

HOT TOPICS IN CARDIAC PACING

Pacing del sistema di conduzione: approccio basato su evidenze e linee guida

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***COI: proctorship e
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Scientific***



Consensus EHRA 2025 – blocco AV

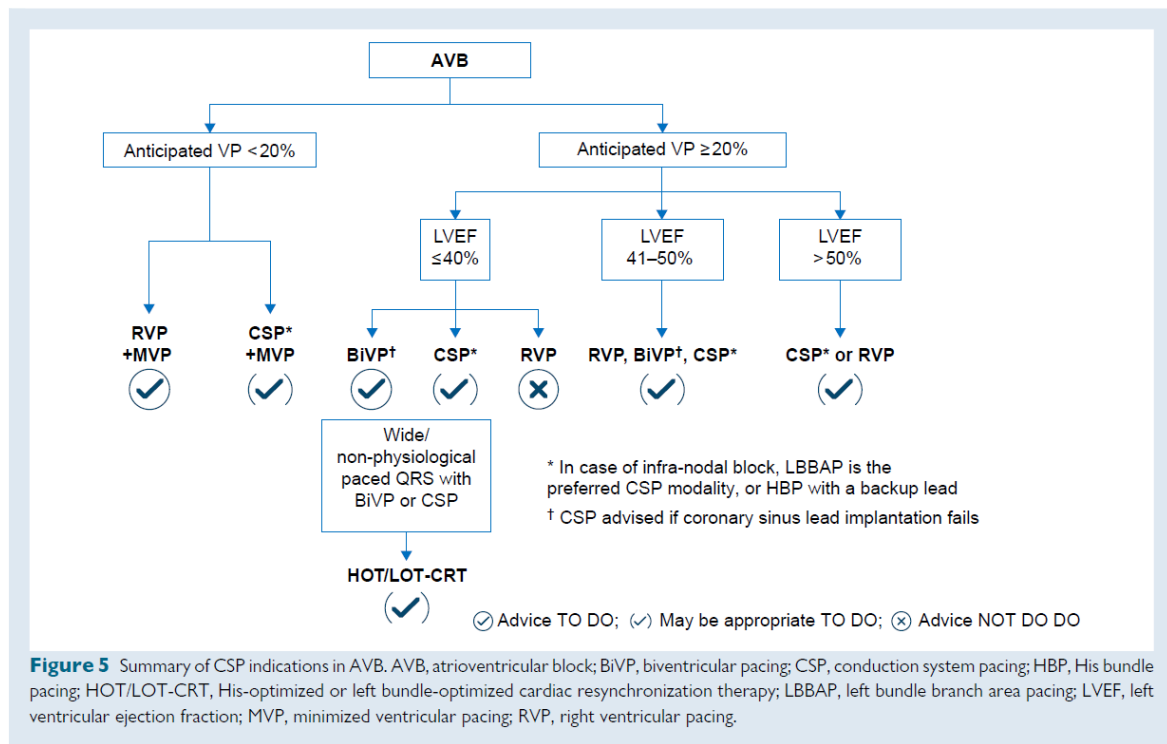


Figure 5 Summary of CSP indications in AVB. AVB, atrioventricular block; BiVP, biventricular pacing; CSP, conduction system pacing; HBP, His bundle pacing; HOT/LOT-CRT, His-optimized or left bundle-optimized cardiac resynchronization therapy; LBBAP, left bundle branch area pacing; LVEF, left ventricular ejection fraction; MVP, minimized ventricular pacing; RVP, right ventricular pacing.

Advice	Strength of evidence
Advice TO DO	
In patients with AV block in whom BiVP is desired, it is advised to implant CSP ^a as a rescue strategy if coronary sinus lead implantation fails ¹³⁹	 >90% agree
May be appropriate TO DO	
It may be appropriate to implant CSP ^a in patients with LVEF >40% with an anticipated ventricular pacing burden >20%. ^{4,26,51,102-106,108,114-116}	
It may be appropriate to implant CSP ^a in lieu of BiVP in patients with AV block and LVEF <40% with an anticipated ventricular pacing burden >20%. ^{130,132}	
In patients with AV block and infrequent (<20%) anticipated ventricular pacing, it may be appropriate to implant CSP ^a in combination with minimized ventricular pacing strategies, in order to provide physiological ventricular pacing in case the conduction disorder progresses	 >90% agree
It may be appropriate to choose CSP ^a as opposed to BiVP as a primary strategy, taking into account operator experience, in the presence of specific patient populations where a simpler device is desired (e.g. frail patients, patients with limited life expectancy, or those requiring a smaller device)	 >90% agree
Advice NOT TO DO	
It is advised to avoid RV pacing inpatients with AV block, LVEF <40%, and frequent (>20%) anticipated ventricular pacing ¹¹⁹⁻¹²¹	

^aThe decision for implanting HBP vs. LBBAP can be based on the relevant advice Table and Table 2. In patients undergoing HBP, a backup lead may be useful, particularly if the block is infra-nodal or in case of sensing issues.

Consensus EHRA – SND

- *There is good evidence that in patients with sinus node dysfunction (SND), unnecessary RVP should be minimized to avoid AF and HF, particularly if systolic function is impaired or borderline.*
- *Sinus node dysfunction and AF often coexist with 40–70% of patients with SND having a history of atrial arrhythmias at the time of diagnosis. Some of these patients may later require AVNA, and in this instance, having a CSP lead from the onset may be desirable.*
- *Due to the paucity of data, it was decided not to formulate advice on this topic for the time being.*

Consensus EHRA – HF

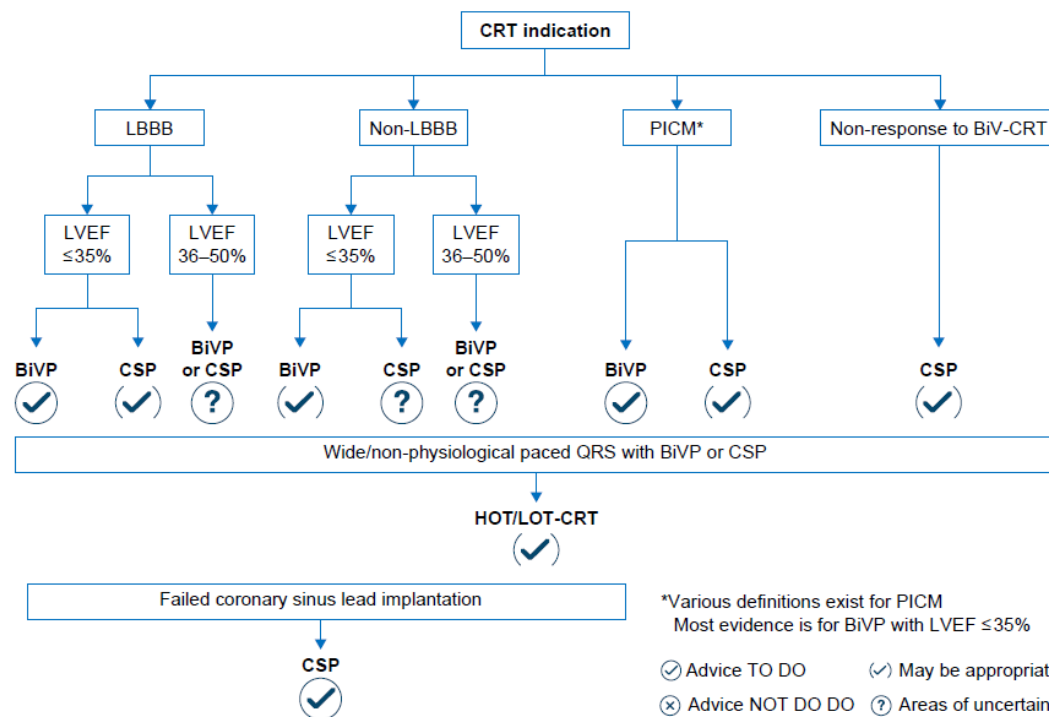


Figure 8 Indication for CSP-CRT. BiV-CRT, biventricular pacing cardiac resynchronization therapy; BiVP, biventricular pacing; CSP, conduction system pacing; HOT/LOT-CRT, His-optimized or left bundle-optimized cardiac resynchronization therapy; LBBB, left bundle branch block; LVEF, left ventricular ejection fraction; PICM, pacing-induced cardiomyopathy.

Advice: CSP-CRT

Strength of evidence

Advice TO DO

In candidates for BiVP in whom coronary sinus lead implantation is unsuccessful, CSP is advised as rescue therapy.^{139,201}



May be appropriate TO DO

For patients with LVEF ≤ 35%, LBBB with QRS ≥ 130 ms, and Class II–IV HF symptoms despite GDMT, CSP may be appropriate as an alternative to BiVP to improve LVEF, exercise capacity, and symptoms and to reduce HFH.^{9,68,123,134,209,210}



In non-responders to BiV-CRT, it may be appropriate to implant CSP to improve HF symptoms and LVEF.^{139,220}



>90% agree

In the presence of specific patient

populations where a simpler device is desired (e.g. frail patients, patients with limited life expectancy, or those requiring a smaller device), it may be appropriate to choose CSP instead of BiVP as a primary strategy, taking into account operator experience



>90% agree

Areas of uncertainty

For patients with a CRT indication and non-LBBB, the clinical impact of CSP is uncertain.^{66,67,208}



>90% agree

For patients with HF and LVEF > 35% without an indication for ventricular pacing, the clinical impact of CSP is uncertain



>90% agree

Conduction System Pacing Italian Network Group (C-SING)

independent, prospective, observational study

1250 LBBAP procedures



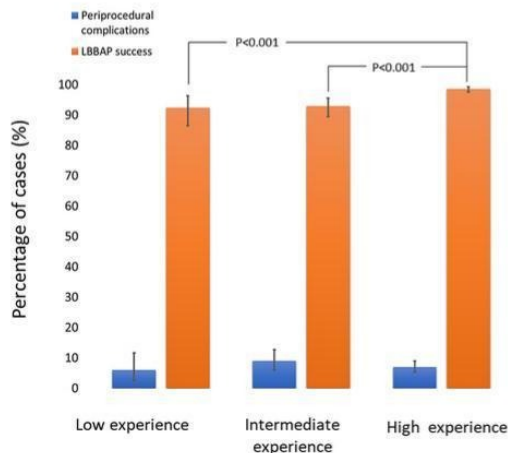
28 Italian sites



Operator LBBAP experience



10.6% Low
25.0% Intermediate
64.4% High



LBBAP lead implantation success rate **96.6%**

Median fluoroscopy time **6.2 minutes**

Periprocedural complications **6.2%**

Stable LBBAP capture and low complication rate (**2.1%**) during follow-up

- Better outcomes for high- vs low-experience operators with reduced fluoroscopy time (**5.9 min vs 9.0 min, p=0.005**) and an **86%** lower risk of lead implantation failure
- Complication rates not affected by operator experience

Conduction System Stimulation to Avoid Left Ventricle Dysfunction

Carlos E. González-Matos, MD , Oriol Rodríguez-Queralto, MD, PhD , Fátima Zárate, MD , Jesús Jiménez, MD, Benjamin Casteigt,

MD, and Ermengol Vallés, MD, PhD  | [AUTHOR INFO & AFFILIATIONS](#)

Circulation: Arrhythmia and Electrophysiology • Volume 17, Number 2 • <https://doi-org.bvssp.idm.oclc.org/10.1161/CIRCEP.123.012473>

JACC 2025

408 screened patients

- **75 patients** with high degree AVB
- Normal or near normal LV function
- High ventricular stimulation burden

77 years
65% male
QRSd 137 ms
LVEF > 40%
VP burden > 80%

Randomization

35 implanted RVAP
31 ITT analyses

40 implanted CSP
39 ITT analyses

90% success
0% complications
4 cross-overs

δ LVEF -6.6%
7 HF admissions

δ LVEF -0.8%
2 HF admissions

Difference **+5.8% in LVEF**
Difference **-17.5% in HF admissions**

6 months
Follow-up

- Riduzione dell'endpoint primario (PICM, CRT upgrade, HFH, mortalità per tutte le cause)
- Prevalente effetto su PICM
- Mix di HBP e LBBAP
- Tempo procedurale/scopia più alti
- Maggior incidenza complicanze «lead related»

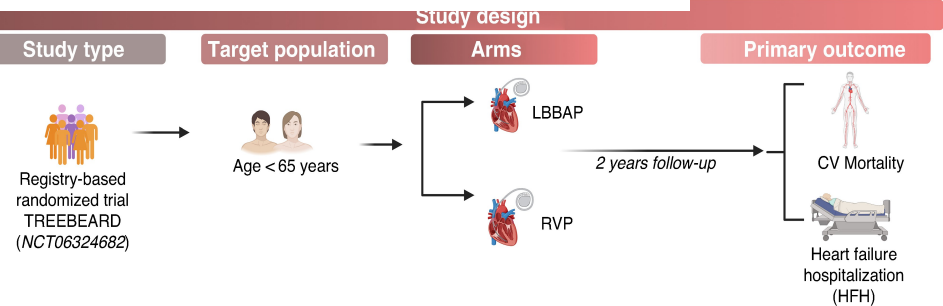
- Endpoint primario «soft»
- Elevato profilo di successo e sicurezza

Two-year outcomes of left bundle branch area pacing versus traditional right ventricular pacing in middle-aged adults: a registry-based trial

Matteo Bertini ✉, Luca Canovi, Francesco Vitali, Lina Marcanтони, Gianni Pastore, Mario Volpicelli, Orlando Munciguerra, Mauro Biffi, Matteo Ziacchi, Luca Rossi ... Show more
 Author Notes

EP Europace, Volume 27, Issue 8, August 2025, euaf181, <https://doi.org/bvsp.idm.oclc.org/10.1093/europace/euaf181>

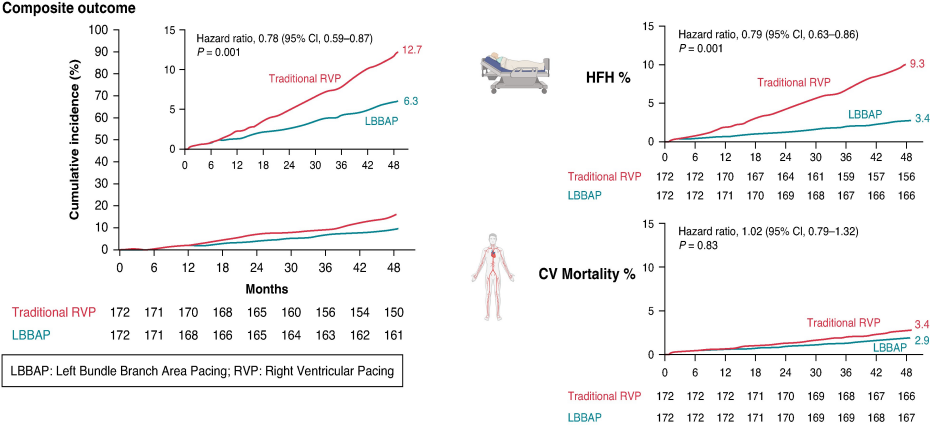
Published: 29 August 2025 Article history ▾



Results

Primary outcome

Secondary outcomes



Key Question

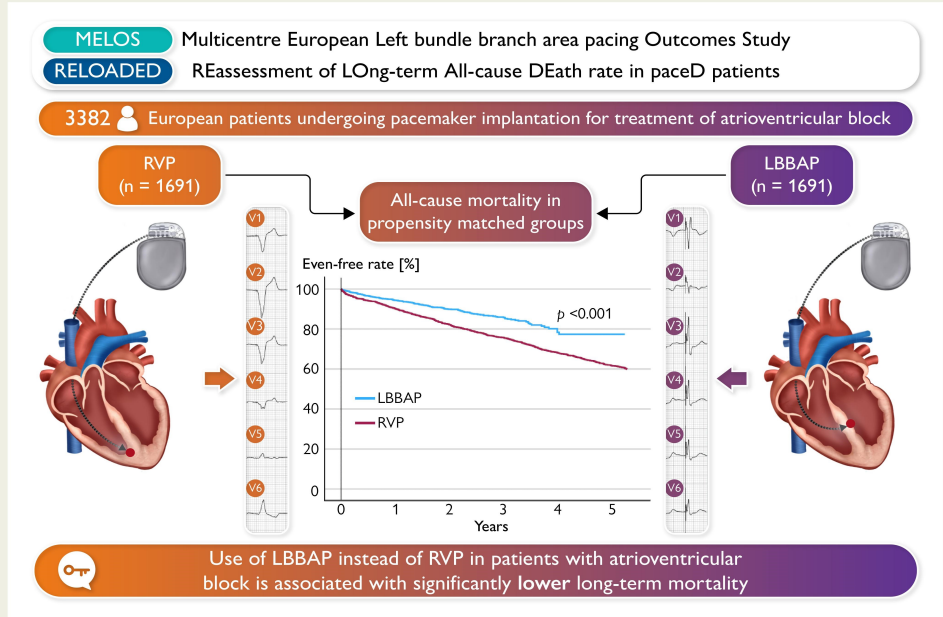
What is the optimal ventricular pacing modality in patients with atrioventricular block and a preserved or mildly reduced left ventricular ejection fraction (>40%) without indications for cardiac resynchronization therapy?

Key Finding

The main finding of this multicentre long-term comparison of left bundle branch area pacing (LBBAP) with right ventricular pacing was a reduction in mortality with LBBAP. In particular, this benefit was observed when conduction system capture was confirmed. Complications and pacing parameters were comparable.

Take Home Message

Thus, LBBAP might be preferred to conventional right ventricular pacing in patients with atrioventricular block and no indications for cardiac resynchronization therapy.

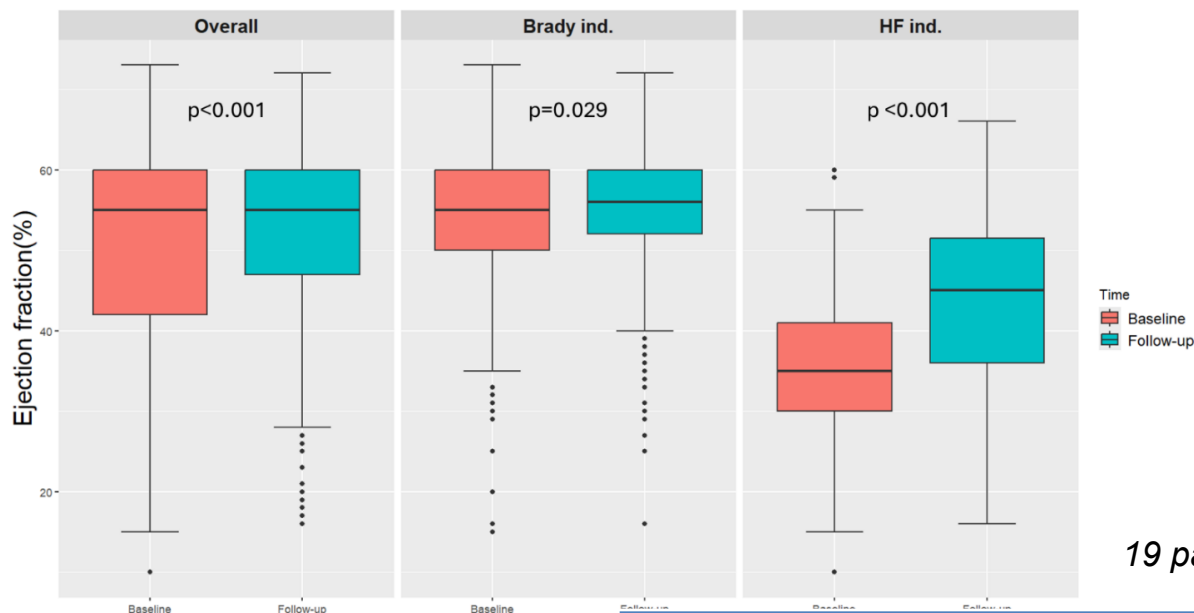


two novel, specific for LBBAP and potentially modifiable independent predictors [of mortality] were identified: lack of LBB capture confirmation, i.e. LVSP (HR 1.85), and low percentage of ventricular pacing (HR 1.12)

Impact of Left Bundle Branch Area Pacing on Echocardiographic Parameters and Symptoms: Data From the Conduction System Pacing Italian Network Group (C-SING) Study

Gabriele Dell'Era [✉](#), Pietro Palmisano, Daniela Dugo, Francesco Raffaele Spera, Alessandro Paoletti Perini, Gianluca Mirizzi, Luca Poggio, Luca De Mattia ... See all authors [v](#)

First published: 07 May 2026 | <https://doi.org/10.1111/jce.70355>



- Dati eco su 697 pazienti (periodo mediano di 12,4 (4,6-23,7) mesi)
- 532 (76,3%) indicazione bradi, 165 (23,7%) indicazione HF

- **aumento significativo della LVEF tra il basale e il follow-up [55% (42%-60%) vs. 55% (47%-60%), p<0,001].**

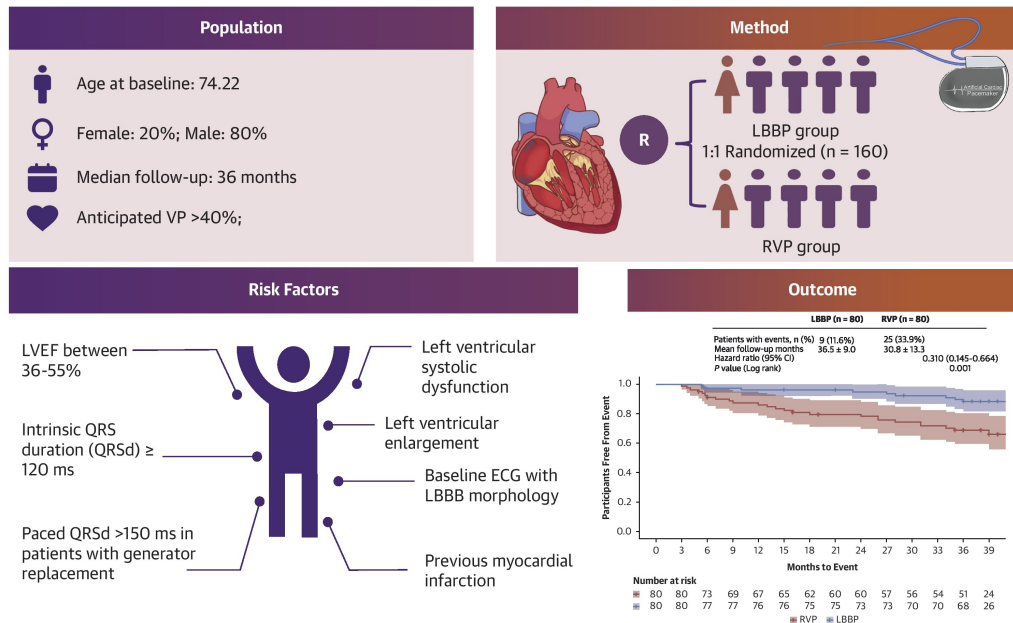
Un aumento significativo della LVEF dal basale al follow-up è stato osservato sia nei gruppi di pazienti con indicazione alla bradicardia (55% [50%-60%] vs. 56% [52%-60%], p = 0,029) che in quelli con indicazione HF (35% [30%-41%] vs 45% [36%-51,5%], p<0,001).

19 pazienti su 697 (2,7%) con sviluppo PICM

Loss of LBBAP	21.65 (6.64-70.63)	<0.001
Percentage of LBBAP (%)	0.98 (0.97-0.99)	0.001

Pazienti «vulnerabili»

CENTRAL ILLUSTRATION: Left Bundle Branch Pacing vs Right Ventricular Pacing for Vulnerable Cardiac Function



Qiu N, et al. JACC. 2026;10.1016/j.jacc.2026.03.161

- Studio multicentrico prospettico
 - BAV 2°-3° o bradi FA con VP previsto >40%
 - Cardiopatia o FE 35-55% o QRS >120 (BBS/PM) o >150ms
 - 170 pz randomizzati a RVP o LBBAP
 - Assenza di complicanze maggiori, procedure LBBP più lunghe (71' vs 54') e con maggior fluoroscopia (9' vs 4')
- Beneficio su endpoint composito mortalità totale, ospedalizzazioni HF, PICM*

HeartSync-LBBP
XueyingChen et al

PhysioSync-HF
Zimmerman et al

Scompenso cardiaco, BBS e FE <35%

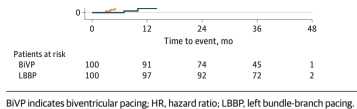
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Figure:

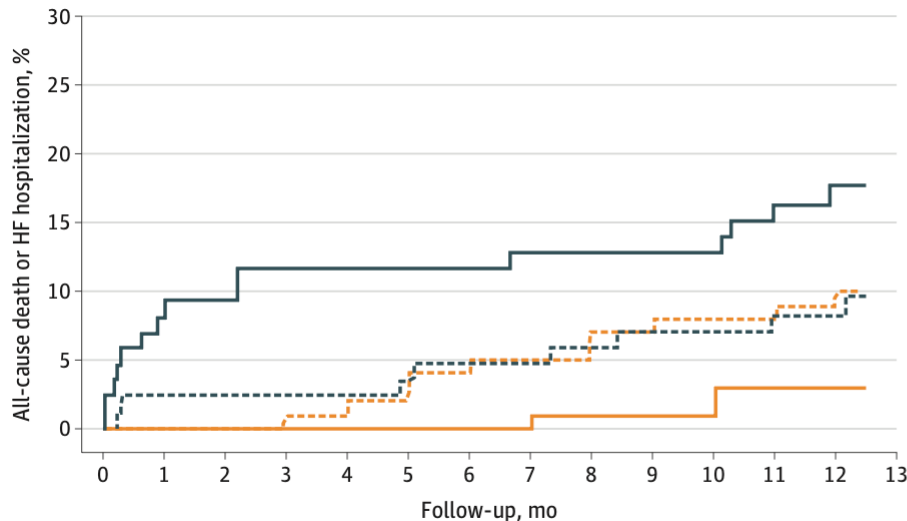
A

BiVP

C



B Curves based on 12 mo of follow-up data on cumulative incidence from both trials



with a significantly lower risk of all-cause mortality and HF hospitalization when compared with BiVP.

Meaning These results demonstrated that LBBP was superior to BiVP in reducing the risk of death or HF hospitalization in patients with LBBB and severely reduced LVEF and might be an alternative to BiVP in this patient population.

No. at risk
BiVP
CSP

86
87

84
79

84
79

Follow-up, mo

82
76

81
73

80
73

69
52

A, Side-by-side comparison of the 2 trials. B, Graph based on data extracted from cumulative incidence curves from both trials and limited to 12 months of follow-up. BiVP, biventricular pacing; CSP, conduction system pacing; HF, heart failure; HR, hazard ratio; LBB, left bundle branch; LBBP, left bundle-branch pacing; LVEF, left ventricular ejection fraction; NYHA, New York Heart Association; OR, odds ratio.

LEFT-BUNDLE-CRT trial

Cano et al

Key Question

Is left bundle branch area pacing (LBBAP) non-inferior to conventional biventricular pacing (BiVP) in patients with heart failure and typical left bundle branch block with indication for cardiac resynchronization therapy (CRT)?

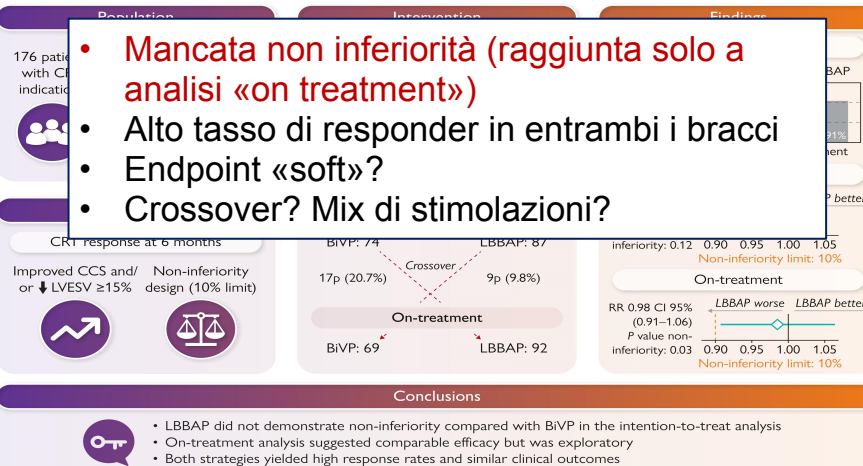
Key Finding

In this randomized trial, LBBAP did not demonstrate non-inferiority to BiVP in the intention-to-treat analysis, while on-treatment analysis suggested comparable efficacy.

Take Home Message

In CRT candidates with typical left bundle branch block, LBBAP represents an alternative pacing strategy, although further trials are needed to define its clinical role.

A non-inferiority randomized comparison between BiVP and LBBAP for CRT: the LEFT-BUNDLE CRT trial



BiVP, biventricular pacing; CRT, cardiac resynchronization therapy; LBBAP, left bundle branch area pacing; LBBB, left bundle branch block; LVESV, left ventricular end-systolic volume
Cano O, et al. European Heart Journal.

LECART: LBBAP vs BiVP trial



Presenter: Jean-Benoit Le Polain de Waroux (St-Jan Hospital - Brugge, Belgium)



Conclusion

Left bundle branch area pacing (LBBAP) was found to be an effective and practical strategy for CRT.



Clinical implications

Reductions in surgical re-intervention and procedure time with LBBAP vs biventricular pacing (BiVP) are important for patients and the healthcare system as a whole.

OBJECTIVE

Primary outcome (1-year): death from any cause, HF hospitalisation, any device-related complication requiring a surgical re-intervention, failure to deliver efficiently the assigned resynchronisation therapy

Primary outcome at 1 y	25%	13%	HR 2.14 (95% CI 1.01-4.51) p=0.039
Device-related complications at 1 y	15%	1%	OR 6.76 (95% CI 1.48-31.25) p=0.006
Procedure time	90 mins	76 mins	p=0.005



Messaggi chiave:

- Evidenze »in costruzione» per HF, più chiare per bradi
- Se la procedura è semplice e non dà complicanze in eccesso, accettabile anche un beneficio modesto
- Accettabile la non inferiorità se vi sono vantaggi procedurali/su complicanze
- Seguire le raccomandazioni esistenti e cercare di ottenere vero CSP

