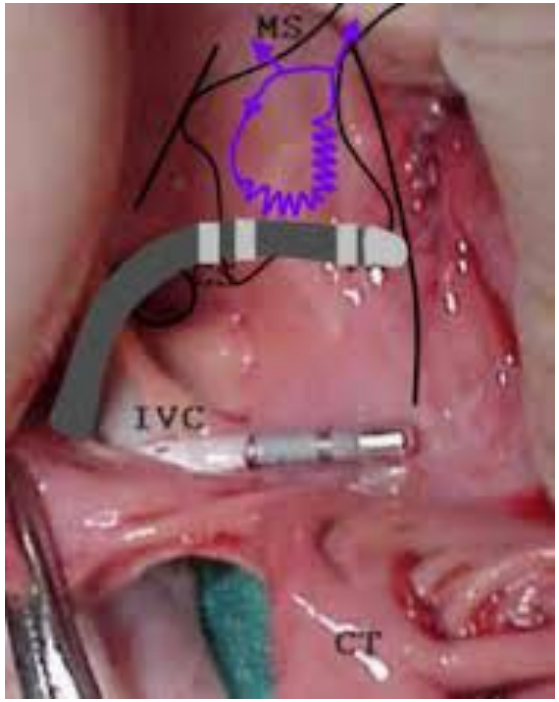
CENTRE HOSPITALIER
ANTIBES JUAN-LES-PINS

ABLATION DU NAV ET RESYNCHRONISATION CARDIAQUE

Nice le 11/4/2014

ABLATION DU NŒUD A-V

- Réservée aux patients chez qui le contrôle de fréquence échoue et qui restent symptomatiques



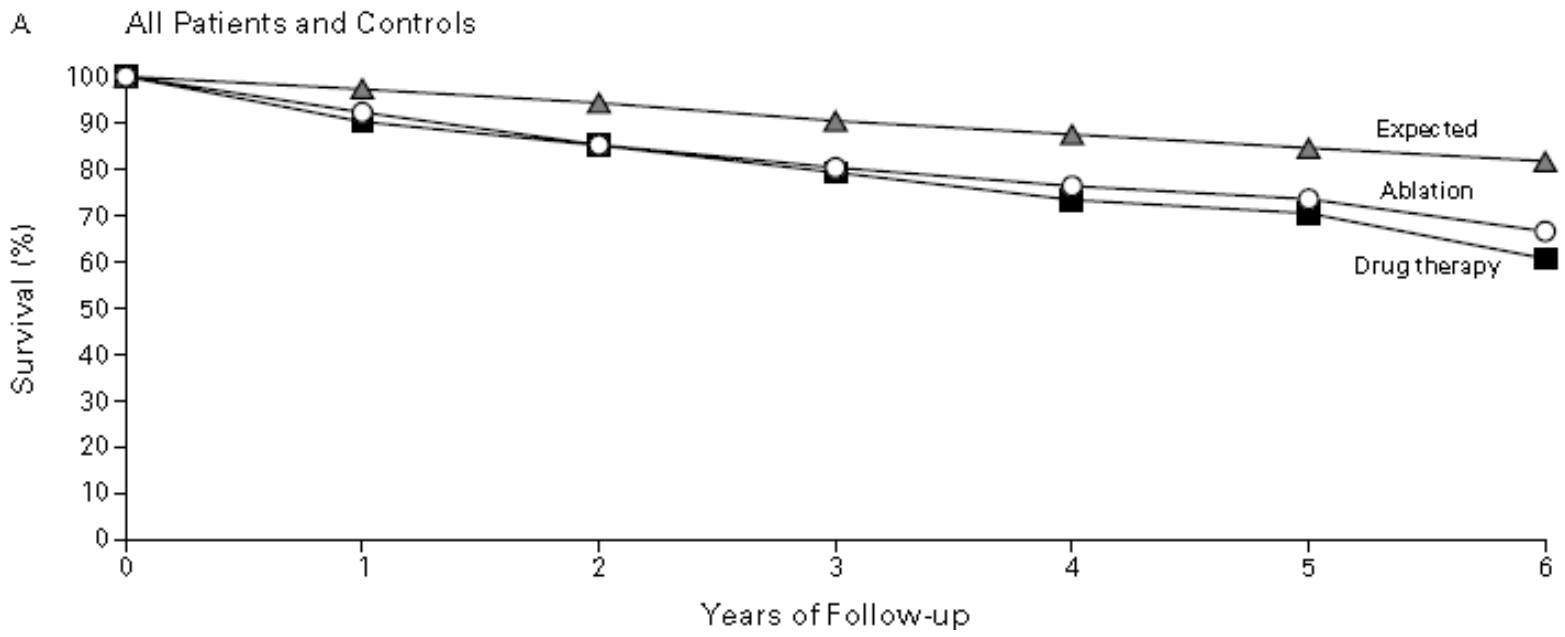
Etude princeps NEJM 2001

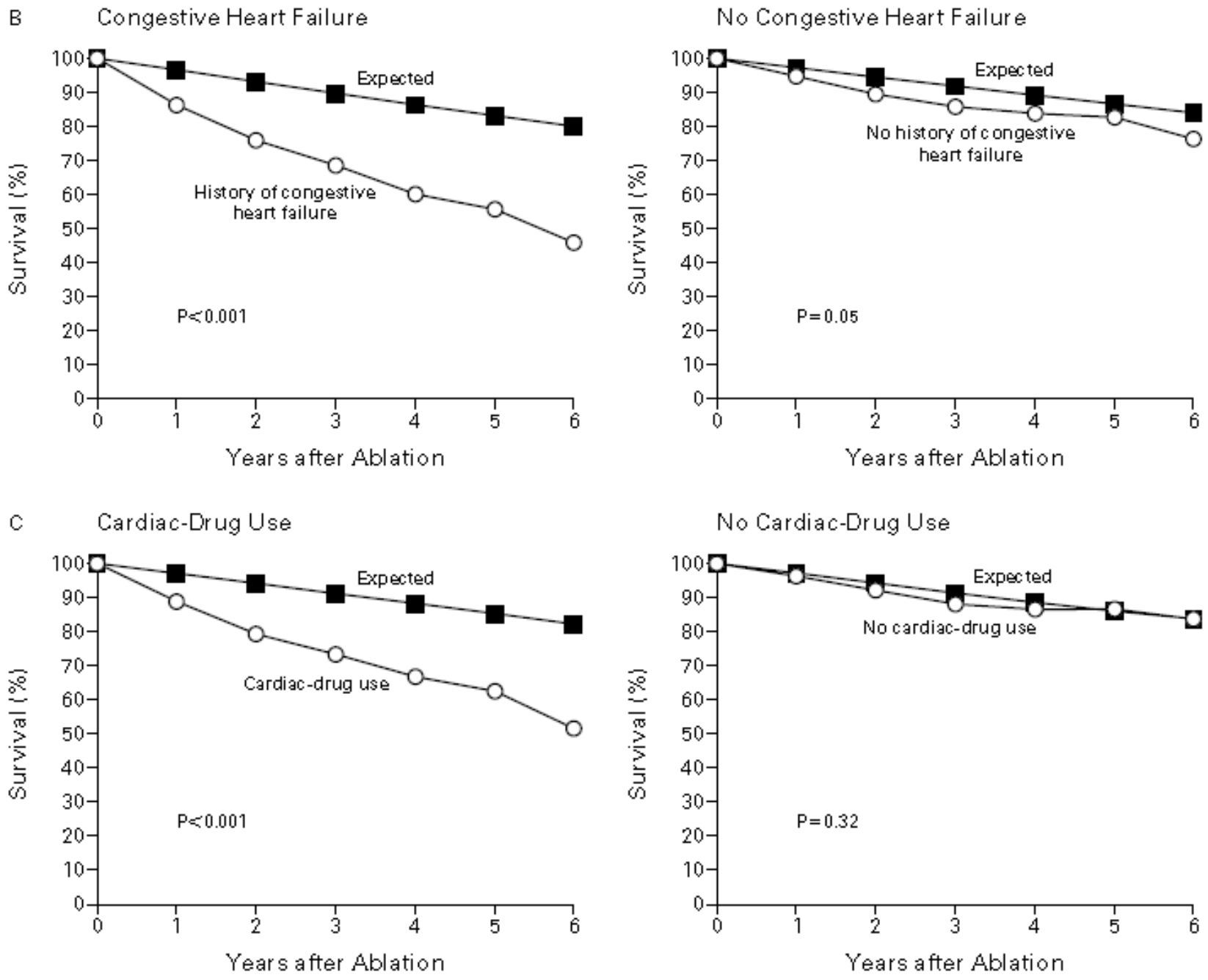
LONG-TERM SURVIVAL AFTER ABLATION OF THE ATRIOVENTRICULAR NODE AND IMPLANTATION OF A PERMANENT PACEMAKER IN PATIENTS WITH ATRIAL FIBRILLATION

CEVHER OZCAN, M.D., ARSHAD JAHANGIR, M.D., PAUL A. FRIEDMAN, M.D., PHILIP J. PATEL, M.D., THOMAS M. MUNGER, M.D., ROBERT F. REA, M.D., MARGARET A. LLOYD, M.D., DOUGLAS L. PACKER, M.D., DAVID O. HODGE, M.S., BERNARD J. GERSH, M.B., CH.B., D.PHIL., STEPHEN C. HAMMILL, M.D., AND WIN-KUANG SHEN, M.D.

Patients inclus entre 1990 et 1998
FA persistante ou paroxystique
symptomatique
réfractaire aux drogues

Dans cette étude, 37% des patients avaient une FE ≤ 40%


A
All Patients and Controls
Survival (%)
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
Years of Follow-up
Expected
Ablation
Drug therapy

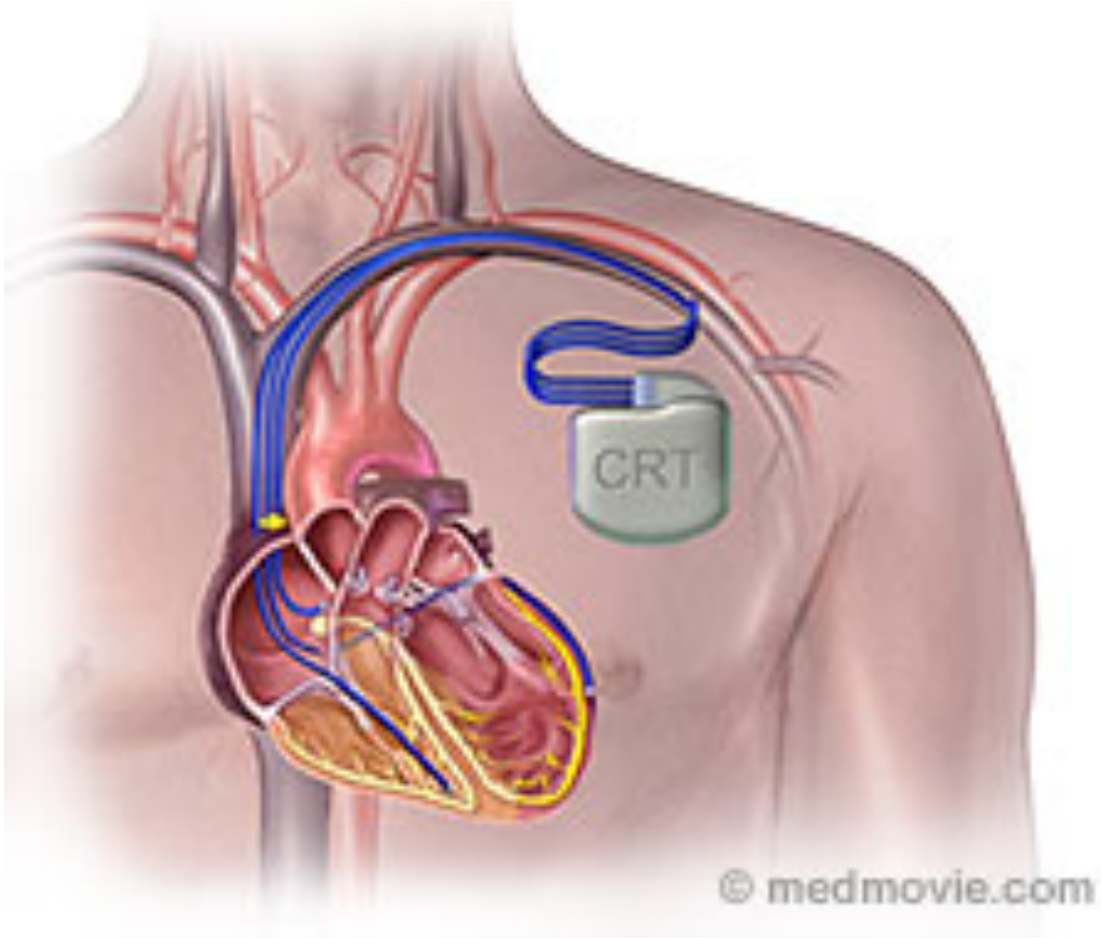

B
Congestive Heart Failure
Expected
History of congestive heart failure
P<0.001
Survival (%)
Years after Ablation
No Congestive Heart Failure
Expected
No history of congestive heart failure
P=0.05
Survival (%)
Years after Ablation
C
Cardiac-Drug Use
Expected
Cardiac-drug use
P<0.001
Survival (%)
Years after Ablation
No Cardiac-Drug Use
Expected
No cardiac-drug use
P=0.32
Survival (%)
Years after Ablation

RECOMMANDATIONS ABLATION NAV

Ablation of the AV node to control heart rate should be considered when the rate cannot be controlled with pharmacological agents and when AF cannot be prevented by antiarrhythmic therapy or is associated with intolerable side effects, and direct catheter-based or surgical ablation of AF is not indicated, has failed, or is rejected.	IIa	B	106,107

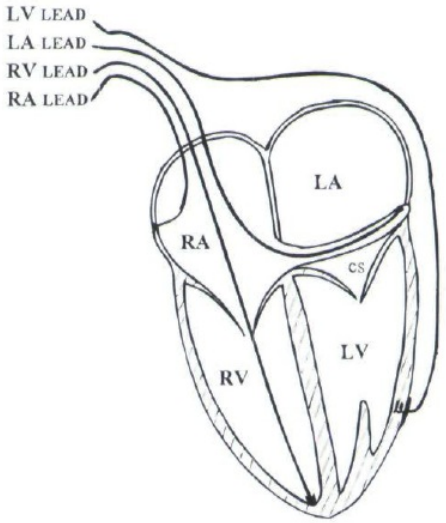
- En cas de cardiopathie sous jacente, la resynchronisation cardiaque doit être discutée d’emblée.

LA RESYNCHRONISATION CARDIAQUE



INDICATIONS 2013

1994

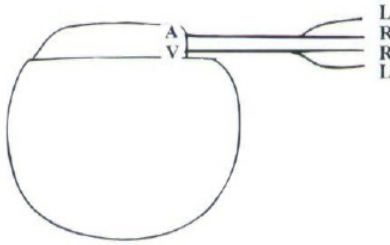


Four Chamber Pacing in Dilated Cardiomyopathy

S. CAZEAU, P. RITTER, S. BAKDACH, A. LAZARUS, M. LIMOUSIN,*
L. HENAO, O. MUNDLER,** J.C. DAUBERT,† and J. MUGICA

From the Val d'Or Surgical Centre, St. Cloud, the *Clinical Research Department, Ela Medical, Le Plessis Robinson, the **Department of Nuclear Medicine, University Hospital of Lariboisière, Paris, and the †University Hospital of Rennes, France

November 1994, Part II PACE, Vol. 17



pacemaker. Six weeks later, the patient's clinical status improved markedly with a weight loss of 17 kg and disappearance of peripheral edema. His functional class was reduced to NYHA II. Four chamber pacing is technically feasible. In patients with evidence of interventricular dyssynchrony, this original pacing mode probably provides a mechanical activation sequence closer to the natural one. We doubt that this technique will have an impact on long-term survival, but it could be of major importance to improve the patient's well-being and control heart failure. (PACE 1994; 17(Pt. II):1974–1979)

NOMBREUSES ETUDES

Table 2 Endpoints, design, and main findings of the randomized clinical trials evaluating cardiac resynchronization therapy in heart failure

Trial	Endpoints	Design	Main findings
MUSTIC-SR[16]	6MWT, QoL, pVO_2, Hosp	Single-blinded, controlled, crossover, 6 months	CRT-P improved: 6MWT, QOL, pVO_2; reduced Hosp
MIRACLE[8]	NYHA class, QoL, pVO_2	Double-blinded, controlled, 6 months	CRT-P improved: NYHA, pVO_2, 6MWT
MUSTIC AF[35]	6MWT, QoL, pVO_2, Hosp	Single-blinded, controlled, crossover, 6 months	CRT-P improved all; reduction of Hosp
PATH CHF[6]	6MWT, pVO_2	Single-blinded, controlled, crossover, 12 months	CRT-P improved: 6MWT; pVO_2
MIRACLE ICD[8]	6MWT, QoL, Hosp	Double-blinded, ICD vs. CRT-D 6 months	CRT-D improved all from baseline (not ICD)
CONTAK CD[54]	All-cause death + HF Hosp, pVO_2, 6MWT, NYHA class, QoL, LVEDD, LVEF	Double-blinded, ICD vs. CRT-D 6 months	CRT-D improved: pVO_2, 6MWT; reduced LVEDD and increased LVEF
MIRACLE ICD II[9]	VE/CO_2, pVO_2, NYHA, QoL, 6MWT, LV volumes, LVEF	Double-blinded, ICD vs. CRT-D 6 months	CRT-D improved: NYHA, VE/CO_2; volumes, LVEF
COMPANION[10]	(i) All-cause death or Hosp	Double-blinded, controlled, OPT, CRT-D, CRT-P, ~15 months	CRT-P/CRT-D: reduced (i)
CARE-HF[11]	(i) All-cause death or CV event (ii) All-cause death	Double-blinded, controlled, OPT, CRT-P, 29 months	CRT-P reduced (i) and (ii)
REVERSE[21]	(i) % worsened by clinical composite endpoint, (ii) LVESVi, (iii) HF Hosp, (iv) all-cause death	Double-blinded, controlled, OPT, CRT-P ± ICD, 12 months	Primary endpoint NS; CRT-P/CRT-D reduced (ii) and (iii) Hosp but not (iv)
MADIT–CRT[20]	(i) HF event or death, (ii) All-cause death, (iii) LVESV	Controlled, CRTP, CRT-D, 2.4 years	CRT-D reduced (i) and (iii) but not (ii)

AF = atrial fibrillation; CRT = cardiac resynchronization therapy; CRT-P = CRT with pacemaker function; CRT-D = CRT with defibrillator function; CV = cardiovascular; HF = heart failure; Hosp = hospitalization; ICD = implantable cardioverter defibrillator; LV = left ventricular; LVEDD = left ventricular end diastolic diameter; LVEF = left ventricular ejection fraction; LVESi = left ventricular stroke volume index, LVESV = left ventricular end-systolic volume; 6MWT = 6 min walk test; NYHA = New York Heart Association; NS = not significant; OPT = optimal medical therapy; pVO_2 = peak oxygen consumption; QoL = quality of life; SR = sinus rhythm; VE/CO_2 = ventilation/carbon dioxide ratio.

RECOMMANDATIONS CLASSE III/IV

Recommendations for the use of CRT where the evidence is strong—patients in sinus rhythm with NYHA functional class III and ambulatory class IV heart failure and a persistently reduced ejection fraction, despite optimal pharmacological therapy

Recommendations	Class[a]	Level[b]	Ref[c]
LBBB QRS morphology CRT-P/CRT-D is recommended in patients in sinus rhythm with a QRS duration of ≥120 ms, LBBB QRS morphology, and an EF ≤35%, who are expected to survive with good functional status for >1 year, to reduce the risk of HF hospitalization and the risk of premature death.	I	A	156, 157
Non-LBBB QRS morphology CRT-P/CRT-D should be considered in patients in sinus rhythm with a QRS duration of ≥150 ms, irrespective of QRS morphology, and an EF ≤35%, who are expected to survive with good functional status for >1 year, to reduce the risk of HF hospitalization and the risk of premature death.	IIa	A	156, 157

CRT-D = cardiac resynchronization therapy defibrillator; CRT-P = cardiac resynchronization therapy pacemaker; EF = ejection fraction; HF = heart failure; LBBB = left bundle branch block; NYHA = New York Heart Association.

[a]Class of recommendation.

[b]Level of evidence.

[c]References.

- Evolution et affinement des indications au fur et à mesure des études.

QUE FAIRE DES STADES I ET II NYHA?

- **MADIT-CRT: nejm 2009**
  - 1820 patients NYHA I (15%), II (84%)
  - FEVG ≤ 30%
  - QRS ≥ 130 ms
  - Randomisation :
    - 731 DAI
    - 1089 CRT-D
  - Critère principal: décès et insuffisance cardiaque
  - Suivi: 2,4 ans

- **MADIT-CRT RESULTATS:**
  - Diminution de 34% du critère primaire (décès et insuffisance cardiaque) dans le groupe CRT-D par rapport au groupe DAI seul
  - Arrêt prématuré de l'étude en raison de l'écart entre les deux groupes
  - Pas de différence CRT-D, CRT-P

RAFT (NEJM 2010)

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 DECEMBER 16, 2010 VOL. 363 NO. 25

Cardiac-Resynchronization Therapy for Mild-to-Moderate Heart Failure

Anthony S.L. Tang, M.D., George A. Wells, Ph.D., Mario Talajic, M.D., Malcolm O. Arnold, M.D., Robert Sheldon, M.D., Stuart Connolly, M.D., Stefan H. Hohnloser, M.D., Graham Nichol, M.D., David H. Birnie, M.D., John L. Sapp, M.D., Raymond Yee, M.D., Jeffrey S. Healey, M.D., and Jean L. Rouleau, M.D., for the Resynchronization–Defibrillation for Ambulatory Heart Failure Trial (RAFT) Investigators

DESIGN RAFT

METHODS

We randomly assigned patients with New York Heart Association (NYHA) class II or III heart failure, a left ventricular ejection fraction of 30% or less, and an intrinsic QRS duration of 120 msec or more or a paced QRS duration of 200 msec or more to receive either an ICD alone or an ICD plus CRT. The primary outcome was death from any cause or hospitalization for heart failure.

CONCLUSIONS

Among patients with NYHA class II or III heart failure, a wide QRS complex, and left ventricular systolic dysfunction, the addition of CRT to an ICD reduced rates of death and hospitalization for heart failure. This improvement was accompanied by more adverse events. (Funded by the Canadian Institutes of Health Research and Medtronic of Canada; ClinicalTrials.gov number, NCT00251251.)

QUE FAIRE DES STADES I ET II NYHA?

- L'analyse des résultats de ces études montre un bénéfice confirmé pour les **stade II** avec **QRS ≥ 150 ms, ou 130ms si morphologie de BBG**

RECOMMANDATIONS STADE II NYHA

Recommendations for the use of CRT where the evidence is strong—patients in sinus rhythm with NYHA functional class II heart failure and a persistently reduced ejection fraction, despite optimal pharmacological therapy

Recommendations	Class[a]	Level[b]	Ref[c]
LBBB QRS morphology CRT, preferably CRT-D is recommended in patients in sinus rhythm with a QRS duration of ≥130 ms, LBBB QRS morphology, and an EF ≤30%, who are expected to survive for >1 year with good functional status, to reduce the risk of HF hospitalization and the risk of premature death.	I	A	154, 155
Non-LBBB QRS morphology CRT, preferably CRT-D should be considered in patients in sinus rhythm with a QRS duration of ≥150 ms, irrespective of QRS morphology, and an EF ≤30%, who are expected to survive for >1 year with good functional status, to reduce the risk of HF hospitalization and the risk of premature death.	IIa	A	154, 155

CRT-D = cardiac resynchronization therapy defibrillator; EF = ejection fraction; HF = heart failure; LBBB = left bundle branch block; NYHA = New York Heart Association.
[a]Class of recommendation.
[b]Level of evidence.
[c]References.

Pour les patients en FA

European Heart Journal (2008) **29**, 1644–1652
doi:10.1093/eurheartj/ehn133

CLINICAL RESEARCH
Heart failure/cardiomyopathy

Long-term survival in patients undergoing cardiac resynchronization therapy: the importance of performing atrio-ventricular junction ablation in patients with permanent atrial fibrillation

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Received 24 June 2007; revised 1 February 2008; accepted 10 March 2008; online publish-ahead-of-print 4 April 2008

Suivi biv+NAV / groupe sinusal

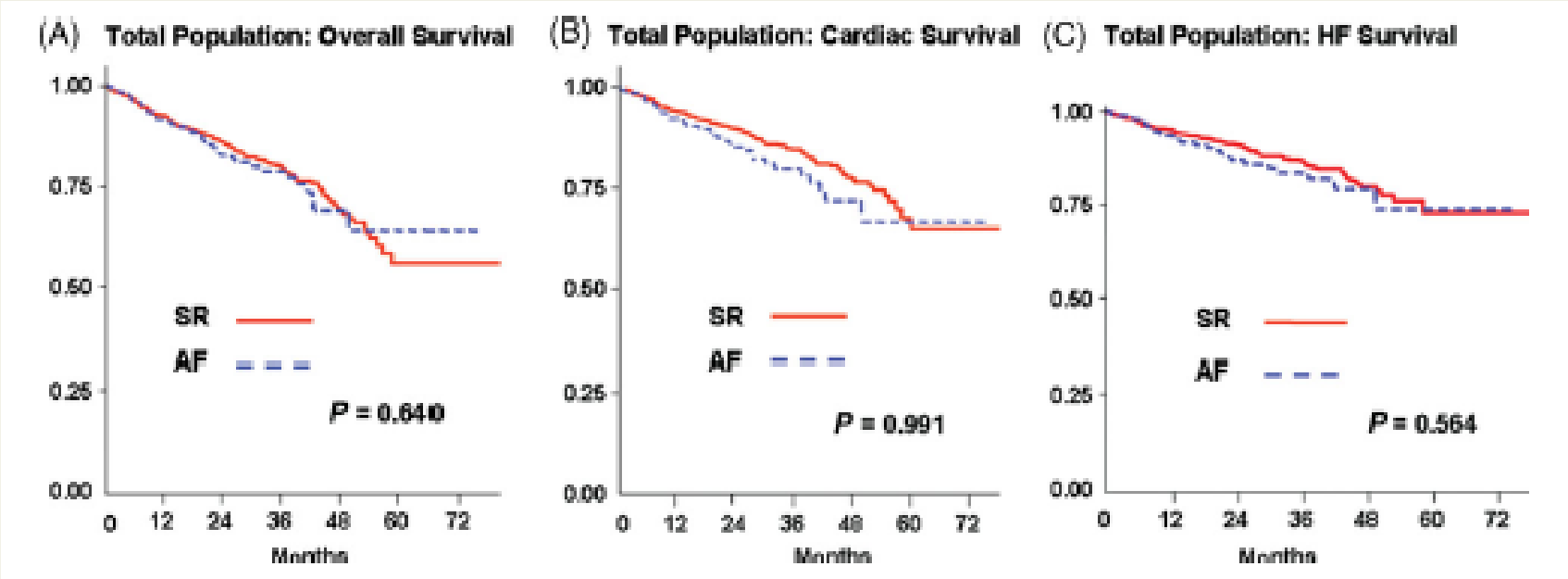


Figure 1 Comparison of Kaplan–Meier estimates of overall (*A*), cardiac (*B*), and heart failure (*C*) survival between sinus rhythm and the global atrial fibrillation population. The *P*-values presented derive from the adjusted hazards ratio analysis stratified according to the corresponding cause of death.

Suivi BiV+NAV / Biv+trt médical

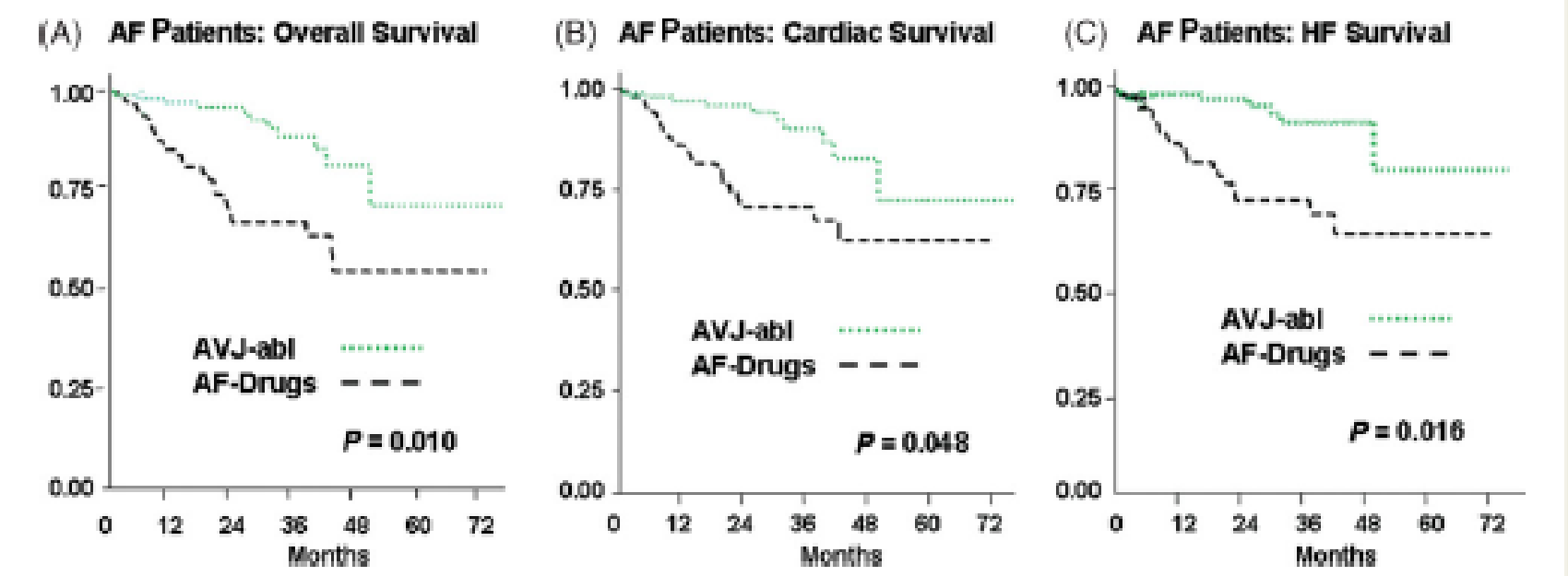


Figure 2 Comparison of Kaplan–Meier estimates of overall (A), cardiac (B), and heart failure (C) survival between atrial fibrillation patients who underwent atrio-ventricular junction ablation (AVJ-abl) and atrial fibrillation patients treated only with negative chronotropic drugs (AF-Drugs). The *P*-values presented derive from the adjusted hazards ratio analysis stratified according to the corresponding cause of death.

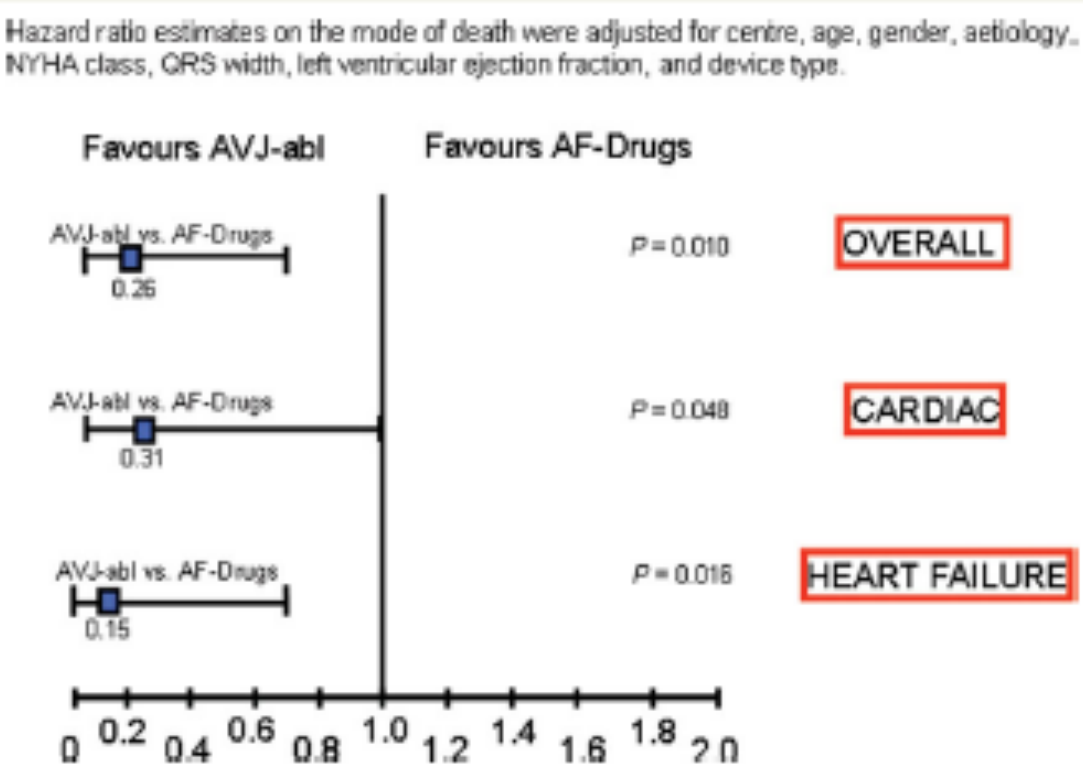


Figure 3 Hazard ratio estimates stratified according to cause of death between atrial fibrillation patients who underwent atrio-ventricular junction ablation (AVJ-abl) and atrial fibrillation patients treated with negative chronotropic drugs (AF-Drugs); hazard ratio estimates were adjusted for centre, age, gender, aetiology, NYHA class, QRS width, left ventricular ejection fraction, and device type. Corresponding hazard ratio values for each cause of death are indicated with a square, the bar represents 95% confidence interval range, and the *P*-value for each estimate is presented on the right of the figure.

RECOMMANDATIONS

Recommendations	Patient population	Class[a]	Level[b]	Ref.[c]
CRT-P/CRT-D[d] should be considered to reduce morbidity	NYHA function class III/IV LVEF ≤35%, QRS ≥130 ms Pacemaker dependency induced by AV nodal ablation	IIa	B	27–40

Recommendations for the use of CRT where the evidence is uncertain—patients with symptomatic HF (NYHA functional class II–IV) and a persistently reduced EF despite optimal pharmacological therapy and in AF or with a conventional pacing indication

Recommendations	Class[a]	Level[b]	Ref[c]
Patients in permanent AF			
CRT-P/CRT-D may be considered in patients in NYHA functional class III or ambulatory class IV with a QRS duration ≥120 ms and an EF ≤35%, who are expected to survive with good functional status for >1 year, to reduce the risk of HF worsening if:			
• The patient requires pacing because of an intrinsically slow ventricular rate	IIb	C	–
• The patient is pacemaker dependent as a result of AV nodal ablation	IIa	B	163a
• The patient's ventricular rate is ≤60 b.p.m. at rest and ≤90 b.p.m. on exercise.	IIb	C	–
Patients with an indication for conventional pacing and no other indication for CRT			
In patients who are expected to survive with good functional status for >1 year:			
• CRT should be considered in those in NYHA functional class III or IV with an EF ≤35%, irrespective of QRS duration, to reduce the risk of worsening of HF	IIa	C	–
• CRT may be considered in those in NYHA functional class II with an EF ≤35%, irrespective of QRS duration, to reduce the risk of worsening of HF.	IIb	C	–

CRT-D = cardiac resynchronization therapy defibrillator; CRT-P = cardiac resynchronization therapy pacemaker; EF = ejection fraction; HF = heart failure; NYHA = New York Heart Association.

[a]Class of recommendation.

[b]Level of evidence.

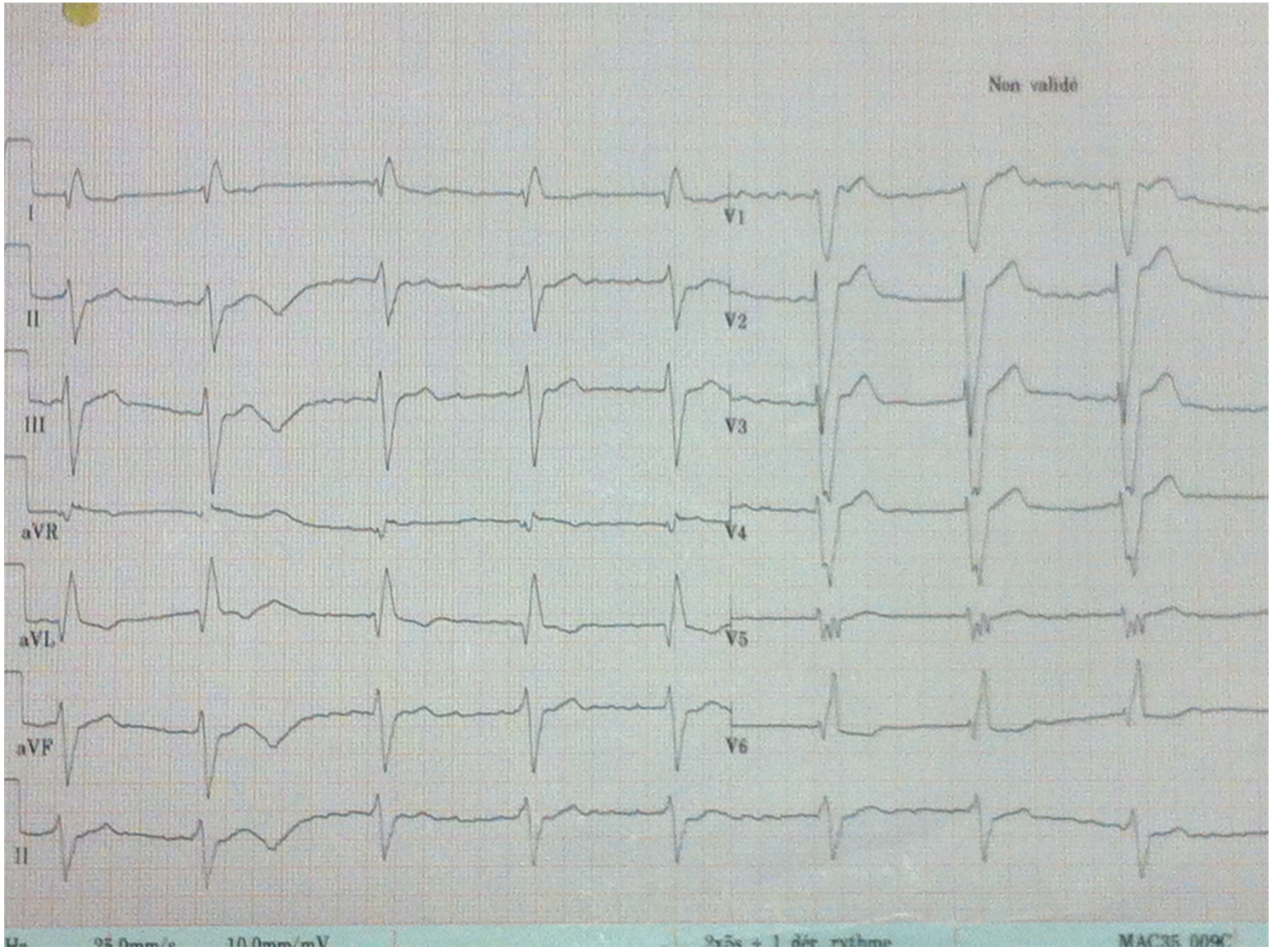
[c]References.

ET LA VRAIE VIE ?

Mr B 71 ans

- Cardiopathie ischémique sévère
- NYHA III et décompensations régulières
- FEVG 25%
- Trt optimal

Mr B 71 ans

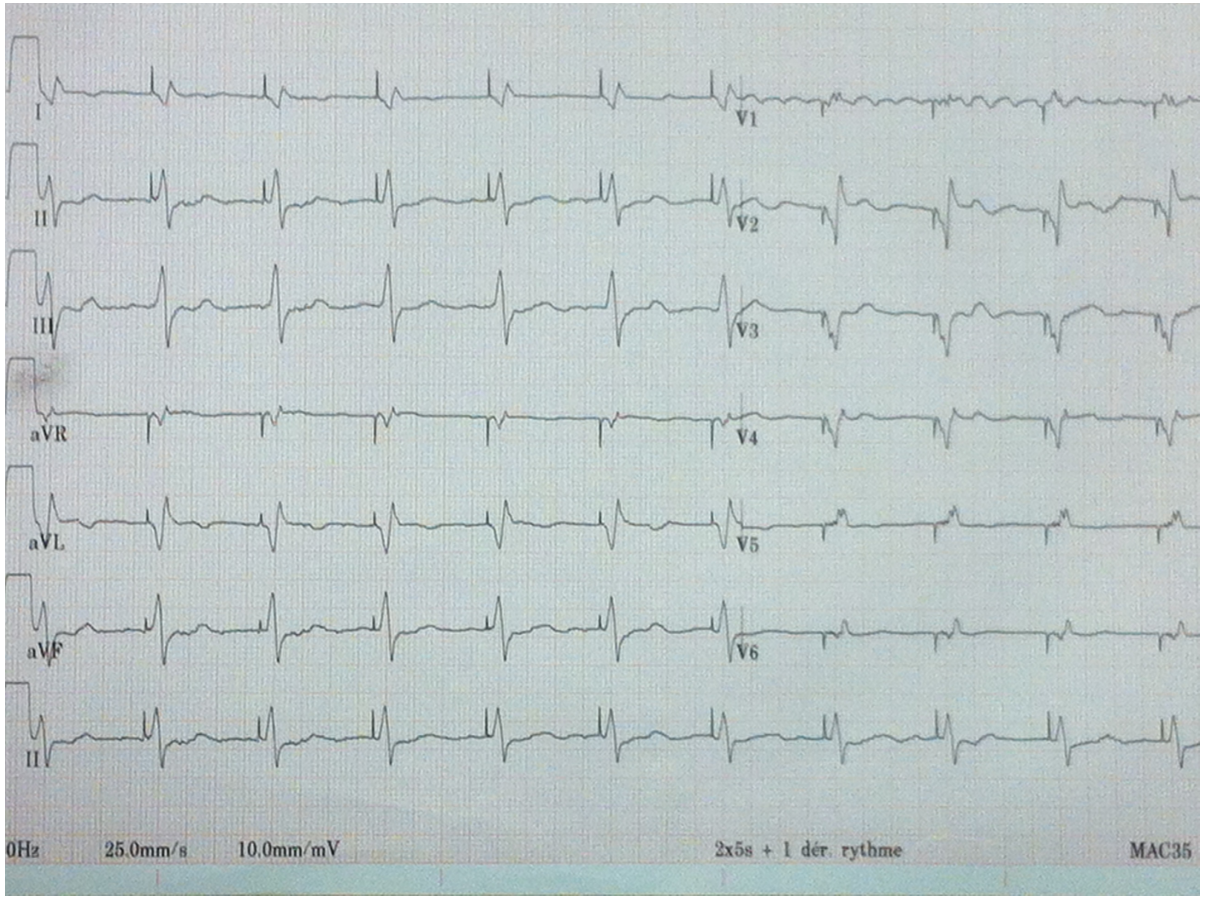


Mr B 71 ans

- Recommandations:
  - NYHA III
  - FA persistante
  - QRS large
  - Aspect de BBG
  - ➔ DAI BiV

Mr B 71 ans

- Amélioration clinique
- 70% de stim BiV en interrogeant le DAI
- ➔ ABLATION DU NAV
- Plus d'hospitalisation depuis 1 an. Va encore mieux..

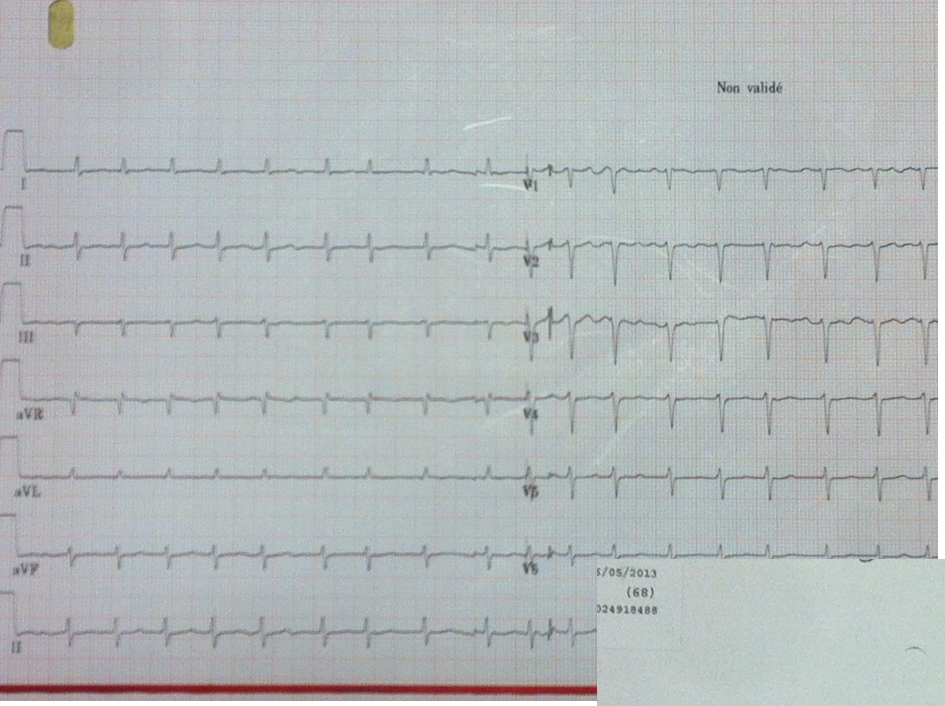


Mr M 68 ans

- HTA
- Obésité
- En FA rapide, persistante
- Décompensation cardiaque globale.
- FE 25%
- Coronaires saines.
- Resistance à la cordarone et à plusieurs CEE
- Persistance CMD et NYHA III

Mr M 68 ans

- Recommandations:
  - Ablation du NAV
  - DAI BiV
- Mais patient « jeune », FA persistante récente (Moins de 1 an à priori)
- Décision d'ablation.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I
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III
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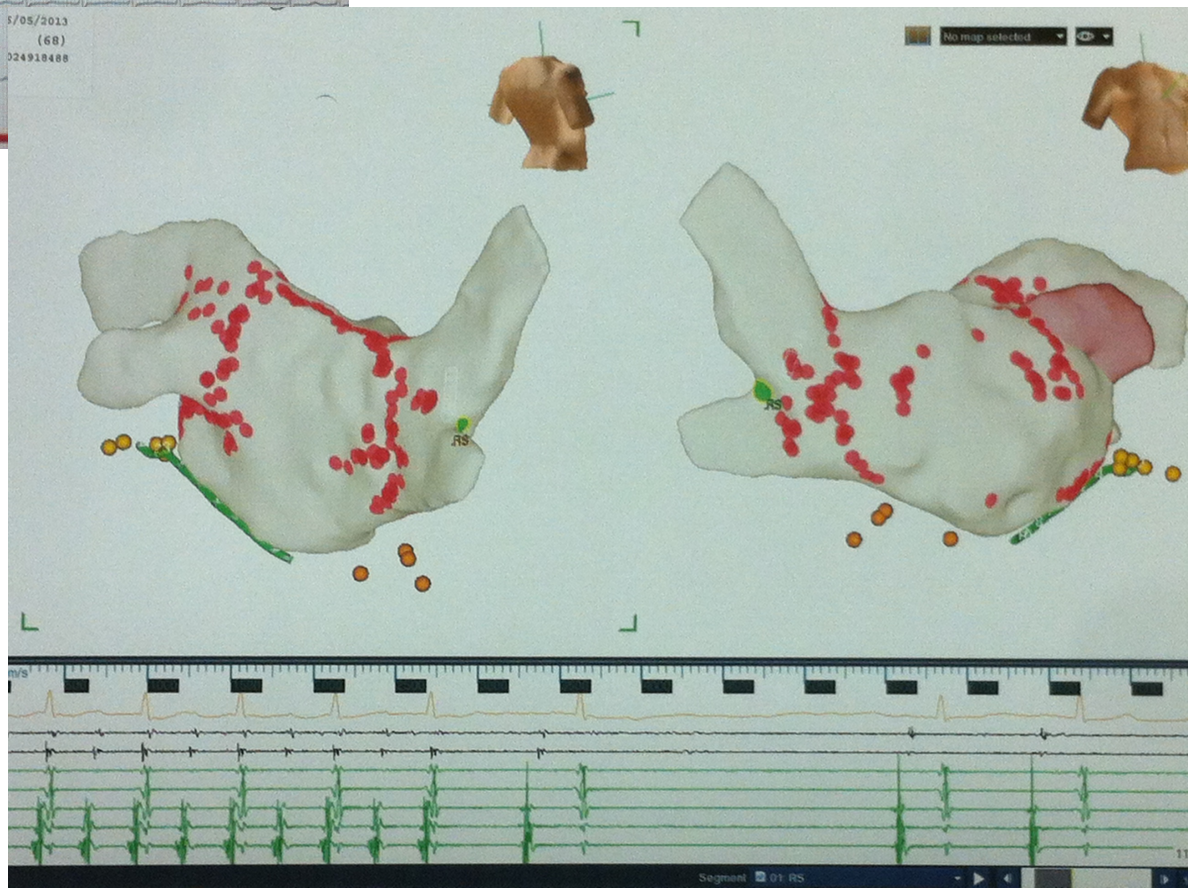
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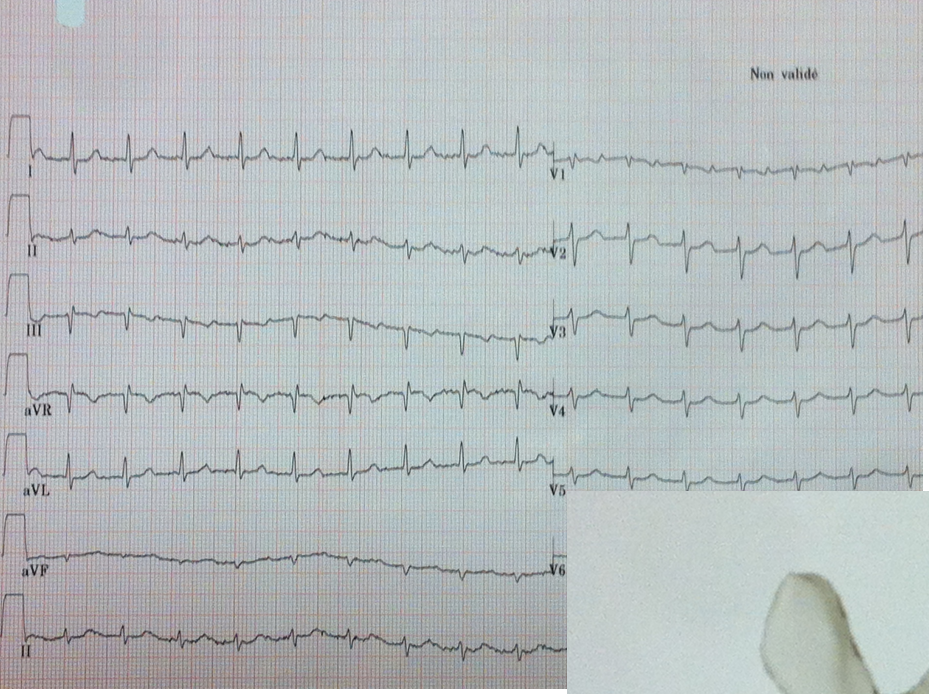
RS
RS
Segment 01 RS

Mr M 68 ans

- Normalisation complète de la FEVG
- Stade NYHA I
- Sortie de l'indication de DAI/ablation NAV.

- 8 mois après, récidive sous forme organisée symptomatique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I
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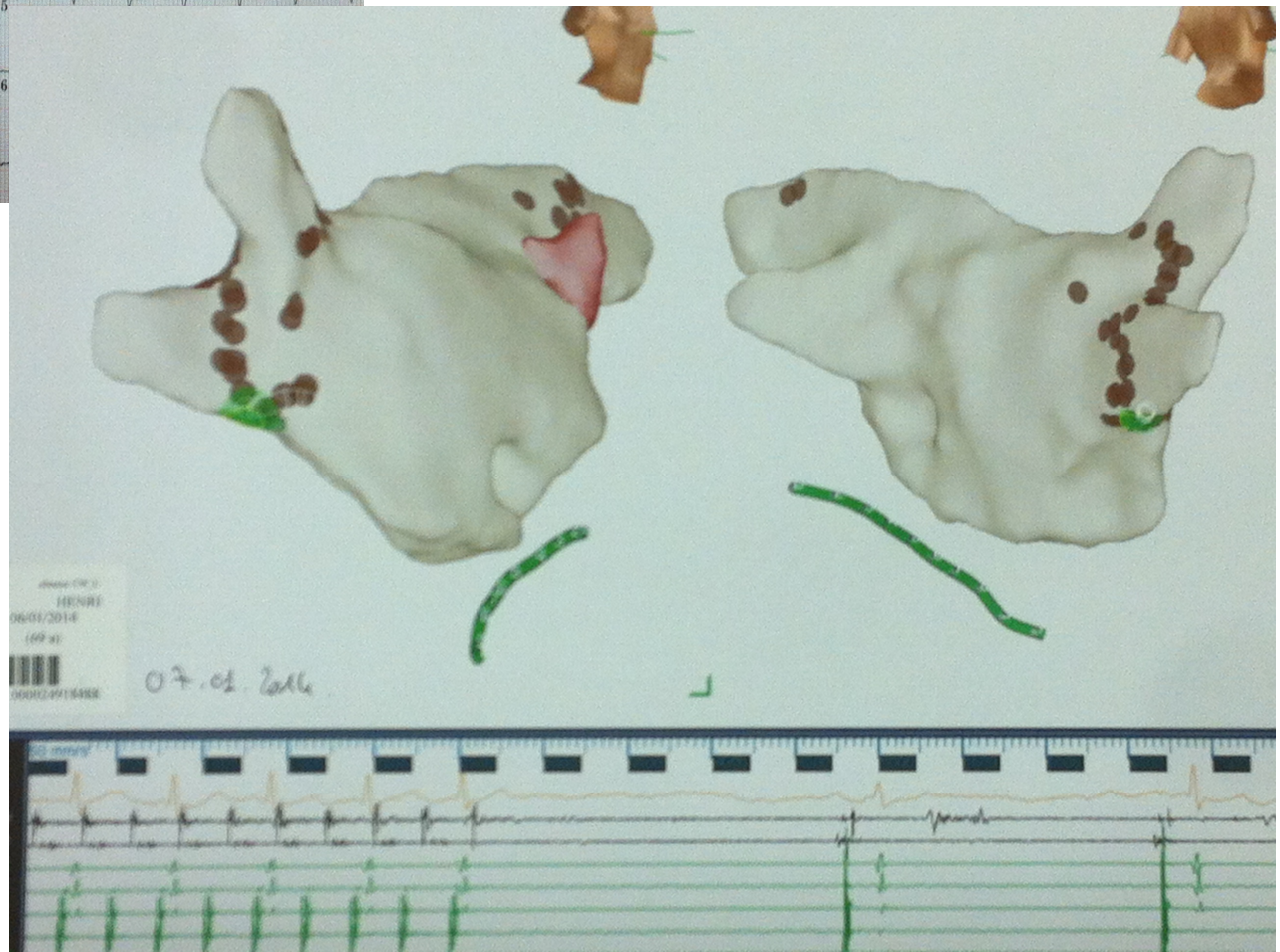
V5
V6


07.01.2016

Mr E 82 ans

- CMI pontée, FE 25%
- DAI triple chambre en 2007
- Ablation de flutter en 2007
- Décompensations cardiaque itératives
- Récidives précoces de FA après plusieurs CEE sous cordarone
- Pas de lésion coronaire à revasculariser.
- Dyspnée stade III / IV permanente.

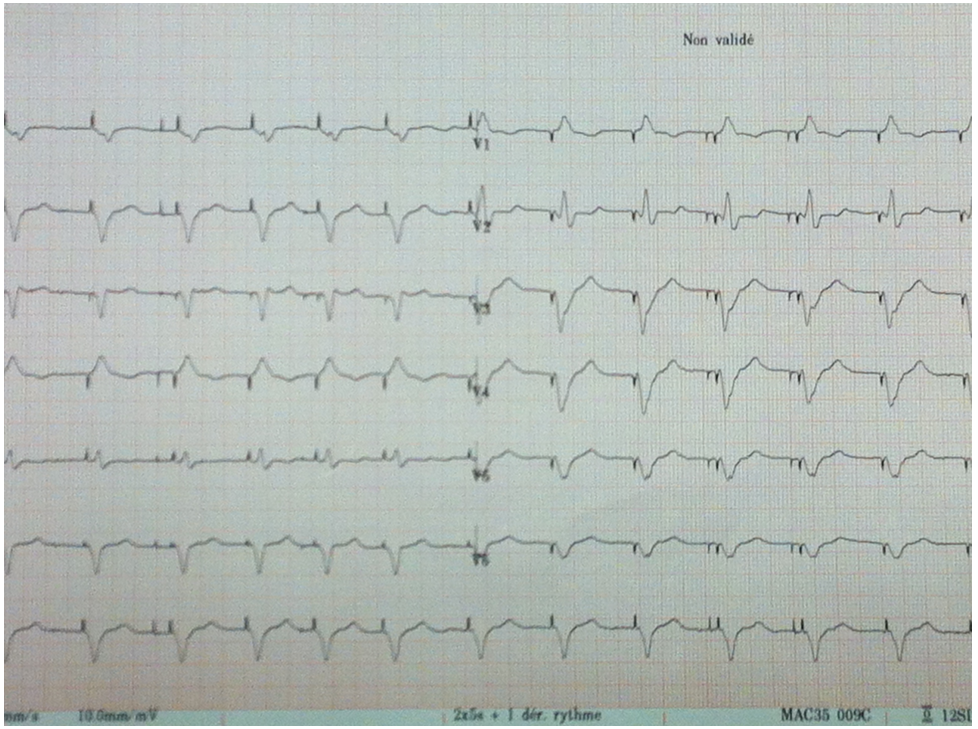
100% de stimulation Biventriculaire à l'interrogatoire du DAI

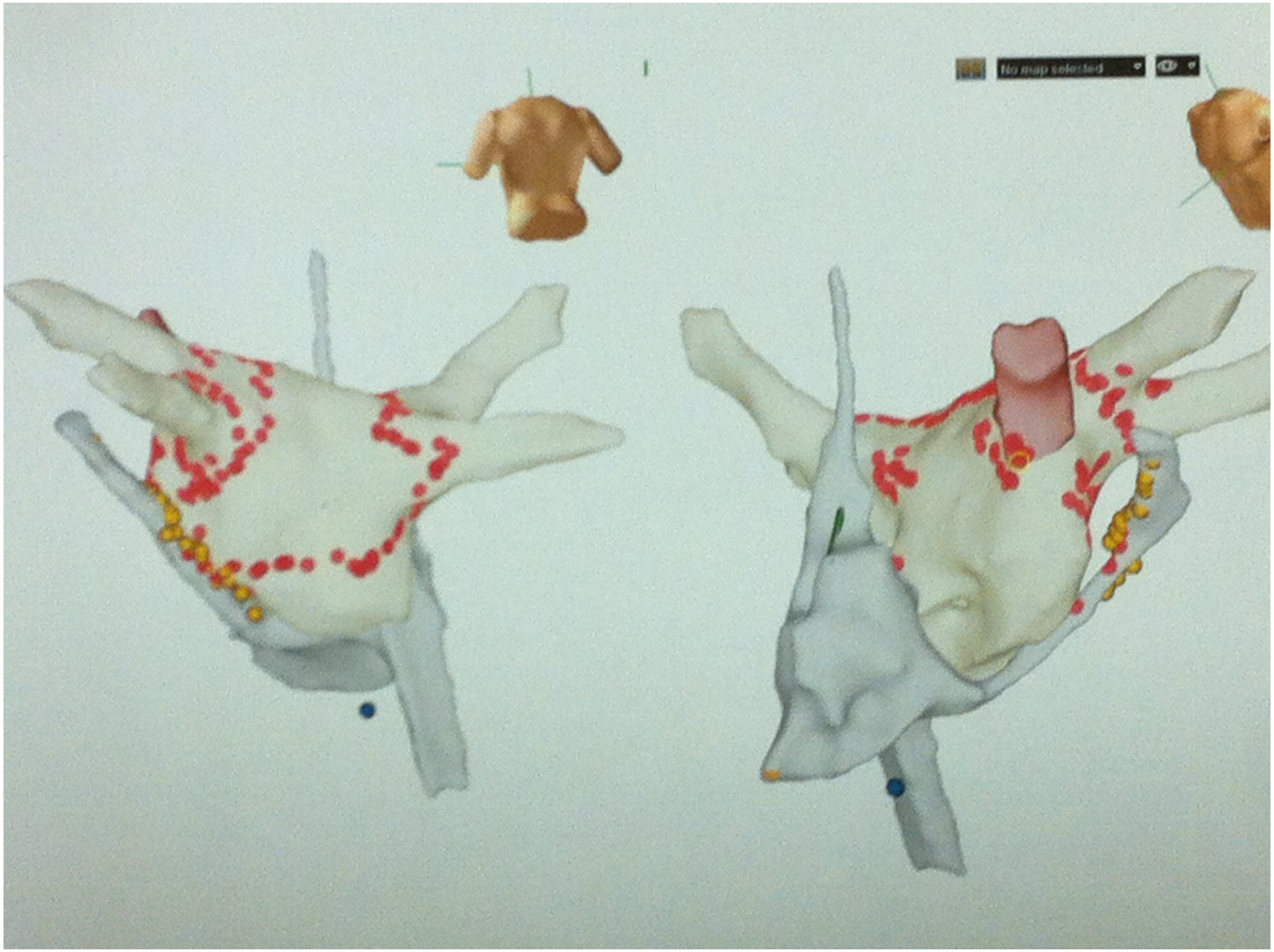
Mr E 82 ans

- Que faire?
- D'après les recommandations: rien
- Demande ++
- Patient stable et

Actif ++ en RS

Ablation programmée

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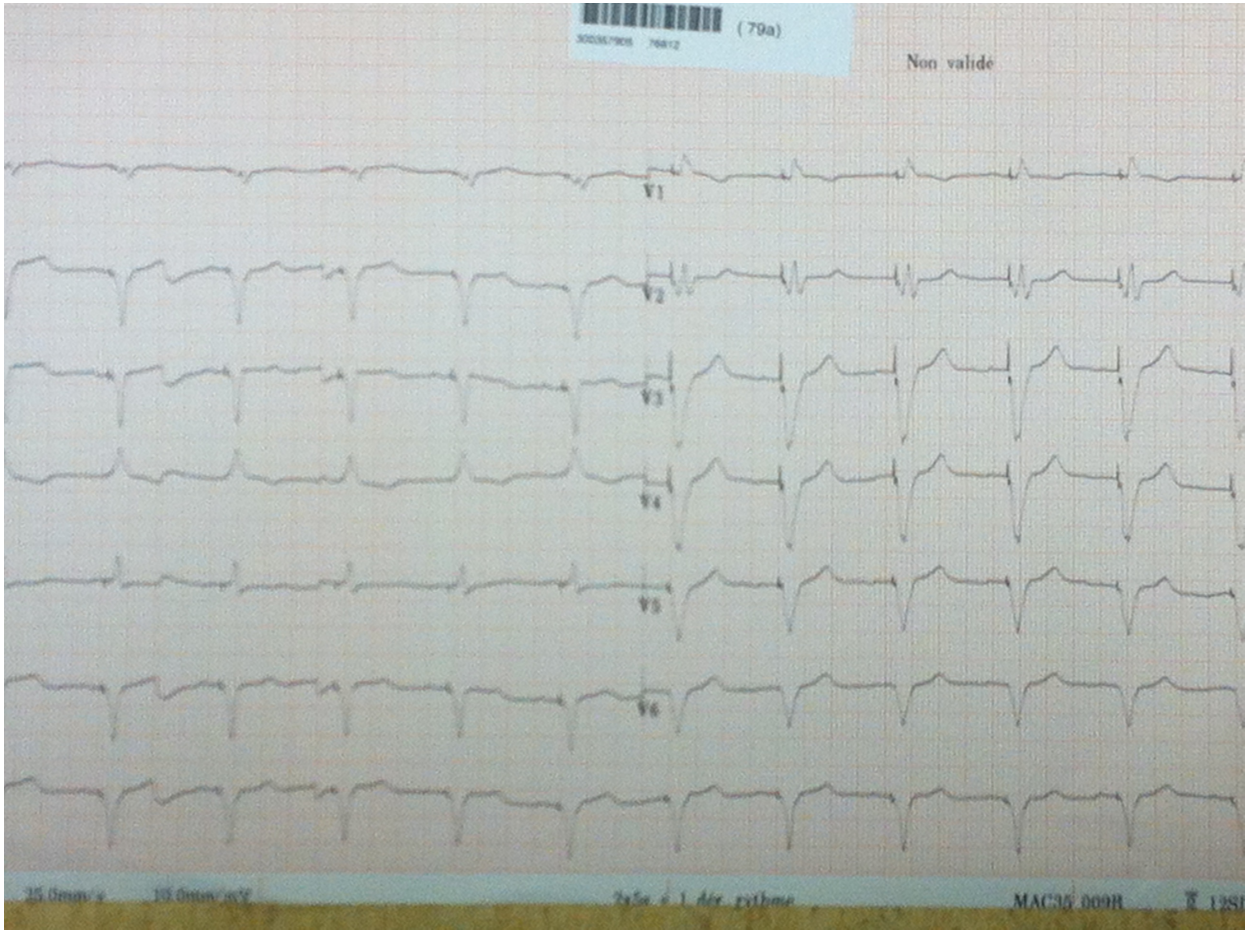
Mr E 82 ans

- Sinusal depuis 10 mois….
- Plus d’hospitalisation
- NYHA II



FIN

Reco 2010

In patients with any type of AF and severely depressed LV function (LVEF ≤35%) and severe heart failure symptoms (NYHA III or IV), biventricular stimulation should be considered after AV node ablation.	IIa	C	
Ablation of the AV node to control heart rate may be considered when tachycardia-mediated cardiomyopathy is suspected and the rate cannot be controlled with pharmacological agents, and direct ablation of AF is not indicated, has failed, or is rejected.	IIb	C	
Ablation of the AV node with consecutive implantation of a CRT device may be considered in patients with permanent AF, LVEF ≤35%, and NYHA functional class I or II symptoms on optimal medical therapy to control heart rate when pharmacological therapy is insufficient or associated with side effects.	IIb	C	