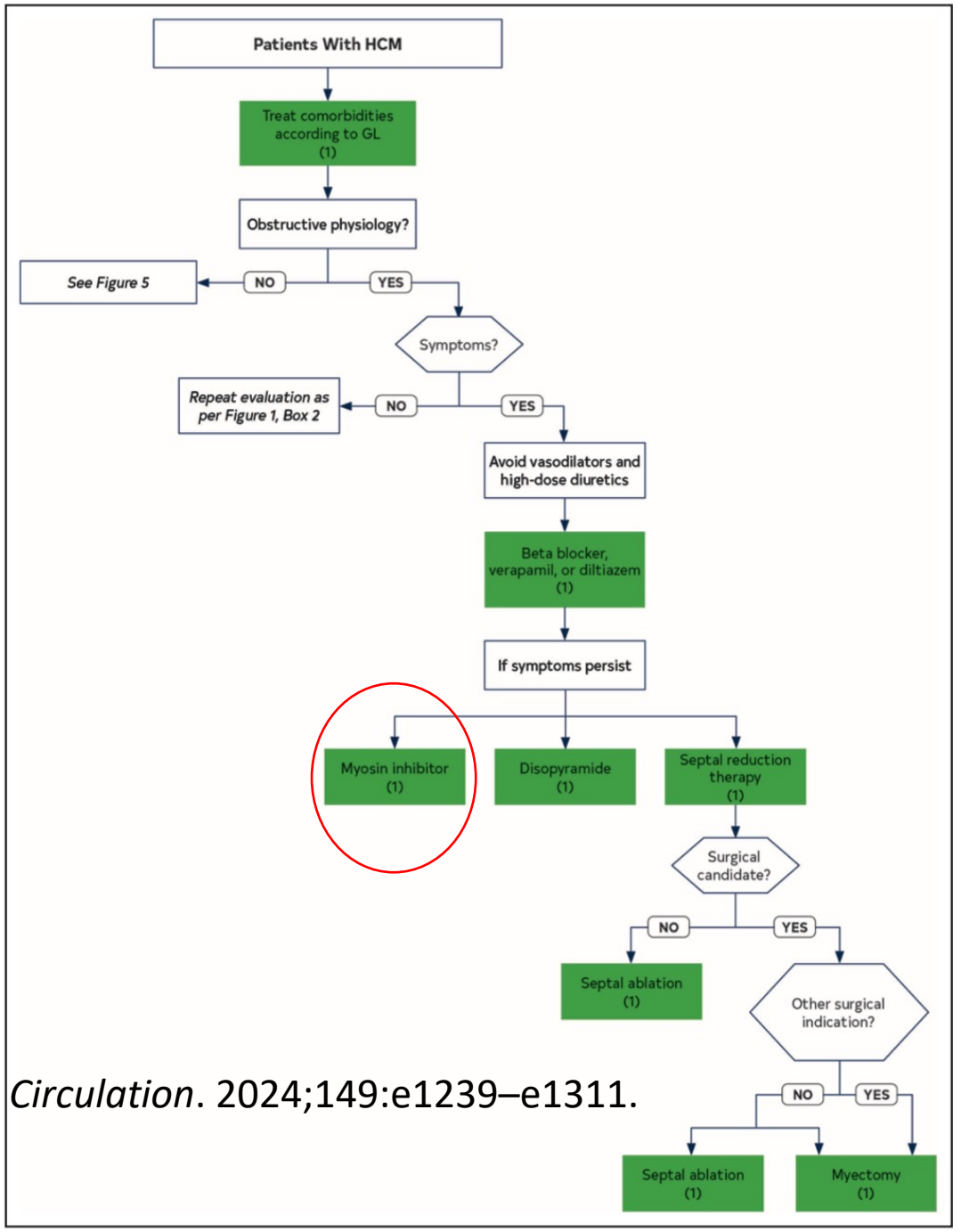
ESC

1. Arbelo E *et al.* European Heart Journal 2023 ESC Guidelines for the management of cardiomyopathies.

Reco ACC/AHA juin 2024

CLINICAL PRACTICE GUIDELINES

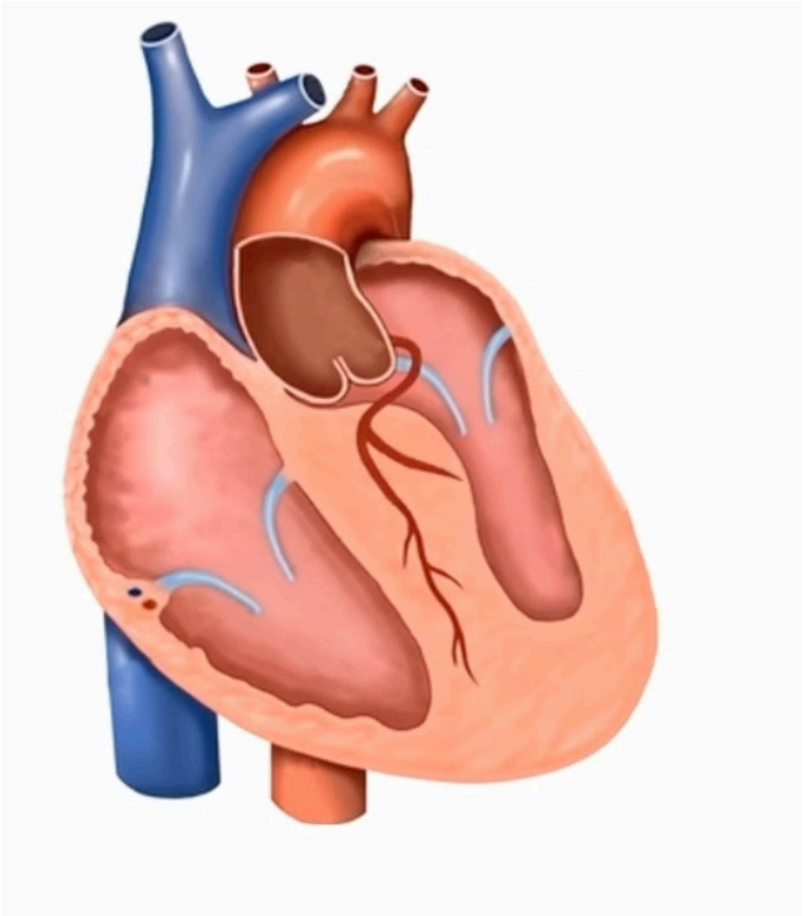
2024 AHA/ACC/AMSSM/HRS/PACES/SCMR Guideline for the Management of Hypertrophic Cardiomyopathy: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines



Circulation. 2024;149:e1239–e1311.

Principes du traitement

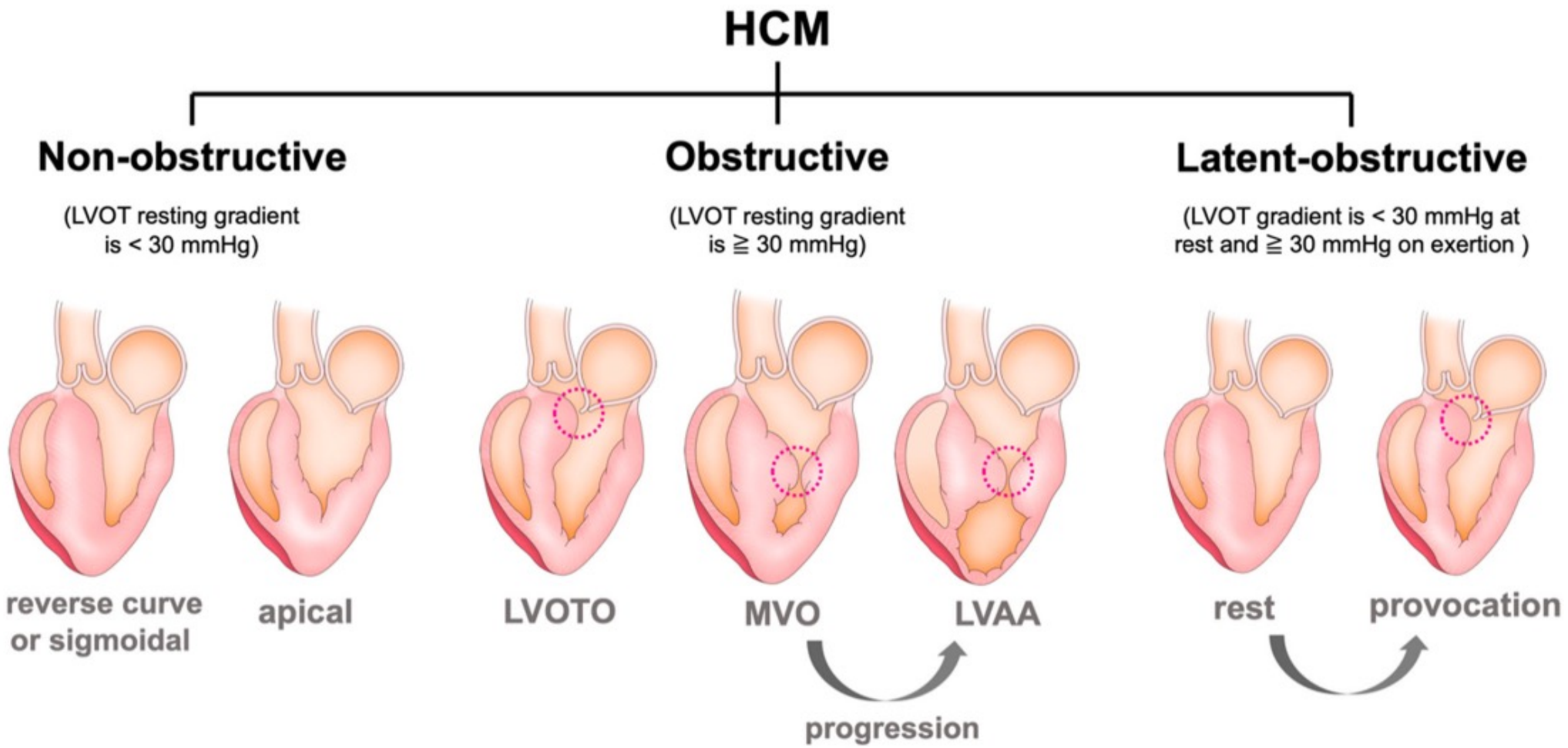
Diminuer la contractilité



Diminuer l’épaisseur septale

CMH et obstruction

A.C.C.A.



Merci de votre attention

- Traitement de la CMH si patient symptomatique +++
- Évaluation complète du patient
- Recherche de l'obstruction à l'état de base
  ± manœuvres de provocation
  (Valsalva, orthostatisme, effort)
- Indications/contre-indications à l'écho d'effort
- Tenir compte des autres facteurs pouvant participer aux symptômes