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STIMULATION DES VOIES DE CONDUCTION

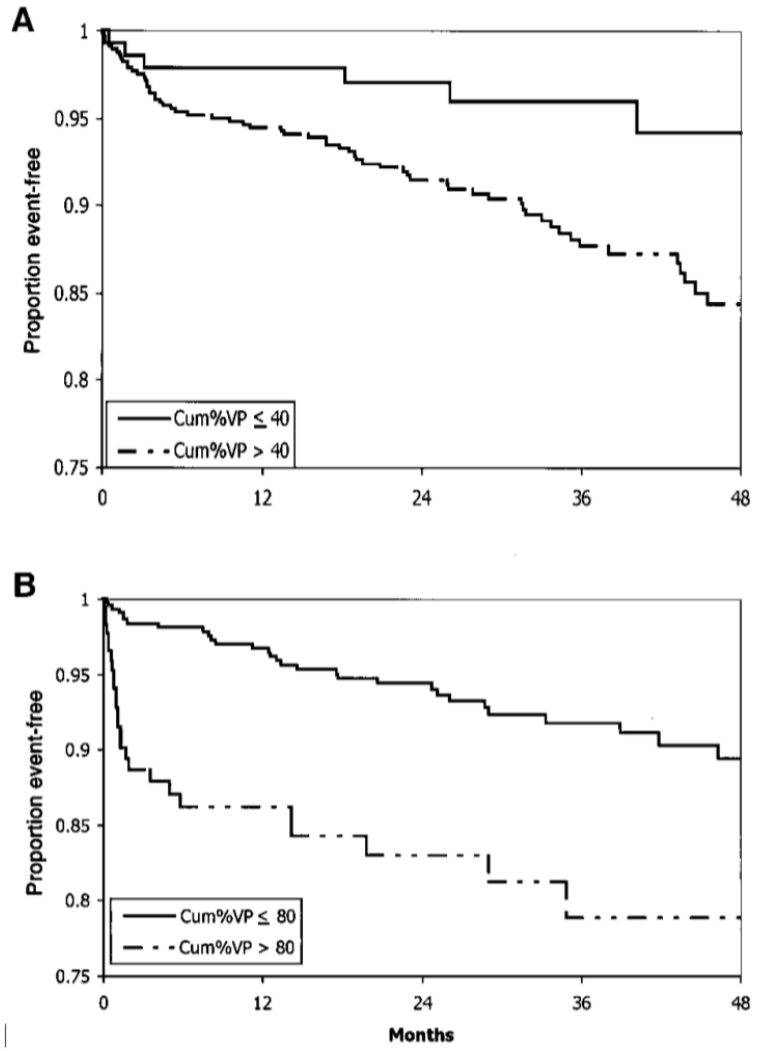
Concept-Espoir-Limites-Preuves

Dr J. Hourdain
CHU Timone Marseille

HF

DDDR

VVIR



AF

DDDR

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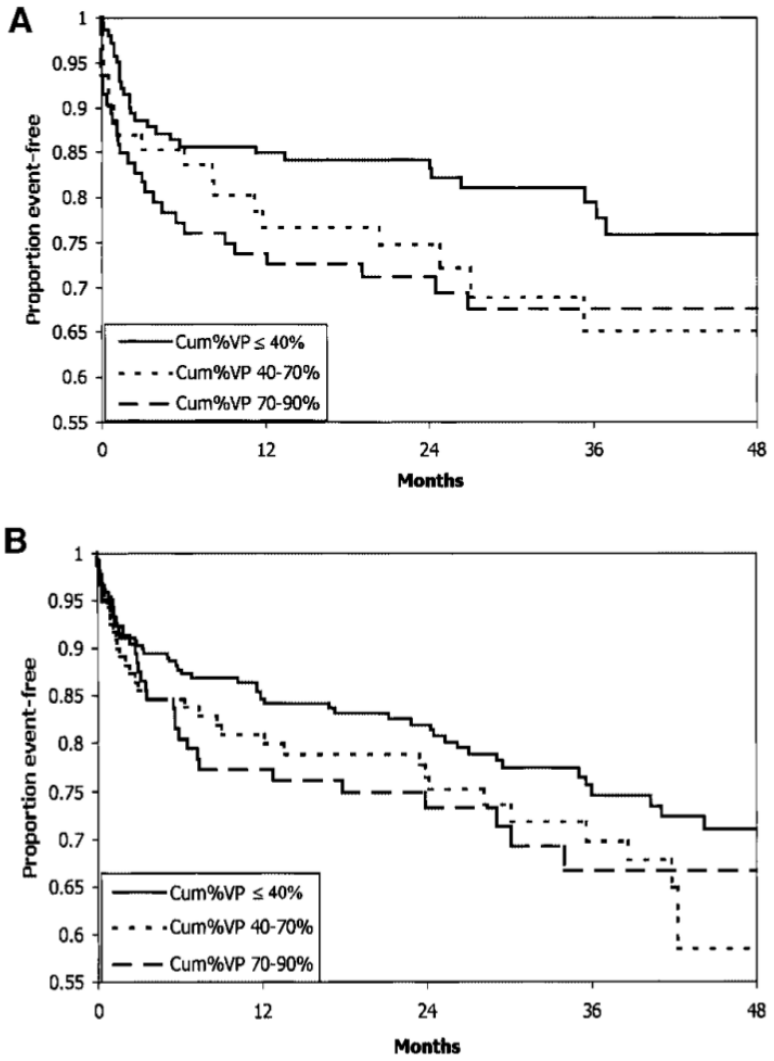


Adverse Effect of Ventricular Pacing on Heart Failure and Atrial Fibrillation Among Patients With Normal Baseline QRS Duration in a Clinical Trial of Pacemaker Therapy for Sinus Node Dysfunction

Michael O. Sweeney, MD; Anne S. Hellkamp, MS; Kenneth A. Ellenbogen, MD;
Arnold J. Greenspon, MD; Roger A. Freedman, MD; Kerry L. Lee, PhD; Gervasio A. Lamas, MD;
for the MOde Selection Trial (MOST) Investigators

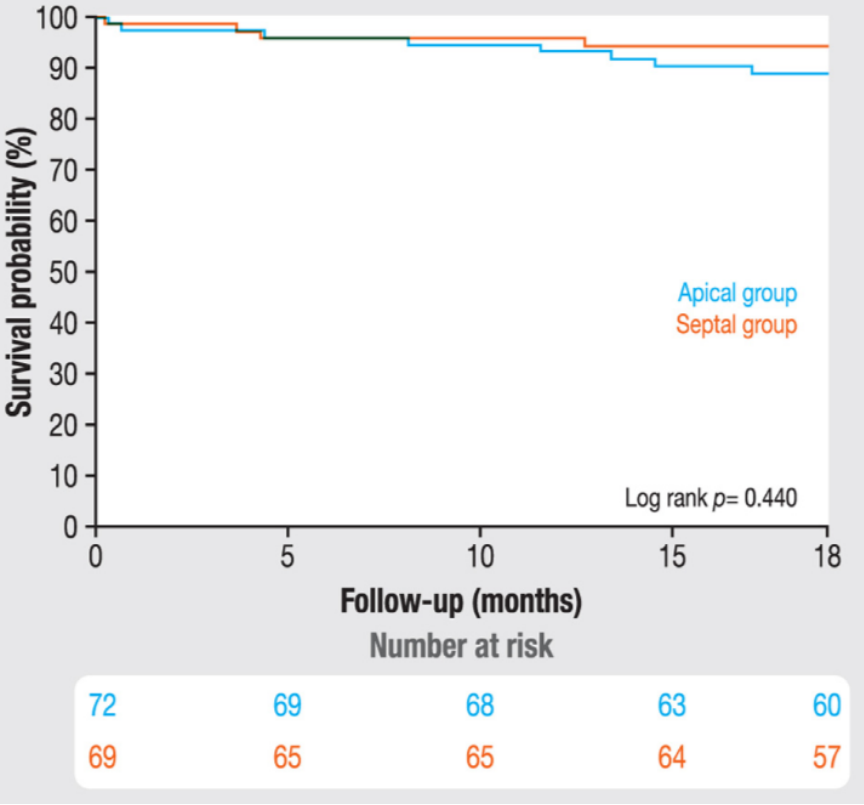
European Heart Journal (2015) 36, 856–862
doi:10.1093/eurheartj/ehu304

Arrhythmia/electrophysiology

Effect of right ventricular pacing lead site on left ventricular function in patients with high-grade atrioventricular block: results of the Protect-Pace study

Gerald C. Kaye[1*], Nicholas J. Linker[2], Thomas H. Marwick[3], Lucy Pollock[4], Laura Graham[4], Erika Pouliot[5], Jan Poloniecki[6], and Michael Gammage[7], on behalf of the Protect-Pace trial investigators

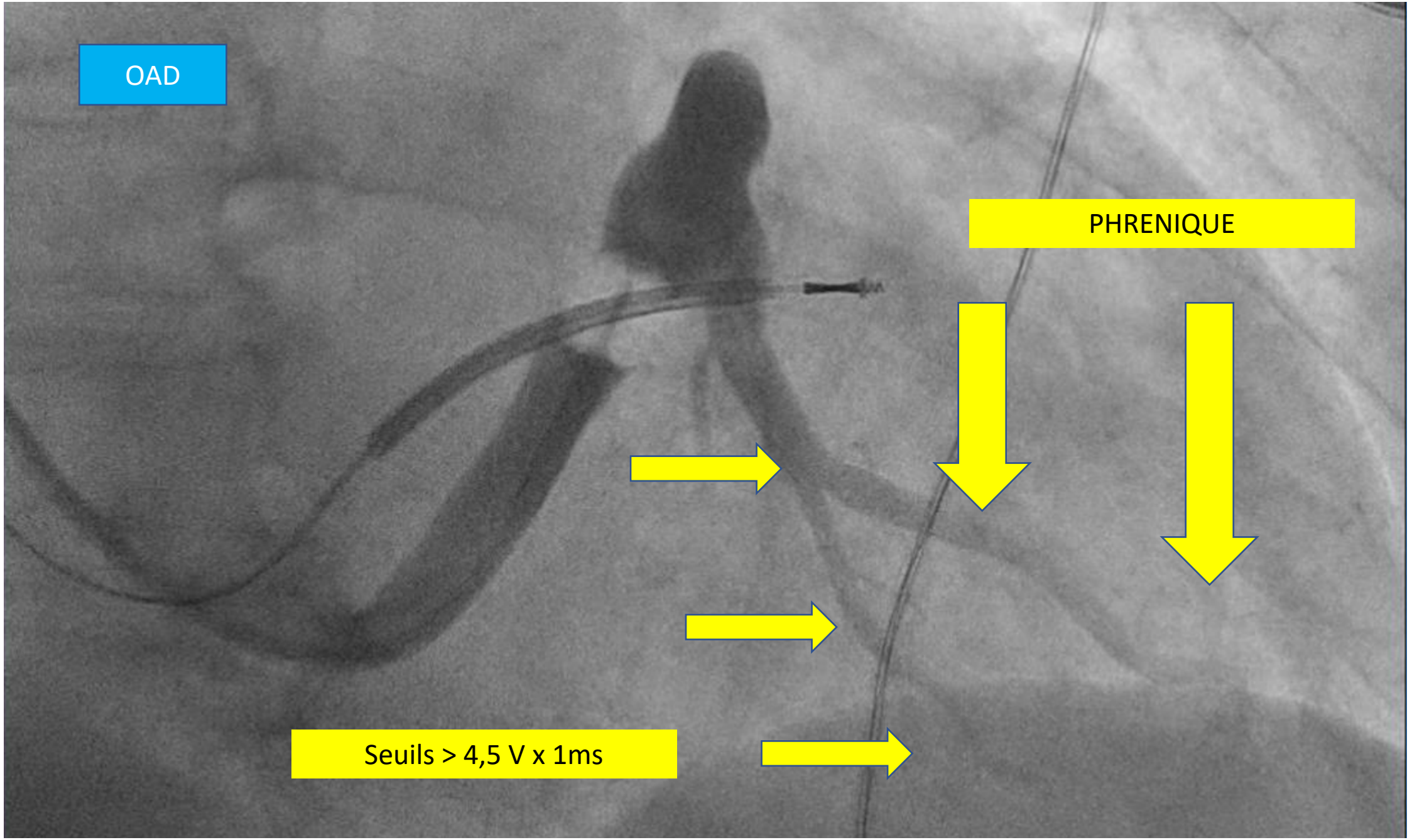
Conclusion In patients with a high-grade AV block and preserved LV function requiring a high percentage of ventricular pacing, RVHS pacing does not provide a protective effect on left ventricular function over RVA pacing in the first 2 years.



Septal versus apical pacing sites in permanent right ventricular pacing: The multicentre prospective SEPTAL-PM study☆

FEVG à 18 mois : 56.7 ± 12.5% vs. 57.7 ± 12.9%; *P* = 0.65

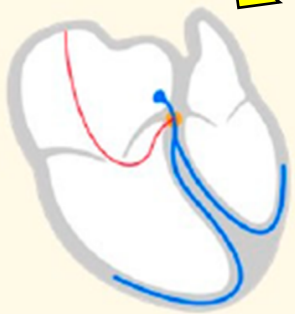
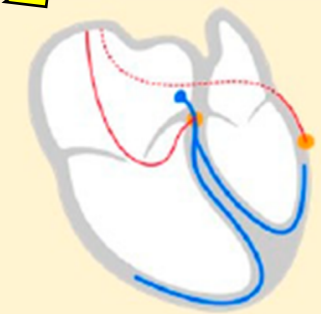
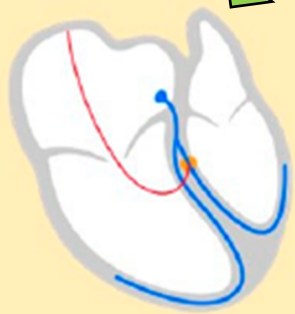
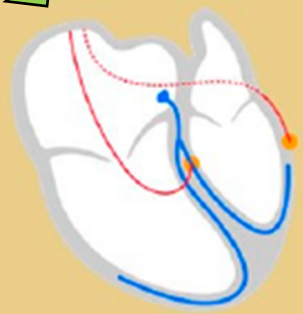
Galand et al. Archives of Cardiovascular Disease 115 (2022) 288—294


OAD
PHRENIQUE
Seuils > 4,5 V x 1ms

Domenichini G et al. Conduction System Pacing versus Conventional Biventricular Pacing for Cardiac Resynchronization Therapy: Where Are We Heading? J Clin Med. 2023 Sep 29;12(19):6288.

HIS

LBBP

Conduction System Pacing			
HBP	***HOT-CRT***	***LBBAP***	***LOT-CRT***
			
▪ **His bundle pacing** (between distal AV node and His bundle branching)	▪ **His bundle** + **Epicardial LV pacing**	▪ **LBB pacing** (between His bundle branching and LBB division) ▪ **LF pacing** (capture of LA, LS or LP fascicles) ▪ **LVS pacing** (left side interventricular septum, no direct activation of conduction system)	▪ **LBBAP** + **Epicardial LV pacing**
👍 • More physiological form of CSP	👍 • Improves electrical resynchronization in case of slow myocardial conduction	👍 • Able to correct infra-Hisian blocks • Lower capture thresholds	👍 • Improves electrical resynchronization in case of severe His-Purkinje disease or slow myocardial conduction
👎 • Inability to correct infra-Hisian blocks • Electrical resynchronization affected by septal scar • High capture thresholds	👎 • High His capture thresholds • Tailored AV and VV interval programmings • DF-1 connection if ICD therapy required	👎 • Electrical resynchronization affected by septal scar	👎 • Tailored AV and VV interval programmings • DF-1 connection if ICD therapy required

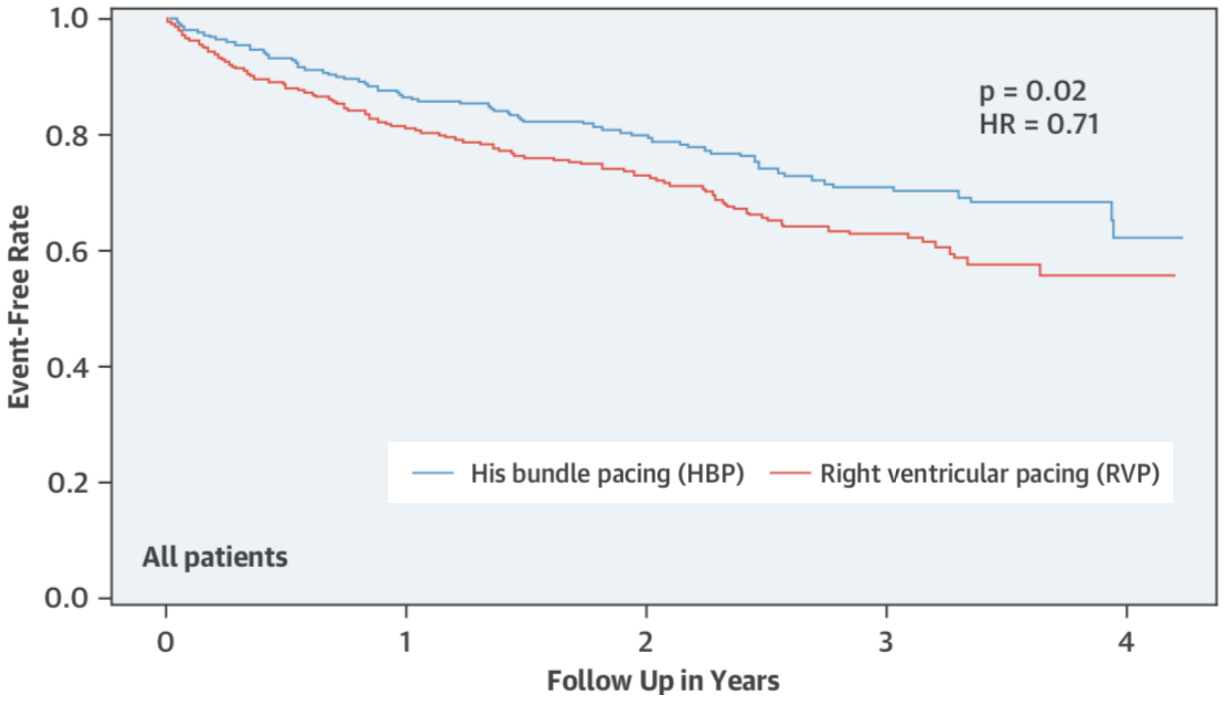
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 71, NO. 20, 2018

PUBLISHED BY ELSEVIER

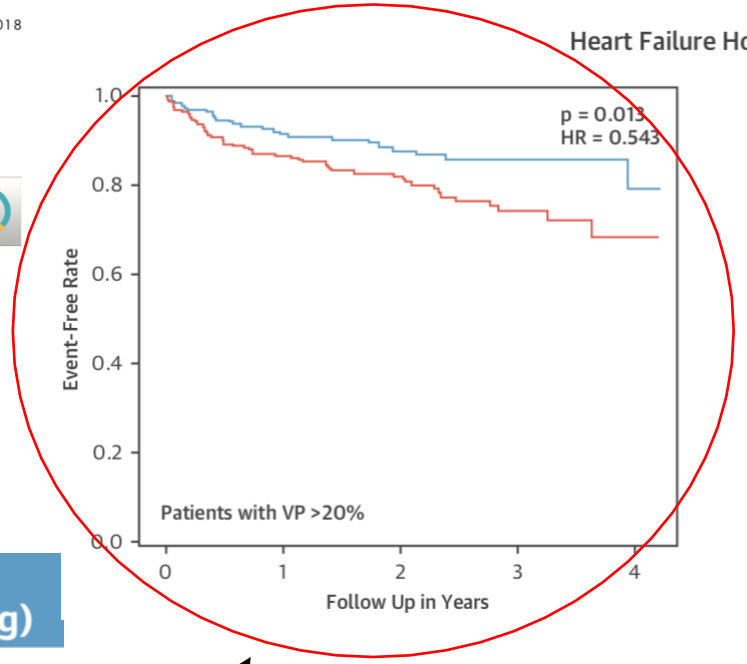
Clinical Outcomes of His Bundle Pacing Compared to Right Ventricular Pacing

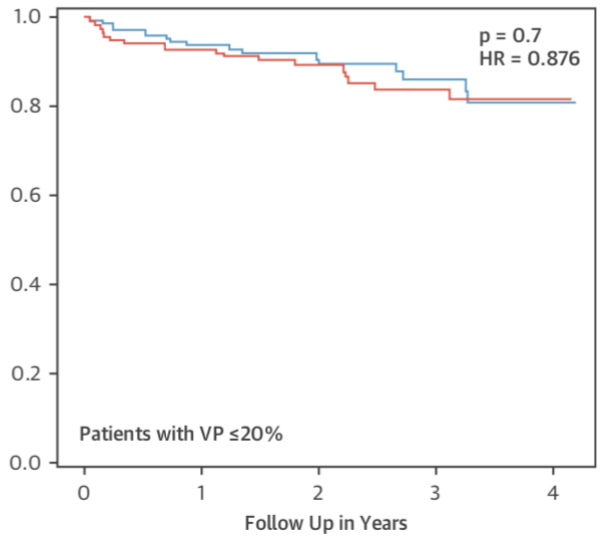
Mohamed Abdelrahman, MD,[a] Faiz A. Subzposh, MD,[a] Dominik Beer, DO,[b] Brendan Durr, DO,[b] Angela Naperkowski, RN, CEPS, CCDS,[a] Haiyan Sun, MS,[c] Jess W. Oren, MD,[b] Gopi Dandamudi, MD,[d] Pugazhendhi Vijayaraman, MD[a]

Primary Outcome (Death, Heart Failure Hospitalization, or Upgrade to Biventricular Pacing)

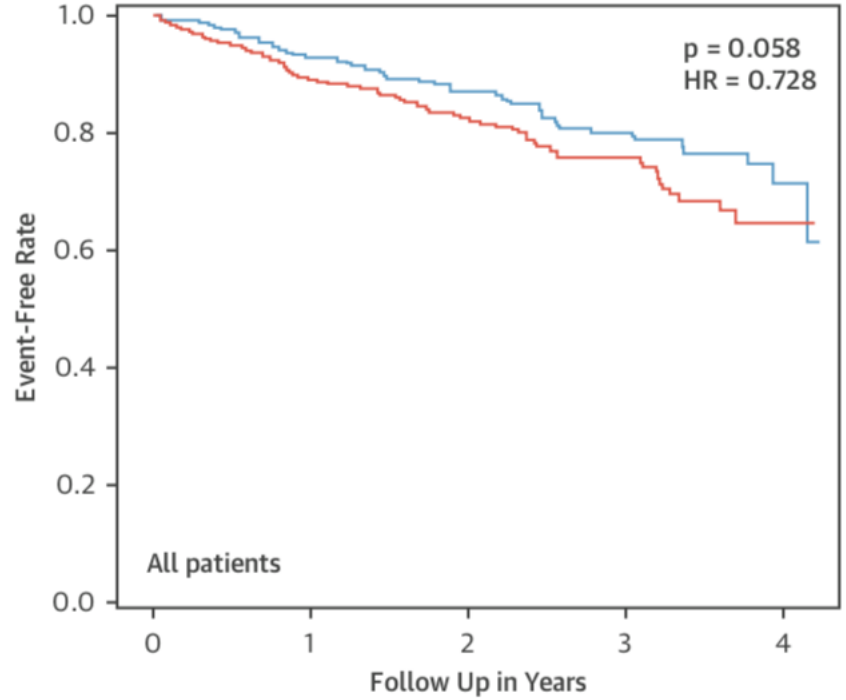


Heart Failure Hospitalizations





All-Cause Mortality



Intermediate-term performance and safety of His-bundle pacing leads: A single-center experience

Todd Teigeler, MD,* Jeffrey Kolominsky, MD,† Chau Vo, MD,‡ Richard K. Shepard, MD,* Gautham Kalahasty, MD,* Jordana Kron, MD, FHRS,* Jose F. Huizar, MD, FHRS,§ Karoly Kaszala, MD, PhD, FHRS,§ Alex Y. Tan, MD,§ Jayanthi N. Koneru, MBBS,* Kenneth A. Ellenbogen, MD, FHRS,* Santosh K. Padala, MD*

Heart Rhythm, Vol 18, No 5, May 2021

274 pts suivis 20(11-33) mois

Stimulation

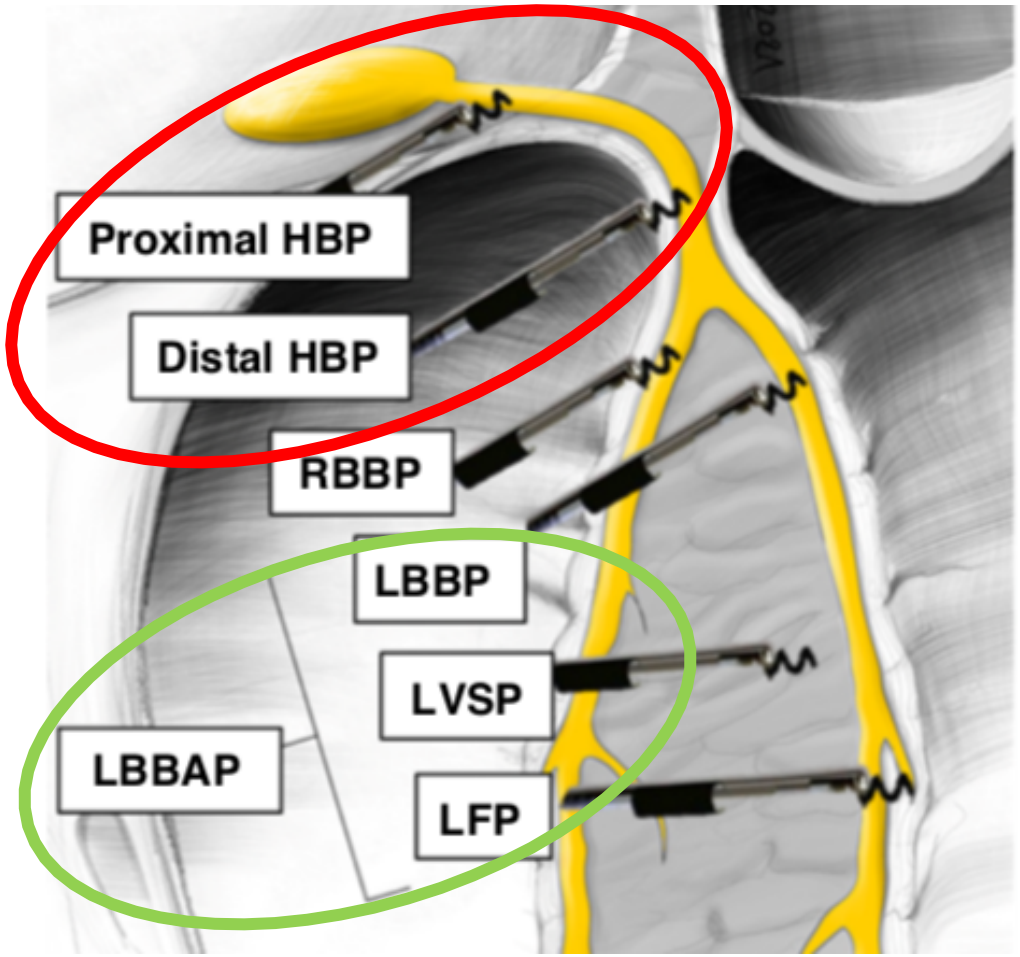
- **Sélective 33%**
- **Non-sélective 67%**

Table 3 Lead safety and outcomes data in follow-up

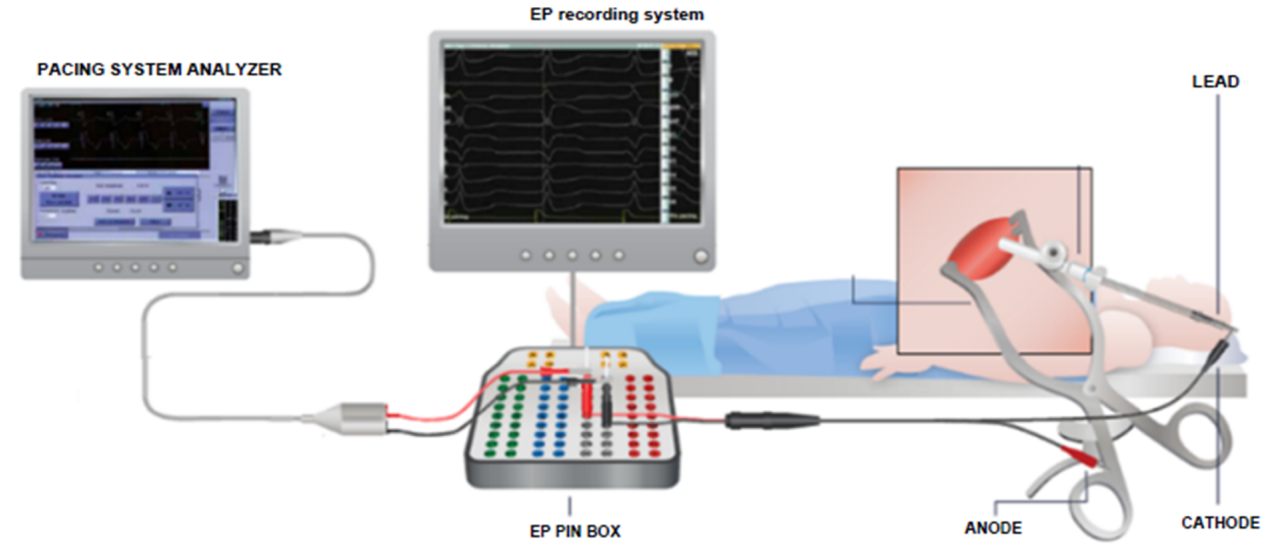
HBP capture threshold* (V)	
≥2.5	60 (24)
≥3.5	18 (7.1)
≥5	3 (1.2)
Septal capture only at follow-up (N = 228)	38 (17)
HBP threshold rise (V)	
≥1	70 (28)
≥2	32 (13)
≥3	11 (4.3)
Lead revision	31 (11)
Increase in threshold	22
Increase threshold after AVJ ablation	5
Lead dislodgment	1
Persistent cardiomyopathy despite HBP	1
Infection	1
Atrial oversensing	1

Table 2 Lead performance data at implant and follow-up

	At implant	Last follow-up	*P* value
Paced QRS (ms)	122 ± 24 *120 (100–140)	124 ± 29 122 (102–144)	.39
Pacing thresholdδ (V)	1.1 ± 0.9 *0.8 (0.5–1.5)	1.7 ± 1.1 1.25 (0.75–2.25)	<.001
Chronic programmed pulse duration (ms)	0.8 ± 0.25 *1.0 (0.5–1.0)	0.8 ± 0.34 1.0 (0.4–1.0)	.02
Sensing (mV)	5.0 ± 4.4 *3.4 (2.2–6.0)	5.9 ± 5.4 4.0 (2.0–8.0)	.03



A



B

Burri H, et al. EHRA clinical consensus statement on conduction system pacing implantation: endorsed by the Asia Pacific Heart Rhythm Society (APHRS), Canadian Heart Rhythm Society (CHRS), and Latin American Heart Rhythm Society (LAHRS). Europace. 2023 Apr 15;25(4):1208-1236.

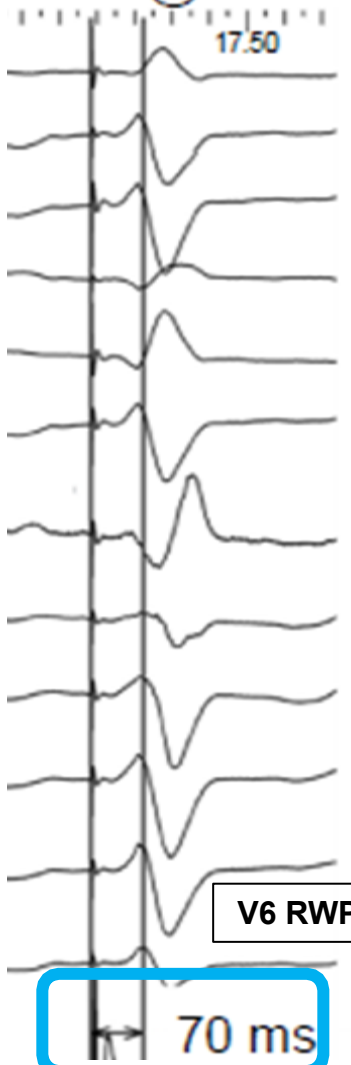
LBB Capture Assessment

Paced QRS Morphology TARGET

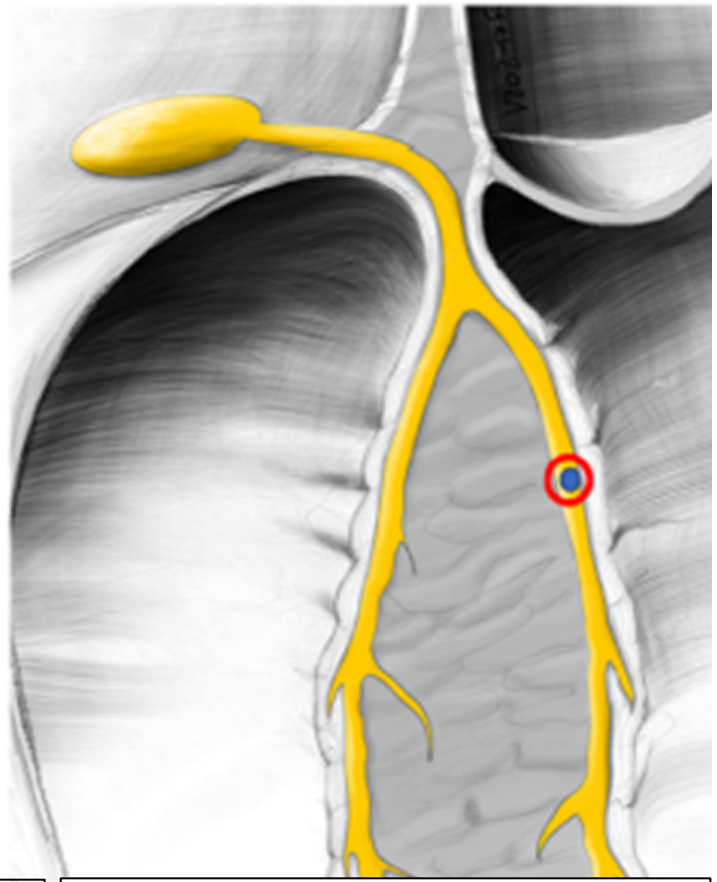
QRS transition at Threshold test +++

sLBBP

0.9V @ 0.5 ms



V6 RWPT



>3Vx0,4ms

NS LBBP

<3Vx0,4ms

S LBBP

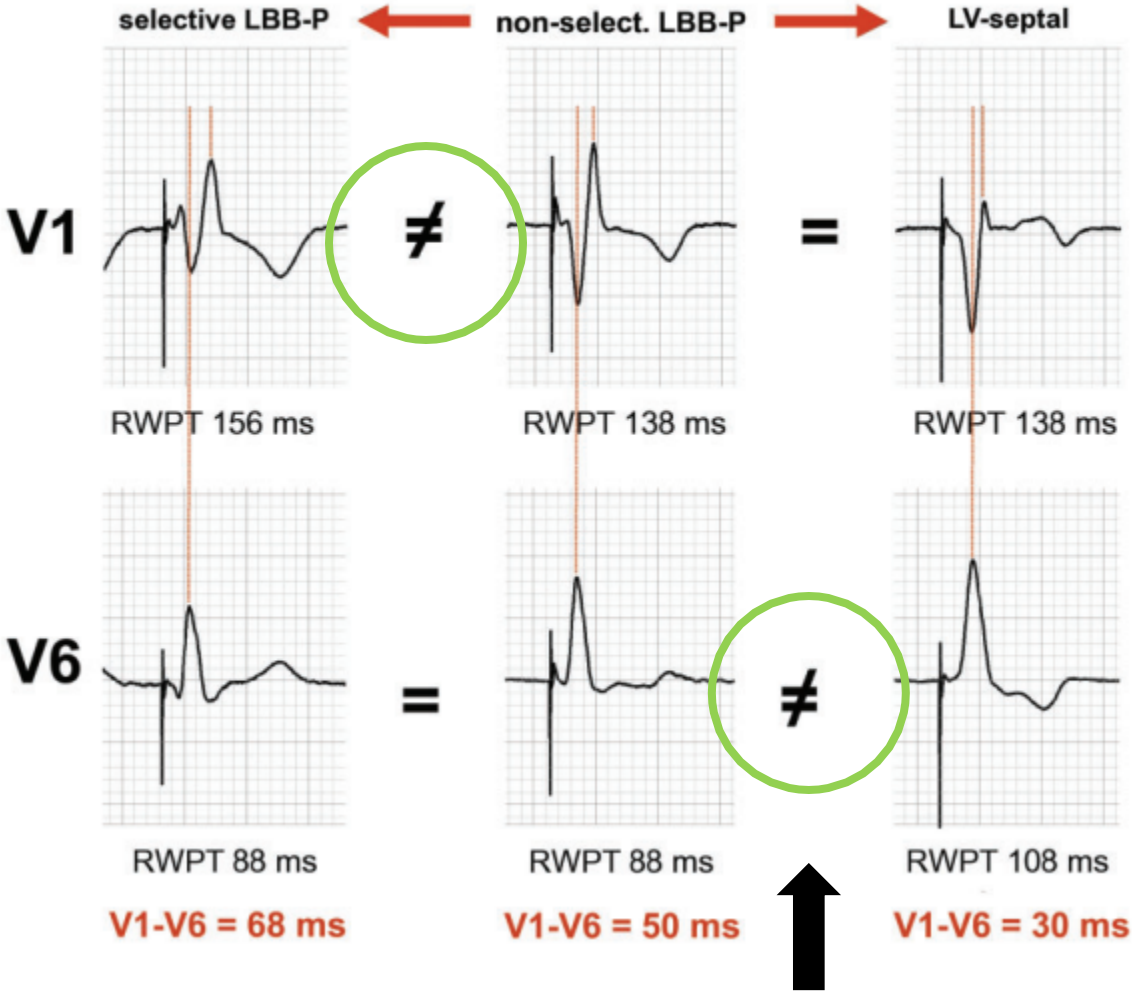
Burri H, et al. EHRA clinical consensus statement on conduction system pacing implantation: endorsed by the Asia Pacific Heart Rhythm Society (APHRS), Canadian Heart Rhythm Society (CHRS), and Latin American Heart Rhythm Society (LAHRS). Europace. 2023 Apr 15;25(4):1208-1236.

ESC European Society of Cardiology
Europace (2022) 24, 40–47
doi:10.1093/europace/euab164

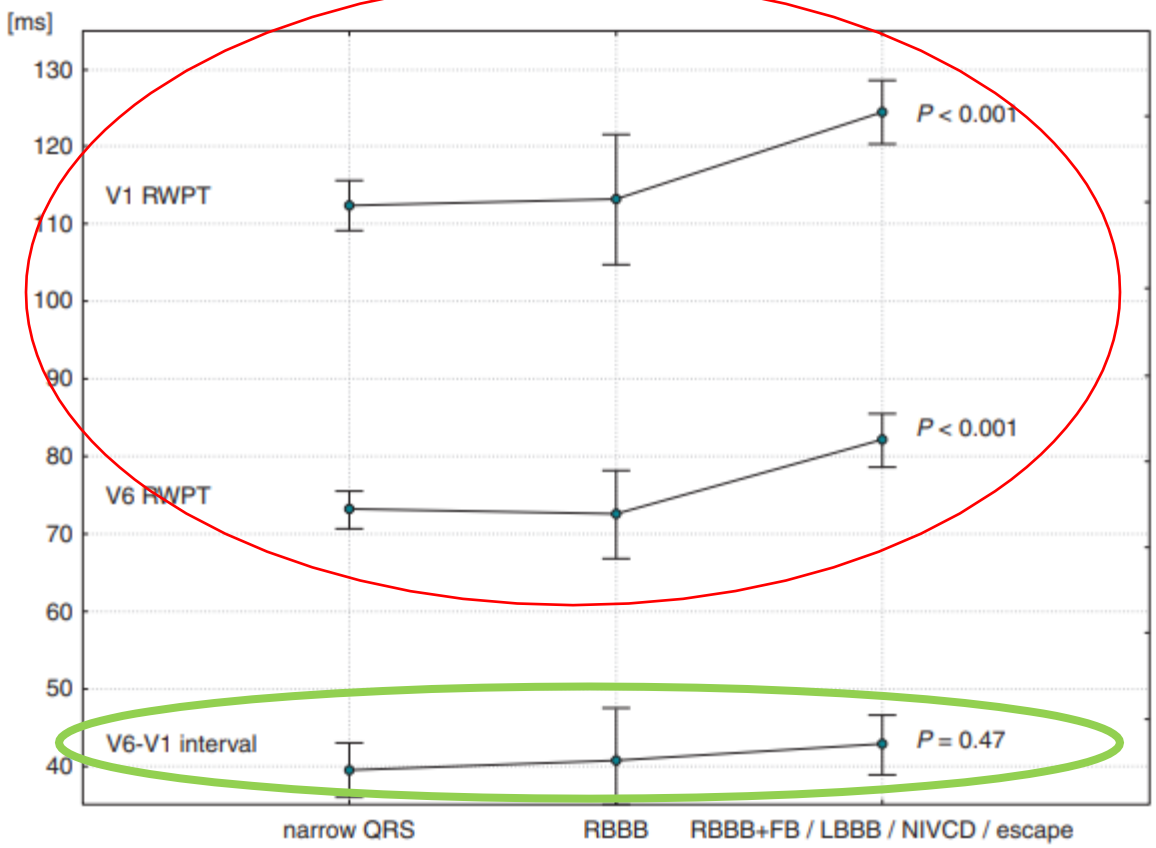
CLINICAL RESEARCH
Pacing and cardiac resynchronization therapy

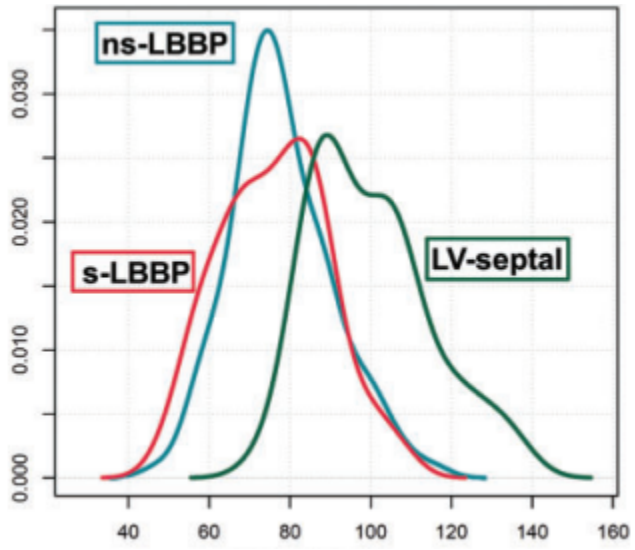
The V6-V1 interpeak interval: a novel criterion for the diagnosis of left bundle branch capture

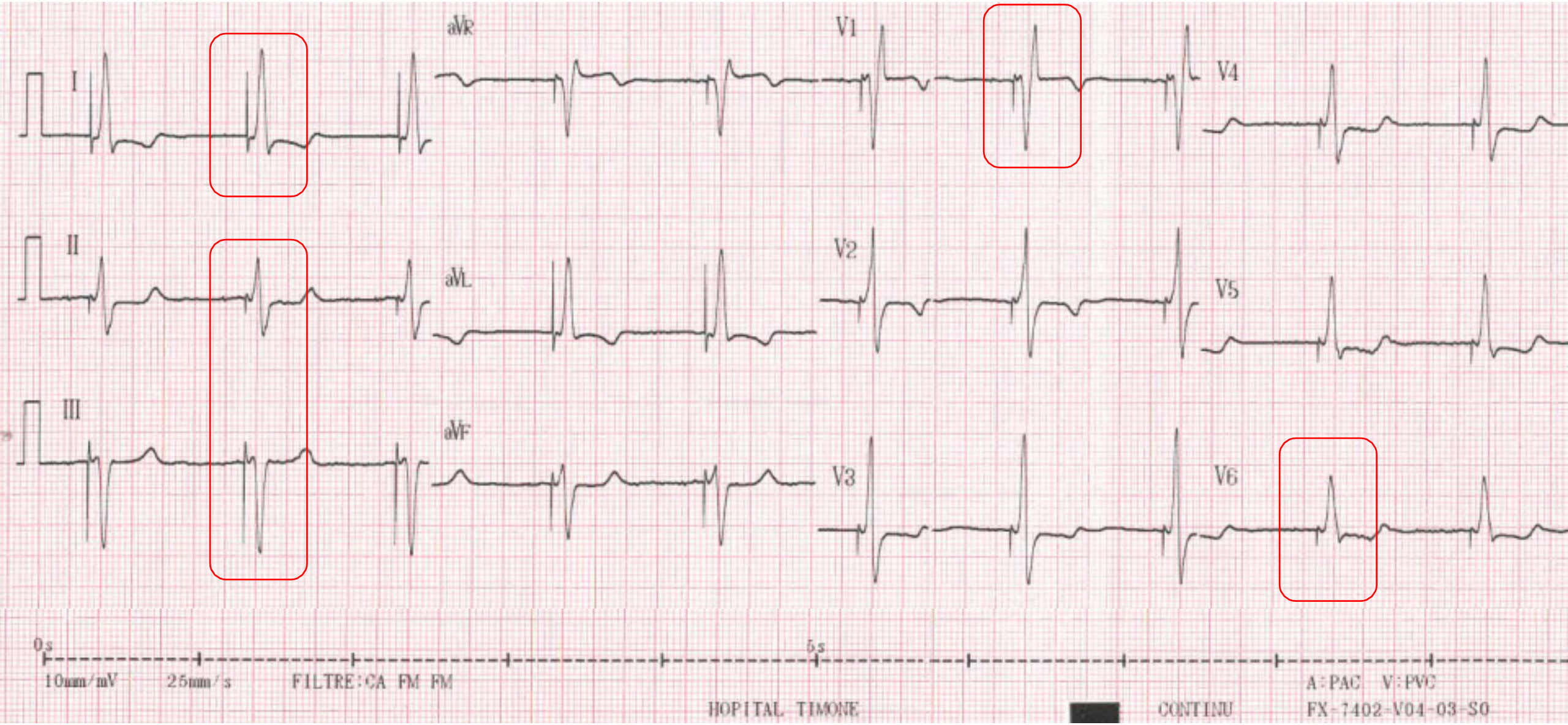
Marek Jastrzębski[1]*, Haran Burri [2], Grzegorz Kiełbasa[1], Karol Curila[3], Paweł Moskal[1], Agnieszka Bednarek[1], Marek Rajzer[1], and Pugazhendhi Vijayaraman[4]

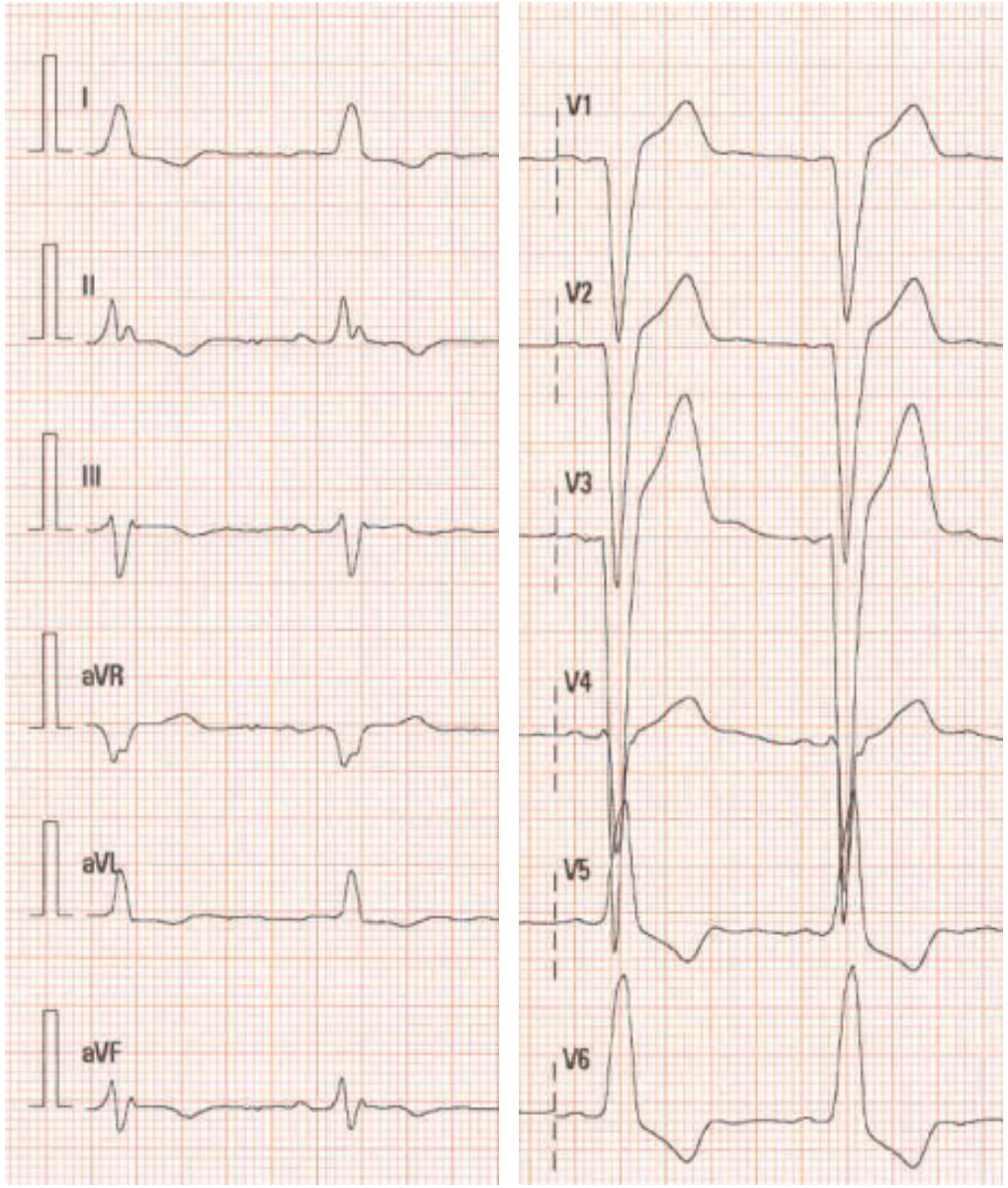


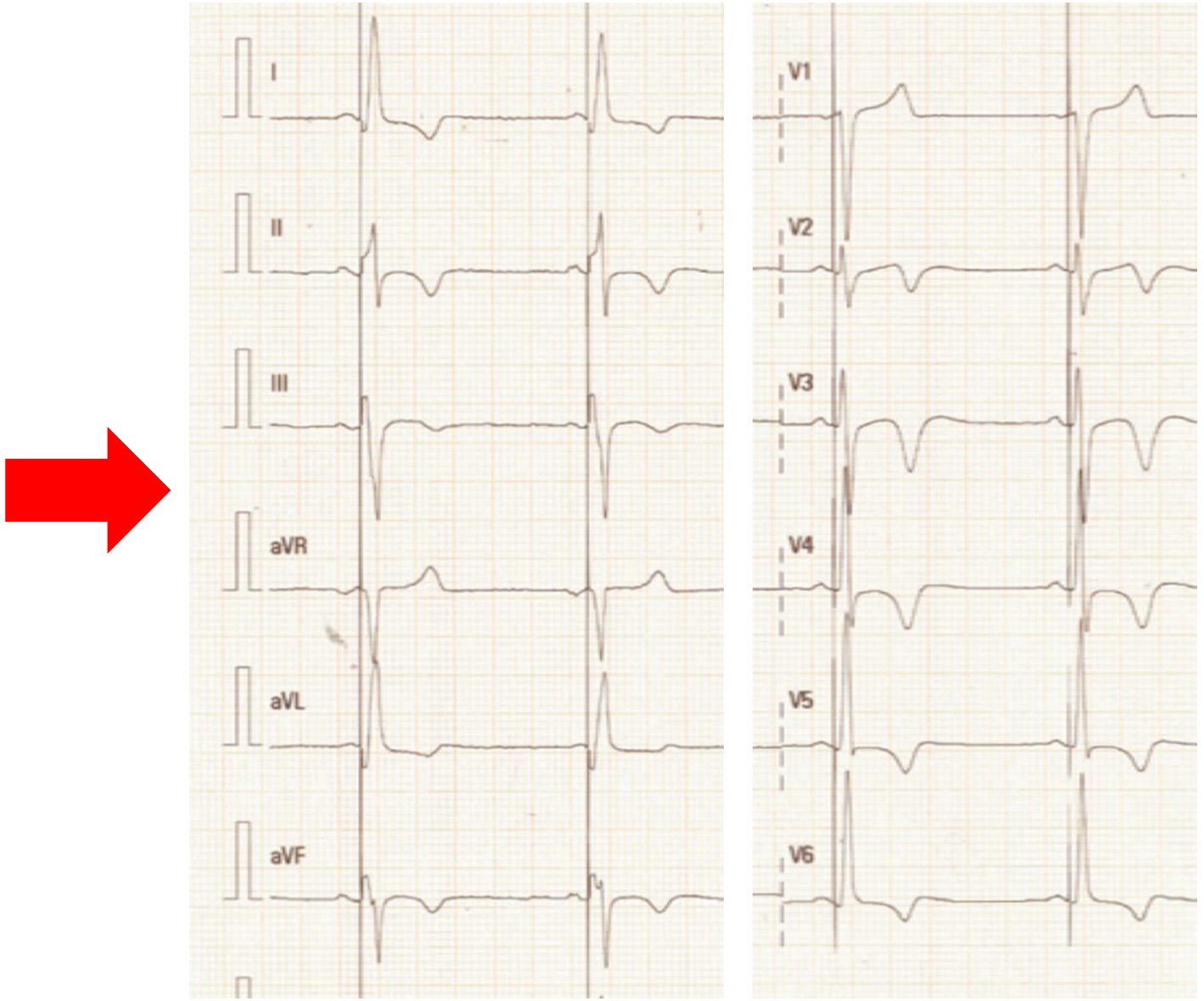
> 44ms (Spe 100%)






I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
0s
5s
10mm/mV
25mm/s
FILTRE:CA FM FM
HOPITAL TIMONE
CONTINU
A:PAC V:PVC
FX-7402-V04-03-S0


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

ESC European Society of Cardiology
European Heart Journal (2022) **43**, 4161–4173
https://doi.org/10.1093/eurheartj/ehac445

CLINICAL RESEARCH
Arrhythmias

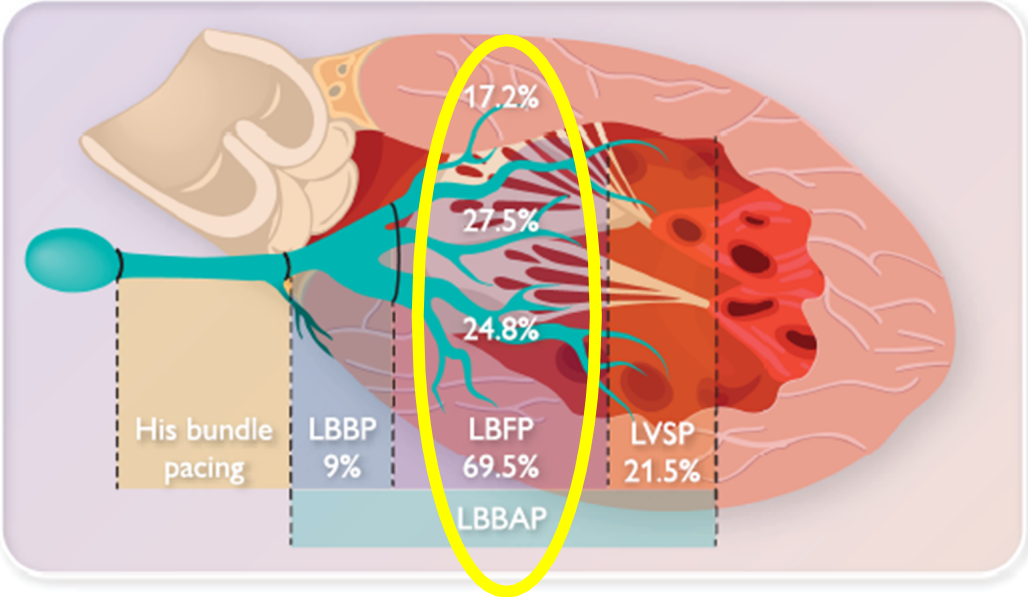
Marek Jastrzębski [1]*, Grzegorz Kiełbasa[1], Oscar Cano [2,3], Karol Curila[4], Luuk Heckman[5], Jan De Pooter[6], Milan Chovanec[7], Leonard Rademakers[8], Wim Huybrechts[9], Domenico Grieco[10], Zachary I. Whinnett[11], Stefan A.J. Timmer[12], Arif Elvan [13], Petr Stros[4], Paweł Moskal[1], Haran Burri [14], Francesco Zanon [15], and Kevin Vernooy [4,16]

MELOS — MULTICENTER EUROPEAN LEFT BUNDLE BRANCH AREA PACING OUTCOMES STUDY

Prospective, multicenter, registry-based observational study

2533 Participants

14 European centres



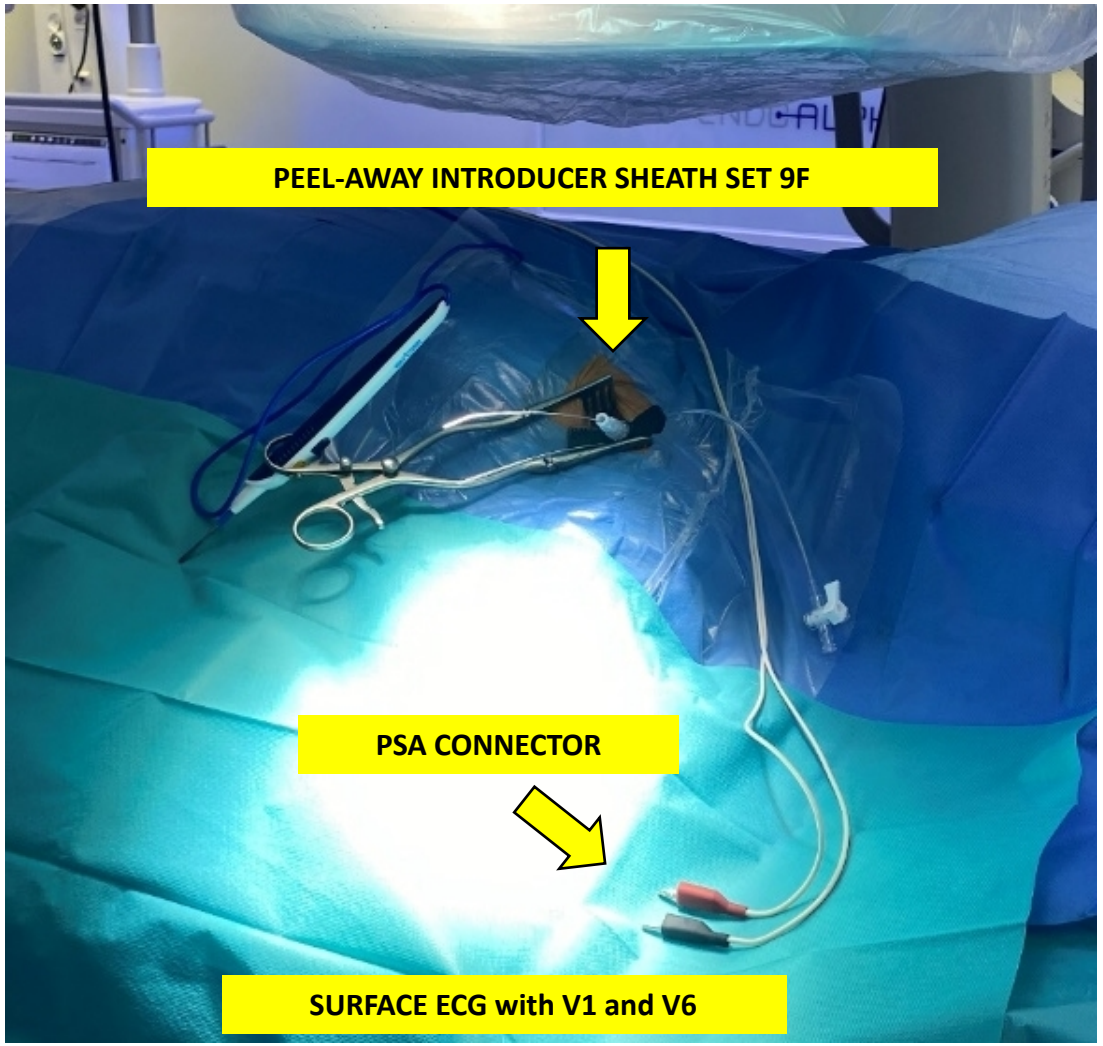
LBBAP implantation success	
Bradycardia indication success	92.4%
Heart failure indication success	82.2%

LBBAP lead complications	8.3%
• Acute perforation to LV	3.7%
• Lead dislodgement	1.5%
• Acute chest pain	1.0%
• Capture threshold rise	0.7%
• Acute coronary syndrome	0.4%
• Trapped/damaged helix	0.4%
• Delayed perforation to LV	0.1%
• Other	0.7%

Independent predictors of LBBAP lead implantation failure

Heart failure indication	OR 1.49, 95% CI 1.01–2.21
Baseline QRS duration, per 10 ms	OR 1.08, 95% CI 1.03–1.14
LVEDD, per 10 mm increase	OR 1.53, 95% CI 1.26–1.86

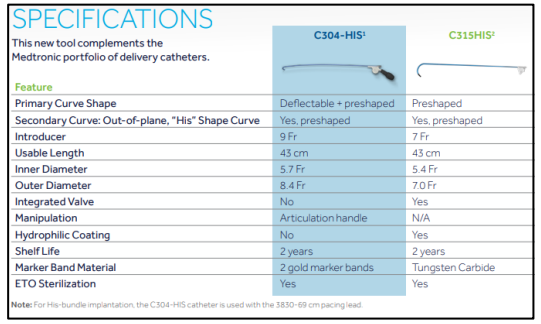
Setup and Specific Tools

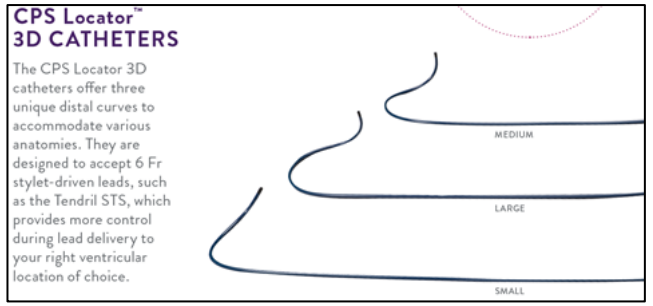


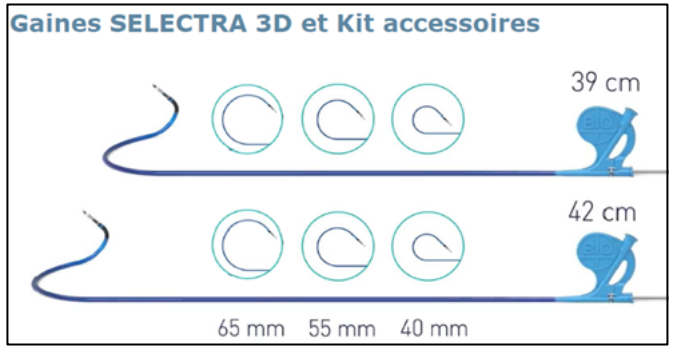
Lumenless

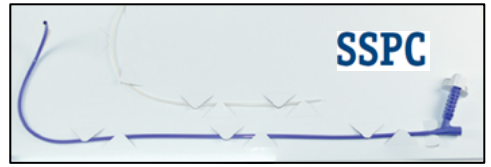
Stylet-driven leads

Lead model	3830 Medtronic ($n = 157$)	Solia S Biotronik ($n = 124$)	Tendril STS Abbott ($n = 27$)	Vega Microport ($n = 8$)	Ingevity Boston Scientific ($n = 5$)
Stylet	No	Yes	Yes	Yes	Yes
Diameter (*F*)	4.1	5.6	5.6	6	5.7
Length (cm)	69	60	58	58	59
Helix type	Fixed	Retractable	Retractable	Retractable	Retractable
Helix length (mm)	1.8	1.8	2.0	1.5	1.8
Body material	Polyurethane	Polyurethane outer (silicone inner)	Optim	Silicone (with silglide treatment)	Polyurethane









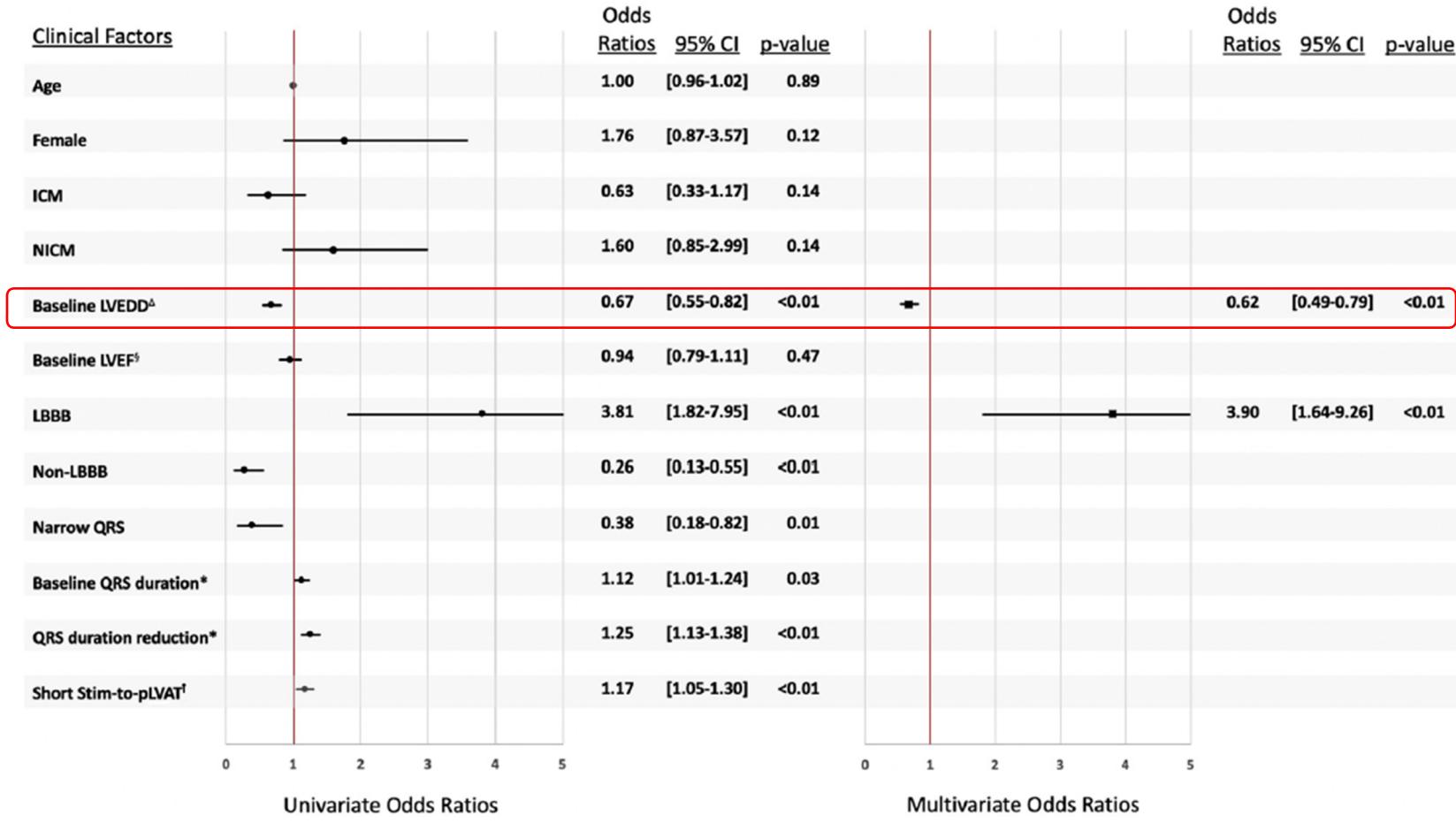
Pour qui ?

Table 5 Preprocedural determinants of LBBAP lead implantation failure ($n = 1809$)

	Uni OR (95% CI)	P	Multi OR [a] (95% CI)	P
Age[b]	0.9 (0.82–0.99)	0.03		
Male sex	1.02 (0.78–1.33)	0.9		
LVEF[c]	0.7 (0.65–0.77)	<0.001		
LVEDD[d]	1.85 (1.59–2.16)	<0.001	1.53 (1.26–1.86)	<0.001
Device upgrade	2.26 (1.62–3.14)	<0.001		
Heart failure indication	2.75 (2.1–3.6)	<0.001	1.49 (1.01–2.21)	0.04
Baseline QRS duration[e]	1.15 (1.1–1.19)	<0.001	1.08 (1.03–1.14)	0.002
Baseline QRS type[f]	2.38 (1.78–3.19)	<0.001		
Stylet driven lead	0.74 (0.48–1.13)	0.16		

Jastrzębski M, et al. Left bundle branch area pacing outcomes: the multicentre European MELOS study. Eur Heart J. 2022 Oct 21;43(40):4161-4173

FIGURE 6 Forest Plot of Predictors of Echocardiographic Response Vijayaraman, P. et al. J Am Coll Cardiol EP. 2021;7(2):135-47.



See text for description. CI = confidence interval; ICM = ischemic cardiomyopathy; LVEDD = left ventricular end-diastolic diameter; LVEF = left ventricular ejection fraction; NICM = nonischemic cardiomyopathy; other abbreviations as in Figure 1.

Original Article

Quant Imaging Med Surg 2023;13(10):6840-6853

Comparison of the left ventricular dyssynchrony between stylet-driven and lumen-less lead technique in left bundle branch area pacing using myocardial perfusion scintigraphy

Keisuke Miyajima[1]^, Tsuyoshi Urushida[2], Yuichiro Tomida[1], Takumi Tamura[1], Sakito Masuda[1], Ayako Okazaki[1], Yoshitaka Kawaguchi[1], Yasushi Wakabayashi[1], Yuichiro Maekawa[2]

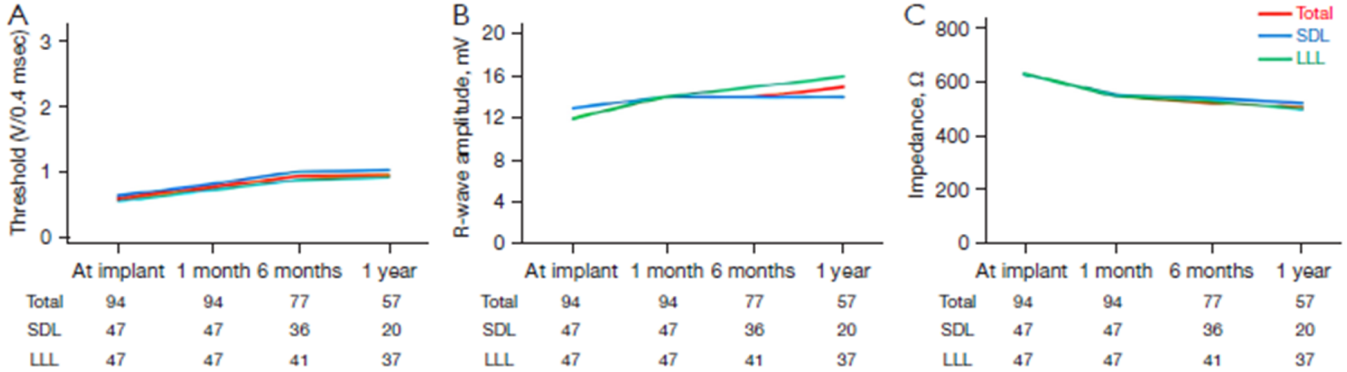
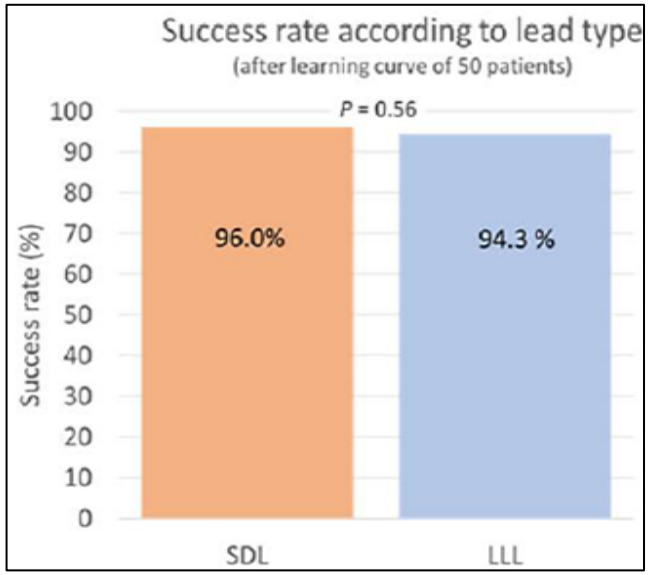


Figure 3 Serial changes of ventricular lead parameters. (A) Capture threshold; (B) R-wave amplitude; (C) impedance at implantation and during the follow-up period. SDL, stylet-driven lead; LLL, lumen-less pacing lead.



	SDL	LLL	*P*
Per-operative complications			
Perforation	11.6%	10.2%	0.59
Micro/macro dislodgements	6.1%	4.5%	0.62
Helix damage	6.1%	0%	0.007
Post-operative complications			
Macro dislodgement	5.4%	3.0%	0.39
Loss conduction system capture	6.1%	3.0%	0.26

ESC European Society of Cardiology

Europace (2023) **25**, 1–9 https://doi.org/10.1093/europace/euad295

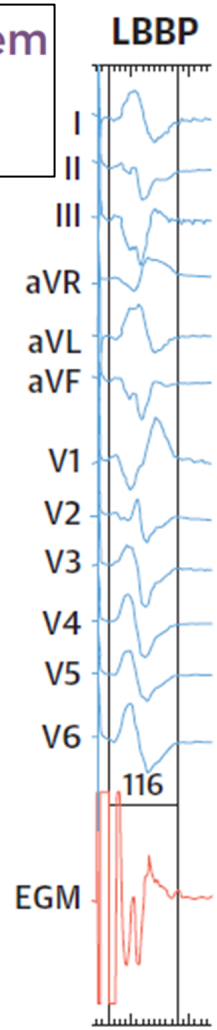
CLINICAL RESEARCH

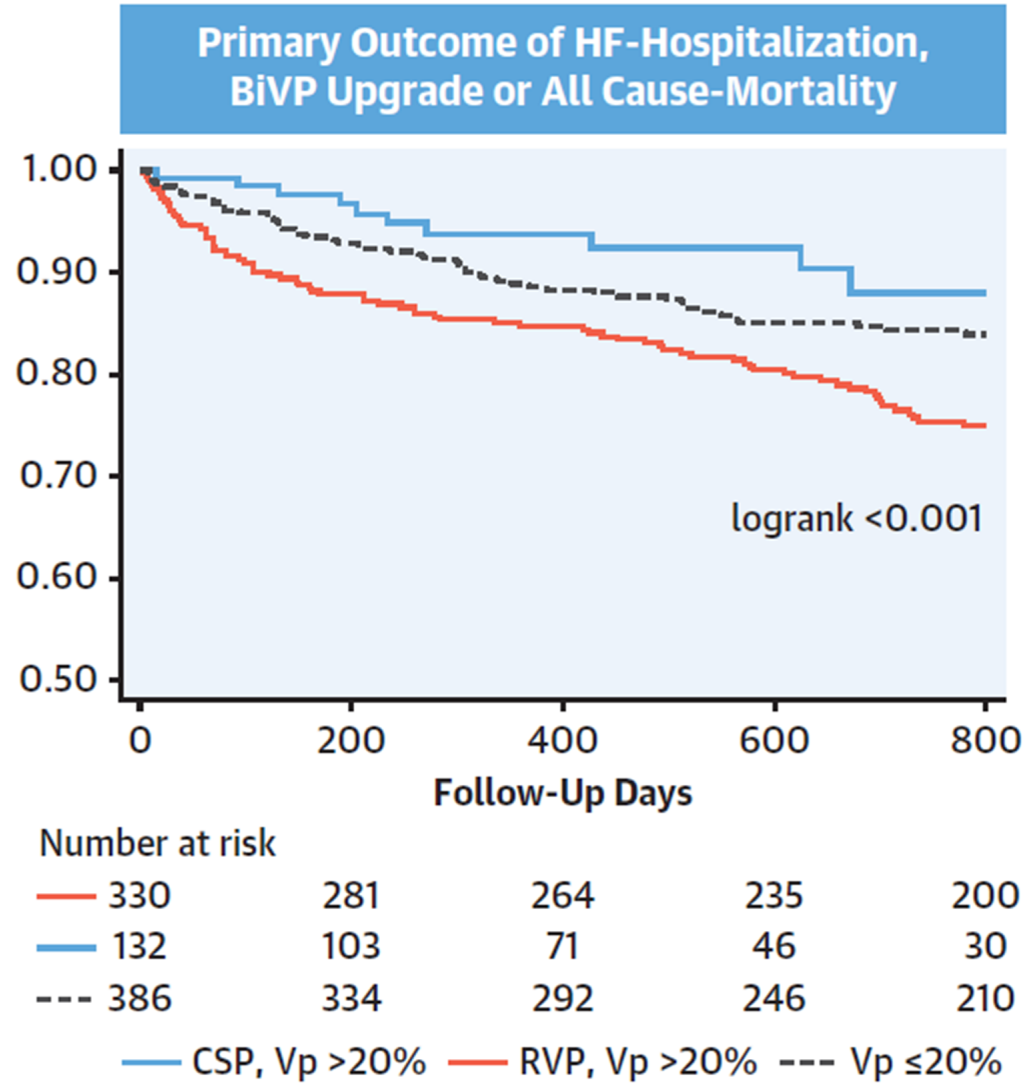
Procedural outcome and follow-up of stylet-driven leads compared with lumenless leads for left bundle branch area pacing

Aarthiga Sritharan, Nikola Kozhuharov, Nicolas Masson, Elise Bakelants, Valérian Valiton, and Haran Burri*

CENTRAL ILLUSTRATION Comparison of Electrical Synchrony and Clinical Outcomes Between CSP and RVP

Clinical Outcomes in Conduction System Pacing Compared to Right Ventricular Pacing in Bradycardia



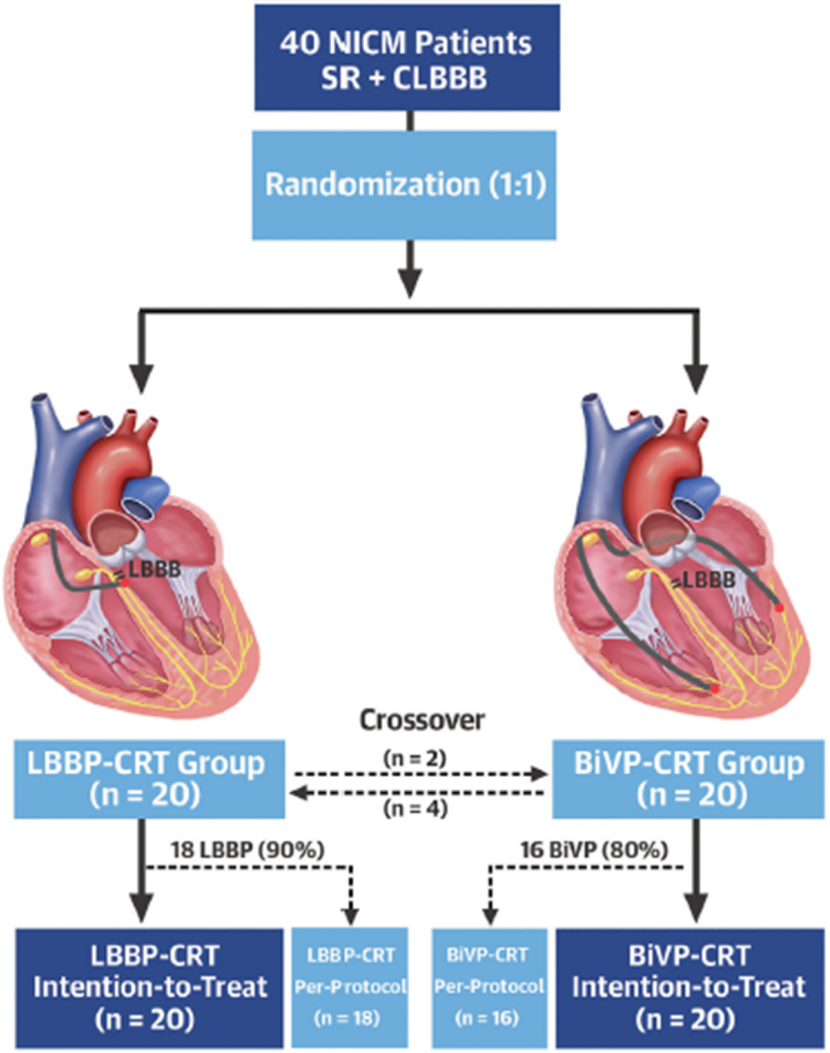


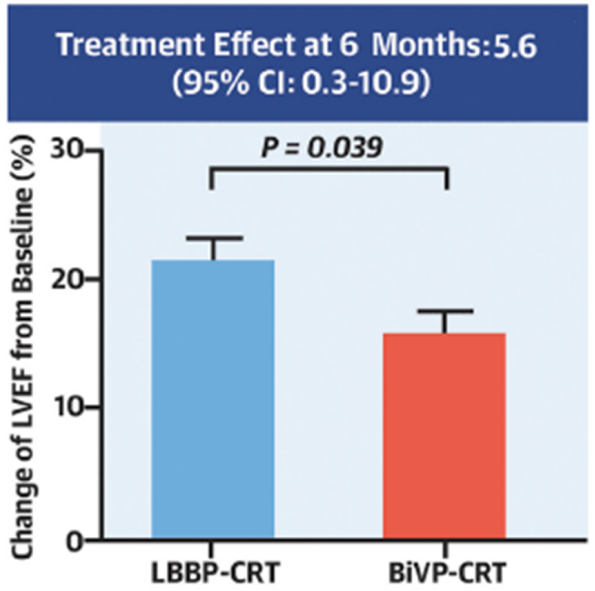
Tan ESJ., et al. J Am Coll Cardiol EP. 2022;■(■):■-■.

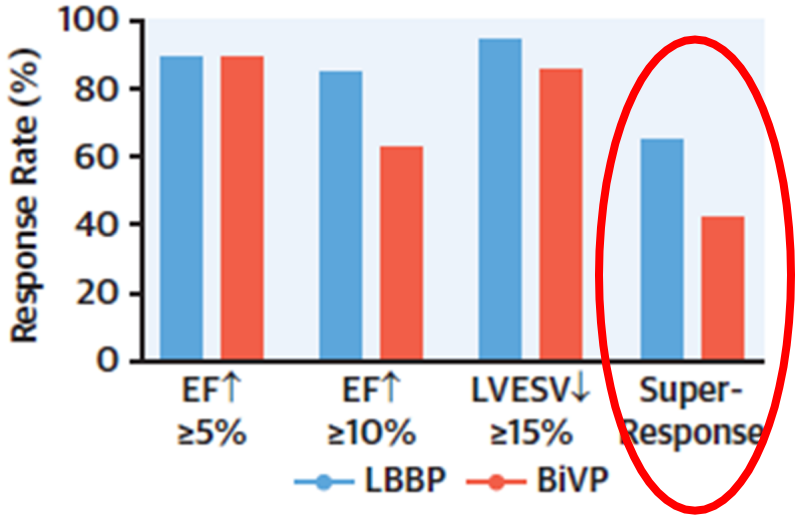
CSP provides more physiological pacing with greater electrical synchrony with improved clinical outcomes compared with RVP when Vp is >20%. BiVP = biventricular pacing; CSP = conduction system pacing; EGM = electrogram; HBP = His-bundle pacing; HF = heart failure; LBBP = left bundle branch pacing; RVP = right ventricular pacing; Vp = ventricular pacing burden.

Wang Y, et al. Randomized Trial of Left Bundle Branch vs Biventricular Pacing for Cardiac Resynchronization Therapy. J Am Coll Cardiol. 2022 Sep 27;80(13):1205-1216.

CENTRAL ILLUSTRATION Left Bundle Branch Pacing vs Biventricular Pacing for cardiac Resynchronization Therapy



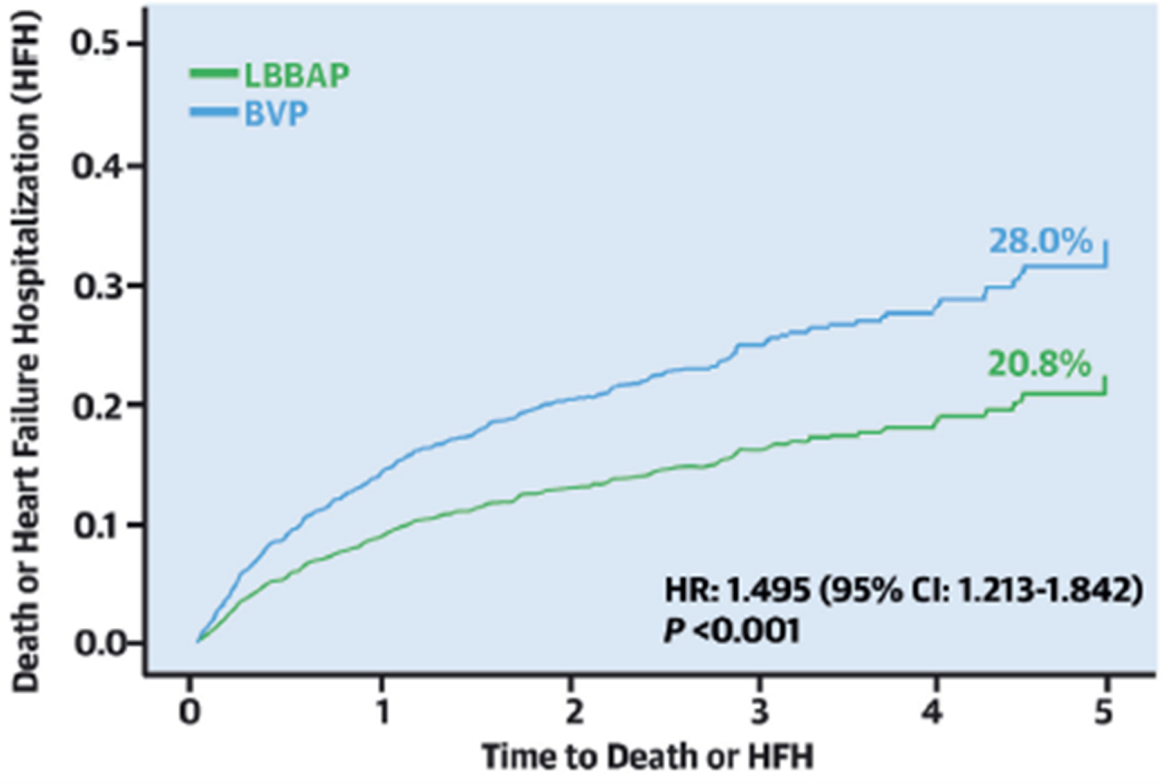




Wang Y, et al. J Am Coll Cardiol. 2022;80(13):1205-1216.

Vijayaraman P et al. Comparison of Left Bundle Branch Area Pacing and Biventricular Pacing in Candidates for Resynchronization Therapy. J Am Coll Cardiol. 2023 Jul 18;82(3):228-241. doi: 10.1016/j.jacc.2023.05.006. Epub 2023 May 21. PMID: 37220862.

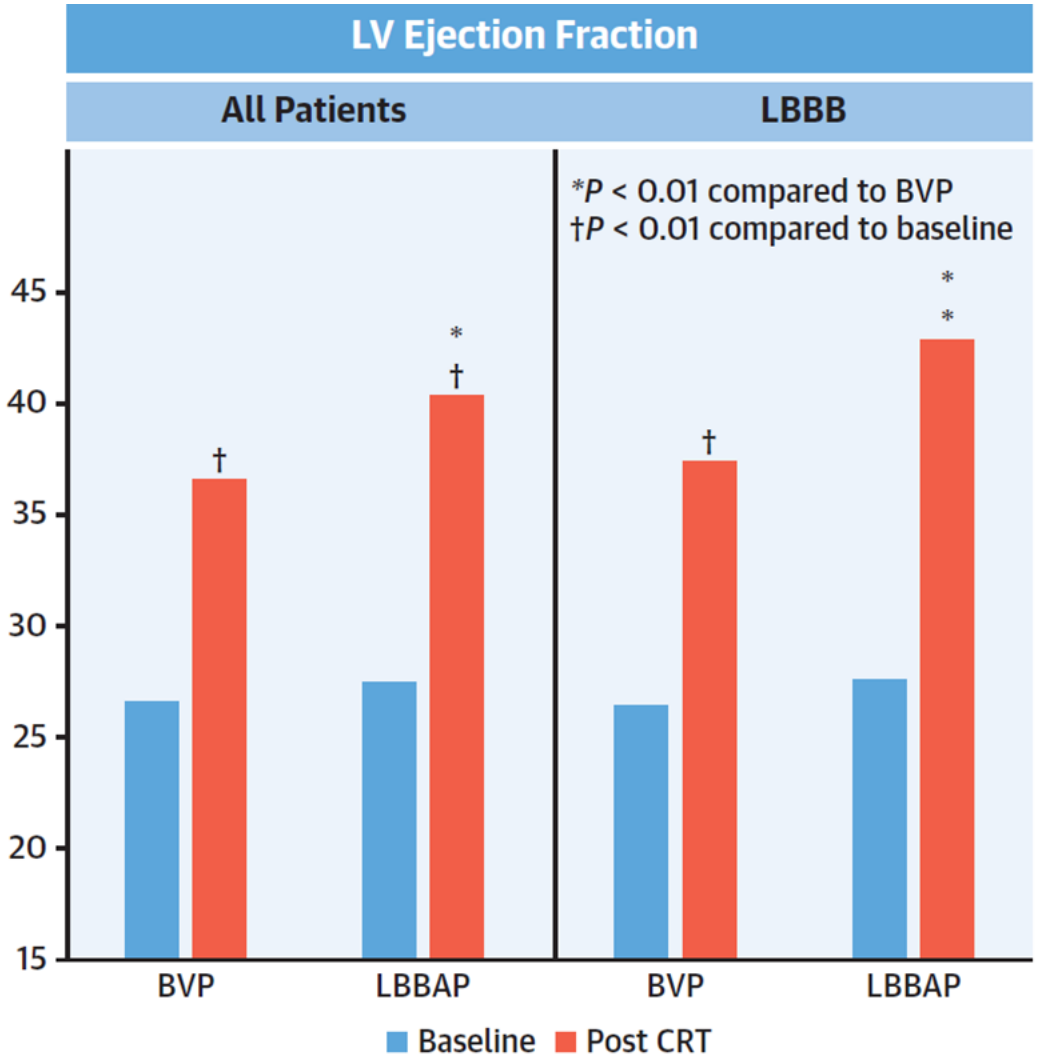
Time to Death or Heart Failure Hospitalization
All Patients (n = 1,778)



BVP	981	728	546	352	166	18
LBBAP	797	574	342	152	18	0

TABLE 2 Procedural Characteristics

	All Patients (N = 1,778)		
	BVP (n = 981)	LBBAP (n = 797)	*P* Value
Procedural duration, min	124 ± 48	142 ± 55	<0.001
Fluoroscopy duration, min	16 ± 12	17 ± 15	0.63
Type of device			
Pacemaker	149 (15.0)	267 (33.0)	<0.001
ICD	832 (85.0)	530 (67.0)	<0.001
Dual chamber	-	237 (30.0)	<0.001
CRT	981 (100.0)	537 (67.0)	<0.001
Pacing threshold (LV-CS/LBBAP)			
Implant, V	1.15 ± 0.7	0.72 ± 0.4	<0.001
Follow-up, V	1.31 ± 0.7	0.74 ± 0.3	<0.001
Threshold increase ≥1 V	72 (7.3)	13 (1.6)	<0.001
Baseline QRS duration, ms	160 ± 25	161 ± 28	0.63
Paced QRS duration, ms	144 ± 23	128 ± 19	<0.001
Ventricular pacing	96.0	95.2	0.17
Lead revision	48 (4.9)	29 (3.6)	0.20
Procedural complications	74 (7.5)	30 (3.8)	<0.001
Pericardial effusion	10 (1.0)	4 (0.5)	
Pneumothorax	5 (0.5)	3 (0.4)	
Acute lead dislodgement	34 (3.5)	13 (1.6)	
Infection	21 (2.1)	6 (0.8)	
Other	4 (0.4)	4 (0.5)	

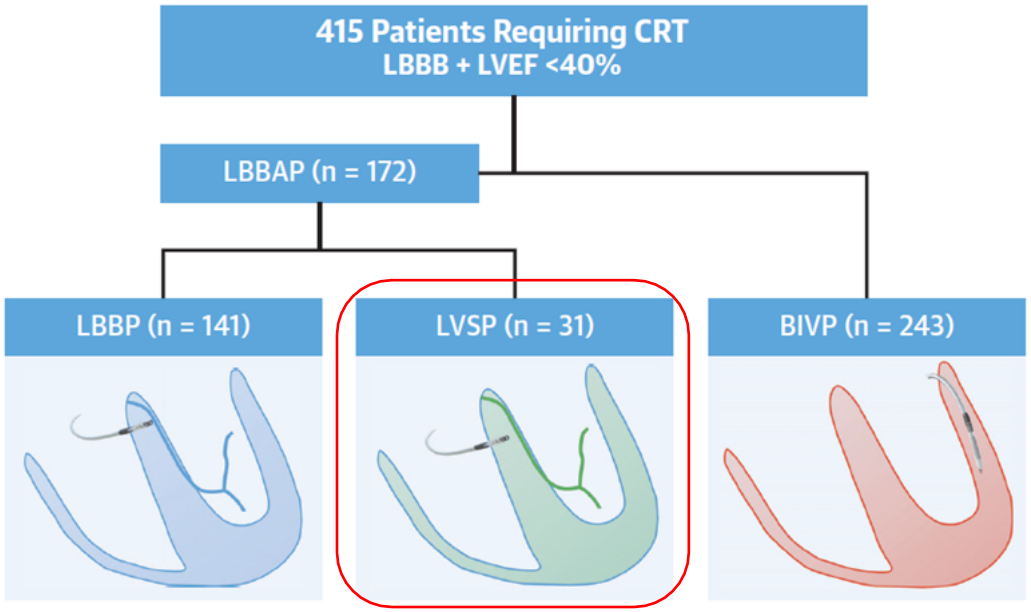


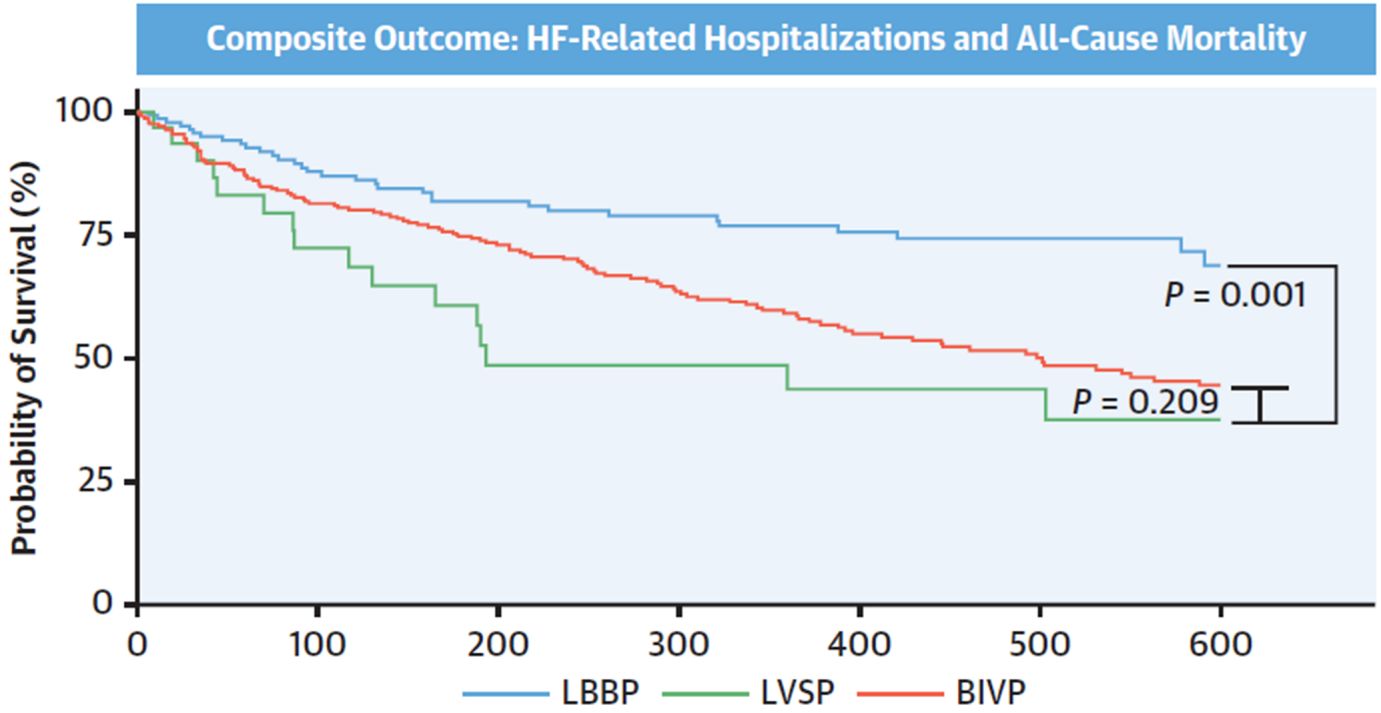
Mais

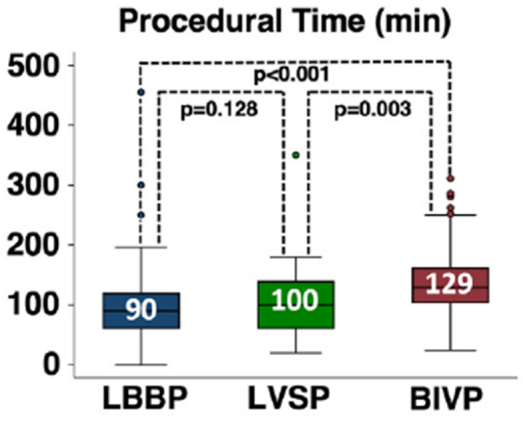
- Rétrospective
- Non randomisée

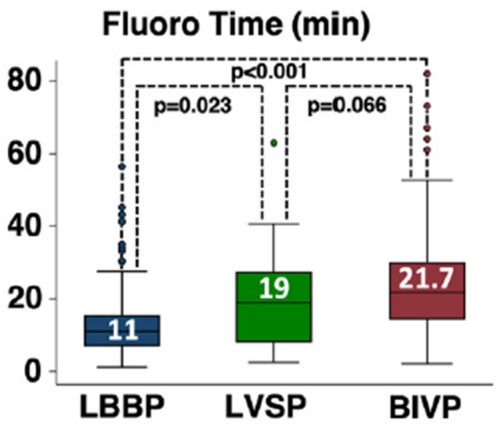
	BVP	LBBAP	P Value
All patients (N = 1,424)	757	667	
Echocardiographic response	495 (65.4)	492 (73.9)	<0.001
Hyper-response	190 (25.1)	226 (33.9)	<0.001
LBBB (n = 874)	492	382	
Echocardiographic response	335 (68.2)	312 (81.7)	<0.001
Hyper-response	140 (28.5)	161 (42.1)	<0.001

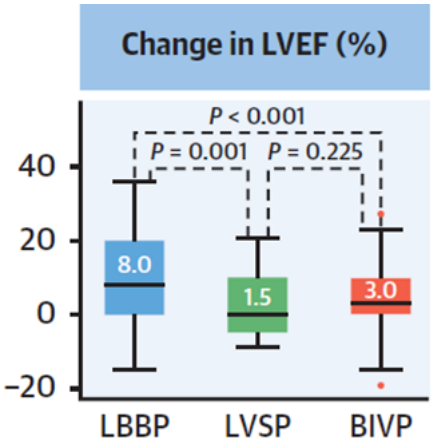
Diaz JC et al. Left Bundle Branch Pacing vs Left Ventricular Septal Pacing vs Biventricular Pacing for Cardiac Resynchronization Therapy. JACC Clin Electrophysiol. 2024 Feb;10(2):295-305.

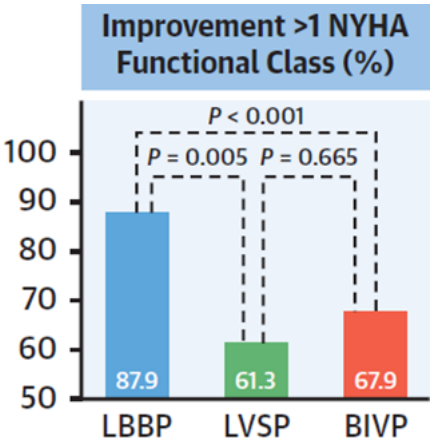


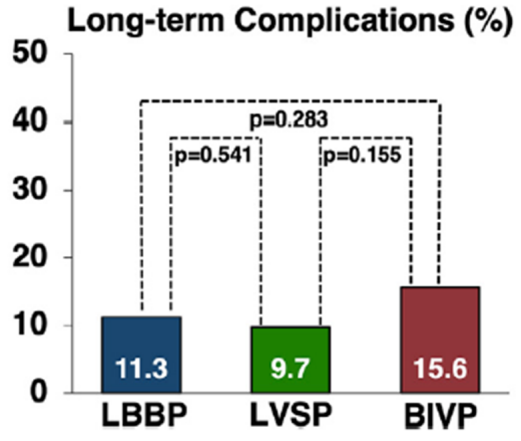






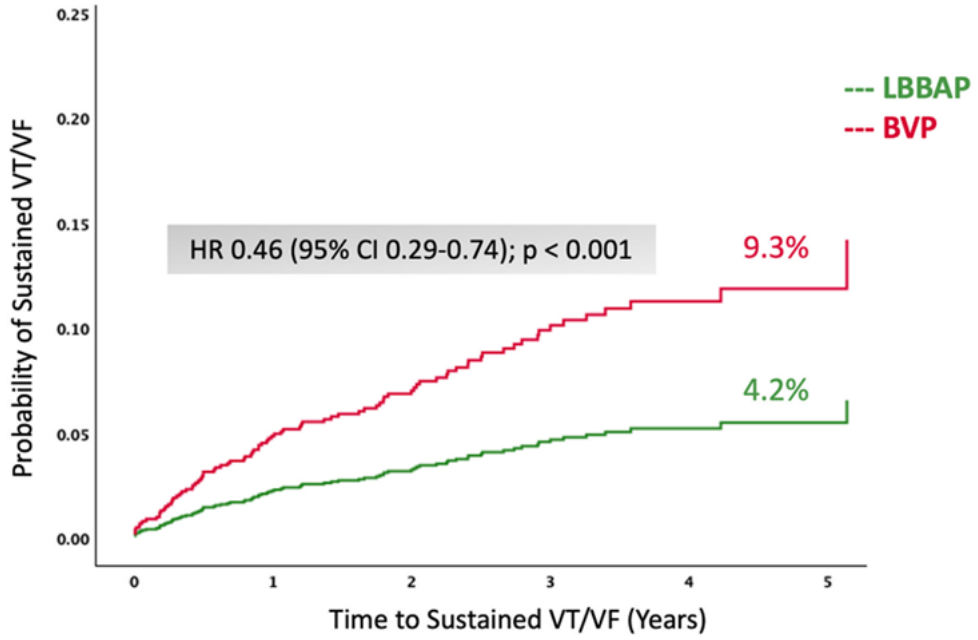






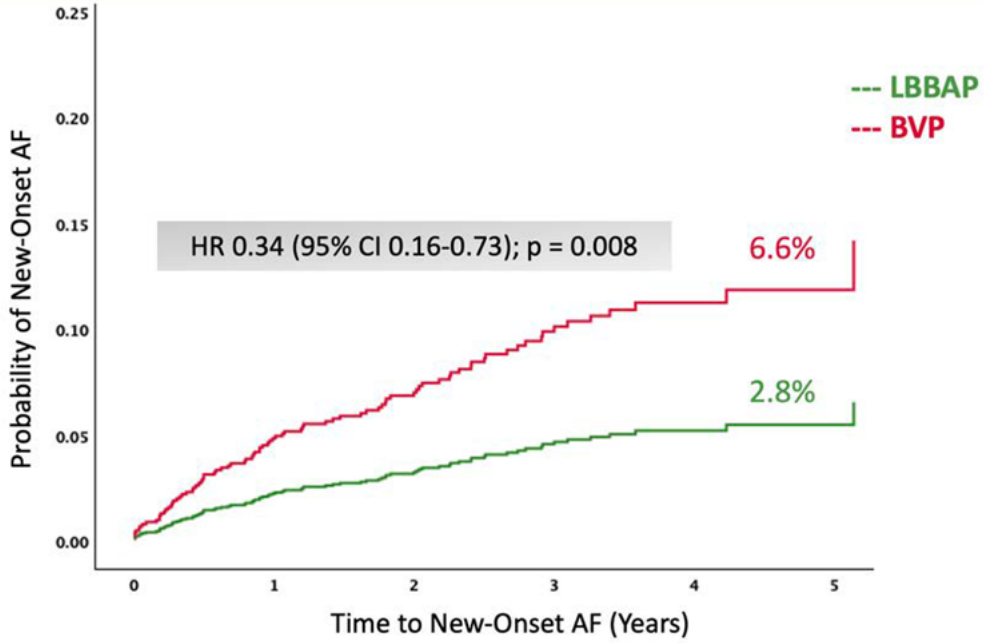
Herweg B et al. Arrhythmic Risk in Biventricular Pacing Compared With Left Bundle Branch Area Pacing: Results From the I-CLAS Study. Circulation. 2024 Jan 30;149(5):379-390.

Time to sustained ventricular tachycardia / ventricular fibrillation among all patients (N=1414)



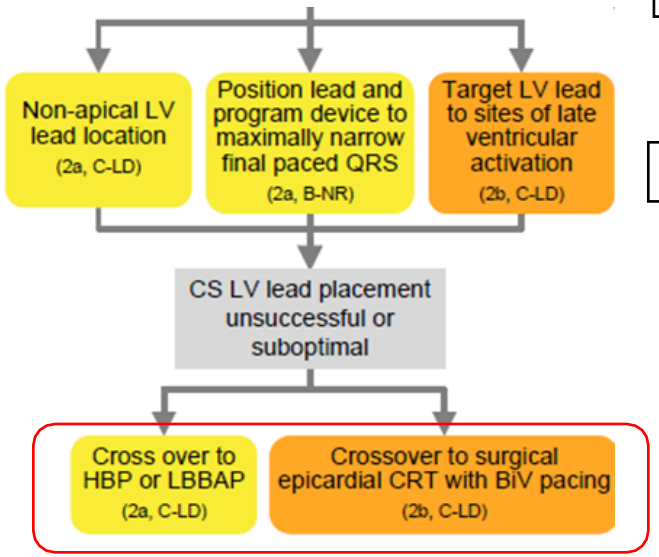
--- LBBAP	707	629	404	198	41	6
--- BVP	707	628	482	333	170	59

Time to new new-onset atrial fibrillation in patients without prior history of atrial fibrillation (N=890)



--- LBBAP	436	397	255	123	24	3
--- BVP	454	404	317	229	115	38

2023 HRS/APHRS/LAHRS guideline on cardiac physiologic pacing for the avoidance and mitigation of heart failure



Echec CRT BIV

1iere intention

Recommendations for LBBB, sinus rhythm, QRS duration ≥ 150 ms, NYHA class I–IV symptoms

COR	LOE	Recommendations
1	A	1. In patients with LVEF ≤ 35%, sinus rhythm, LBBB with QRS duration ≥ 150 ms, and NYHA class II–IV symptoms on GDMT, CRT with BiV pacing is indicated to improve symptoms and reduce morbidity and mortality.
2a	C-LD	2. In patients with LVEF ≤35%, sinus rhythm, LBBB with QRS duration ≥150 ms, and NYHA class II–IV symptoms on GDMT, CSP with HBP with LBBB correction or LBBAP is reasonable if effective CRT cannot be achieved with BiV pacing based on anatomical or functional criteria.
2b	C-LD	5. In patients with LVEF ≤35%, sinus rhythm, LBBB with a QRS duration ≥150 ms, and NYHA class II–IV symptoms on GDMT, CSP with HBP or LBBAP may be considered as an alternative to CRT with BiV pacing.
2b	C-LD	4. In patients with LVEF 36%–50%, sinus rhythm, LBBB with QRS duration ≥ 150 ms, and NYHA class II–IV symptoms on GDMT, CPP may be considered to maintain or improve LVEF.

Recommendations for non-LBBB, sinus rhythm, QRS duration ≥150 ms, NYHA class II–IV symptoms

COR	LOE	Recommendations
2a	A	1. In patients who have LVEF ≤35%, sinus rhythm, a non-LBBB pattern with QRS duration ≥150 ms, and NYHA class III or ambulatory class IV symptoms on GDMT, CRT with BiV pacing can be useful to improve functional class, cardiac structure, and LVEF.
2b	B-R (CRT)	2. In patients who have LVEF ≤35%, sinus rhythm, a non-LBBB pattern with QRS duration ≥150 ms, and NYHA class II symptoms on GDMT, CPP may be considered to potentially improve mortality, HFH, LVEF, and/or functional class.
	C-LD (HBP, LBBAP)	

Chung MK, et al. 2023 HRS/APHRS/LAHRS guideline on cardiac physiologic pacing for the avoidance and mitigation of heart failure. Heart Rhythm. 2023 Sep;20(9):e17-e91.

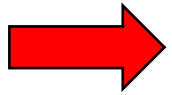
ESC European Society of Cardiology
European Heart Journal (2021) 42, 3427–3520
doi:10.1093/eurheartj/ehab364

2021 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

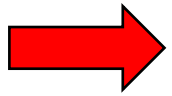
Developed by the Task Force on cardiac pacing and cardiac resynchronization therapy of the European Society of Cardiology (ESC)

With the special contribution of the European Heart Rhythm Association (EHRA)

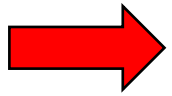
In CRT candidates in whom coronary sinus lead implantation is unsuccessful, HBP should be considered as a treatment option along with other techniques such as surgical epicardial lead.[318,424,440,443]	IIa	B
HBP with a ventricular backup lead may be considered in patients in whom a 'pace-and-ablate' strategy for rapidly conducted supraventricular arrhythmia is indicated, particularly when the intrinsic QRS is narrow.[197,199,200,318]	IIb	C
HBP may be considered as an alternative to RV pacing in patients with AVB and LVEF >40%, who are anticipated to have >20% ventricular pacing.[42,433]	IIb	C



ECHEC DE CRT



FA/ABLATION VN



BAV3 FE>40%

Batta A, Hatwal J. Left bundle branch pacing set to outshine biventricular pacing for cardiac resynchronization therapy? World J Cardiol. 2024 Apr 26;16(4):186-190.

Table 1 Ongoing randomized controlled trials comparing the clinical outcomes following left bundle branch-area pacing- or biventricular pacing-cardiac resynchronization therapy

Trial name	Design	Interventions arm	Unique identifier	*n*	Primary endpoint
LeCaRt trial	RCT	LBBP-CRT *vs* BiVP-CRT	NCT05365568	170	Composite of death, HF hospitalization or worsening HF
LEFT-BUNDLE-CRT trial	RCT	LBBP-CRT *vs* BiVP-CRT	NCT05434962	176	Positive CRT response: improved clinical composite score or > 15% reduction in LVESV
RAFT-P & A trial	RCT	AV nodal ablation + LBBP-CRT *vs* AV nodal ablation + BiVP-CRT	NCT05428787	284	Change in NT-ProBNP at 6 months follow-up
Left *vs* left trial	RCT	HBP/LBBP-CRT *vs* BiVP-CRT	NCT05650658	2136	All-cause mortality and HF hospitalization at 5.5 yr

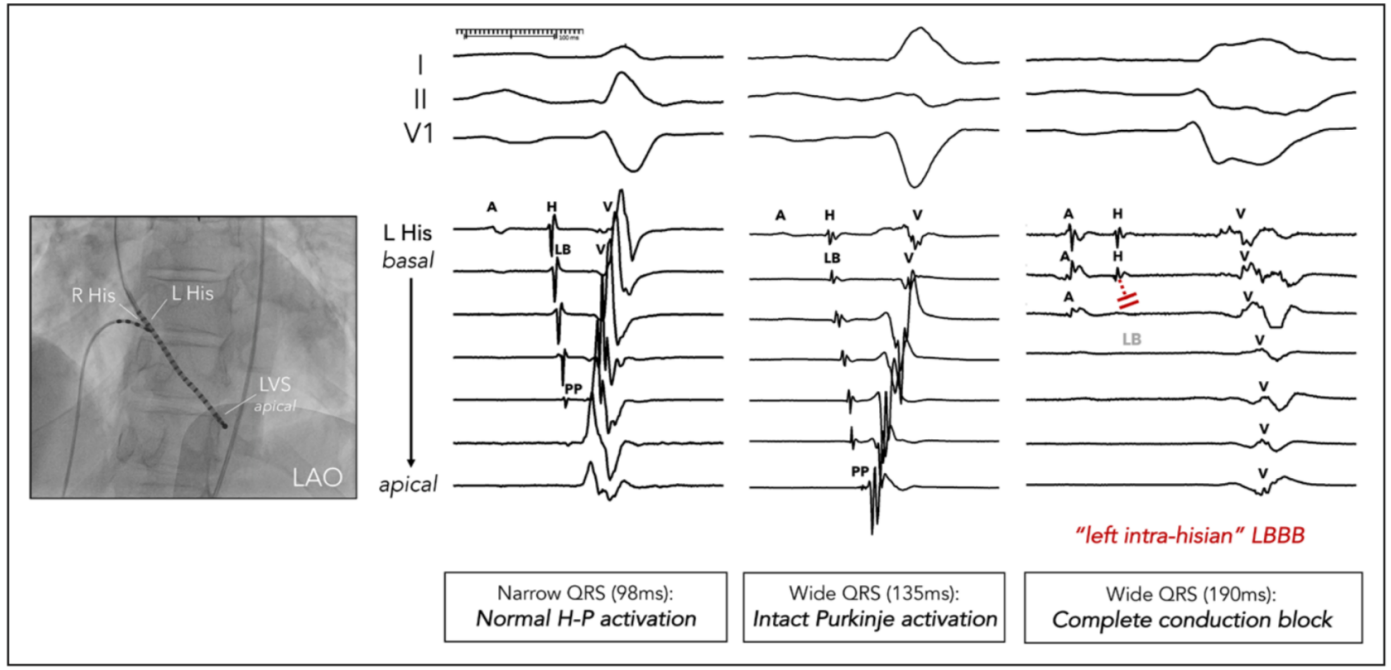
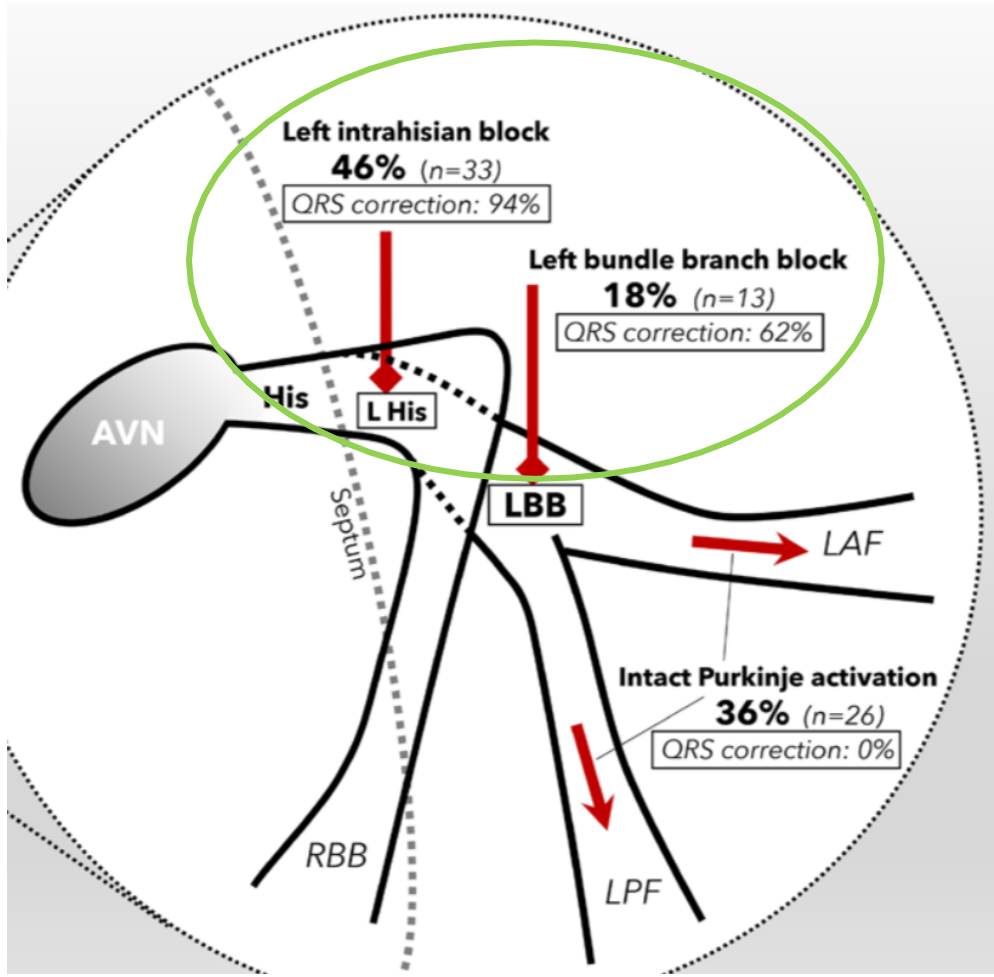


Figure 1. Examples of intracardiac septal conduction observed in patients with surface LBBB pattern.

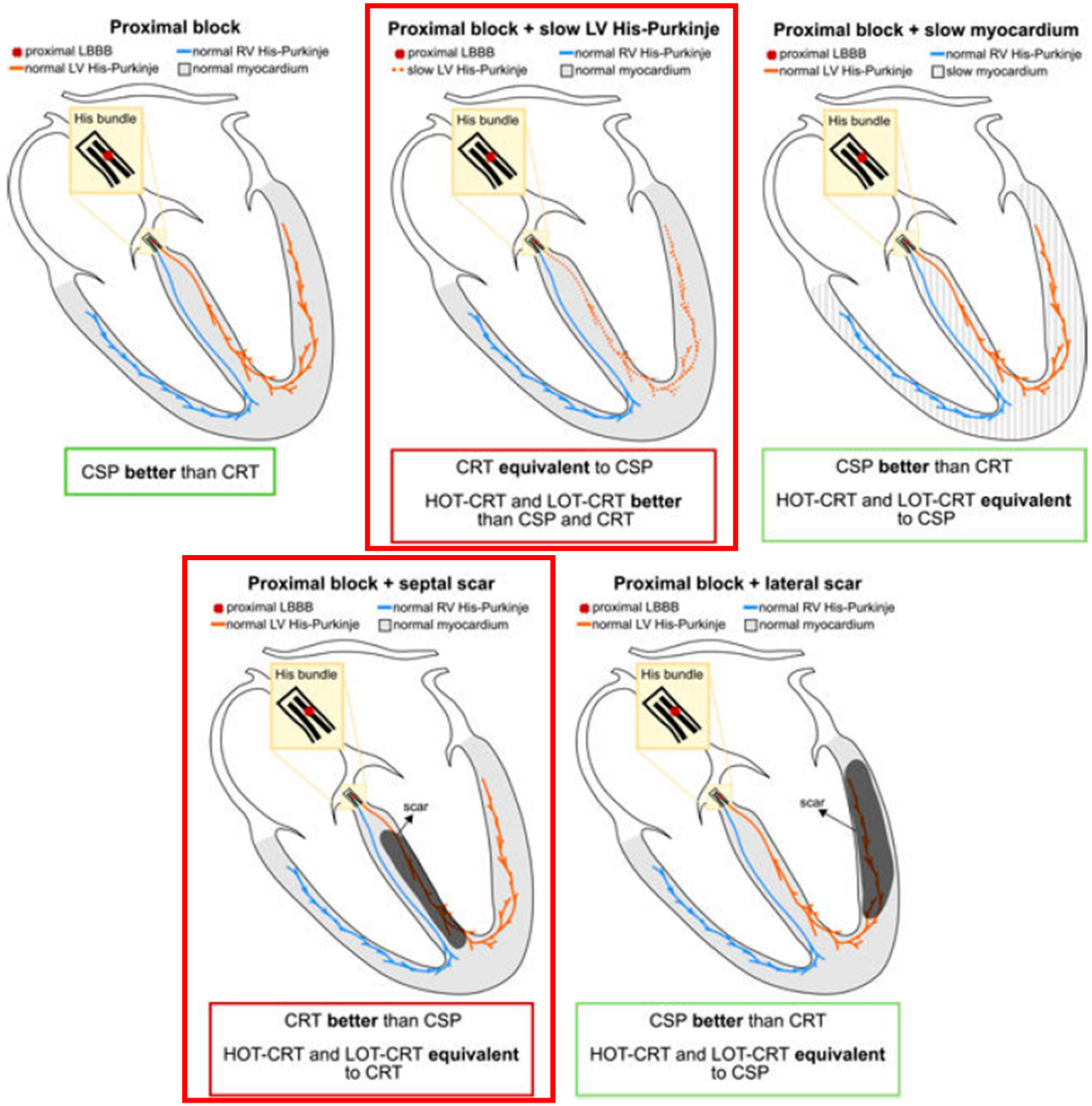
Characteristic	IPA (n=26)	CCB (n=46)	*P* Value
Electrocardiographic characteristics			
QRS duration, ms	152±19	171±23	0.001
QRS duration >140 ms (men) or >130 ms (women)	23 (88.5)	44 (95.7)	0.34
R-wave amplitude in V_1, mV	0.08 (0.00–0.13)	0.07 (0.00–0.15)	0.91
R wave in V_1 <0.1 mV,	15 (57.7)	29 (63.0)	0.65
Presence of QRS notching in V_1, V_2, V_5, V_6, I, or aVL	14 (53.9)	44 (95.7)	<0.0001
Overall Strauss criteria met	10 (38.5)	42 (91.3)	<0.0001

Table 2. Electrocardiographic and Intracardiac Electrophysiological Characteristics by Presence of IPA or CCB in Patients With LBBB by Traditional Surface Criteria

Upadhyay GA, et al. Intracardiac Delineation of Septal Conduction in Left Bundle-Branch Block Patterns. Circulation. 2019 Apr 16;139(16):1876-1888.



Strocchi M et al. Effect of scar and His-Purkinje and myocardium conduction on response to conduction system pacing. J Cardiovasc Electrophysiol. 2023 Apr;34(4):984-993.



Conclusion

- CSP : LBBAP > His
- Technique encourageante
- Sélection des malades : anti-bradycardie et CRT
- Ne pas oublier la resynchronization conventionnelle
- Matériel spécifique necessaire
- Futures complications : fracture – extraction