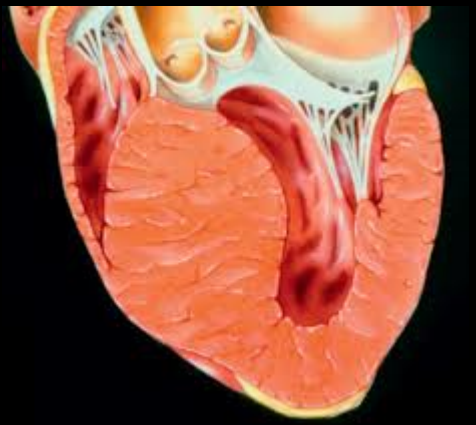
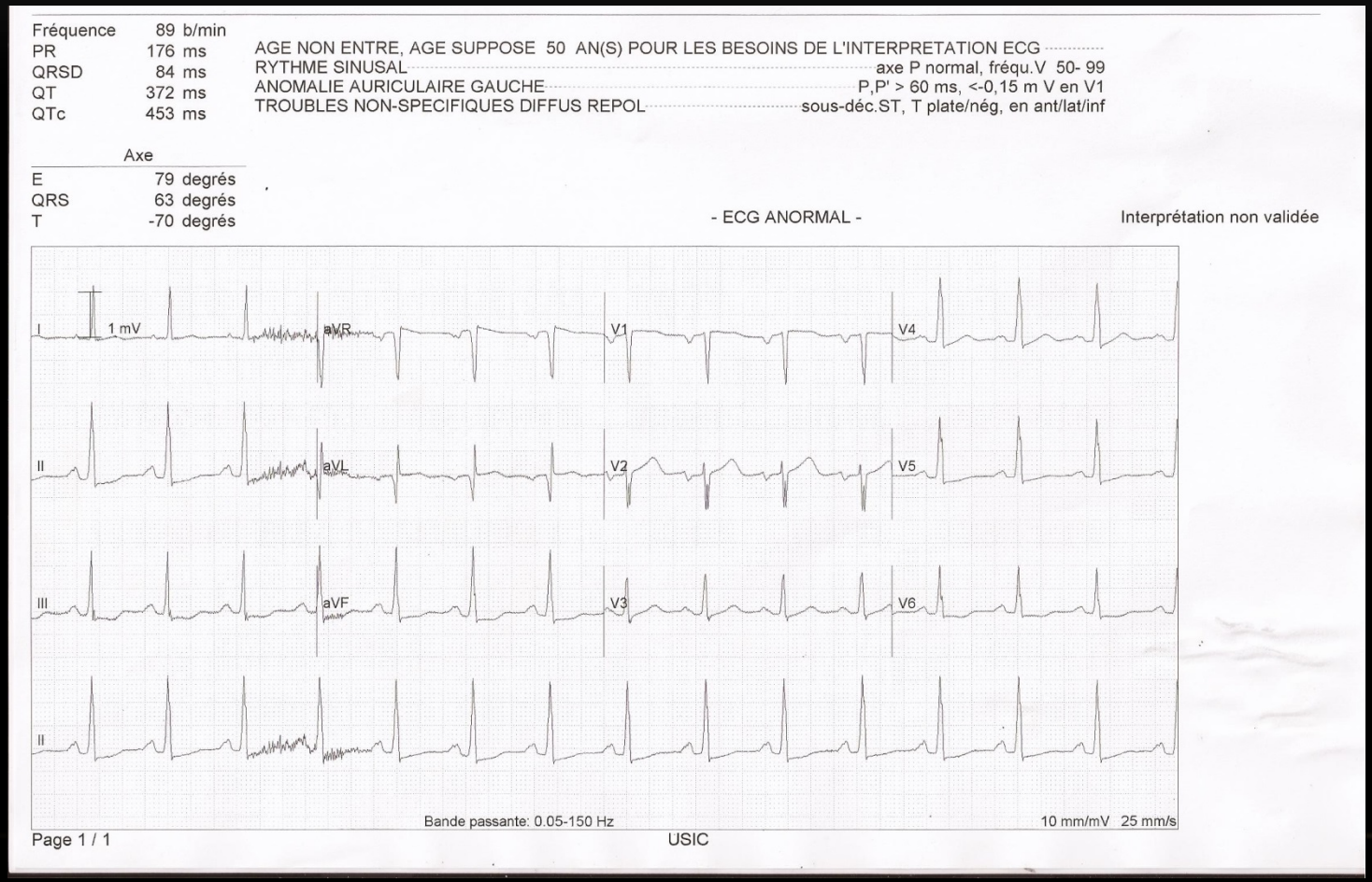
CMH

APPROCHE RYTHMOLOGIQUE



A Durand-Dubief, H Poty, C Durand, H Brahic
Cliniques Tonkin, Protestante,Sauvegarde

FEMME 32 ANS ASTHENIE



Fréquence	89 b/min
PR	176 ms
QRSD	84 ms
QT	372 ms
QTc	453 ms

AGE NON ENTRE, AGE SUPPOSE 50 AN(S) POUR LES BESOINS DE L'INTERPRETATION ECG
RYTHME SINUSAL ..... axe P normal, fréqu.V 50- 99
ANOMALIE AURICULAIRE GAUCHE ..... P,P' > 60 ms, <-0,15 m V en V1
TROUBLES NON-SPECIFIQUES DIFFUS REPOL ..... sous-déc.ST, T plate/nég, en ant/lat/inf

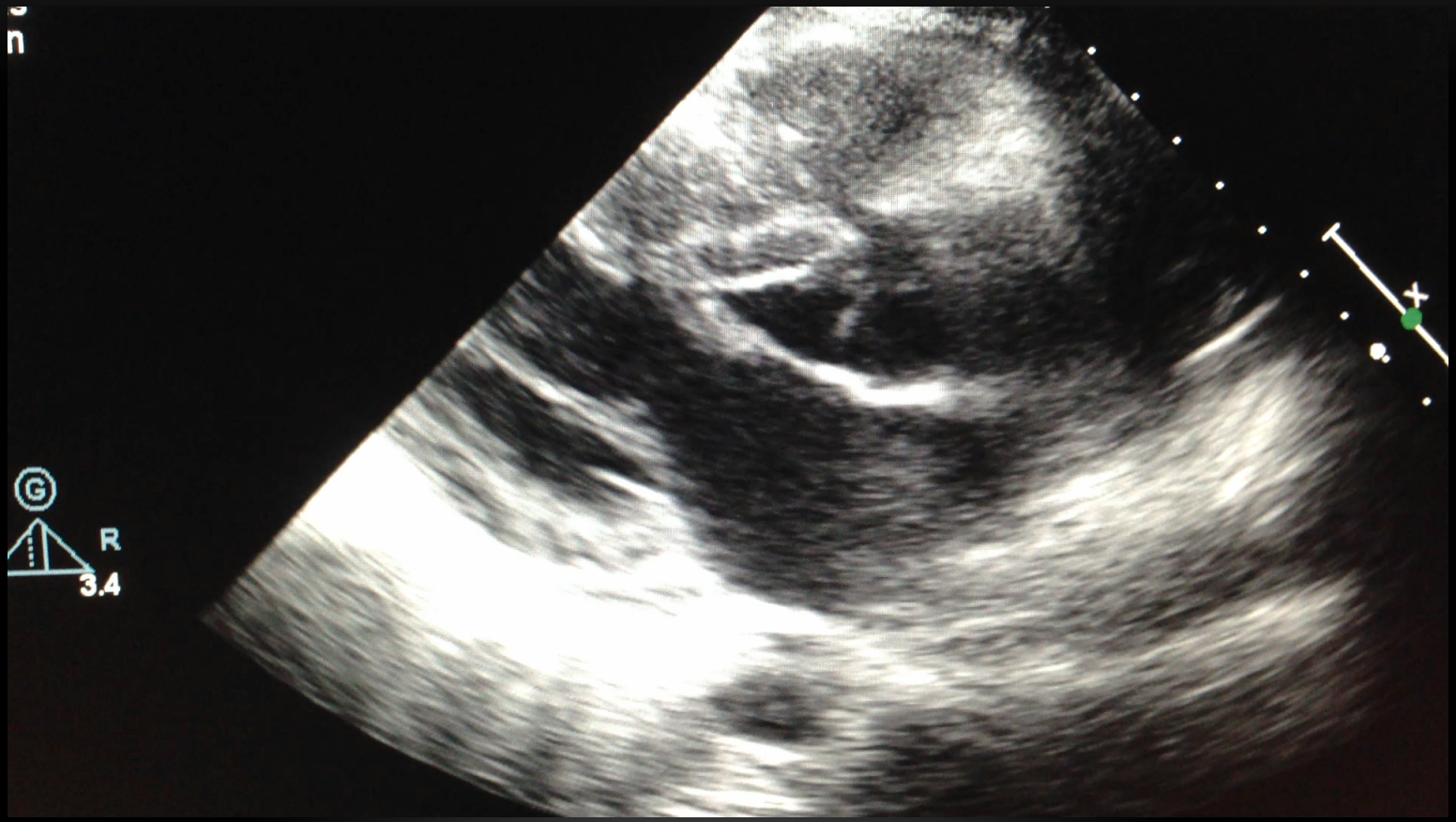
Axe	
E	79 degrés
QRS	63 degrés
T	-70 degrés

- ECG ANORMAL -

Interprétation non validée

Page 1 / 1

USIC


n
G
R
3.4

QUE LUI ANNONCER ?

- RARE, Prévalence CMH 0,02 à 0,23 %
- HEREDITAIRE, autosomique dominant, > 1400 mutations sur 11 gènes, pénétrance variable/ familiale ou sporadique.
- MCH assymétrique épaisseur >15 mm (place de l'IRM)
- POTENTIELLEMENT GRAVE, Première cause mort subite chez le jeune, sportif, < 35 ans, 1/100000/an

  Mortalité > 4 %/ an quand FDR
- 30-35 % CMH svt frustres
- Obstruction 60-70% repos ou provoquée

BILAN EN 2014

- ATCD
- Clinique
- ECG
- Echographie cardiaque (épaisseur, obstruction)

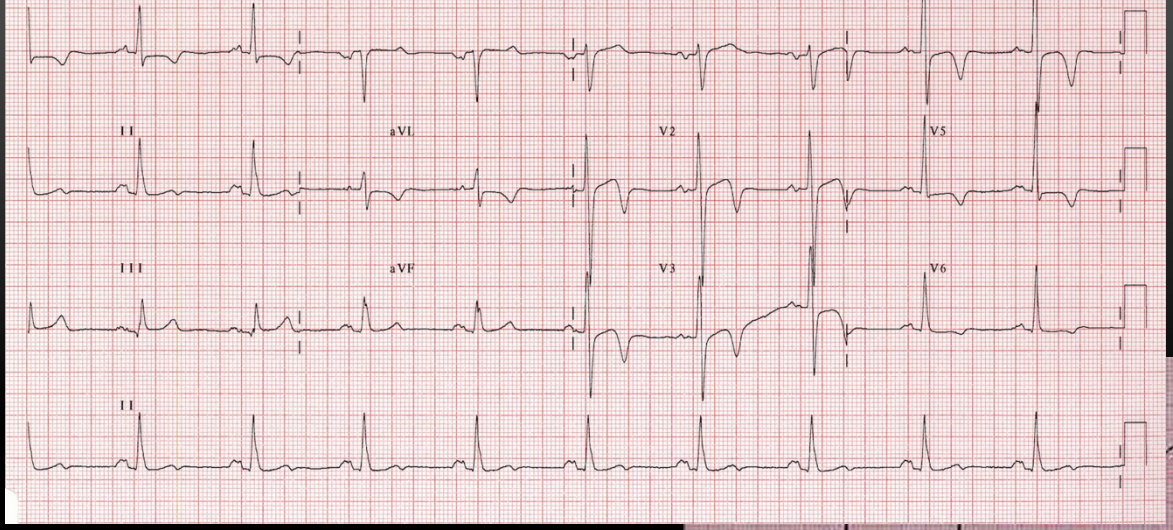
avec provocation obstruction (Valsava, debout, effort)

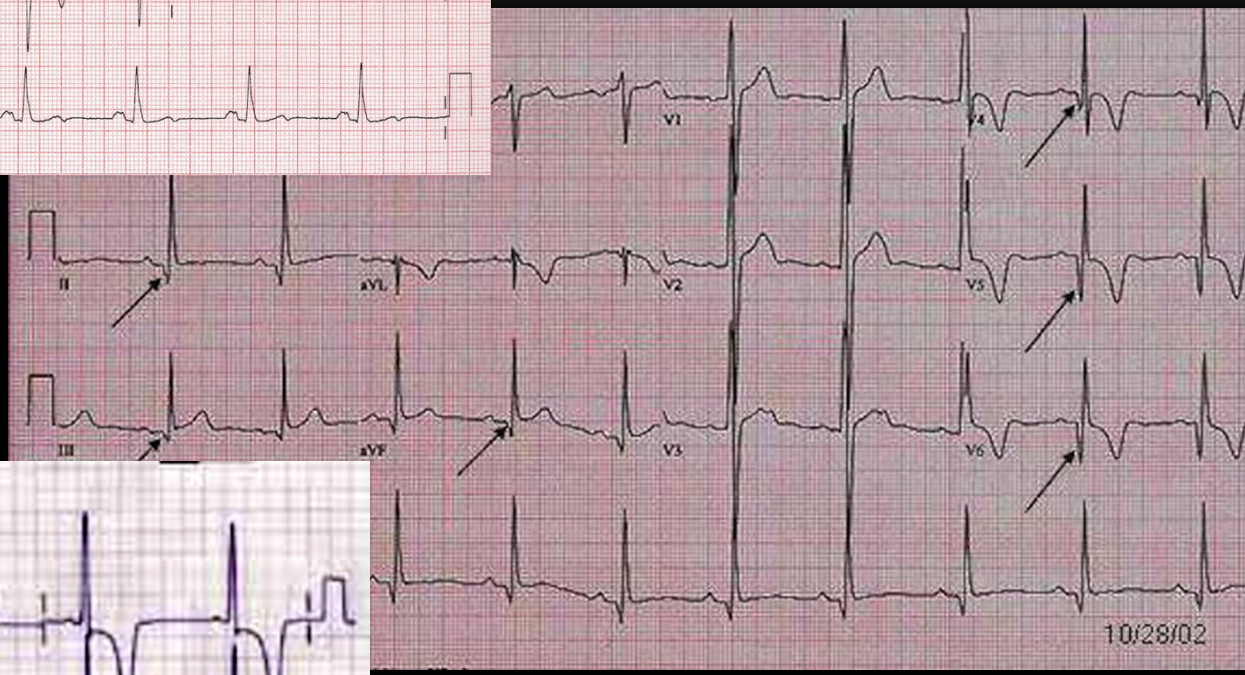
- Holter ECG (TDR)
- Epreuve d'effort (évaluation tensionnelle)
- IRM (épaisseur, fibrose, amylose)
- Bilan génétique

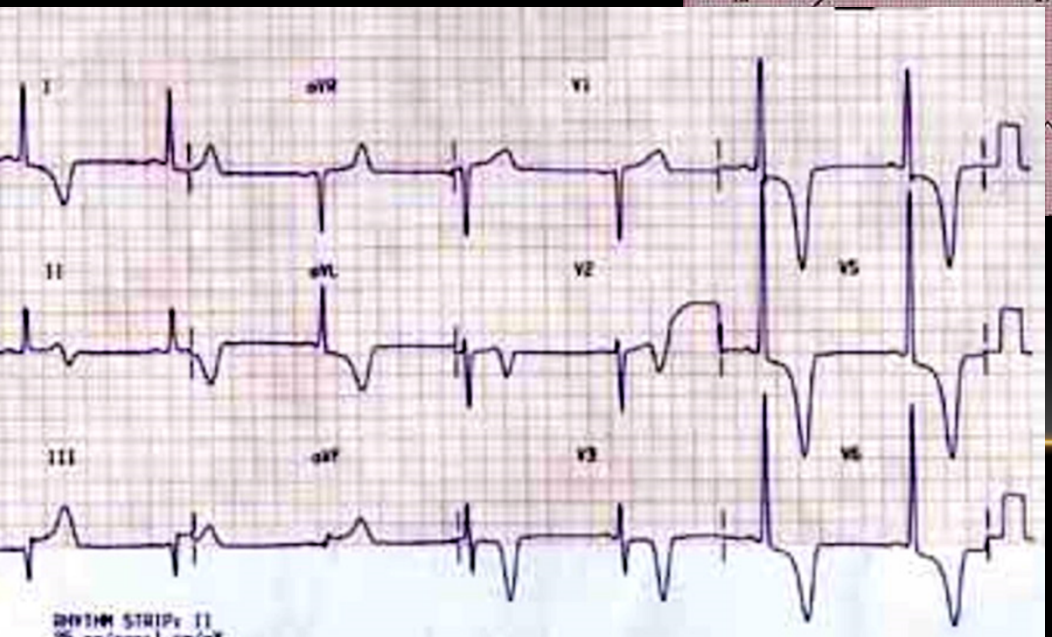
ECG

Anormal dans environ 80 % des cas, recherche:

- à un degré variable : une HVG électrique (appréciée sur l'indice de Sokolov SV1RV5)
- Troubles de la repolarisation (inversion des ondes T dans au moins deux dérivations concordantes)
- Ondes Q pathologiques (souvent fines, mais profondes avec amplitude > 3 mm ou > a 1/3 de l'R suivante, dans au moins deux dérivations concordantes) dérivations inférieures ou latérales;

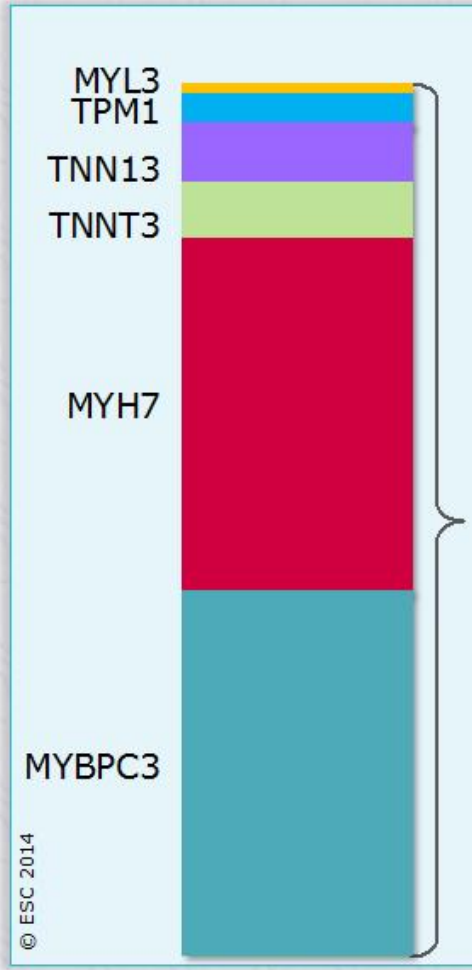

I
aVL
V2
V5
III
aVF
V3
V6
II

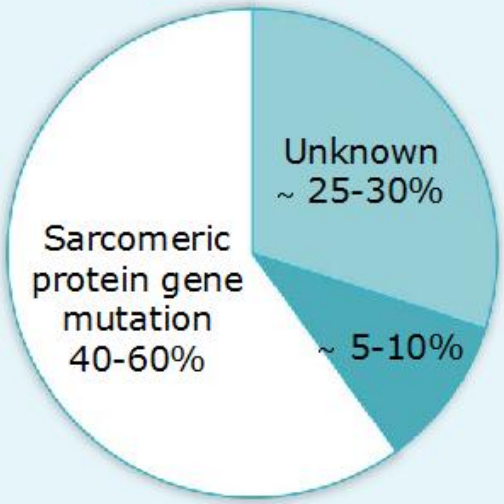

V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
10/28/02


I
aVR
V1
II
aVL
V2
V5
III
aVF
V3
V6
RHYTHM STRIP: II

5 à 10 % Causes non sarcomérique à rechercher (maladie infiltrative)

Diverse aetiology of hypertrophic cardiomyopathy





The majority of cases in adolescents and adults are caused by mutations in sarcomere protein genes.

Other genetic and non-genetic causes

- **Inborn errors of metabolism**
  Glycogen storage diseases:
  - Pompe
  - Danon
- **AMP-Kinase (PRKAG2)**
- **Carnitine disorders**
- **Lysosomal storage diseases**
  - Anderson-Fabry
- **Neuromuscular diseases**
  - Friedreich's ataxia
  - FHL1
- **Mitochondrial diseases**
  - MELAS
  - MERFF
- **Malformation Syndromes**
  - Noonan
  - LEOPARD
  - Costello
  - CFC
- **Amyloidosis**
  - Familial ATTR
  - Wild type TTR (senile)
  - AL amyloidosis
- **Newborn of diabetic mother**
- **Drug-induced**
  - Tacrolimus
  - Hydroxychloroquine
  - Steroids

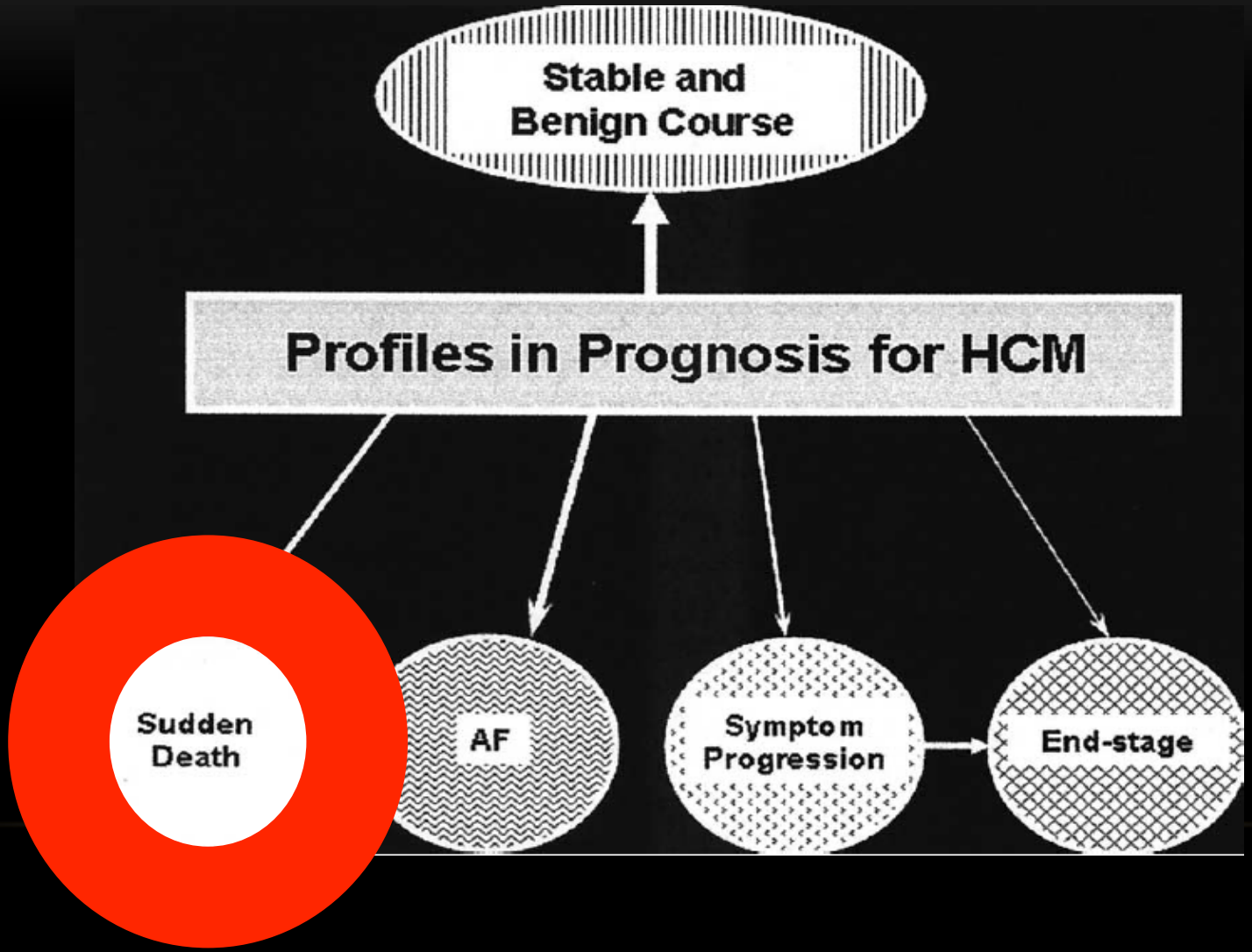
www.escardio.org/guidelines European Heart Journal (2014);35:2733–2779 - doi:10.1093/eurheartj/ehu284

Amylose: atteinte systémique, microvoltage, trouble du rythme ou de conduction, HVG concentrique, aspect granité, hypokinésie VG, épanchement péricardique, scinti osseuse fixant traceur au nveau cardiaque, insuffisance rénale…..

Maladie mitochondriale: troubles visuels, ptosis, troubles neurologiques, trouble conductifs, hypokinésie VG, pertubation bilan hépatique rénal CPK….

Maladie de Fabry: maladie de surcharge lysosomiale, atteinte neurologique, visuelle, musculaire, rénale, HVG, cardiopathie, trouble du rythme….

QUE LUI PROPOSER ?



STRATIFIER LE RISQUE

5 FDR MAJEURS: ECHO, HOLTER, E. EFFORT SATAP

HAUT RISQUE MCD SI > 2 > 4 % MS/ AN, DAI/ SI 1 FDR DISCUSSION DAI

- **Mort subite, FV, TV soutenue**
- **Syncope inexpliquée,**
- **Antécédents familial de mort subite**
- **tachycardies ventriculaires (TV) non soutenues sur** le holter ECG (24 à 48 heures)
- **Réponse anormale de la pression artérielle lors de l'épreuve d'effort**
- **paroi VG supérieure à 30 mm à** l'échographie cardiaque

si MS risque récidive 10 %/an

particulièrement quand elle survient à l'effort et de façon répétitive ou bien chez un sujet jeune. Cependant, la valeur prédictive de la syncope comme signe précurseur d'une mort subite éventuelle est faible .

< à 50 ans, surtout si survenue chez un apparenté au premier degré et surtout si ≥ 2 cas)

≥ 3 complexes à une fréquence supérieure à 120/min) ;

La réponse est pathologique
en cas de réponse tensionnelle plate (PAS max – PAS repos < 20 ou 25 mmHg) ou de survenue d'une hypotension (sur tapis roulant ou sur un vélo) valable si < 50 ans

mesure en incidence parasternale petit axe qui permet de ne pas surestimer l'épaisseur).
MS relation linéaire avec épaisseur

20 % MS à 10 ans

Indications dans la Cardiomyopathie hypertrophique

LE RISQUE EST PROPORTIONNEL AU NOMBRE DE FACTEURS

	Mort subite / an
Pas de FR	0,8 % (0,2 - 1,5)
1 FR	1,2 % (0,2 - 2,2)
2 FR	3 % (0,7 - 5,5)
3 FR	6 % (4 - 16)
≥ 2 FR	4,8 % (2,5 - 8)

Cox Model

368 patients

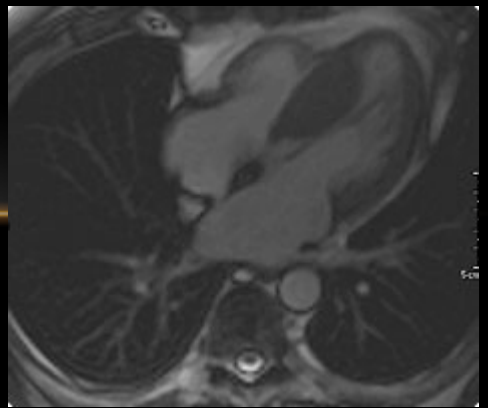
Elliot PM et al. JACC 2000; 36: 2212-8.

Discussion de Défibrillateur à 2 critères voire 1
1 seul suffit pour mort subite

FDR MINEUR: PROBABLEMENT PÉJORATIF SI PLUSIEURS

- Début des symptômes dès l'enfance
- Ischémie myocardique documentée
- Obstruction sous aortique isolée ≥ 30 mm Hg
- Mutation dite à haut risque (mutation de la Bêtamyosine et la plupart des mutations de la troponine T).
- Taille de l'OG

- IRM rehaussement tardif après gadolinium signe zone de fibrose proA mais faible VPP
- Anévrysme apical risque proA

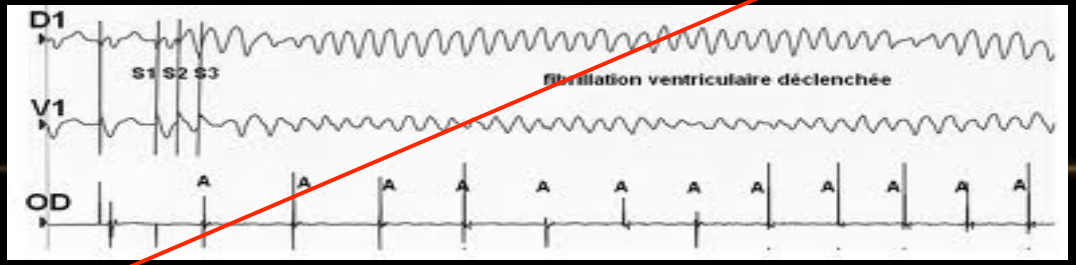


EXPLORATION ELECTROPHYSIOLOGIQUE ?

- indication de SVP discutée car non spécifique
- induit rarement TV mais peut induire TV polymorphe ou FV même chez patients à faible risque

Peut être utile si TV monomorphe en vue d'un TT par RF

- Mais OUI pour bilan conductif ou TPSV, réentrée, voie accessoire.



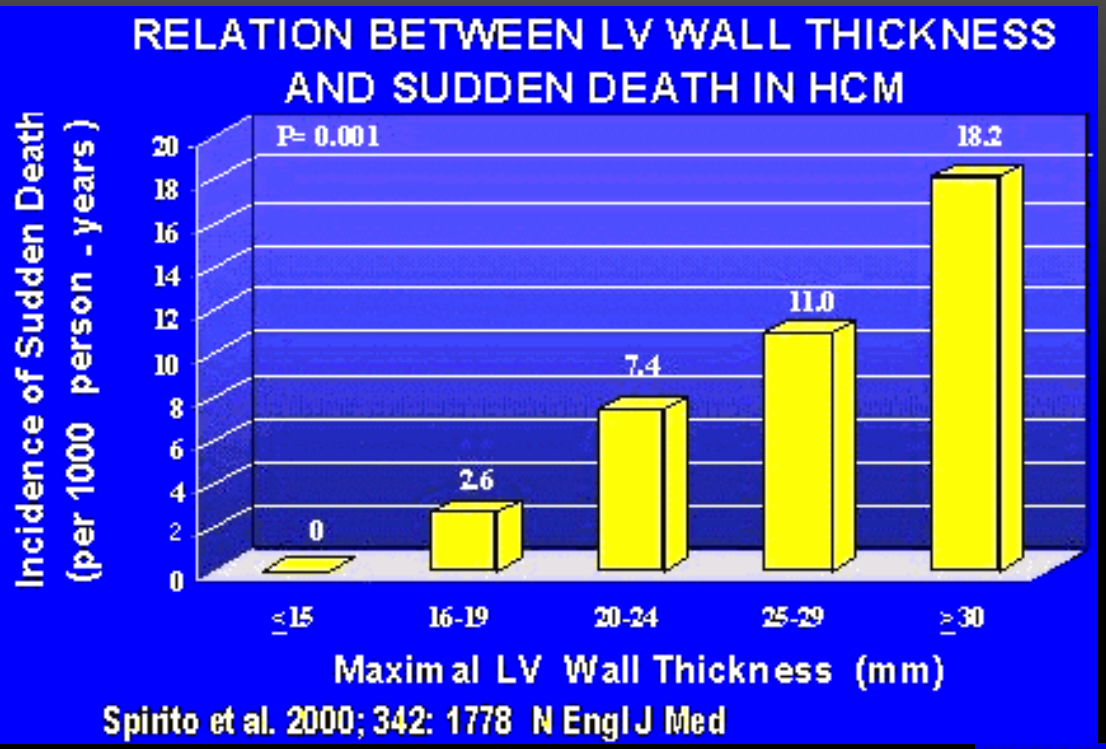
Electrophysiologic testing

Recommendations	Class	Level
Invasive electrophysiological study is recommended in patients with documented persistent or recurrent supraventricular tachycardia (atrial flutter, atrial tachycardia, atrioventricular nodal re-entry tachycardia, accessory atrioventricular pathway mediated tachycardias) and in patients with ventricular pre-excitation, in order to identify and treat an ablatable substrate.	I	C
Invasive electrophysiological study may be considered in selected patients with documented, symptomatic, monomorphic, sustained (>30 s) ventricular tachycardia in order to identify and treat an ablatable arrhythmia substrate.	IIb	C
Invasive electrophysiological study with programmed ventricular stimulation is not recommended for sudden cardiac death risk stratification.	III	C

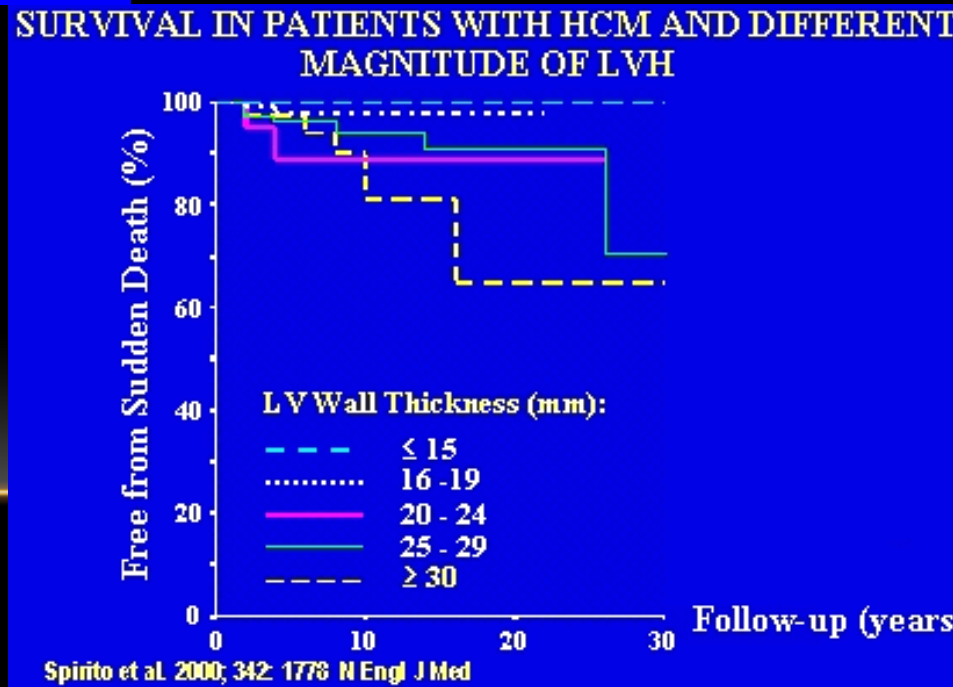
European Heart Journal (2014);35:2733–2779 - doi:10.1093/eurheartj/ehu284

SCORE DE LA PATIENTE = 1

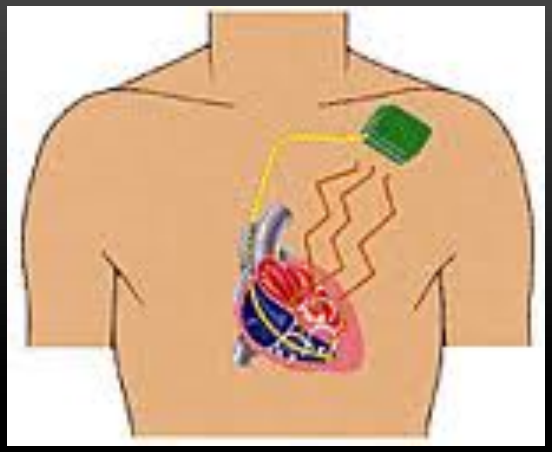
- PÈRE DCD à 53 ans subitement, cardiopathie ?
- SEPTUM 25 mm



480 patients, M suivi 6,5 ans



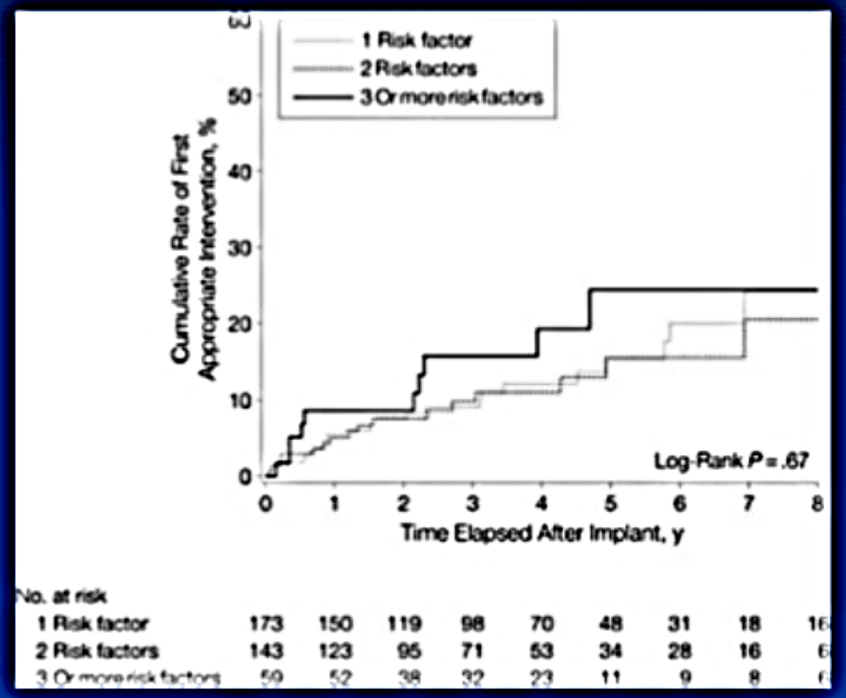
SEUL TRAITEMENT: DAI SI

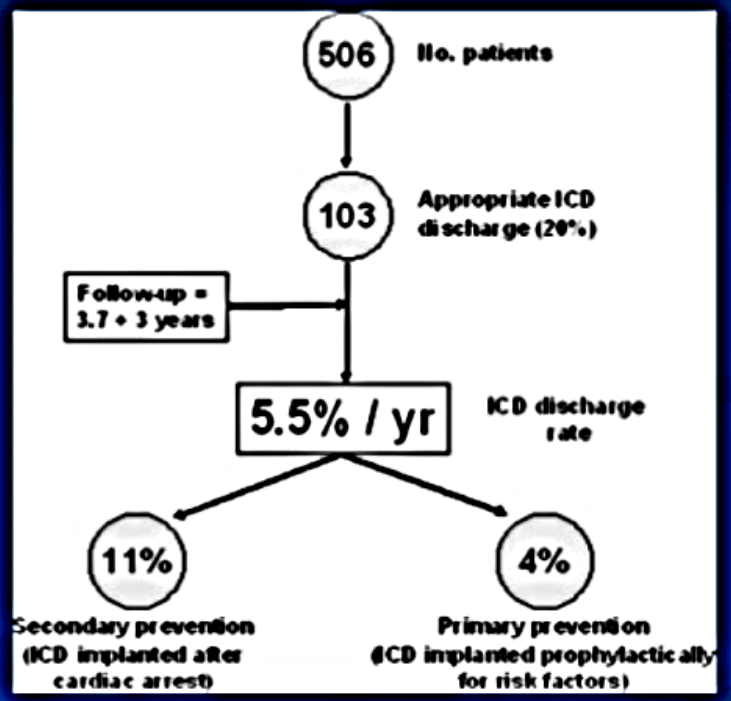


Prévention secondaire: de la mort subite récupérée, FV ou TV soutenue

Prévention primaire selon les facteurs de risque.

REGISTRE INTERNATIONAL 1986- 2003





J Cardiovasc Electrophysiol 2008;19(10).

MAIS

Complications DAI 4 %/ an (registre 1986- 2003)

- Précoce: hématome, PTX, péricarde, infection, déplacement de sonde
- Tardive: Choc inapproprié, fracture de sonde (++ chez le jeune), thrombose, infection

Cependant le matériel à évolué depuis

Petit boîttier, simplification connection, batterie plus importante, algorythme de discrimination TPSV.

TRAITEMENT

- Patiente mise sous Sotalex 80 x 2
- Dépistage génétique: 1 fille porteuse du gène et de la MCH

et 2 fils sans le gène

- Surveillance régulière

SUIVI ?

CMH avérée Symptomatique ou non

ECG, une échographie/ 12-24 mois, (le rythme de cette surveillancecardiologique est adapté en fonction des symptômes et du nombre de facteurs de risque de mort subite).
Holter / 12 -24 mois si stable /6 à 12 mois si palpitations ou OG > 45 mm
EE/ 2-3 ans si stable / an si aggravation
+/- IRM/ 5 ans si stable / 2-3 an si évolution
HAS 2011, ESC 2014

Mutation CMH sans signe clinique ou paraclinique

une surveillance tous les 1 à 3 ans est nécessaire HAS 2011
12 à 18 mois enfant, ado et / 5 ans adulte ACC 2011

ttt	Diminue mortalité	Efficacité
Bbloquant	Pas de preuve	Chez patients symptomatique, angor ou dyspnée
Icalcique bradycardisant	Pas de preuve	Qd symptomatique
Rythmodan (effet I -)	Non, pas d'étude de sécurité	Qd symptomatique
Cordarone	Peut être	Rôle sur FA
Myomectomie	Excellente survie	Diminue gradient si > 50
Alcoolisation	Risque pro A ?	Diminue gradient si > 50
Pace maker	non	+/- Diminue gradient
Défibrillateur	**oui**	Si ACR, FV ou TV ou si FDR ++ 2C si gdt ou trouble conductif

L'ABSENCE DE SYMPTÔMES : IL N'Y A PAS DE TRAITEMENT RECOMMANDÉ, EN DEHORS DES RESTRICTIONS SPORTIVES ET DE LA

POURSUITE D'UNE SURVEILLANCE RÉGULIÈRE

SPORT EN COMPETITION ET À RISQUE INTERDIT/

Table 4. Recommendations for the Acceptability of Recreational (Noncompetitive) Sports Activities and Exercise in Patients With HCM*

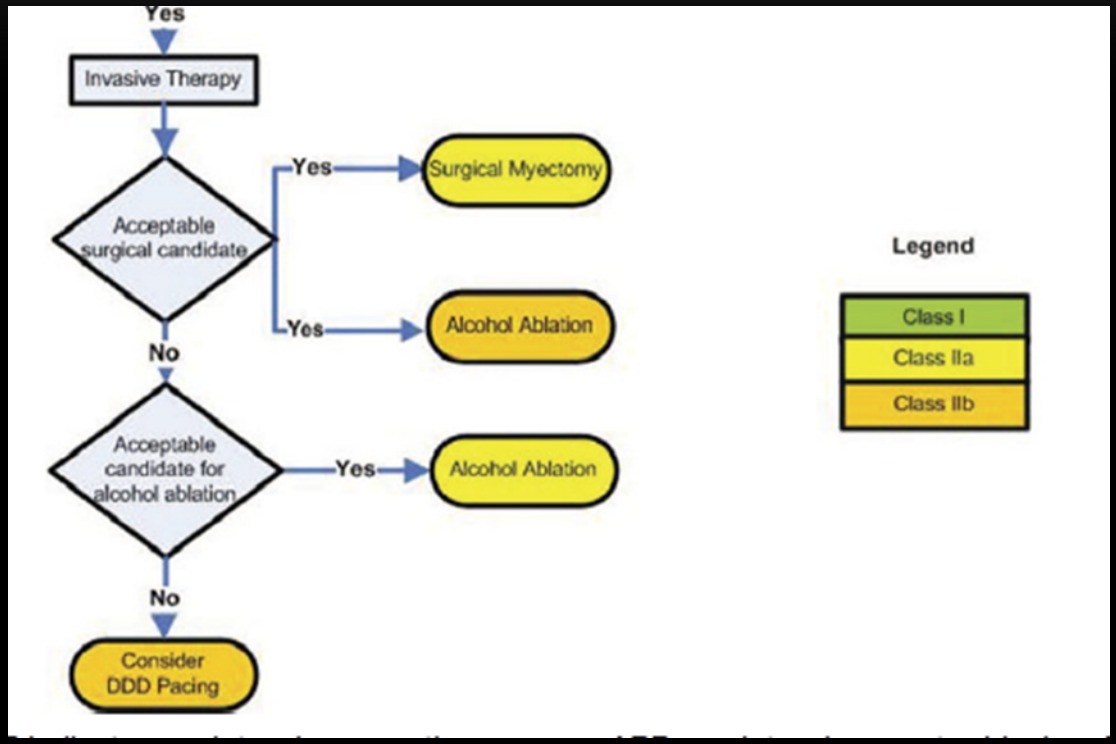
Intensity Level	Eligibility Scale for HCM†
High	
Basketball (full court)	0
Basketball (half court)	0
Body building‡	1
Gymnastics	2
Ice hockey‡	0
Racquetball/squash	0
Rock climbing‡	1
Running (sprinting)	0
Skiing (downhill)‡	2
Skiing (cross-country)	2
Soccer	0
Tennis (singles)	0
Touch (flag) football	1
Windsurfing§	1
Moderate	
Baseball/softball	2
Biking	4
Hiking	3
Modest hiking	4
Motorcycling‡	3
Jogging	3
Sailing§	3
Surfing§	2
Swimming (laps)§	5
Tennis (doubles)	4
Treadmill/stationary bicycle	5
Weightlifting (free weights)‡‖	1
Low	
Bowling	5
Brisk walking	5
Golf	5
Horseback riding‡	3
Scuba diving§	0
Skating¶	5
Snorkeling§	5
Weights (nonfree weights)	4

4 et 5 autorisé
0 et 1 proscris

ACC/AHA guidelines
2011

ET SI ……..

OBSTRUCTION SYMPTOMATIQUE SUIS-JE MEILLEUR QUE LES CHIRURGIENS ET LES CORONAROGRAPHISTES ?



Septal reduction therapy

Recommendations	Class	Level
It is recommended that septal reduction therapies be performed by experienced operators, working as part of a multidisciplinary team expert in the management of HCM.	I	C
Septal reduction therapy to improve symptoms is recommended in patients with a resting or maximum provoked LVOT gradient of ≥50 mm Hg, who are in NYHA functional Class III–IV despite maximum tolerated medical therapy.	I	B
Septal reduction therapy should be considered in patients with recurrent exertional syncope caused by a resting or maximum provoked LVOTO gradient ≥50 mm Hg despite optimal medical therapy.	IIa	C
Septal myectomy, rather than SAA, is recommended in patients with an indication for septal reduction therapy and other lesions requiring surgical intervention (e.g. mitral valve repair/replacement, papillary muscle intervention).	I	C
Mitral valve repair or replacement should be considered in symptomatic patients with a resting or maximum provoked LVOTO gradient ≥50 mm Hg and moderate-to-severe mitral regurgitation not caused by SAM of the mitral valve alone.	IIa	C
Mitral valve repair or replacement may be considered in patients with a resting or maximum provoked LVOTO gradient ≥50 mm Hg and a maximum septal thickness ≤16 mm at the point of the mitral leaflet–septal contact or when there is moderate-to-severe mitral regurgitation following isolated myectomy.	IIb	C

European Heart Journal (2014);35:2733–2779 - doi:10.1093/eurheartj/ehu284

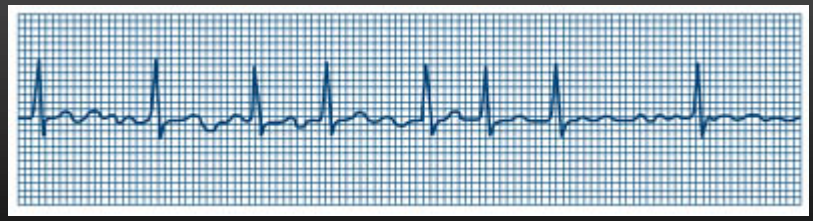
ESC 2014

Indication for cardiac pacing in patients with hypertrophic cardiomyopathy

Recommendations	Class [a]	Level [b]	Ref. [c]
1) **Left ventricular outflow tract obstruction.** Sequential AV pacing with short AV interval may be considered in selected patients with resting or provocable LV outflow tract obstruction and drug-refractory symptoms who: a) have contraindications for septal alcohol ablation or septal myectomy;	IIb	B	142–148
or b) or are at high risk of developing heart block following septal alcohol ablation or septal myectomy.	IIb	C	-
2) For patients in whom there is an indication for an ICD, a dual-chamber ICD should be considered	IIa	C	-

Pace maker si complication BAV qd myomectomie 2 % et alcoolisation septale 10 à 20 %

FA



- Arythmie la plus fréquente touchant près de 25 % des patients. Elle ne fait pas partie des facteurs de risque majeurs de mortalité,
-

Insuff cardiaque	Thrombo-embolie	syncope

- Un traitement anticoagulant est conseillé.
- L'amiodarone est le meilleur traitement préventif de récidive, mais son rapport thérapeutique/risque doit être évalué.
- Le traitement par ablation du noeud auriculoventriculaire et stimulation ventriculaire définitive est une alternative possible en cas d'échec des traitements classiques
- Place de l'ablation par radiofréquence: semble être efficace chez 2/3 des patients avec svt 2 procédure et trigger extra VP

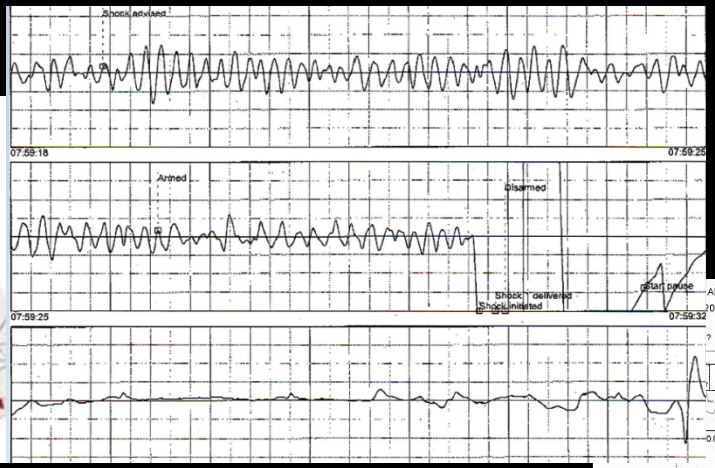
ESC 2003/ LANCET 2013

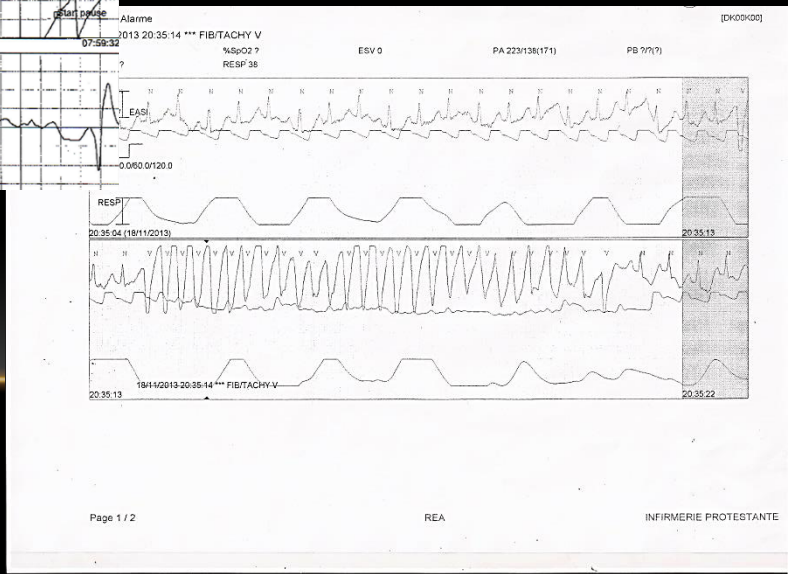
LES ANNEES PASSENT

- Décès de la fille à l'âge de 18 ans
- Mesure du septum de la patiente autour de 28 mm

LES ANNEES PASSENT TOUJOURS

- ARRET CARDIAQUE à l'âge de 52 ans RECUPERE par collègue d'association puis par pompier DSA





DONC TIRONS LEÇON

- Bien réévaluer les FDR dans le temps
- On est vraiment pas à quelques millimètres
- Seul le défibrillateur a fait ses preuves dans la mort subite de la MCH

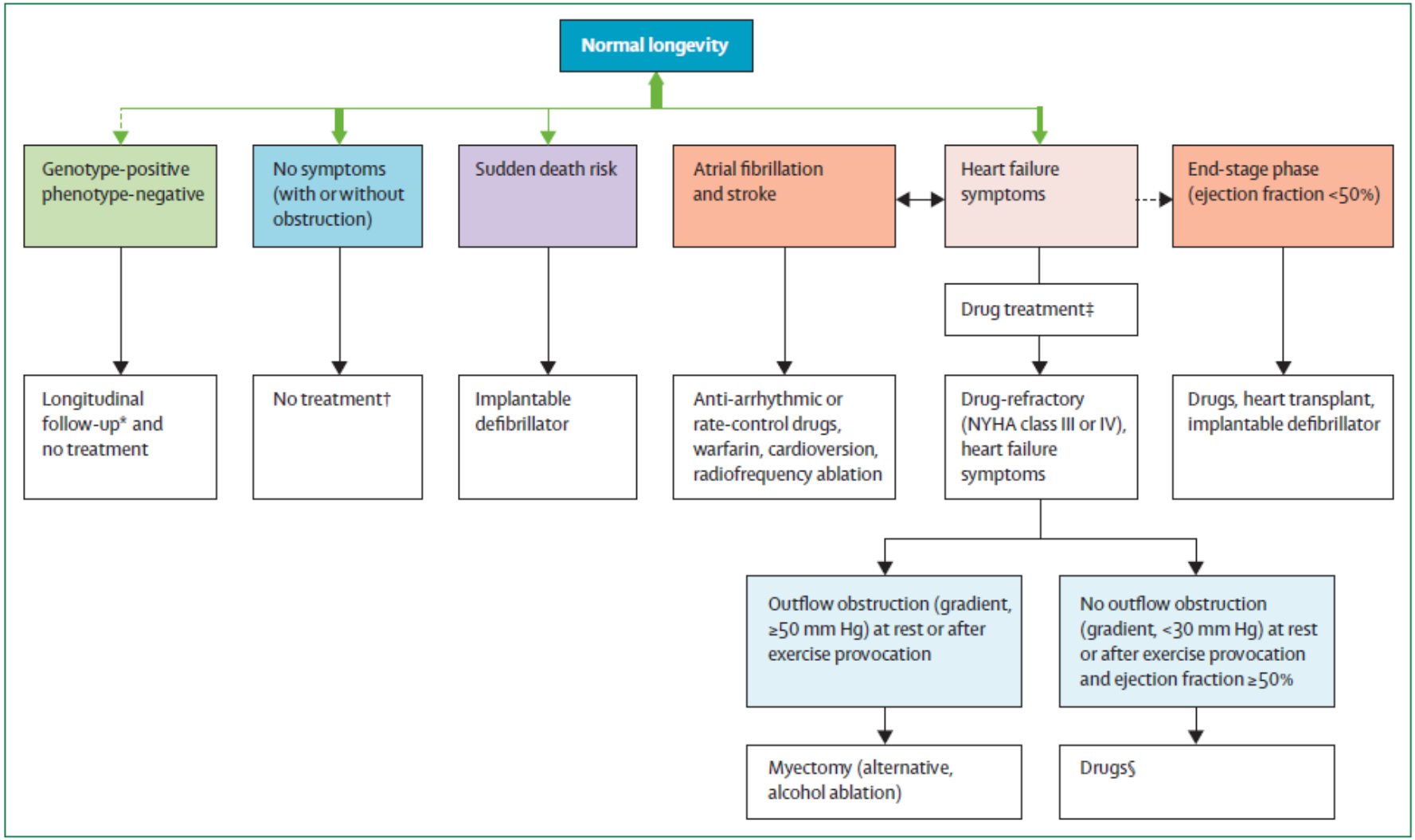


Figure 3: Prognostic pathways and primary treatment strategies for various presentations of hypertrophic cardiomyopathy

Maron et al Lancet 2013

CALCUL RISQUE DE MS à 5 ans

NOUVEAU!

EHJ 2013

shown in *Table 5*. The risk of SCD in 5 years for an individual HCM patient can be calculated from the following equation:

$$\hat{P}_{\text{SCD at 5 years}} = 1 - 0.998^{\exp(\text{Prognostic Index})},$$

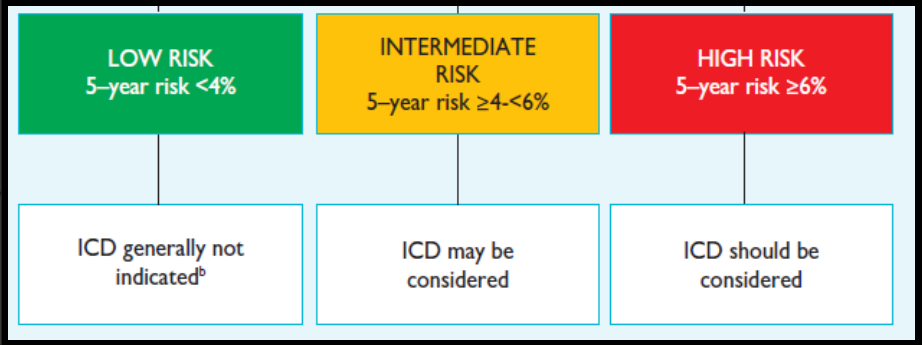
where Prognostic Index = 0.15939858*Maximal wall thickness (mm) − 0.00294271*Maximal wall thickness^2 (mm^2) + 0.0259082* Left atrial diameter (mm) + 0.00446131*Maximal left ventricular outflow tract gradient (mmHg) + 0.4583082*Family history SCD + 0.82639195*NSVT + 0.71650361*Unexplained syncope − 0.01799934*Age at clinical evaluation (years).

A novel clinical risk prediction model for sudden cardiac death in hypertrophic cardiomyopathy (HCM Risk-SCD)

Constantinos O'Mahony[1], Fatima Jichi[2], Menelaos Pavlou[8], Lorenzo Monserrat[3],

death

Recommendations	Class[a]	Level[b]	Ref.[c]
Avoidance of competitive sports[d] is recommended in patients with HCM	I	C	395
ICD implantation is recommended in patients who have survived a cardiac arrest due to VT or VF, or who have spontaneous sustained VT causing syncope or haemodynamic compromise, and have a life expectancy of >1 year.	I	B	327,367, 391–393
HCM Risk-SCD is recommended as a method of estimating risk of sudden death at 5 years in patients aged ≥16 years without a history of resuscitated VT/VF or spontaneous sustained VT causing syncope or haemodynamic compromise.	I	B	73
It is recommended that the 5-year risk of SCD be assessed at first evaluation and re-evaluated at 1–2 year intervals or whenever there is a change in clinical status.	I	B	73
ICD implantation should be considered in patients with an estimated 5-year risk of sudden death of ≥6% and a life expectancy of >1 year, following detailed clinical assessment that takes into account the lifelong risk of complications and the impact of an ICD on lifestyle, socio-economic status and psychological health.	IIa	B	73,327, 393,396
ICD implantation may be considered in individual patients with an estimated 5-year risk of SCD of between ≥4% and <6% and a life expectancy of >1 year, following detailed clinical assessment that takes into account the lifelong risk of complications and the impact of an ICD on lifestyle, socio-economic status and psychological health.	IIb	B	73,327, 393,396



DAI si score > 4 à 6 %
Score à réévaluer/1-2 ans

ublication date	Versions	References	Size
2014	Full Text	Eur Heart J (2014) 35:2733-2779 - doi/10.1093/eurheartj/ehu284	
2014	Essential Messages	2014 Takes Home Messages & Gap in Evidence	632 KB
2014	Summary Card (direct access)	Summary Card for General Practice on HCM	323 KB
2014	Pocket Guidelines	Pocket Guidelines Abriged version	
2014	Pda	HCM Pocket Guidelines Mobile App	
2014	Slide-set (direct access)	ESC-2014-Slide-set-Hypertrophic-Cardiomyopathy	9 MB
2014	CME Questions	36 CME Questions	
2014	Related Materials	Web Addenda	935 KB
2014	Related Materials	HCM online calculator	

HCM Risk-SCD Calculator

Age	50	**Years**	*Age at evaluation*
Maximum LV wall thickness	28	**mm**	*Transthoracic Echocardiographic measurement*
Left atrial size	50	**mm**	*Left atrial diameter determined by M-Mode or 2D echocardiography in the parasternal long axis plane at time of evaluation*
Max LVOT gradient	20	**mmHg**	*The maximum LV outflow gradient determined at rest and with Valsalva provocation (irrespective of concurrent medical treatment) using pulsed and continuous wave Doppler from the apical three and five chamber views. Peak outflow tract gradients should be determined using the modified Bernouilli equation: Gradient= $4V^2$, where V is the peak aortic outflow velocity*
Family History of SCD	◉ No ○ Yes		*History of sudden cardiac death in 1 or more first degree relatives under 40 years of age or SCD in a first degree relative with confirmed HCM at any age (post or ante-mortem diagnosis).*
Non-sustained VT	◉ No ○ Yes		*3 consecutive ventricular beats at a rate of 120 beats per minute and <30s in duration on Holter monitoring (minimum duration 24 hours) at or prior to evaluation.*
Unexplained syncope	◉ No ○ Yes		*History of unexplained syncope at or prior to evaluation.*

Risk of SCD at 5 years (%):	2.77
ESC recommendation:	ICD generally not indicated **

** *ICD not recommended unless there other clinical features that are of potential prognostic importance and when the likely benefit is greater than the lifelong risk of complications and the impact of an ICD on lifestyle, socioeconomic status and psychological health.*

Reset

2014 ESC Guidelines on Diagnosis and Management of Hypertrophic Cardiomyopathy (Eur Heart J 2014 – doi:10.1093/eurheartj/ehu284)

O'Mahony C et al Eur Heart J (2014) 35 (30): 2010-2020

HCM Risk-SCD should not be used in:

EUROPEAN SOCIETY OF CARDIOLOGY®

HCM Risk-SCD Calculator

Age	40	**Years**	*Age at evaluation*
Maximum LV wall thickness	20	**mm**	*Transthoracic Echocardiographic measurement*
Left atrial size	45	**mm**	*Left atrial diameter determined by M-Mode or 2D echocardiography in the parasternal long axis plane at time of evaluation*
Max LVOT gradient	20	**mmHg**	*The maximum LV outflow gradient determined at rest and with Valsalva provocation (irrespective of concurrent medical treatment) using pulsed and continuous wave Doppler from the apical three and five chamber views. Peak outflow tract gradients should be determined using the modified Bernouilli equation: Gradient= $4V^2$, where V is the peak aortic outflow velocity*
Family History of SCD	◉ No ○ Yes		*History of sudden cardiac death in 1 or more first degree relatives under 40 years of age or SCD in a first degree relative with confirmed HCM at any age (post or ante-mortem diagnosis).*
Non-sustained VT	○ No ◉ Yes		*3 consecutive ventricular beats at a rate of 120 beats per minute and <30s in duration on Holter monitoring (minimum duration 24 hours) at or prior to evaluation.*
Unexplained syncope	◉ No ○ Yes		*History of unexplained syncope at or prior to evaluation.*

Risk of SCD at 5 years (%):	5.67
ESC recommendation:	ICD may be considered

Reset

2014 ESC Guidelines on Diagnosis and Management of Hypertrophic Cardiomyopathy (Eur Heart J 2014 – doi:10.1093/eurheartj/ehu284)

O'Mahony C et al Eur Heart J (2014) 35 (30): 2010-2020

HCM Risk-SCD should not be used in:

- ***Paediatric patients (<16 years)***
- ***Elite/competitive athletes***
- ***HCM associated with metabolic diseases (e.g. Anderson-Fabry disease), and syndromes (e.g. Noonan syndrome).***
- ***Patients with a previous history of aborted SCD or sustained ventricular arrhythmia who should be treated with an ICD for secondary prevention***

HCM Risk-SCD Calculator

Age	60 **Years**	*Age at evaluation*
Maximum LV wall thickness	26 **mm**	*Transthoracic Echocardiographic measurement*
Left atrial size	45 **mm**	*Left atrial diameter determined by M-Mode or 2D echocardiography in the parasternal long axis plane at time of evaluation*
Max LVOT gradient	40 **mmHg**	*The maximum LV outflow gradient determined at rest and with Valsalva provocation (irrespective of concurrent medical treatment) using pulsed and continuous wave Doppler from the apical three and five chamber views. Peak outflow tract gradients should be determined using the modified Bernouilli equation: Gradient= $4V^2$, where V is the peak aortic outflow velocity*
Family History of SCD	(•) No ( ) Yes	*History of sudden cardiac death in 1 or more first degree relatives under 40 years of age or SCD in a first degree relative with confirmed HCM at any age (post or ante-mortem diagnosis).*
Non-sustained VT	(•) No ( ) Yes	*3 consecutive ventricular beats at a rate of 120 beats per minute and <30s in duration on Holter monitoring (minimum duration 24 hours) at or prior to evaluation.*
Unexplained syncope	(•) No ( ) Yes	*History of unexplained syncope at or prior to evaluation.*

Risk of SCD at 5 years (%):	2.23
ESC recommendation:	ICD generally not indicated **

** *ICD not recommended unless there other clinical features that are of potential prognostic importance and when the likely benefit is greater than the lifelong risk of complications and the impact of an ICD on lifestyle, socioeconomic status and psychological health.*

SCORE DE RISQUE À 5 ANS

- 4 %: 1 patient sauvé / 5 ans/ 16 DAI implanté
- 6 % : 1 patient sauvé/ 5 ans/ 11 DAI Implantés

Epicardial ablation of monomorphic ventricular tachycardia storm in hypertrophic cardiomyopathy

Stefano Bordignon*, K.R. Julian Chun, and Boris Schmidt

Cardioangiologisches Centrum Bethanien (CCB), Markus-Krankenhaus, Wilhelm-Epstein Str. 4, 60431 Frankfurt/M., Germany

* Corresponding author. Tel: +49 2952623, Email: dr.s.bordignon@gmail.com

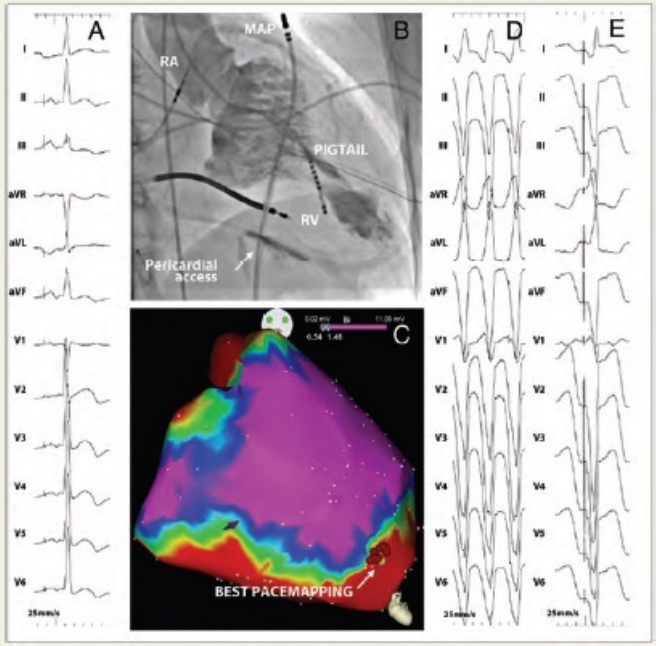
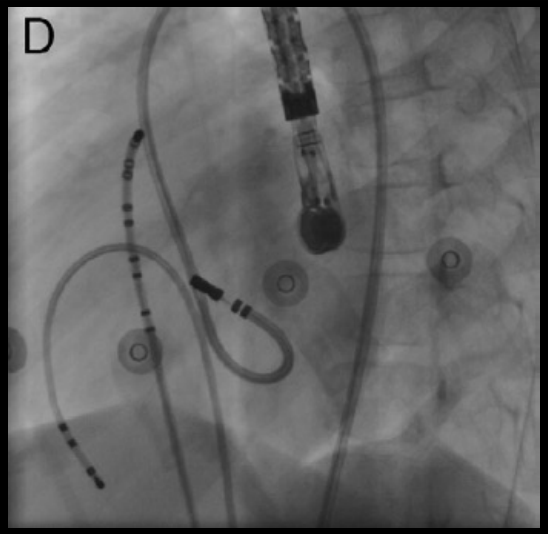


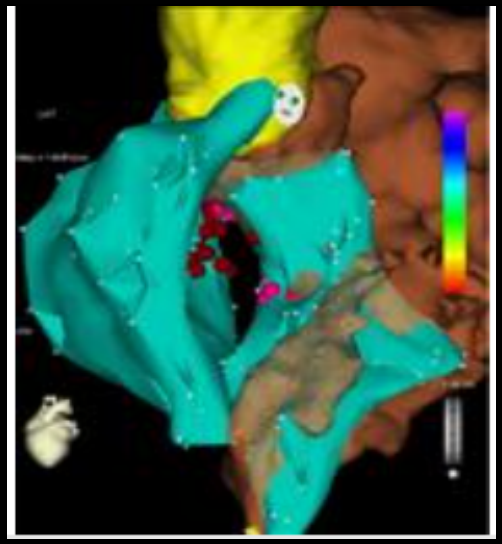
Figure 1 Panel *A*: Baseline ECG. Panel *B*: RAO 30° LV angiography with mid-cavitary obliteration and apical aneurysm; RA and RV indicate the ICD leads. Panel *C*: Epicardial bipolar electroanatomical map. The red dots indicate the best pacemapping and ablation site. Panel *D*: Induced monomorphic VT. Panel *E*: Best pacemapping at the ablation site.

JACC 2011

Percutaneous Radiofrequency Septal Reduction for Hypertrophic Obstructive Cardiomyopathy in Children

Narayanswami Sreeram, MD,* Mathias Emmel, MD,* Joseph V. de Giovanni, MD†





Clinical Research: Hypertrophic Cardiomyopathy | February 2011

Endocardial Radiofrequency Ablation for Hypertrophic Obstructive Cardiomyopathy

Acute Results and 6 Months' Follow-Up in 19 Patients

MERCI