

# ELECTRA



4-5 DÉCEMBRE 2021

HOTEL VILLA M.  
MARSEILLE | FRANCE

1<sup>È</sup>mes journées françaises  
pratiques de rythmologie  
& de stimulation cardiaque

## COMITÉ D'ORGANISATION

Frédéric FOSSATI, Lille

Maxime GUENOUN, Marseille

Arnaud LAZARUS, Paris

Nicolas LELLOUCHE, Créteil

Jacques MANSOURATI, Brest

Jérôme TAÏEB, Aix-en-Provence

[CONGRES-ELECTRA.COM](http://CONGRES-ELECTRA.COM)





# ELECTRA

4-5 DÉCEMBRE 2025

VILLA M. - MARSEILLE | FRANCE

19<sup>èmes</sup> journées françaises  
pratiques de rythmologie  
& de stimulation cardiaque

[WWW.CONGRES-ELECTRA.COM](http://WWW.CONGRES-ELECTRA.COM)

## Trucs et astuces en stimulation et défibrillation

Cas 3 : PM sans sonde :  
implante / implante pas ?

**Peggy Jacon** CHU Grenoble



# Mme A, 72 ans, BMI 20, prothese mécanique mitrale (1998)

DDD PM pour BAV 2008 pour BAV complet

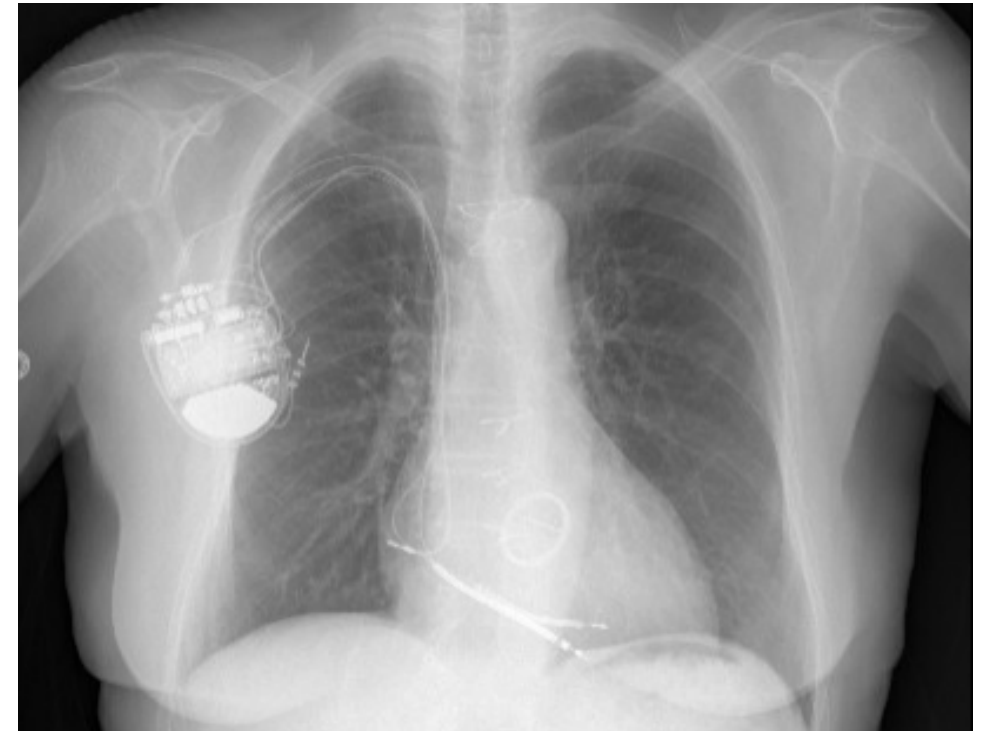
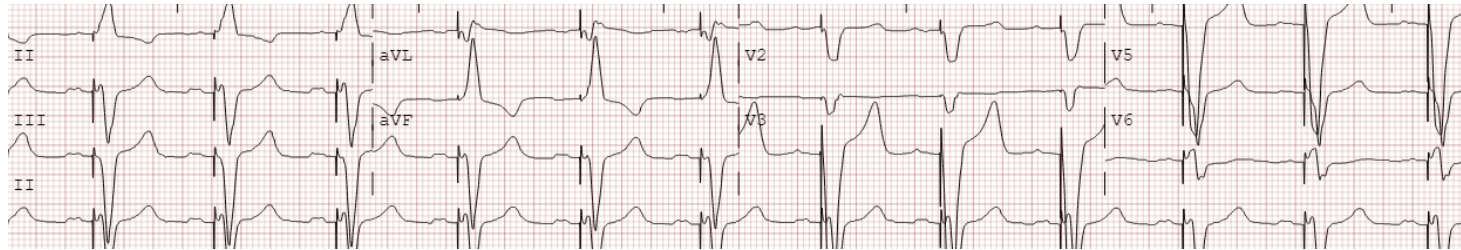
2008 Upgrade en DAI pour TV syncopale

2009 Extraction/remplacement sonde VD (PNO hématome)

2016 Extraction/remplacement sonde VD (hématome)

2024 Remplacement de Boitier, changement de sonde

VD (hématome)



1 mois après... Hématome avec  
fistulisation/infection > EXTRACTION  
PLANNIFIEE  
Que réimplanter?

# Mme A, 72 ans, BMI 20, prothèse mécanique mitrale (1998)

DDD PM pour BAV 2008 pour BAV complet

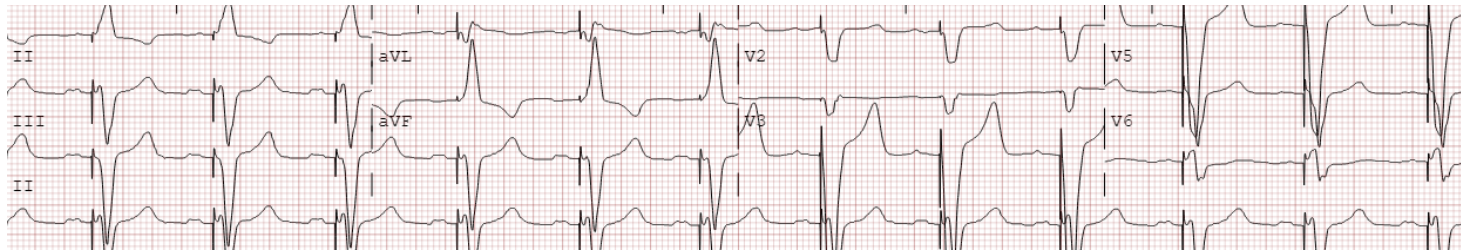
2008 Upgrade en DAI pour TV syncopale

2009 Extraction/remplacement sonde VD (PNO hématome)

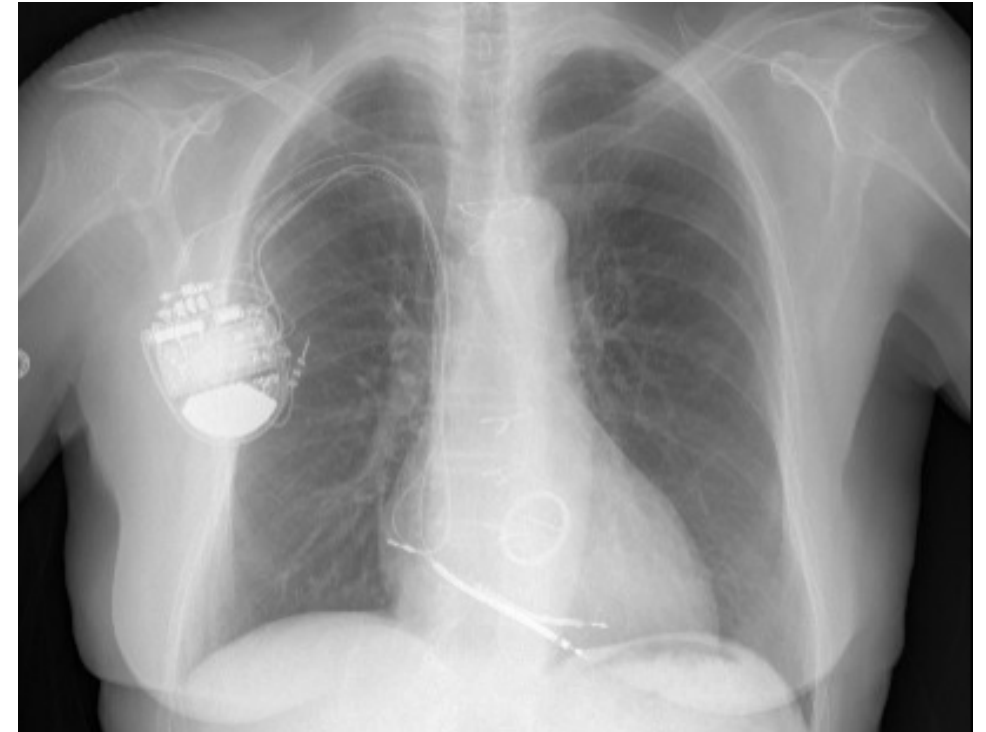
2016 Extraction/remplacement sonde VD (hématome)

2024 Remplacement de Boitier, changement de sonde

VD (hématome)



1 mois après... Hématome avec  
fistulisation/infection  
Que réimplanter? **PM SANS SONDE??**



# Reimplantation : PM sans sonde vs... DAI endo??

72 ans, RVM, BAV complet

DDD PM pour BAV 2008 ;

2008 Upgrade en DAI pour TV syncopale

2009 Extraction/remplacement sonde VD (**PNO**

**hématome) dysfonction 1**

2016 Extraction/remplacement sonde VD (**hématome)**

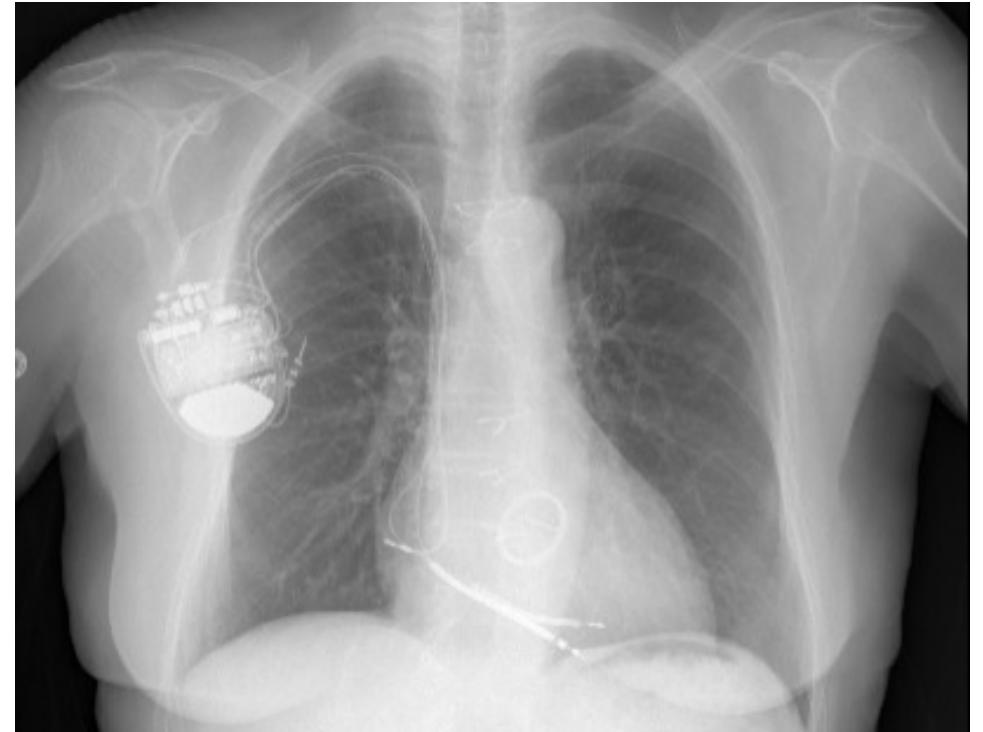
**dysfonction 2**

2024 Remplacement de Boitier, **changement de sonde**

**VD (hématome) Dysfonction 3**

## POUR

- problèmes de complications hémorragiques itératifs
- problèmes de sonde itératifs
- problème d'infection

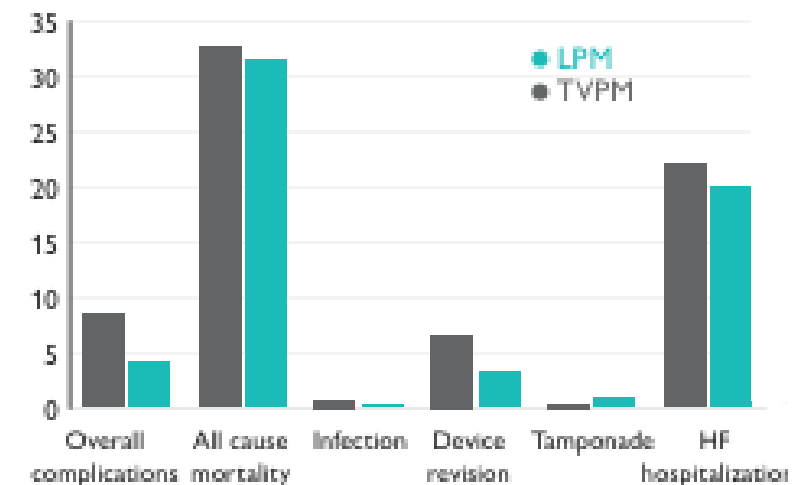


# Leadless pacing: a comprehensive review

Shmaila Saleem-Talib <sup>1,\*</sup>, Crispijn P. R. Hoevenaars<sup>1</sup>, Nadine Molitor<sup>2</sup>, Vincent J. van Driel<sup>1</sup>, Jeroen van der Heijden<sup>1</sup>, Alexander Breitenstein <sup>2</sup>, Harry van Wessel<sup>1</sup>, Mathijs S. van Schie<sup>3</sup>, Natasja M. S. de Groot<sup>3</sup>, and Hemanth Ramanna <sup>1,4</sup>

	Micra CED <sup>39</sup>	Micra PAR <sup>40</sup>	Garweg et al., <sup>41</sup> LVEF and TR	Boveda et al., <sup>42</sup> high-risk cohorts	Shtembari et al., <sup>43</sup> meta-analysis
Follow-up (years)	3	3	1	2	
Participants LPM (n)	6.219	1.809	27	9.858	8.340
Participants TVPM (n)	10.212	2.667	24	12.157	15.008
Complication rate (LPM vs. TVPM)	4.9% (LPM) vs. 7.1% (TVPM)	4.1% (LPM) vs. 8.5% (TVPM)			4.6% (LPM) vs. 7.3% (TVPM)
System revision rate (LPM vs. TVPM)	3.6% (LPM) vs. 6.0% (TVPM)	3.2% (LPM) vs. 6.6% (TVPM)			2.7% (LPM) vs. 4.8% (TVPM)
Mortality	Similar			Similar	
Conclusion	Significantly fewer complications, reinterventions, HF hospitalizations, and infections in LPM cohort compared with TVPM cohort	Significantly fewer complications and system revisions in LPM cohort compared with TVPM cohort	No significant difference in LVEF decay and lower TR severity in LPM group compared with TVPM cohort	Fewer complications and revisions in high-risk LPM sub-analyses (malignancies, diabetes, TVD, and COPD)	Fewer reinterventions, device dislodgements, pneumothoraxes, and overall complications in LPM cohort. More PE in LPM cohort

## Long-term complications\*

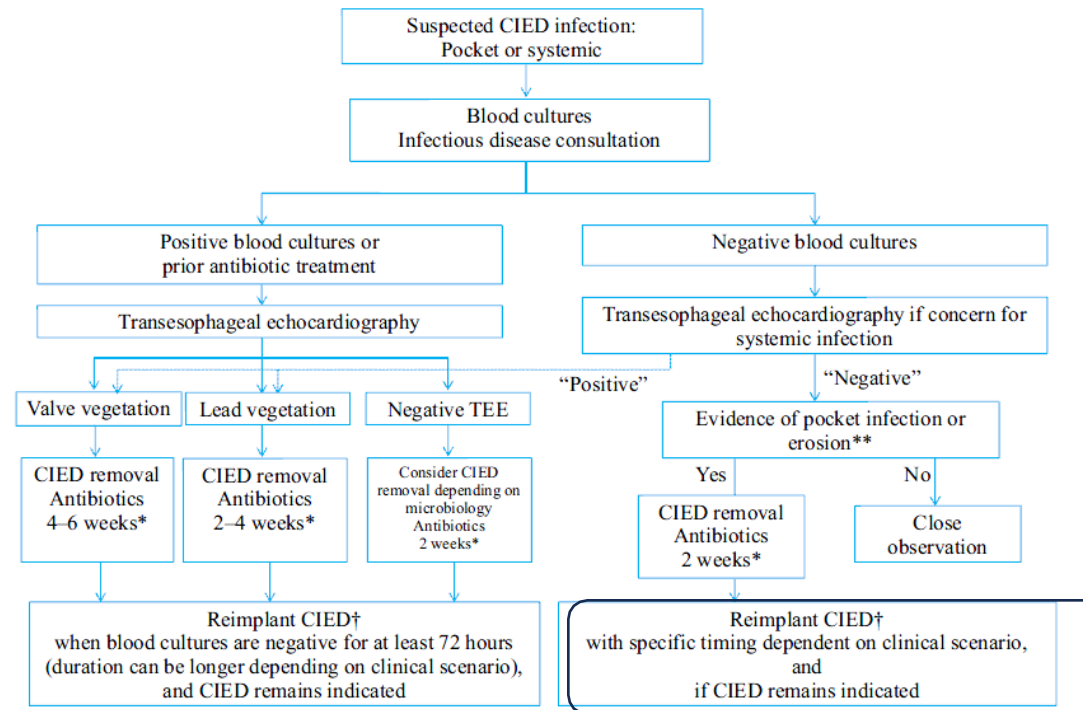


# PM sans sonde vs... DAI endo??

Mme A, 72 ans, BMI 20, prothese mécanique mitrale (1998)?  
BAV complet

2017 HRS expert consensus statement on cardiovascular implantable electronic device lead management and extraction

POUR : BESOIN D'UN SYSTÈME DE STIMULATION IMMEDIAT



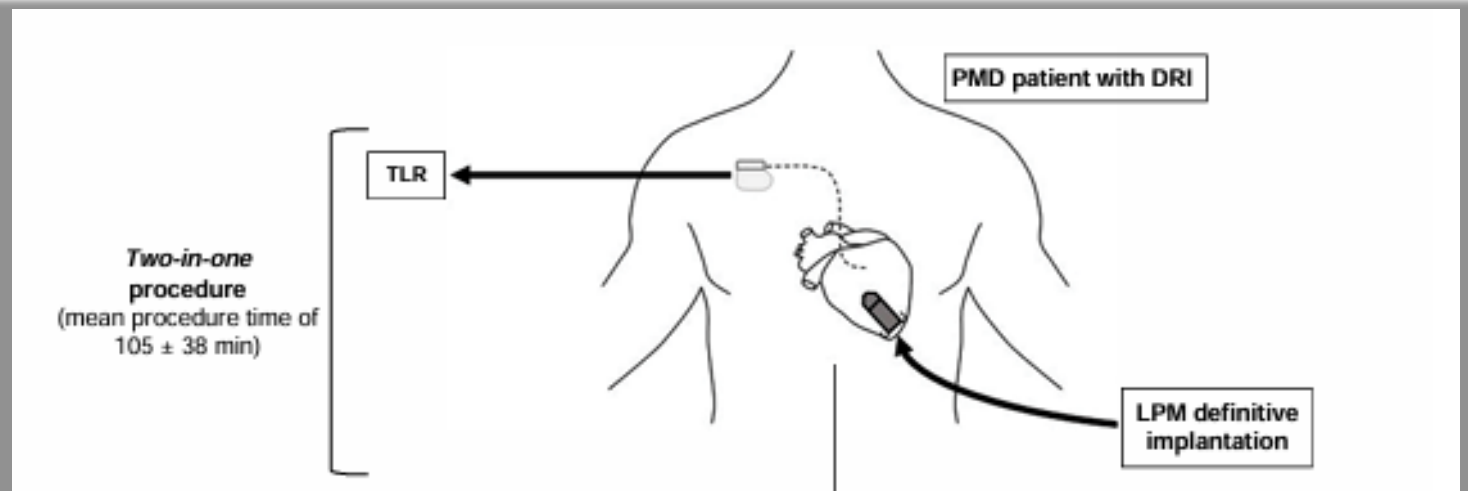
**Figure 2** Management of suspected CIED infection. \*Refer to text for specific recommendations depending on microbiology. Antimicrobial therapy should be at least 4–6 weeks for endocarditis (4 weeks for native valve, 6 weeks for prosthetic valve or staphylococcal valvular endocarditis). If lead vegetation is present in the absence of a valve vegetation, 4 weeks of antibiotics for *Staphylococcus aureus* and 2 weeks for other pathogens is recommended. †Usually the contralateral side; a subcutaneous ICD may also be considered. \*\*2010 AHA CIED Infection Update distinguishes between pocket infection and erosion (Baddour et al. Circulation 2010;121:458–477).

# PM sans sonde vs... DAI endo??

Mme A, 72 ans, BMI 20, prothese mécanique mitrale (1998), BAV complet

**POUR : BESOIN D'UN SYSTÈME DE STIMULATION IMMEDIAT**

**Two-in-one procedure for transvenous lead extraction and leadless pacemaker reimplantation in pacemaker-dependent patients with device infection: streamlined patient flow**



	Two-in-one procedure cohort	Historical cohort	P
Number of days alive and out of hospital during the 30 days after the TLR, days	22.2 (8.6)	17.6 (7.3)	0.02
Duration of stay before TLR, days	8.0 (10.6)	4.9 (3.0)	0.13
ICU duration stay, days	1.2 (2.7)	7.0 (4.9)	<0.001
Patients alive at 1 month after TLR with a cured DRI	41 (93.2%)	26(86.7%)	0.35
Complication-free survival rate of patients with a cured DRI at 1 month	27(61.4%)	18 (60.0%)	0.91

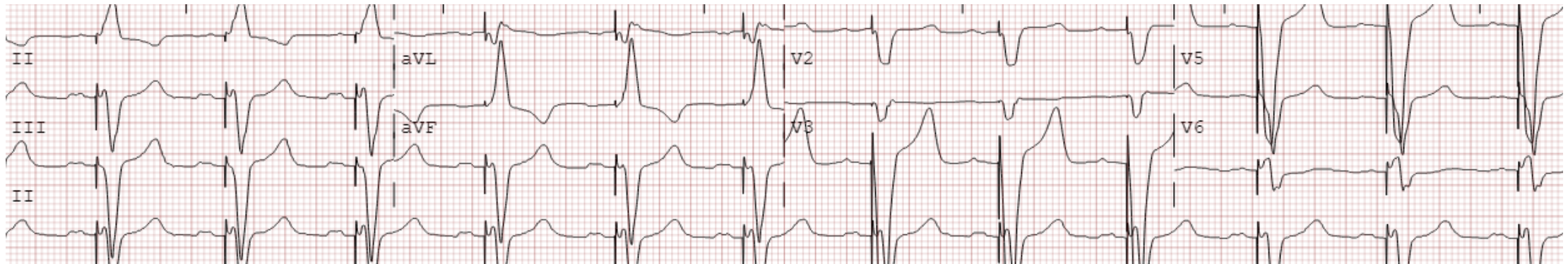
# PM sans sonde ?

Mme A, 72 ans, BMI 20, prothèse mécanique mitrale (1998), BAV complet

**CONTRE ? SYSTÈME « DOWNGRADE »**

**1/ Simple chambre chez patiente en rythme sinusal**

**2/ on se « passe » du defibrillateur**



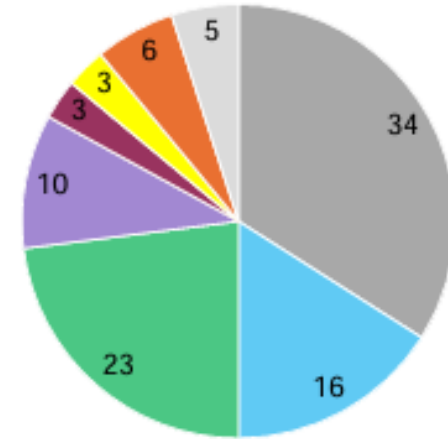
# PM sans sonde vs... DAI endo??

## Micra leadless pacemaker revisions: incidence, characteristics, and outcomes from a multicentre French cohort

**Table 2** Indications for revision according to type of LLP

	Total population (N = 100)	Micra AV (N = 27)	Micra VR (N = 73)	P-value
Device upgrade	55 (55)	18 (66.7)	37 (50.7)	0.555
Heart failure	34 (34)	10 (37)	24 (33)	
Pacemaker syndrome	16 (16)	7 (26)	9 (12)	
Programmed bridge <sup>a</sup>	5 (5)	1 (3.7)	4 (5.5)	
High thresholds	33 (33)	6 (22.2)	27 (37)	
Battery depletion	3 (3)	0 (0)	3 (4.1)	
Ventricular arrhythmias	3 (3)	1 (3.7)	2 (2.7)	
Other	6 (6)	2 (7.4)	4 (5.5)	

Total revisions (n = 100)

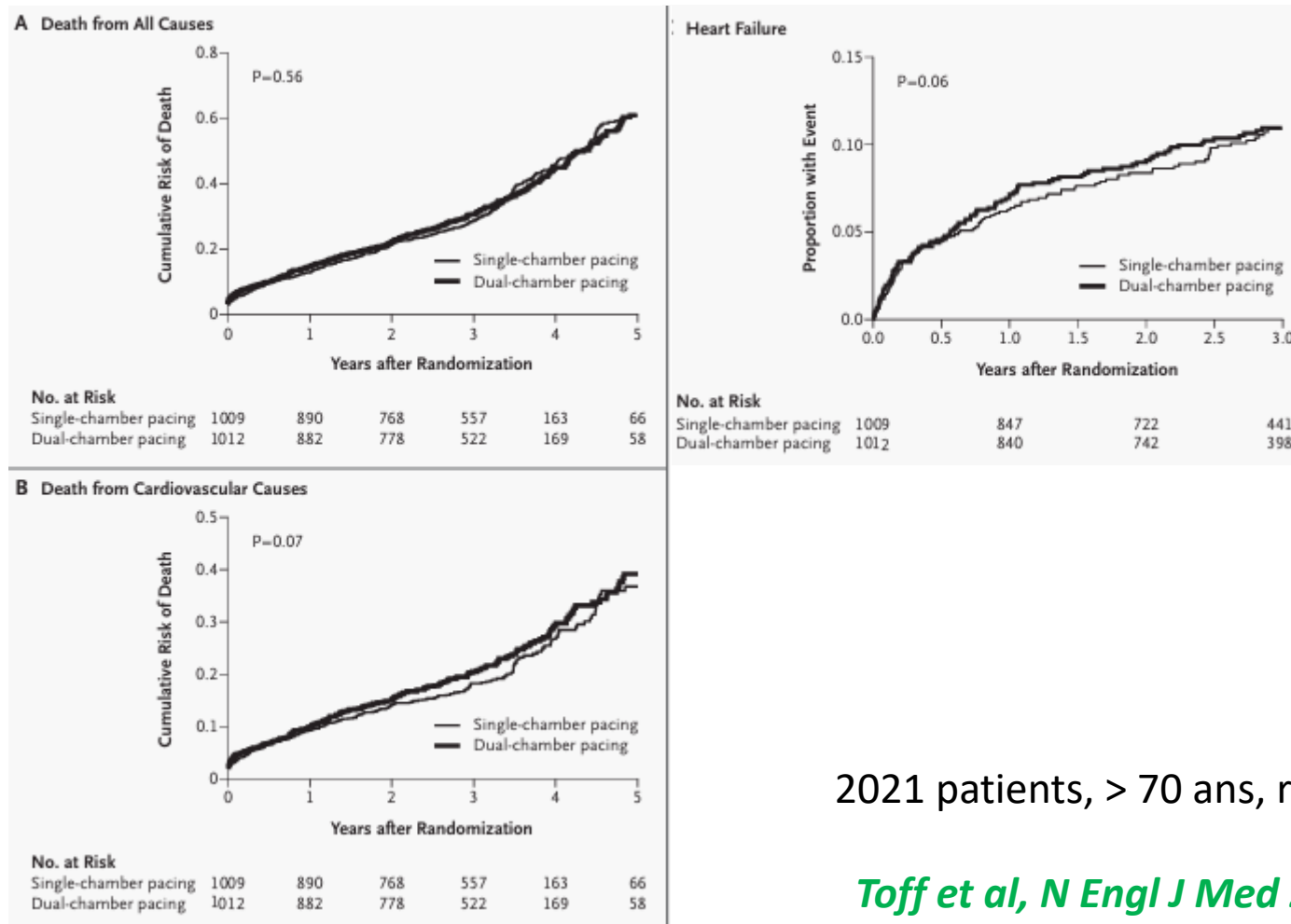


- Heart failure
- Pacemaker syndrome
- High threshold
- High threshold + Battery depletion
- Battery depletion
- Ventricular arrhythmias
- Other
- Programmed bridge

.... Ponderer la « face noire du VVI »....?

## Single-Chamber versus Dual-Chamber Pacing for High-Grade Atrioventricular Block

UKPACE



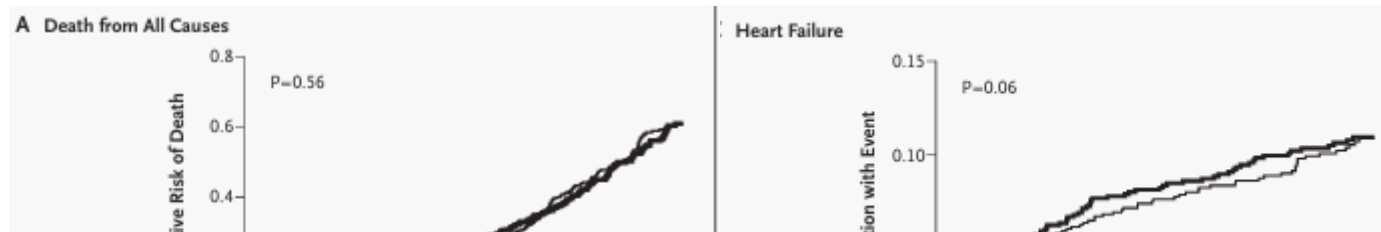
2021 patients, > 70 ans, randomisé

*Toff et al, N Engl J Med 2005;353:145-55.*

.... Ponderer la « face noire du VVI »....?

## Single-Chamber versus Dual-Chamber Pacing for High-Grade Atrioventricular Block

UKPACE



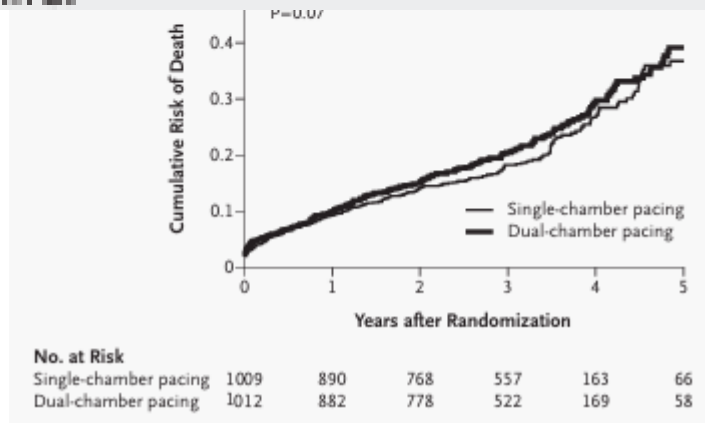
In patients with AVB, DDD should be preferred over single-chamber ventricular pacing to avoid pacemaker syndrome and to improve quality of life.

20,140,181,182

IIa

A

ESC 2021

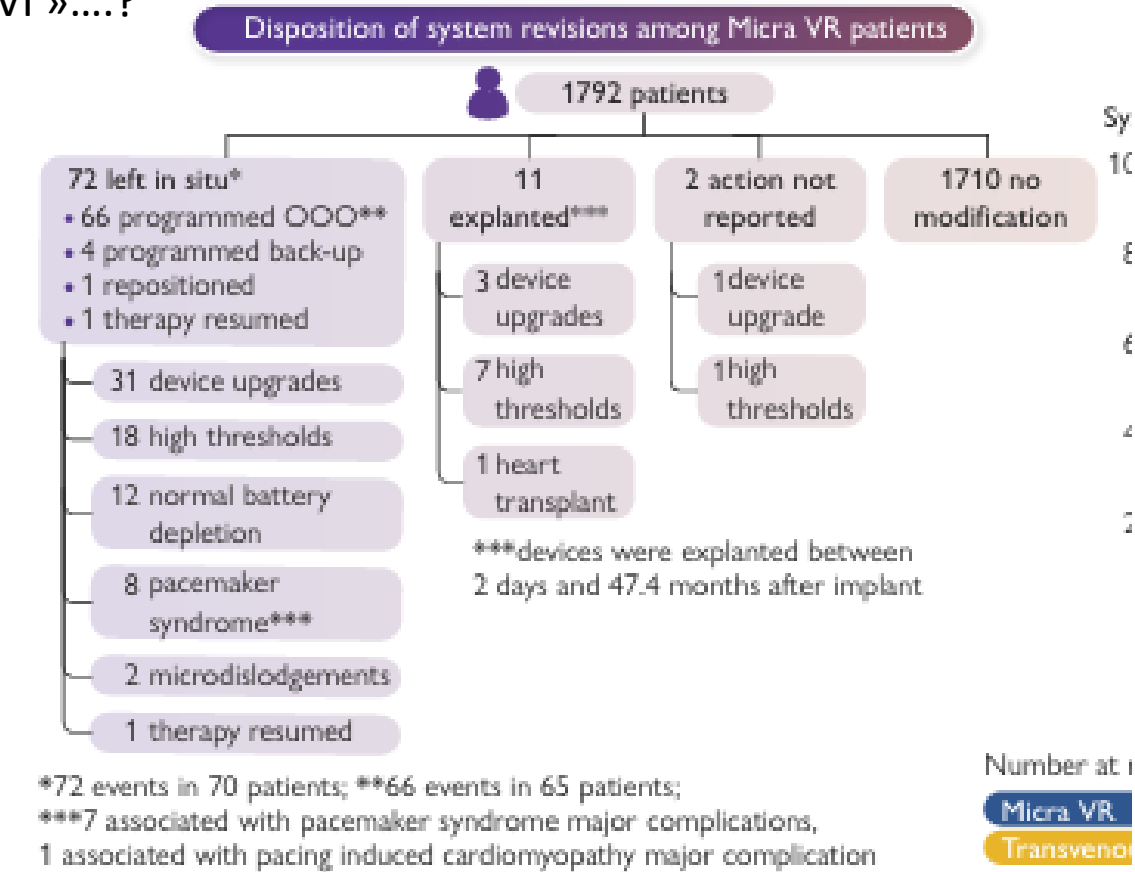


2021 patients, > 70 ans, randomisé

*Toff et al, N Engl J Med 2005;353:145-55.*

# PM sans sonde?

.... Ponderer la « face noire du VVI »....?



\*72 events in 70 patients; \*\*66 events in 65 patients;  
 \*\*\*7 associated with pacemaker syndrome major complications,  
 1 associated with pacing induced cardiomyopathy major complication

## 5-year follow-up of the Micra VR post-approval registry



Micra PAR  
690 pts rythme sinusal

# Mme A, 72 ans, BMI 20, prothese mécanique mitrale (1998)

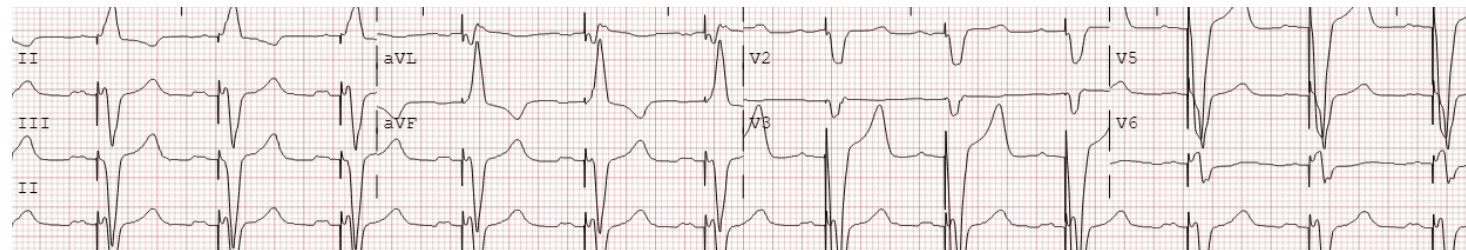
DDD PM pour BAV 2008 ;

2008 Upgrade en DAI pour TV syncopale

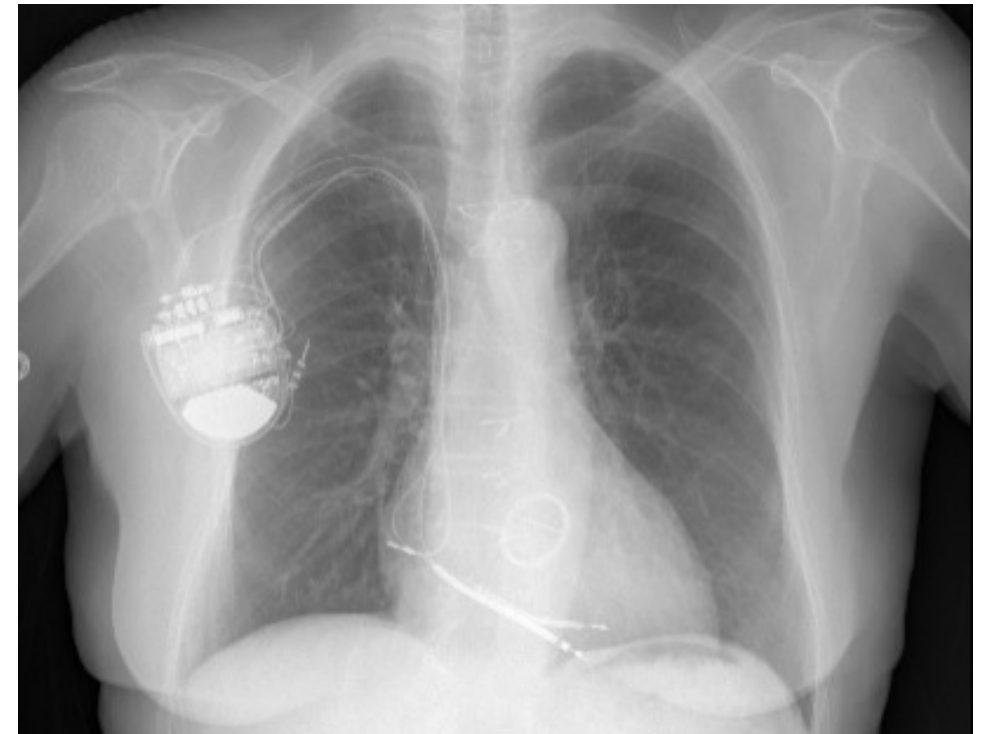
2009 Extraction/remplacement sonde VD (PNO hématome)

2016 Extraction/remplacement sonde VD (hématome)

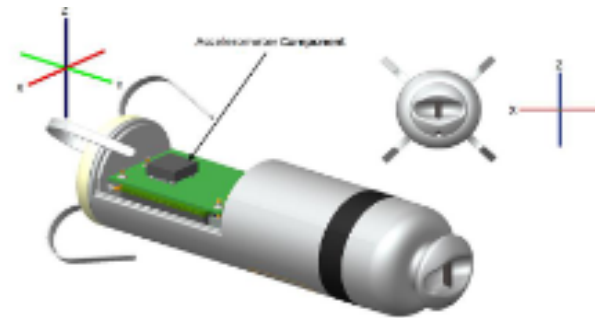
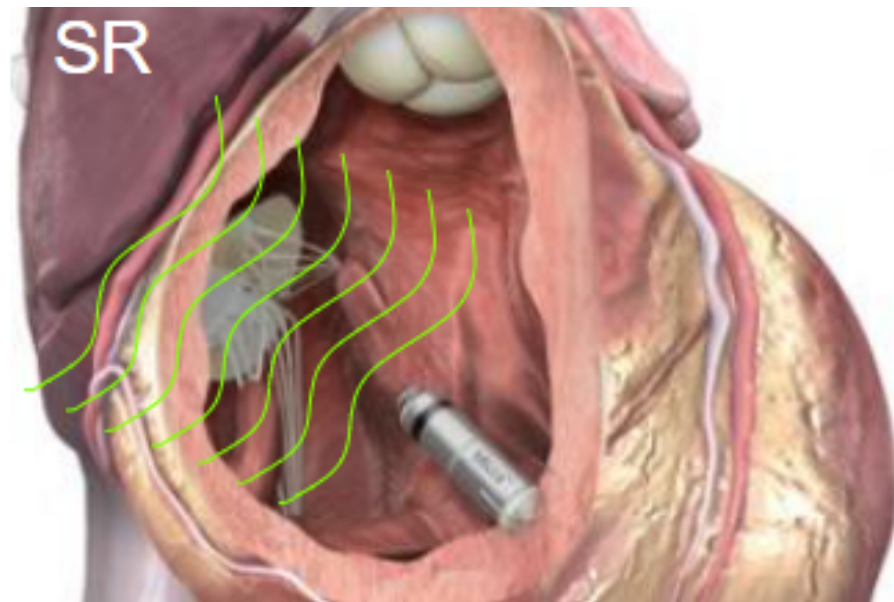
2024 Remplacement de Boitier, changement de sonde VD (hématome)



**EXTRACTION COMPLEXE**  
**Que réimplanter??**



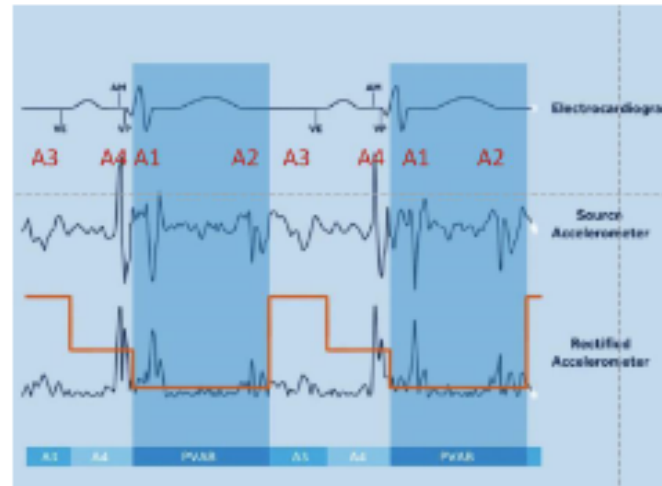
# Si leadless : Leadless VVI non modulable, VVI « upgradable » ou VDD?



## Atrioventricular Synchronous Pacing Using a Leadless Ventricular Pacemaker

Results From the MARVEL 2 Study

Clemens Steinwender, MD,<sup>1,2</sup> Surinder Kaur Khelae, MD,<sup>3</sup> Christophe Garweg, MD,<sup>4</sup> Joseph Yat Sun Chan, MD,<sup>5</sup> Philippe Ritter, MD,<sup>6</sup> Jens Brock Johansen, MD, PhD,<sup>7</sup> Venkata Sagi, MD,<sup>8</sup> Laurence M. Epstein, MD,<sup>9</sup> Jonathan P. Piccini, MD, MHS,<sup>1</sup> Mario Pascual, MD,<sup>2</sup> Llais Mont, MD,<sup>1</sup> Todd Sheldon, MS,<sup>10</sup> Vincent Spletter, MS,<sup>11</sup> Kurt Stromberg, MS,<sup>12</sup> Nicole Wood, BS,<sup>13</sup> Larry Chinitz, MD<sup>14</sup>



SI CHOIX MICRA AV :

- 1 seule intervention
- Qualité synchronisation AV

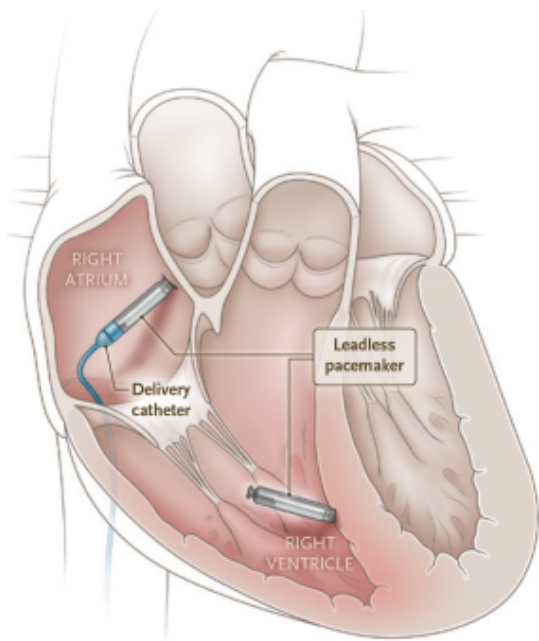
Vie réelle?

Sachant que cardiopathie/OD dilatée

# Si leadless : Leadless VVI non modulable, VVI « upgradable » ou VDD?

## A Dual-Chamber Leadless Pacemaker

Reinoud E. Knops, M.D., Ph.D., Vivek Y. Reddy, M.D., James E. Ip, M.D.,  
Rahul Doshi, M.D., Derek V. Exner, M.D., M.P.H., Pascal Defaye, M.D.,  
Robert Canby, M.D., Maria Grazia Bongiorno, M.D., Morio Shoda, M.D.,  
Gerhard Hindricks, M.D., Petr Neuzil, M.D., Mayer Rashtian, M.D.,  
Karel T.N. Breeman, M.D., Jordan R. Nevo, M.S., Leonard Ganz, M.D.,  
Chris Hubbard, M.B.A., and Daniel J. Cantillon, M.D.,  
for the Aveir DR i2i Study Investigators\*



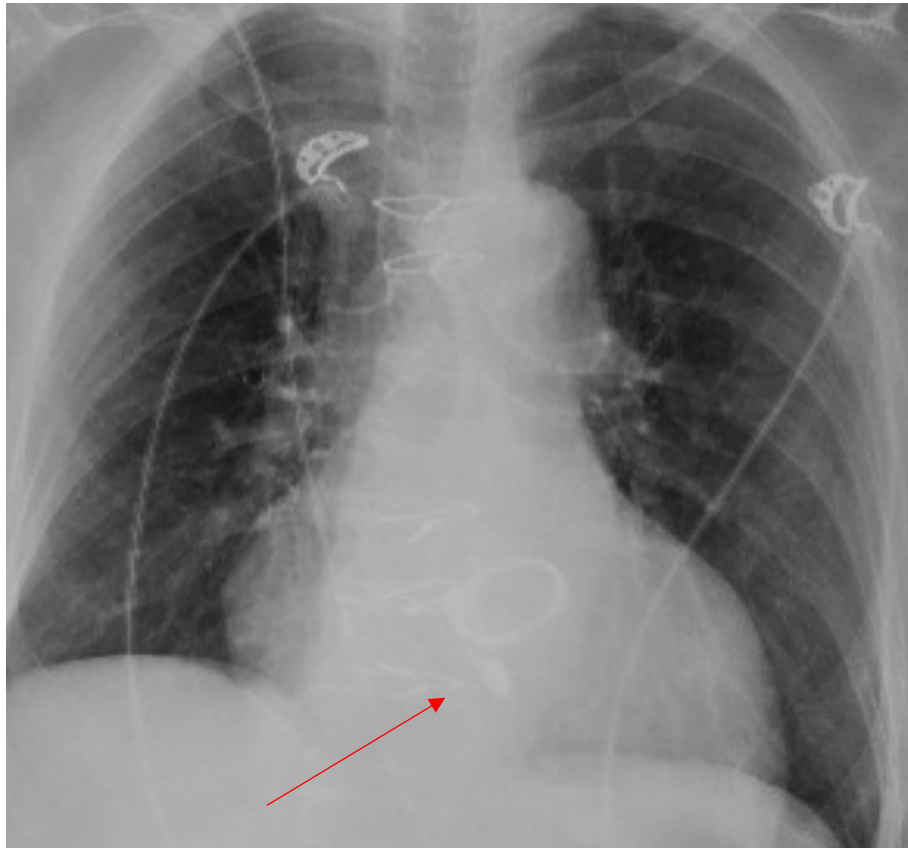
Succès d'implantation 98,3%  
Complications 3 mois 9,7% ( id PM DDD)

### SI CHOIX AVEIR :

- Upgrading secondaire possible
- Necessite autre intervention
- Faisabilité bonne
- Consommation/communication si  
Rajout capsule atriale

# Mme A, 72 ans, BMI 20, prothese mécanique mitrale (1998)

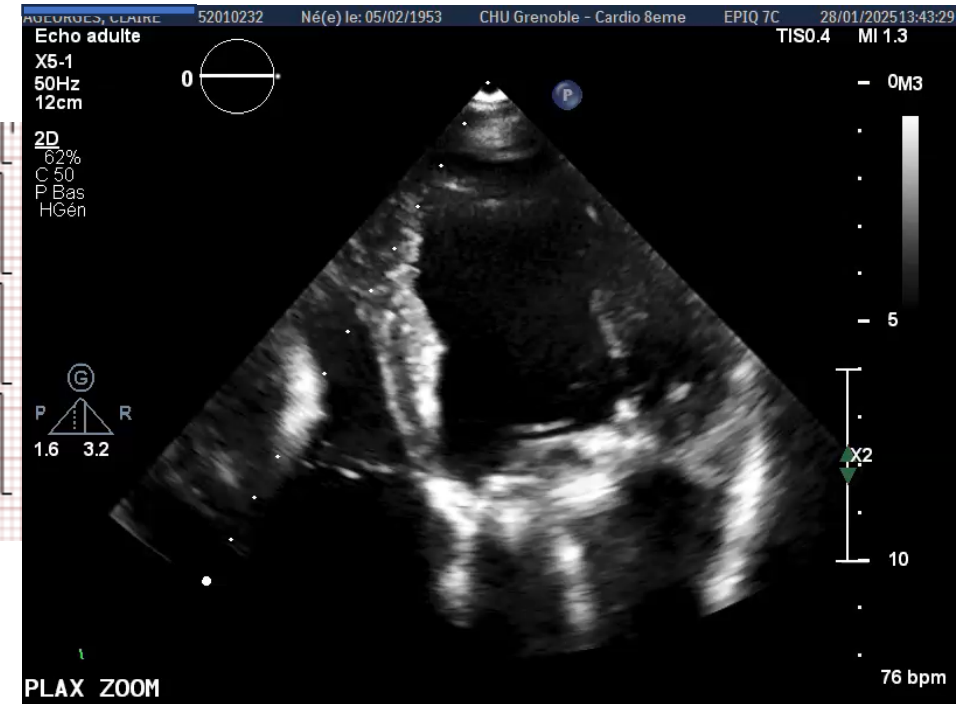
Extraction, décision de réimplantation uniquement d'un système de stimulation sans sonde (pas de thérapie DAI depuis 2009) **BRIDGE MAIS PROBABEMENT « DESTINATION THERAPY »**



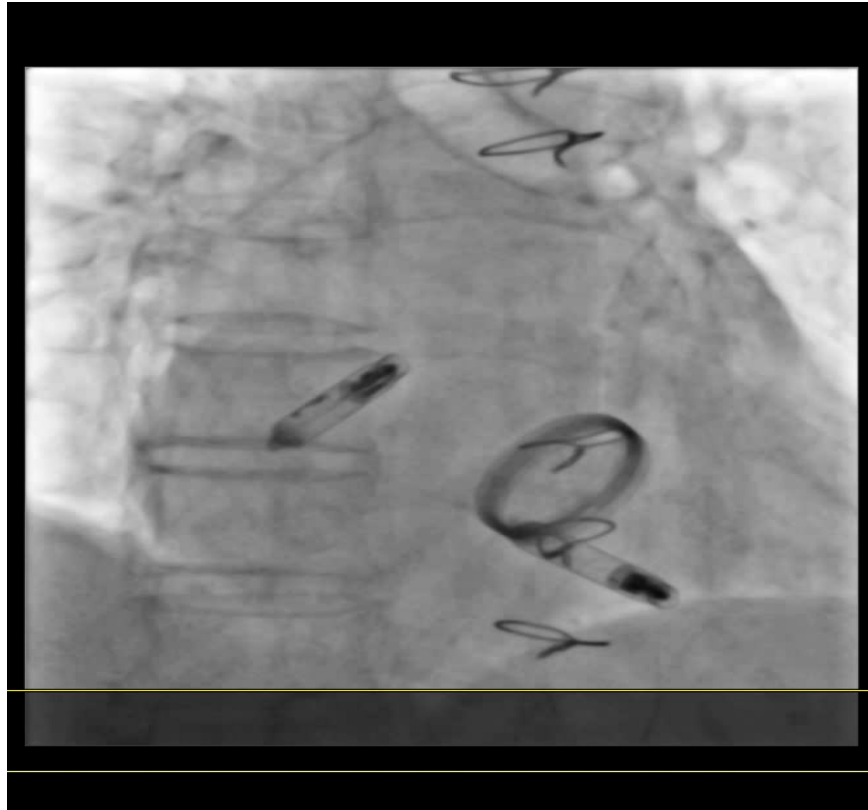
AVEIR VR sept 2024 (implantation per extraction)

# Mme A, 72 ans, BMI 20, prothese mécanique mitrale (1998)

Aveir VR M3, FEVG 40% dyspnee...CAT??



# Mme A, 72 ans, BMI 20, prothese mécanique mitrale (1998)

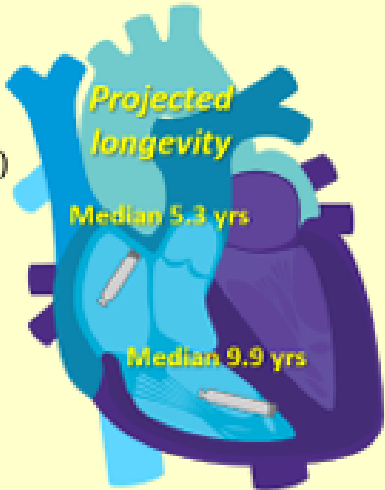


## *Upgrading Aveir A*

Resolution of symptômes  
LVEF 45%...

## Getting the most out of dual-chamber leadless pacing: how to prolong battery longevity?

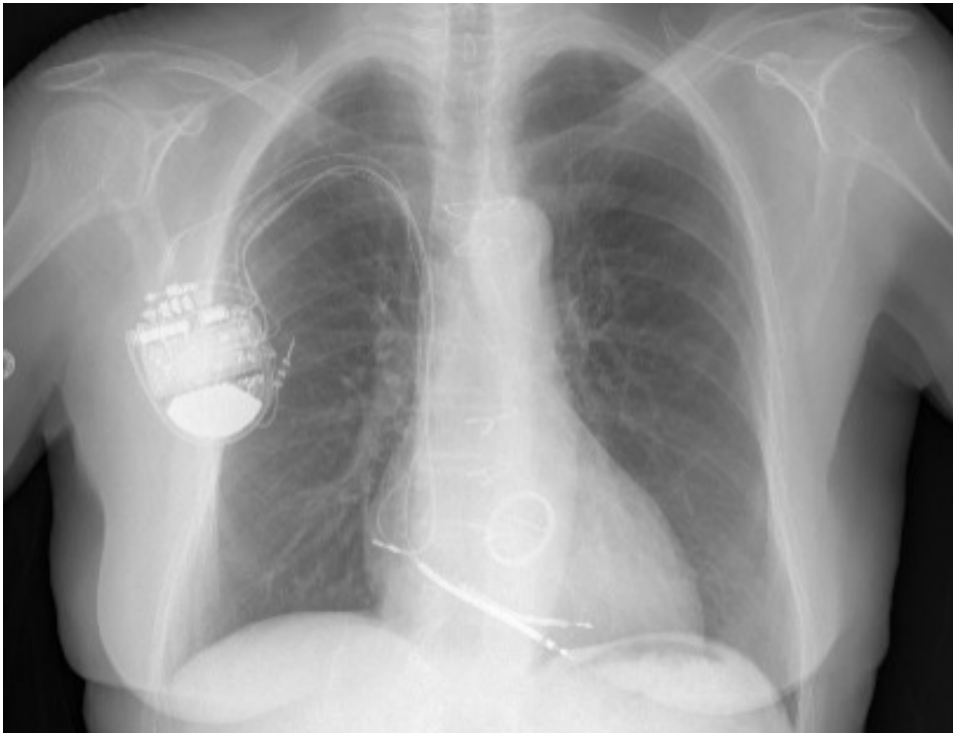
**Battery longevity with dual-chamber leadless pacing (AVEIR DR i2i study)**

Impacting factors		Strategies to maximize longevity
<ul style="list-style-type: none"><li>• Pulse width (<math>\searrow</math> 3 mo per <math>\nearrow</math> 0.1 ms)</li><li>• Pulse amplitude (<math>\searrow</math> 11 mo per <math>\nearrow</math> 1.0 V)</li><li>• Impedance (<math>\searrow</math> 8–10 mo per <math>\searrow</math> 100 <math>\Omega</math>)</li><li>• Base rate (<math>\searrow</math> 11 mo per <math>\nearrow</math> 10 bpm)</li><li>• Pacing % (<math>\searrow</math> 3–6 mo per <math>\nearrow</math> 10 %)</li><li>• i2i setting (<math>\searrow</math> by years for levels 7)</li></ul>		<ul style="list-style-type: none"><li>• AAIR leadless pacemaker if isolated SND</li><li>• AAIR + VVI modes if infrequent AVB</li><li>• Atrial + VDD leadless pacemakers?</li><li>• Adapt pacing output (<math>\leq</math> 1.5 V &amp; ms)</li><li>• Minimum acceptable base rate</li><li>• Hysteresis (base rate, AV interval)</li><li>• Tailored i2i settings<ul style="list-style-type: none"><li>- Program minimum acceptable value</li><li>- Prioritize ALP-to-VLP for AV block</li><li>- Prioritize VLP-to-ALP for SND</li></ul></li></ul>

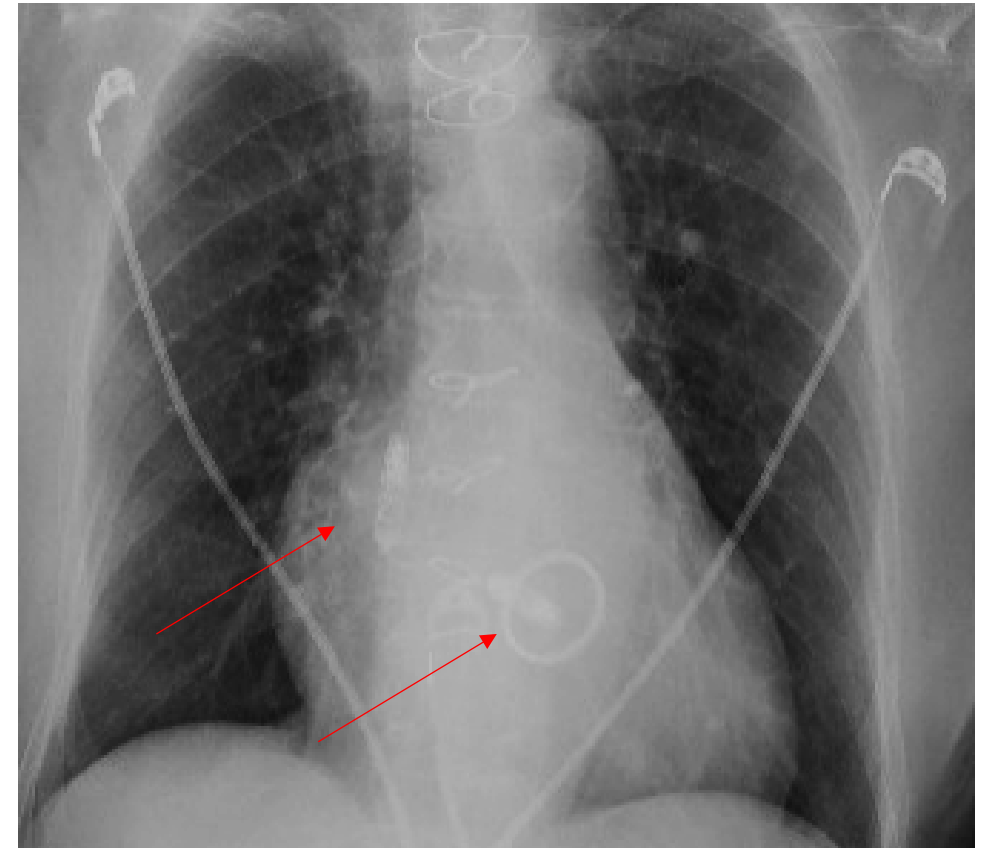
Abbreviations: ALP = atrial leadless pacemaker; AV = atrioventricular; AVB = atrioventricular block; bpm = beats per minute; i2i = implant to implant; mo = months, ms = millisecond; SND = sinus node dysfunction; V = volt; VLP = ventricular leadless pacemaker

# Mme A, 72 ans, BMI 20, prothese mécanique mitrale (1998)

Extraction, décision de réimplantation uniquement d'un système de stimulation sans sonde (pas de thérapie DAI depuis 2009) ... quid du DAI??



DAI double ...

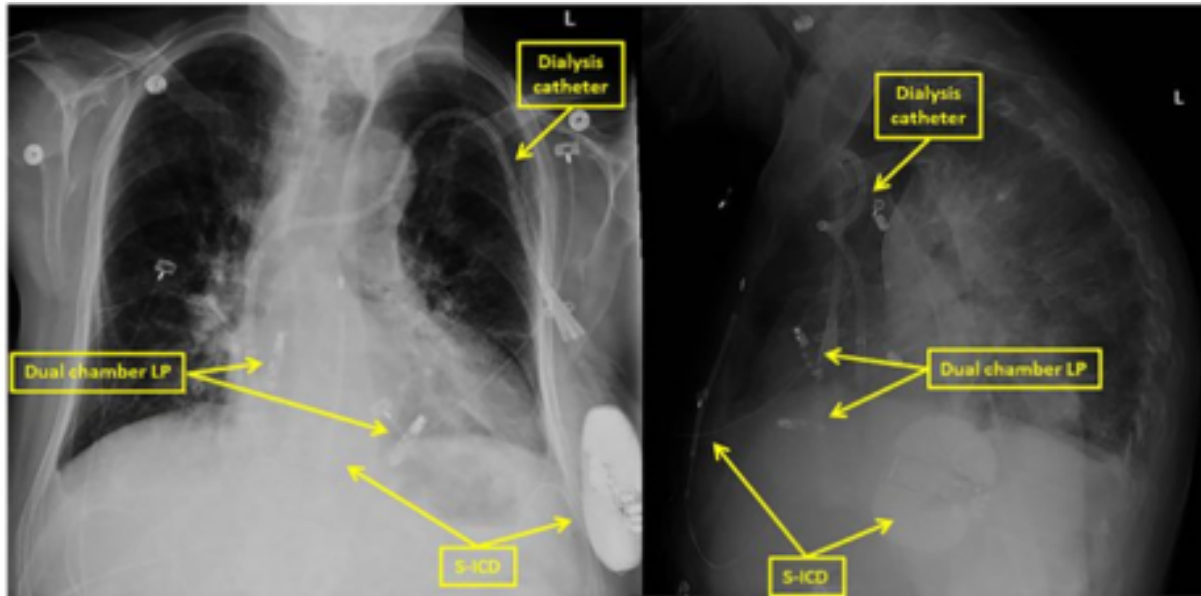


AVEIR DR 2025

# Si leadless : quid DAI???

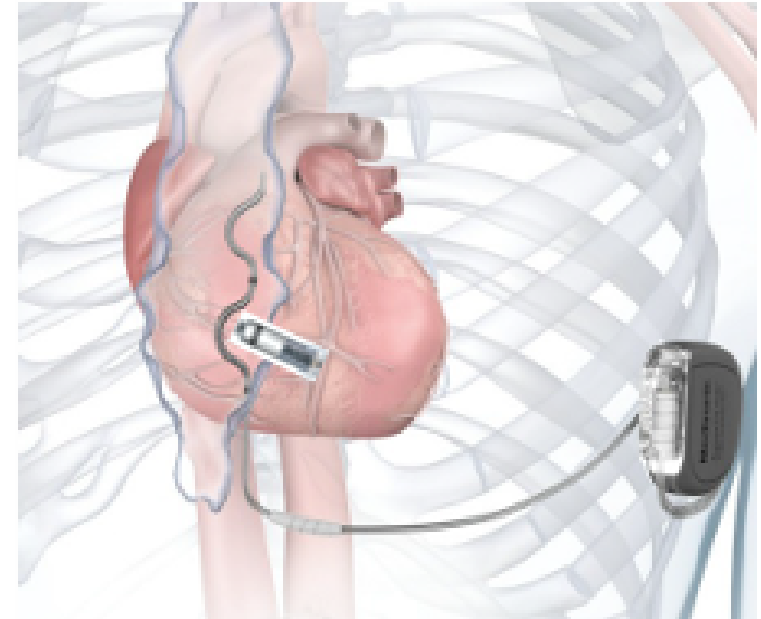
## EXPERIENCES EMERGENTES ...

Completely wireless: First concomitant dual-chamber leadless pacemaker and subcutaneous defibrillator implant



*Ip et al, heart rhythm 2025*

## Extravascular implantable cardioverter and leadless pacemaker interactions



*Hernandez et al, Europace (2025) 27, euaf255*



# ELECTRA



4-5 DÉCEMBRE 2025

VILLA M. - MARSEILLE | FRANCE

19<sup>èmes</sup> journées françaises  
pratiques de rythmologie  
& de stimulation cardiaque

[WWW.CONGRES-ELECTRA.COM](http://WWW.CONGRES-ELECTRA.COM)

## MES MESSAGES : on implante ou pas un PM sans sonde?

- RAISONNER BENEFICE / RISQUE PAR RAPPORT AU SYSTEME ENDOVEINEUX
- SUPERIORITE SUR COMPLICATIONS « MECANIQUES »
- COMPROMIS « HEMODYNAMIQUE »

Acceptabilité à court terme

Acceptabilité (et moyen de gérer) à plus long terme

APPROCHE INDIVIDUALISEE

