TIGULLIO 2024 II Congresso Nazionale di ARITMOLOGIA

16-17 Aprile Sestri Levante (GE)

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Guido Parodi, Lavagna

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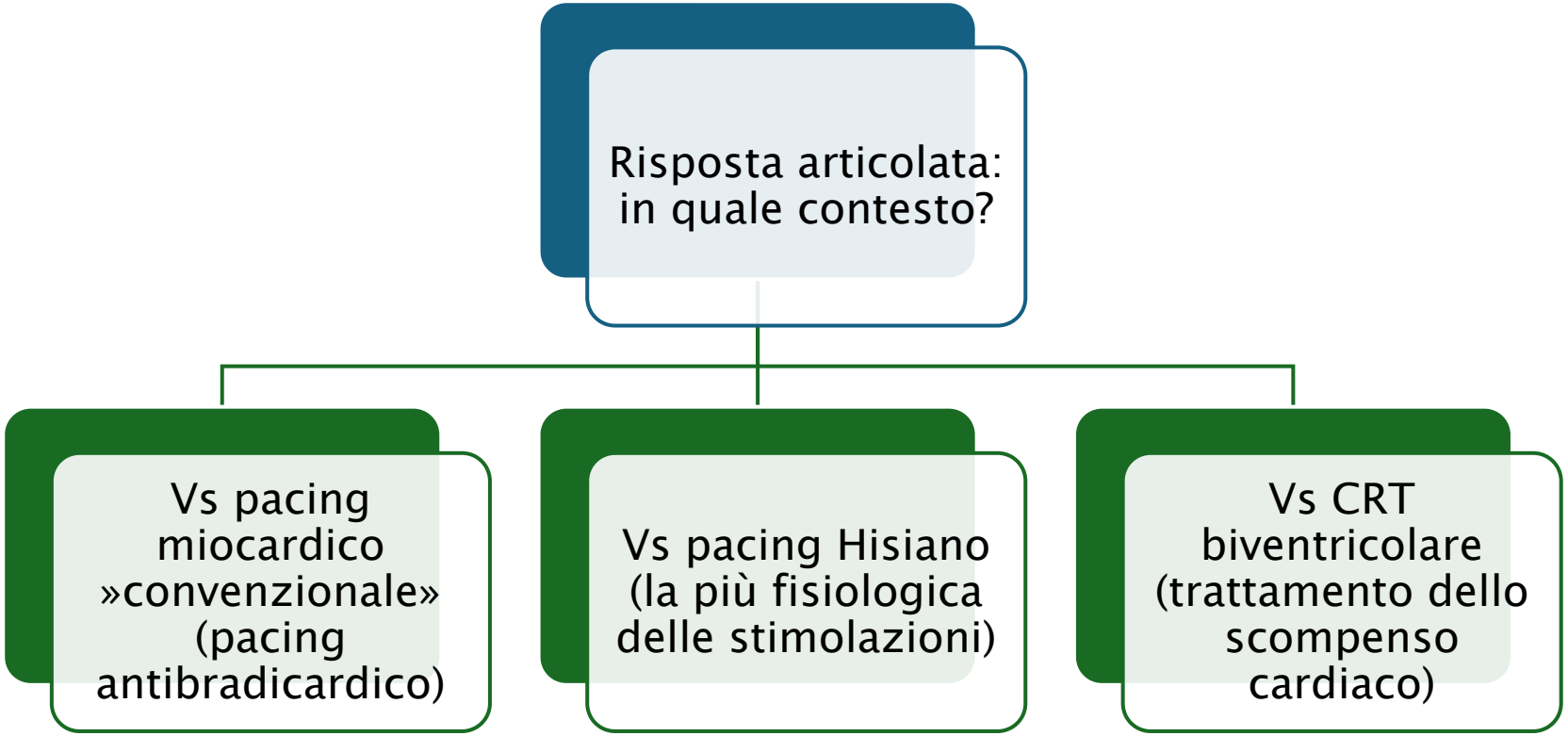
Sede Congressuale
Hotel Vis a Vis ****
Sestri Levante

C'è un razionale per eseguire come prima scelta la stimolazione della branca sinistra?

Gabriele Dell'Era, FAIAC
Direttore Unità di Elettrofisiologia, SCDU Cardiologia, AOU Maggiore della Carità - Novara

Risposta breve: Sì (con qualche precisazione..)



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

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https://doi.org/10.1016/j.hrthm.2023.03.1538

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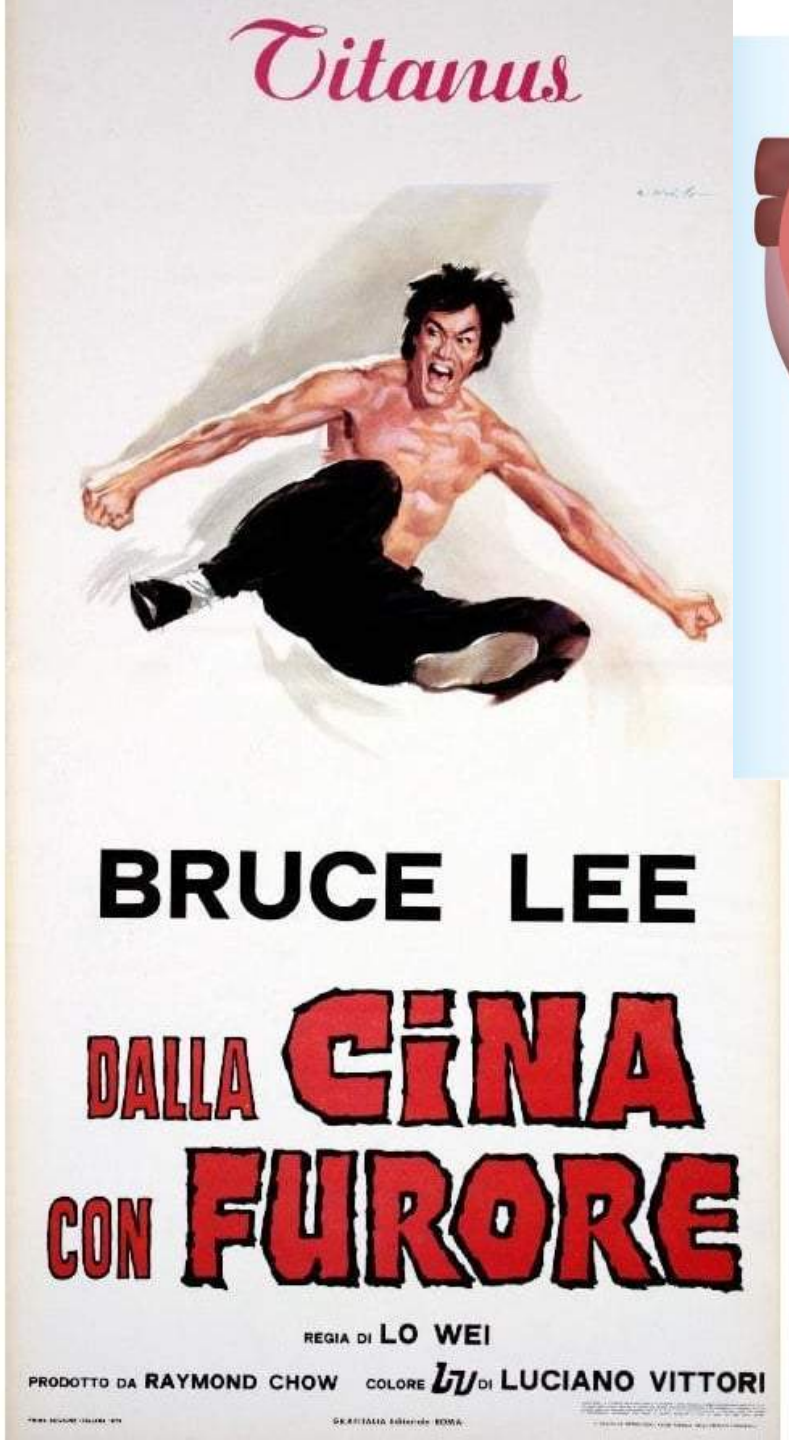
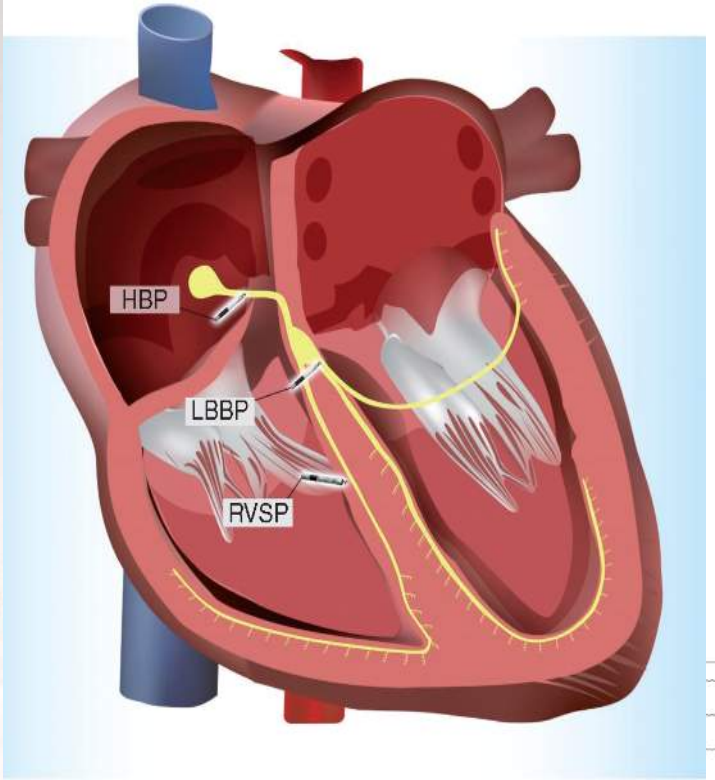
**Representative of the Heart Rhythm Society (HRS)*
†Representative of the International Society for Holter and Noninvasive Electrocardiology (ISHNE)
‡Representative of the Pediatric and Congenital Electrophysiology Society (PACES)
§Patient partner
¶Representative of the Heart Failure Society of America (HFSA)
#Representative of the Asia Pacific Heart Rhythm Society (APHRS)
***Representative of the American Heart Association (AHA)*
††Representative of the Latin American Heart Rhythm Society (LAHRS)
‡‡Representative of the American College of Cardiology (ACC)

Abstract

Cardiac physiologic pacing (CPP), encompassing cardiac resynchronization therapy (CRT) and conduction system pacing (CSP), has emerged as a pacing therapy strategy that may mitigate or prevent the development of heart failure (HF) in patients with ventricular dyssynchrony or pacing-induced cardiomyopathy. This clinical practice guideline is intended to provide guidance on indications for CRT for HF therapy and CPP in patients with pacemaker indications or HF, patient selection, pre-procedure evaluation and preparation, implant procedure management, follow-up evaluation and optimization of CPP response, and use in pediatric populations. Gaps in knowledge, pointing to new directions for future research, are also identified.



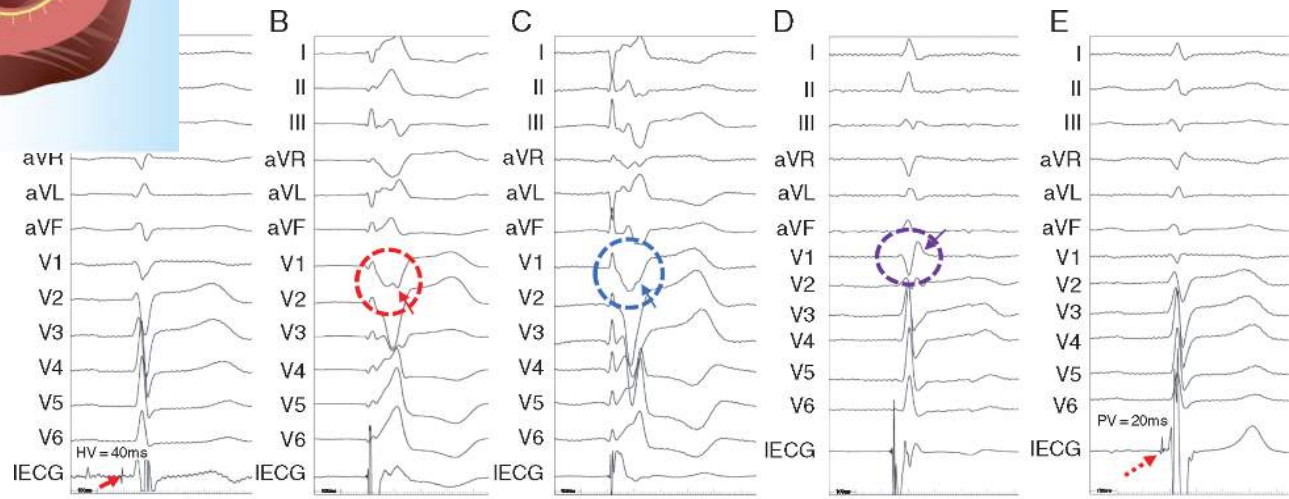


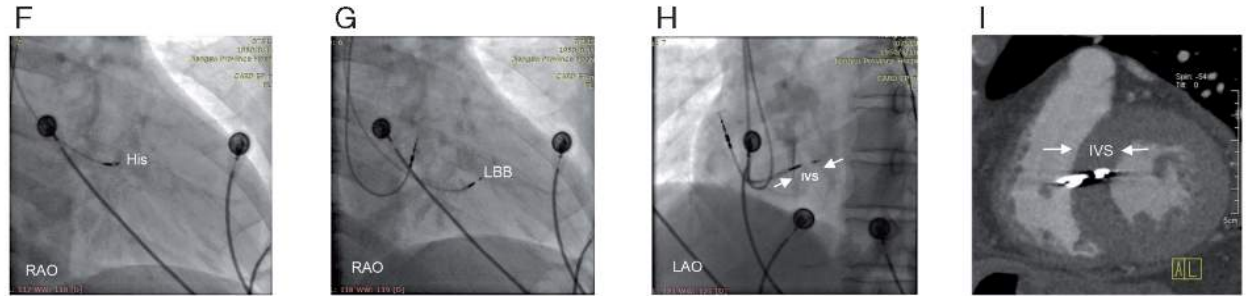
Feasibility and cardiac synchrony of permanent left bundle branch pacing through the interventricular septum

Xiaofeng Hou, Zhiyong Qian, Yao Wang, Yuanhao Qiu, Xing Chen, Hai Jiang, Zeyu Jiang, Hongping Wu, Zhongqiang Zhao, Weihua Zhou ... Show more
Author Notes

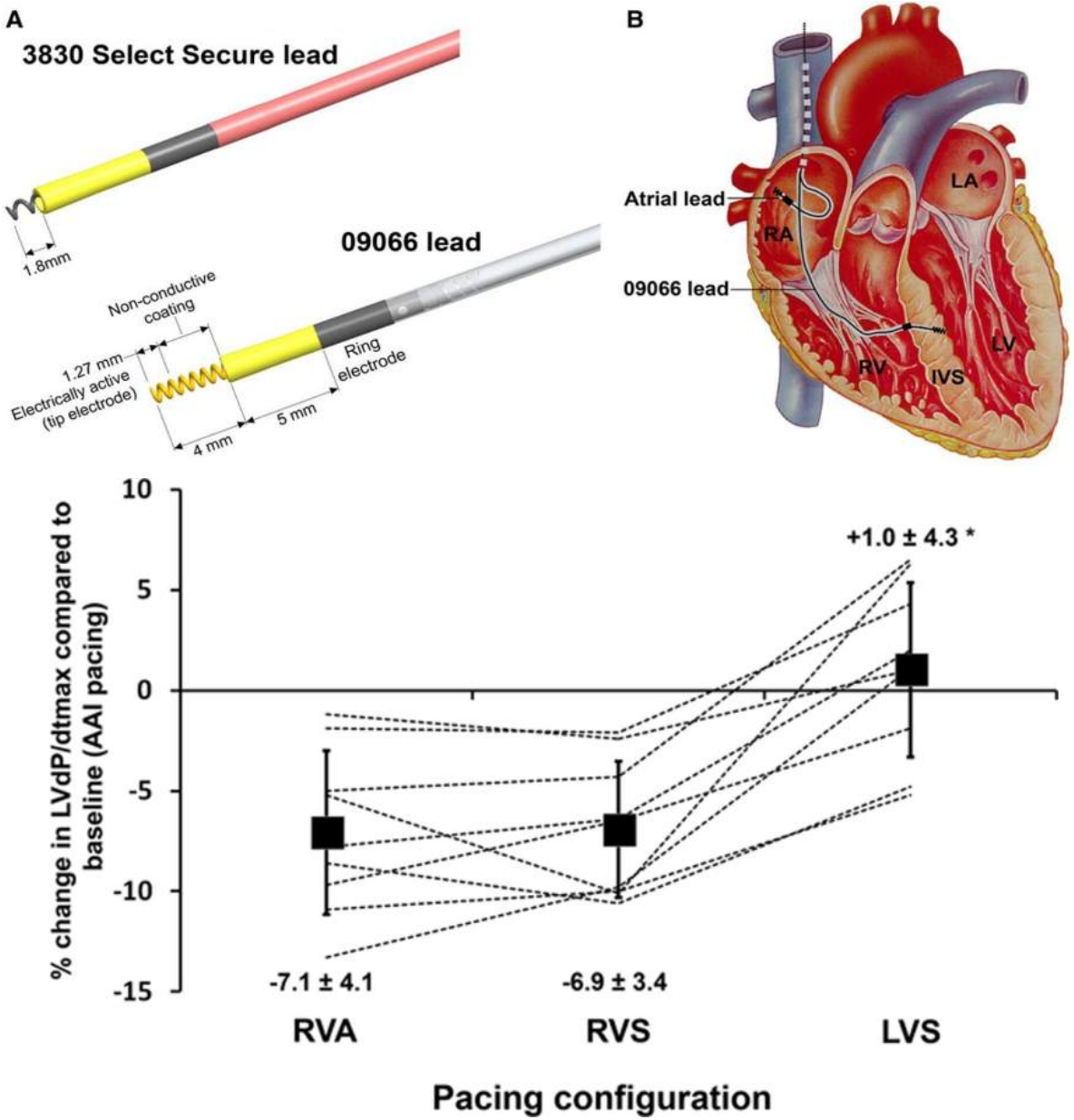
EP Europace, Volume 21, Issue 11, November 2019, Pages 1694–1702,

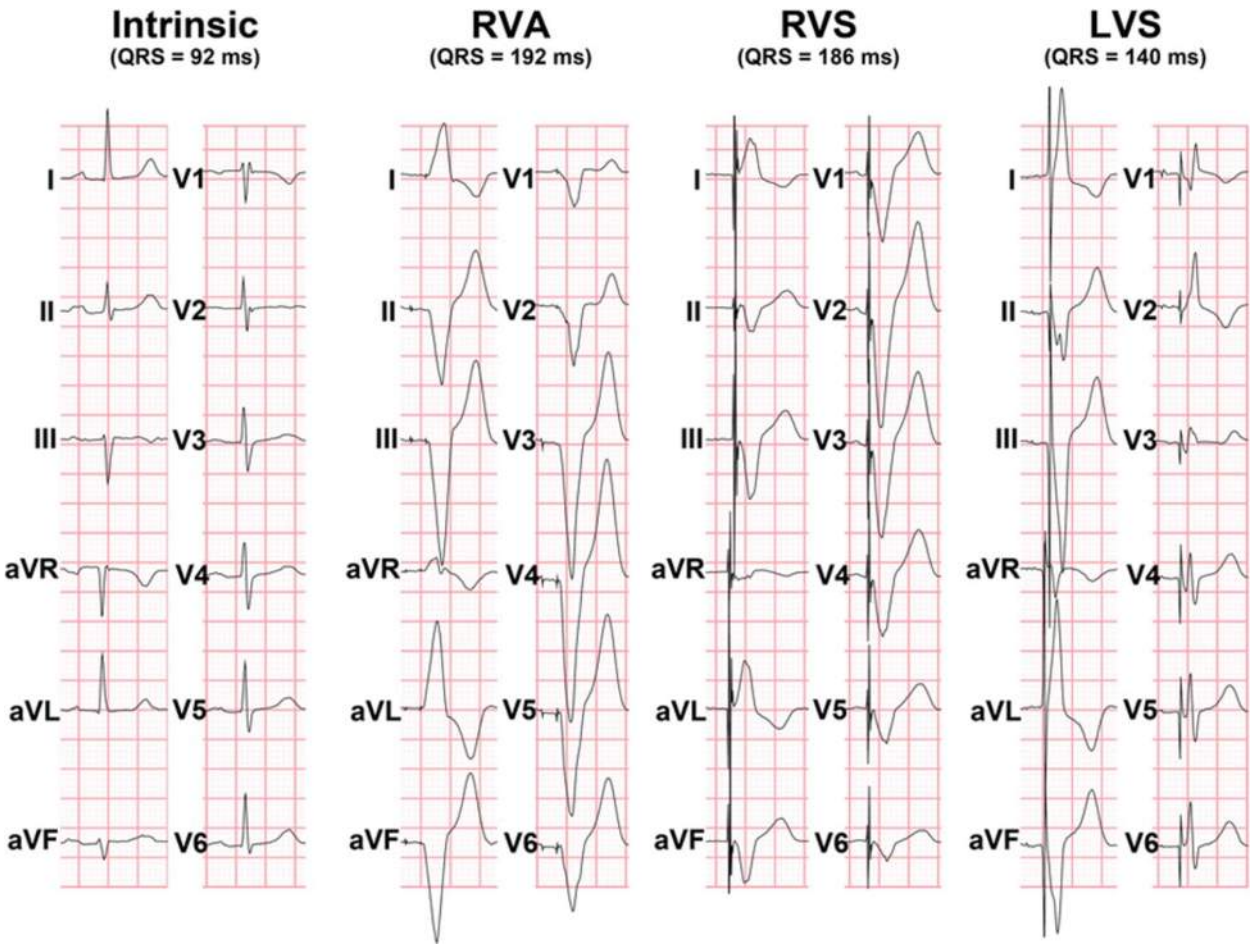
Implantation procedure of LBBP





Vernooy 2016 – «LVS» (left ventricular septal pacing)





10 pazienti impiantati

Masih Mafi-Rad. Circulation: Arrhythmia and Electrophysiology. Feasibility and Acute Hemodynamic Effect of Left Ventricular Septal Pacing by Transvenous Approach Through the Interventricular Septum, Volume: 9, Issue: 3, Pages: e003344, DOI: (10.1161/CIRCEP.115.003344)

Brady pacing: perché sì?

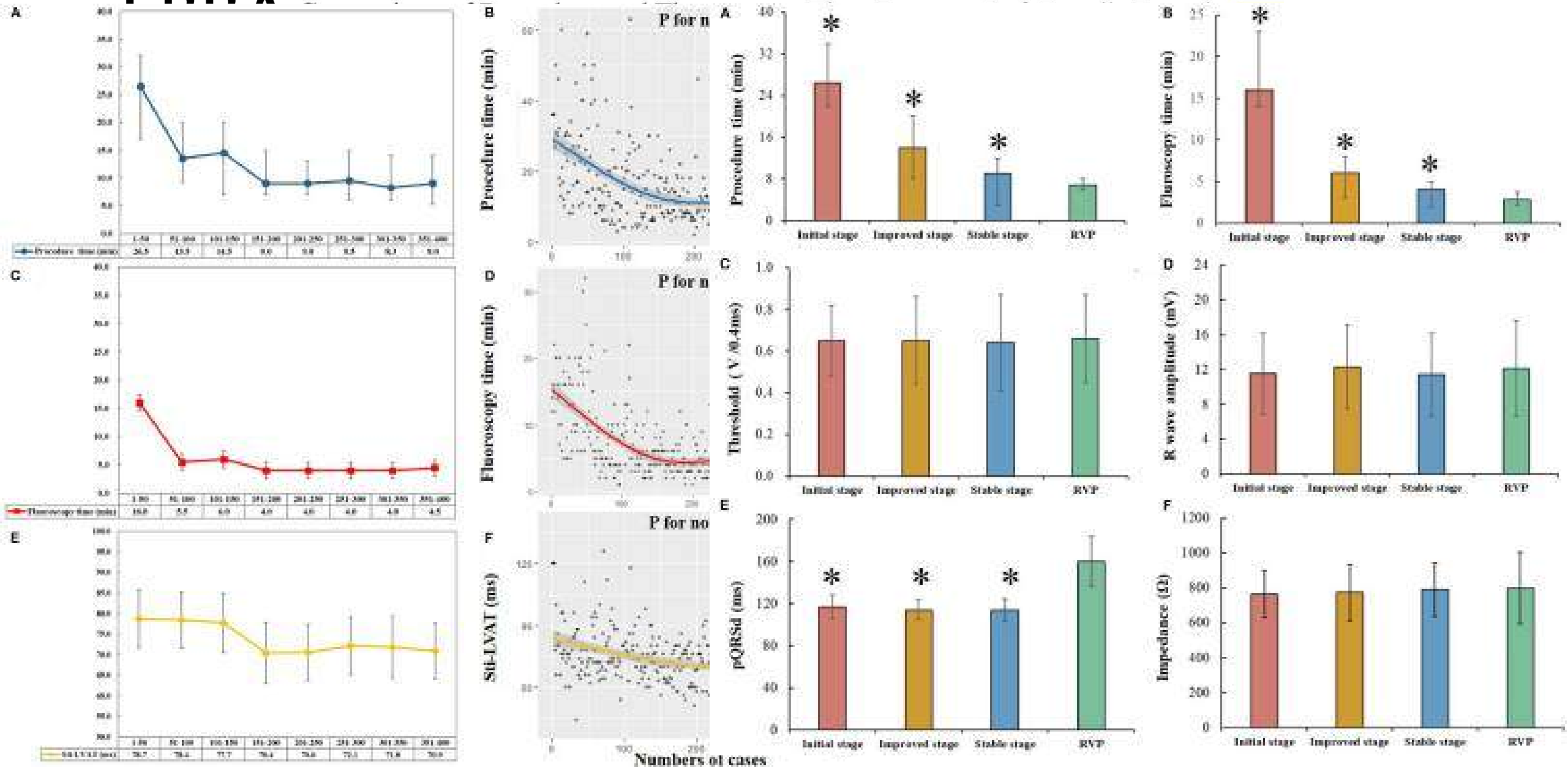
- Indicazione »sicura»
- Tempi procedurali, curva di apprendimento e complicanze non sono dissimili dal pacing miocardico convenzionale
- Blocco AV avanzato: possibilità di mantenere la fisiologia dell'attivazione del ventricolo sinistro

LBBAP è **facile**

- Il bersaglio da raggiungere è ampio e non è rivestito da tessuto fibroso
- Non indispensabile analisi EGM *(approccio anatomico + ECG)*
- Dotazione tecnologica *poco raffinata*
- *Successo 87-94% già nelle prime casistiche*

Front Cardiovasc Med. 2021; 8: 695531. Published online 2021 Sep 23. doi: 10.3389/fcvm.2021.695531

PMCID: PMC8494944 | PMID: 34631812



I **parametri elettrici** sono ottim

- Pressoché assente rischio di *farfield* atriale
- Ampia onda R (come per pacing miocardico)
- Bassa soglia di cattura (come per pacing miocardico)

Pacing characteristics	Baseline	Follow-up	p value
R-wave amplitude (mV)	10.6 ± 6	12.5 ± 5.7	0.06
Impedance (Ω)	674 ± 193	530 ± 123	<0.001
LBBP threshold (V at 0.5 ms)	0.6 ± 0.3	0.7 ± 0.3	0.17

Pugazhendhi Vijayaraman, ShunmugaSundaram Ponnusamy, Óscar Cano, et al,
Left Bundle Branch Area Pacing for Cardiac Resynchronization Therapy: ***Results From the International LBBAP Collaborative Study Group****, JACC: Clinical Electrophysiology, 2021*

La **programmazione** è semplice

- Perché il canale di CSP si comporta come un «vero» canale ventricolare, con valori elettrici simili
- Perché generalmente la cattura del sistema di conduzione si mantiene fino alla perdita di cattura (non c'è pressoché differenza tra cattura muscolare/CSP, come può avvenire per His)
- Quindi, gli algoritmi di pacing funzionano come in un PM «convenzionale»
- Anche il *monitoraggio remoto* funziona bene!

Received: 6 January 2023 | Revised: 26 May 2023 | Accepted: 24 June 2023

DOI: 10.1111/pace.14777

PACE WILEY

ORIGINAL ARTICLE

Left bundle branch area pacing (LBBAP) Auto Threshold algorithms Evaluation for Conduction System Pacing: The LATECS pilot Trial

Chiara Ghiglieno MD[1,2] | Gabriele Dell'Era MD[1] | Alessandro Veroli MD[1,2] | Federica De Vecchi MD[1] | Matteo Santagostino MD[1] | Stefano Porcellini MD[1] | Giuseppe Patti MD[1,2]

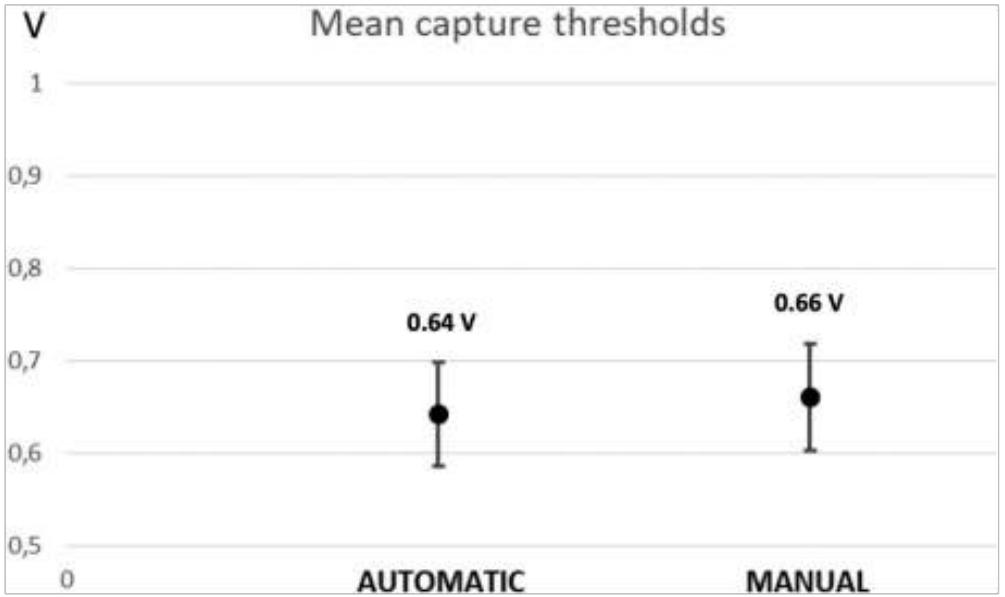
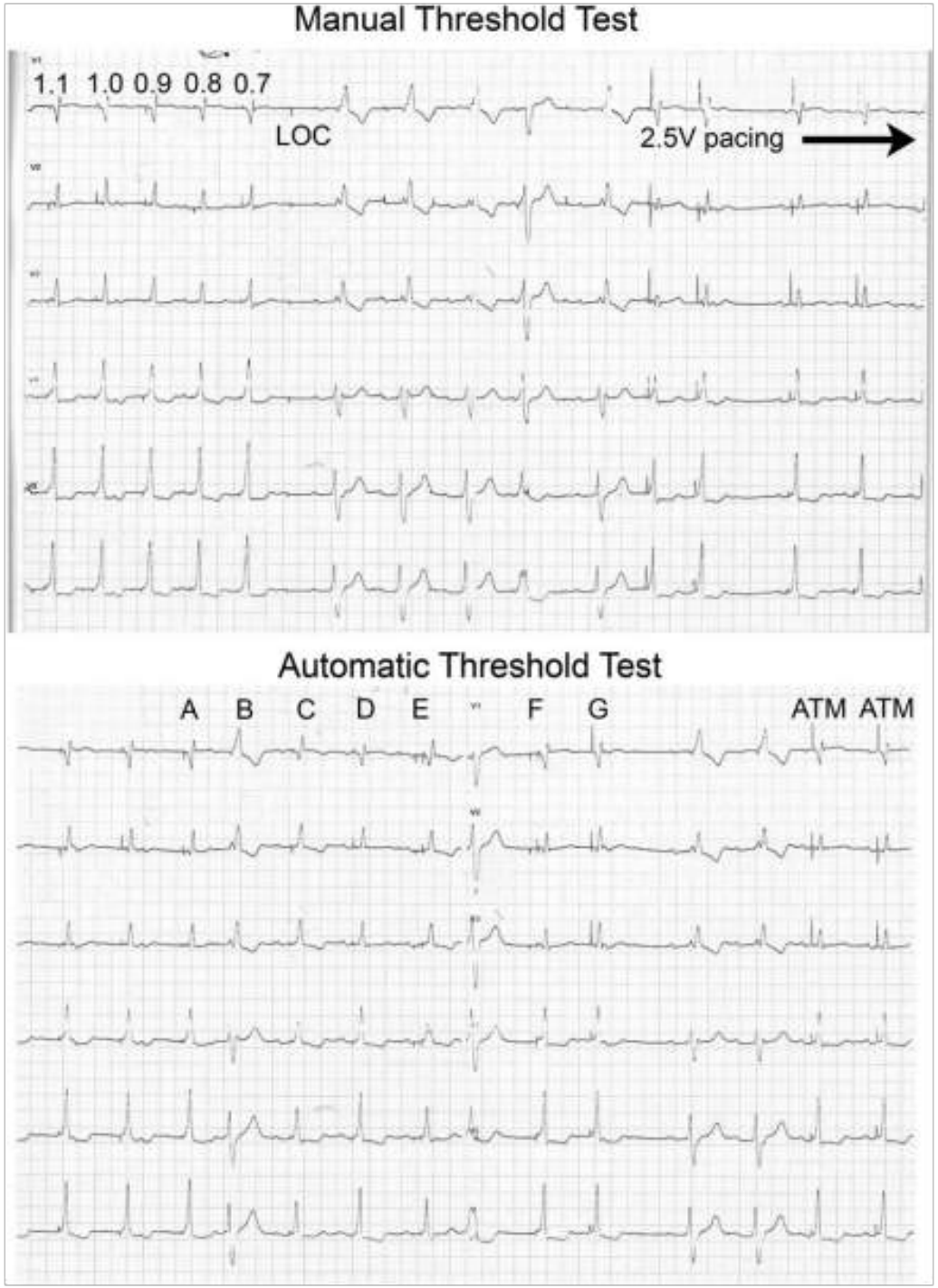
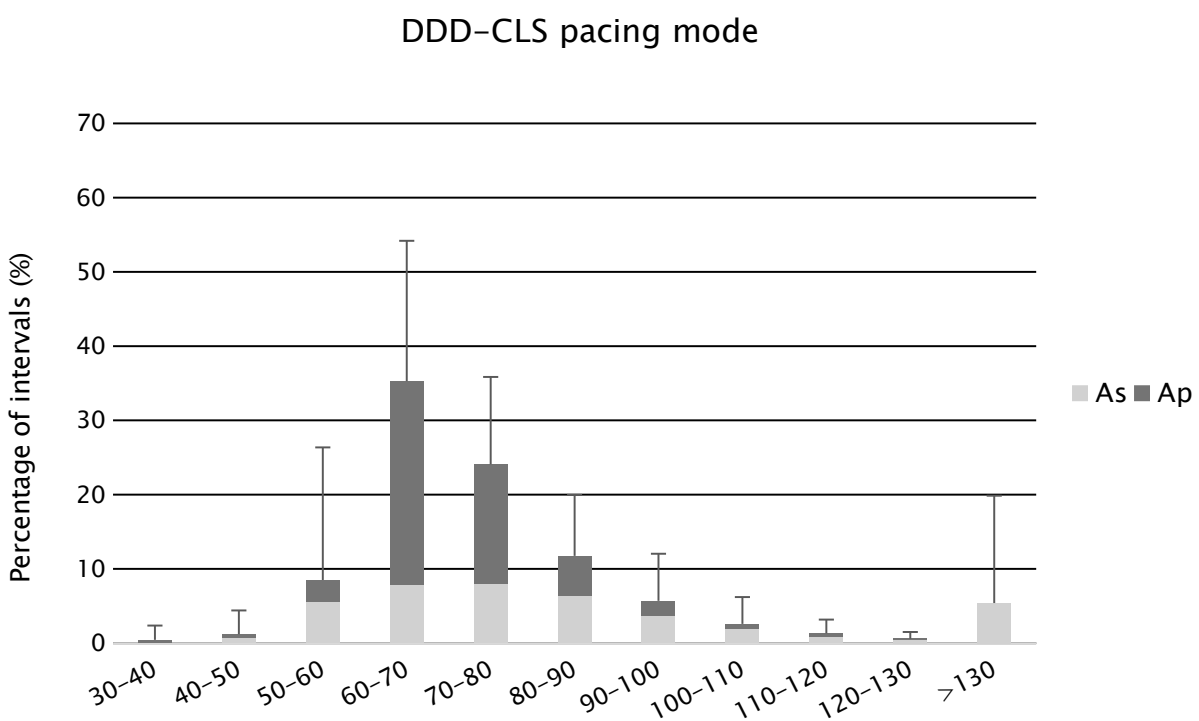
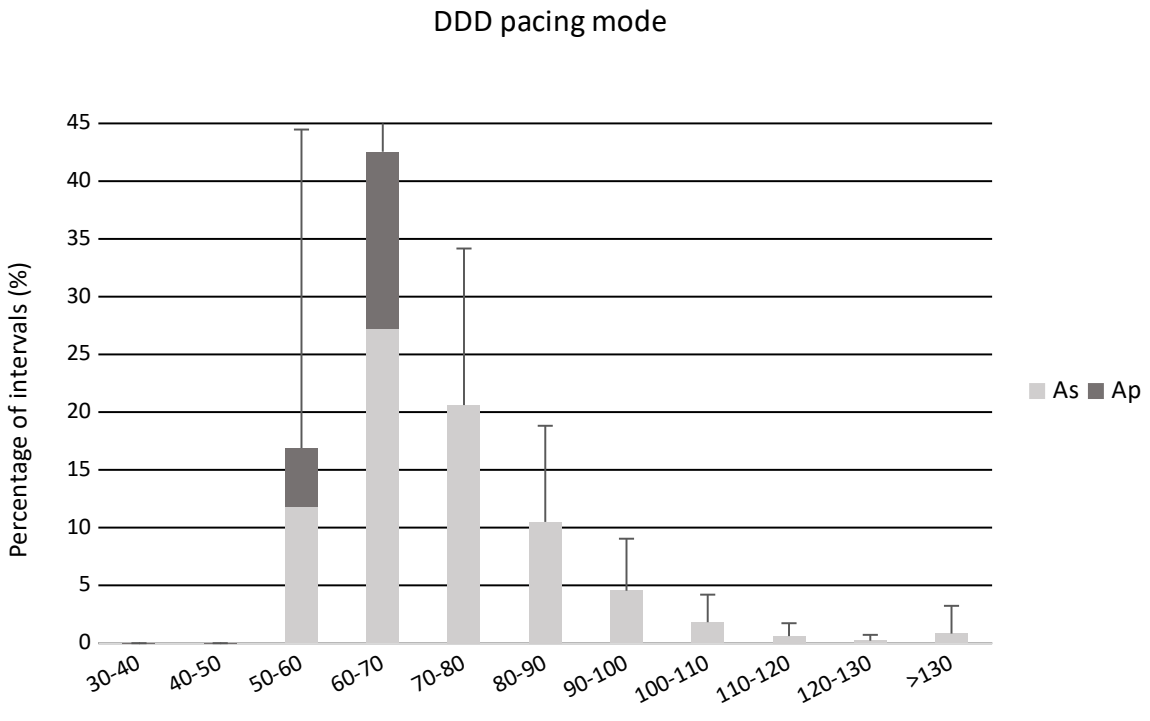


FIGURE 3 Comparison of automatic and manual capture threshold at 3 months. *p* according to TOST analysis for equivalence: .66.



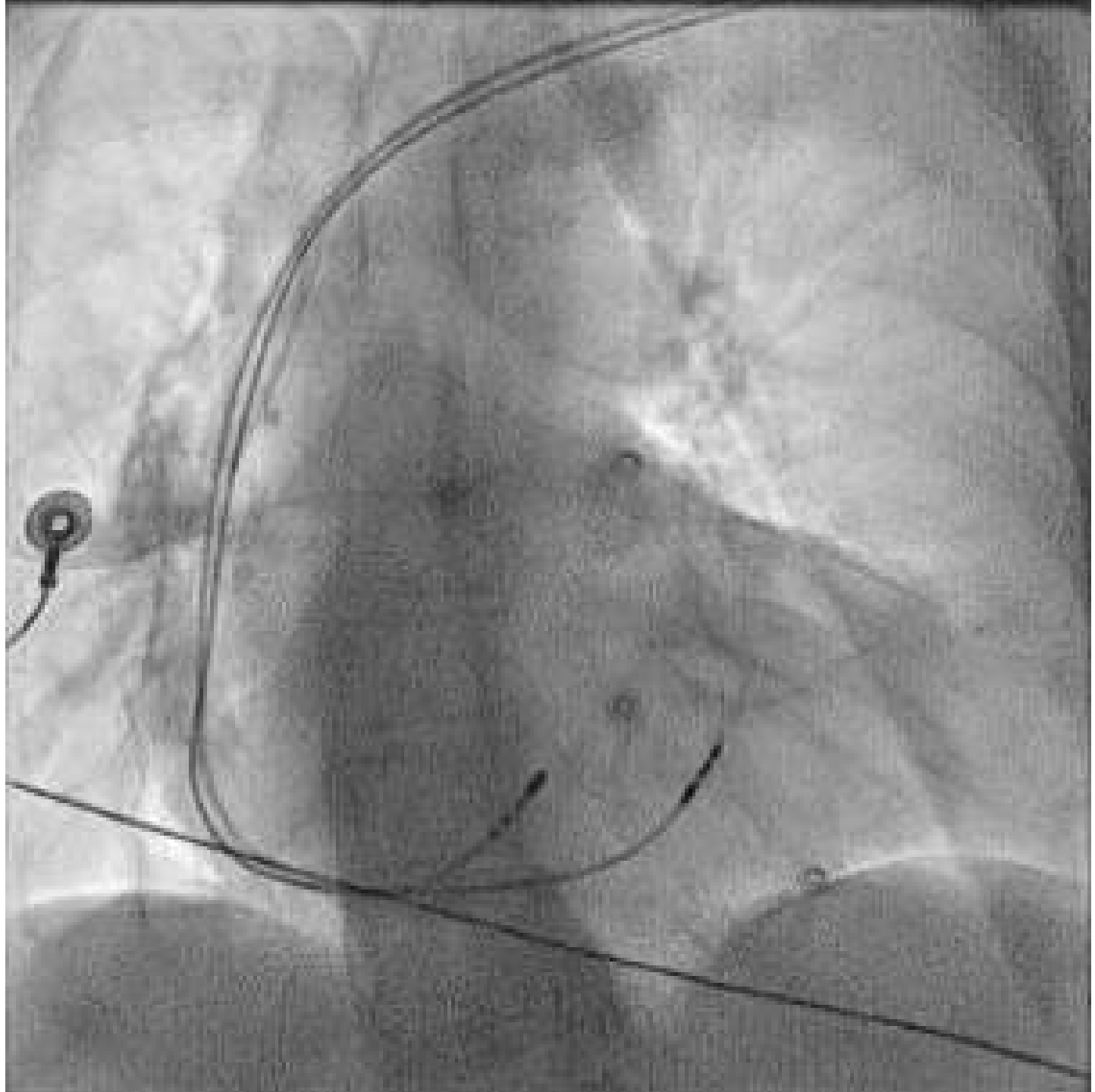
CLS – LBBAP


DDD-CLS pacing mode
Percentage of intervals (%)
70
60
50
40
30
20
10
0
30-40
40-50
50-60
60-70
70-80
80-90
90-100
100-110
110-120
120-130
>130
As
Ap

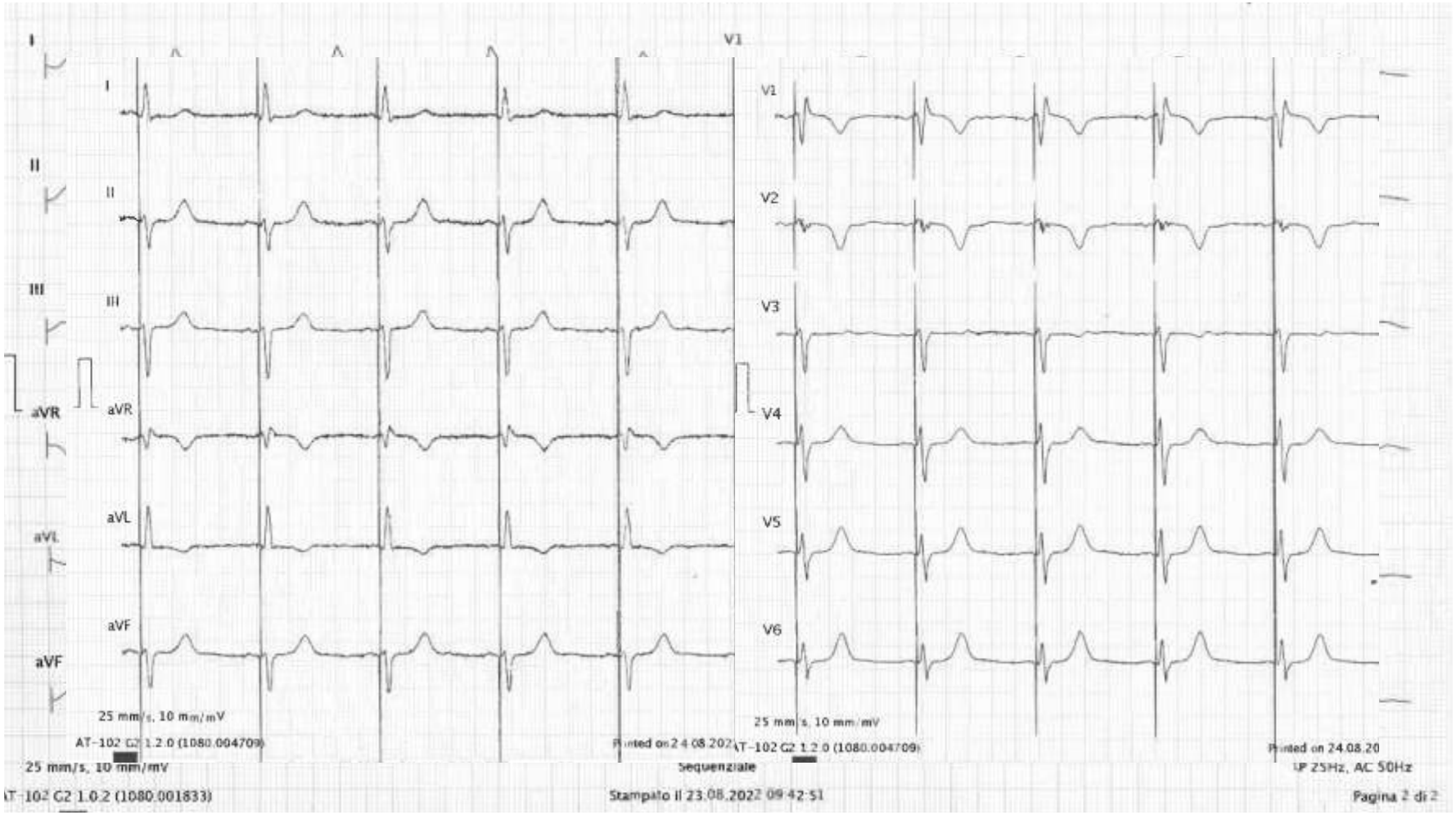

DDD pacing mode
Percentage of intervals (%)
45
40
35
30
25
20
15
10
5
0
30-40
40-50
50-60
60-70
70-80
80-90
90-100
100-110
110-120
120-130
>130
As
Ap

Perché **non serve backup** e **ablazione NAV è più semplice e sicura**

- Sebbene anche nell'HBP il backup non sia indispensabile e sia sempre meno diffuso, è sempre possibile la dislocazione o la perdita di cattura hisiana (pacing miocardico)
- Nel LBBAP il backup non è più necessario che nel pacing convenzionale (analoghe performance elettriche e di stabilità)
- Il rischio di dislocare/compromettere il pacing LBB durante ablate and pace è pressoché nullo



LBBAP **corregge blocchi infra/sottohisiani**



Rate and nature of complications of conduction system pacing compared with right ventricular pacing: Results of a propensity score–matched analysis from a multicenter registry

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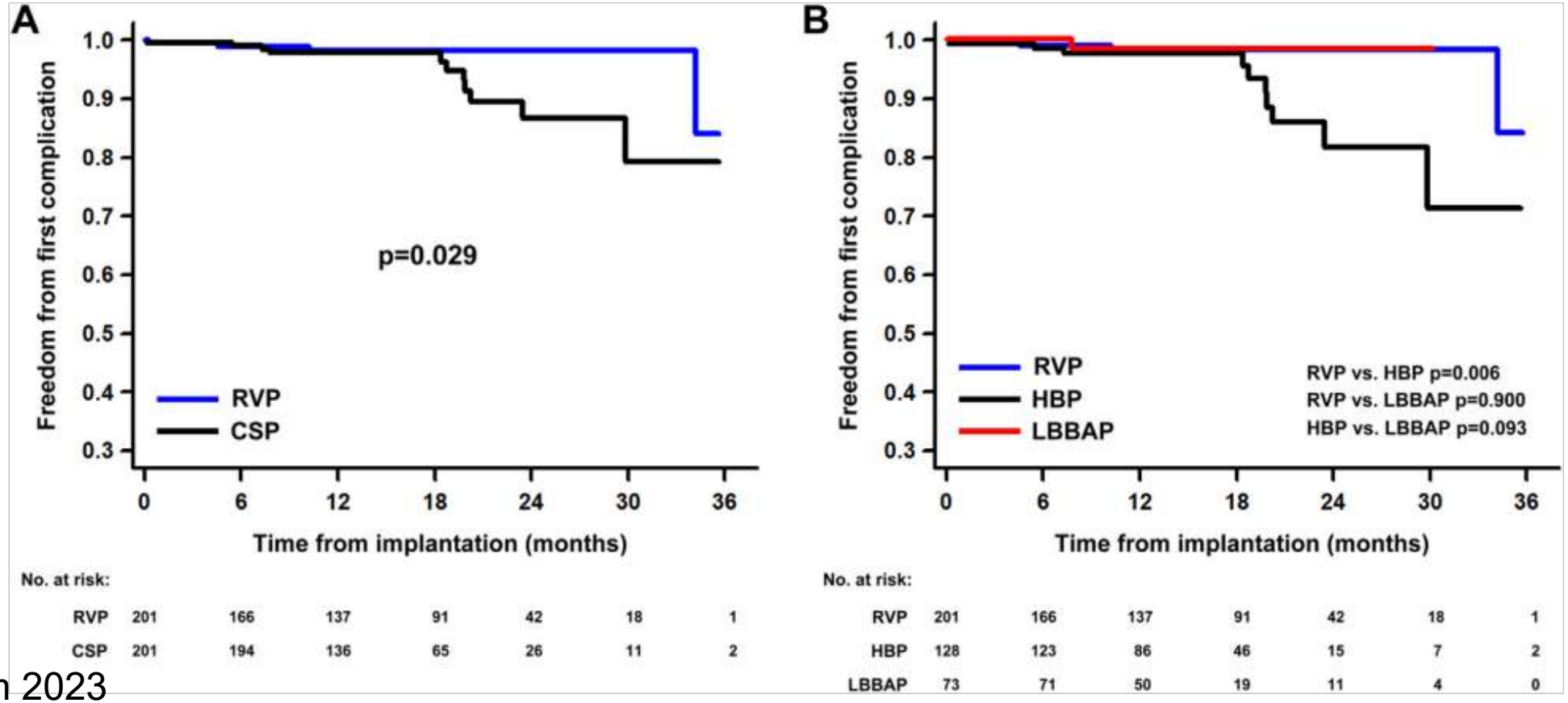
Alessandro Guido, MD,* Giuseppe Pio Piemontese, MD,†¶ Mirco Lazzeri, MD,†
Chiara Ghiglieno, MD,‡ Alessandro Veroli, MD,‡ Roberto Maggi, MD,§
Vincenzo Russo, MD, PhD,‖ Anna Rago, MD,‖ Gerardo Nigro, MD, PhD,‖
Jacopo Senes, MD,§ Giuseppe Patti, MD,‡ Mauro Biffi, MD,† Michele Accogli, MD*

LBBAP sembra sicuro quanto RVP



Heart Rhythm 2023

Journal of Interventional Cardiac Electrophysiology
https://doi.org/10.1007/s10840-023-01616-7

Early effects of left bundle branch area pacing on ventricular activation by speckle tracking echocardiography

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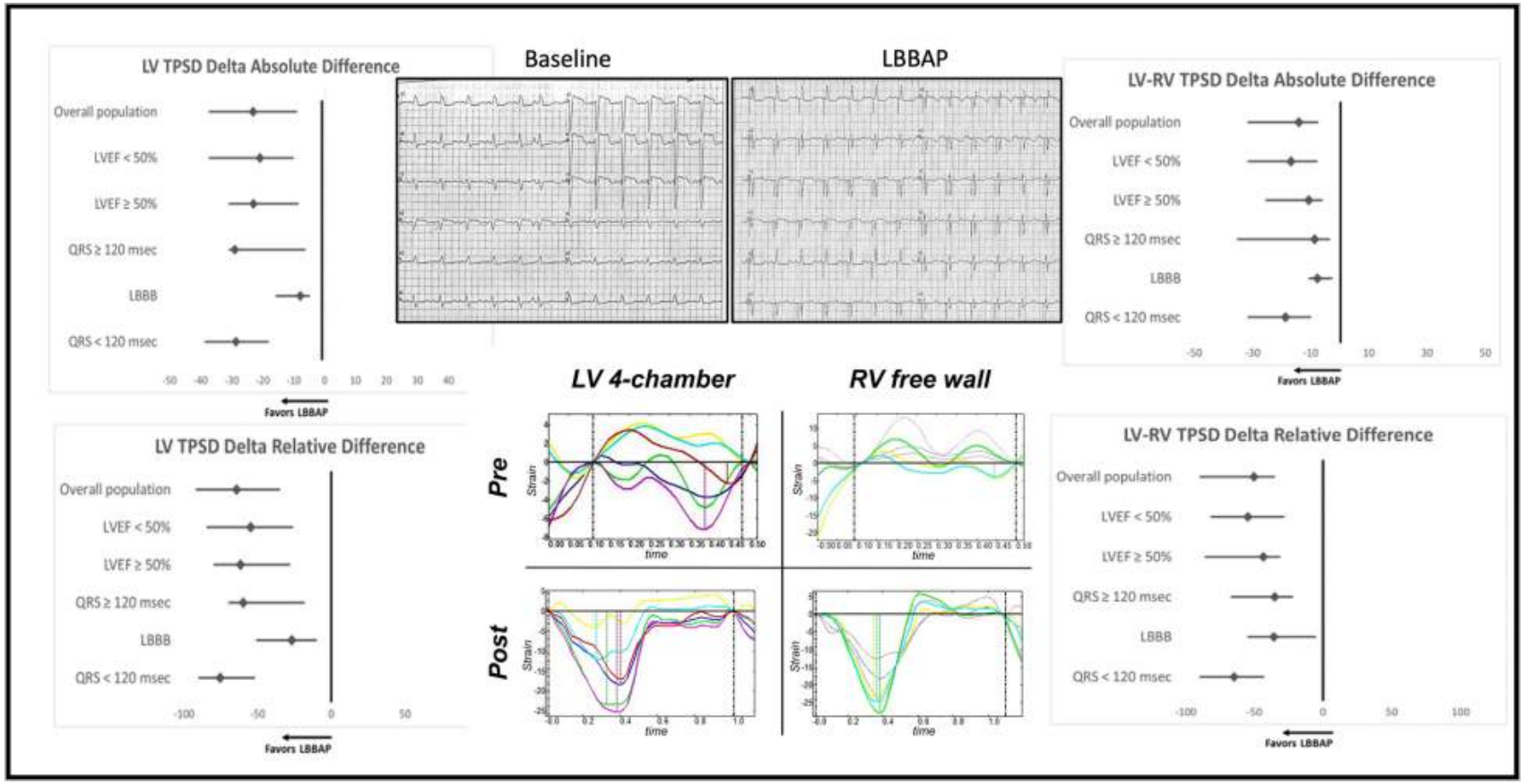

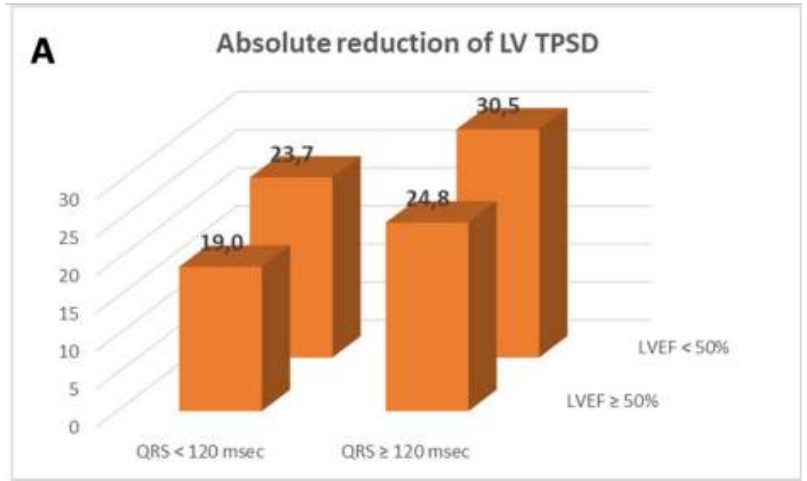

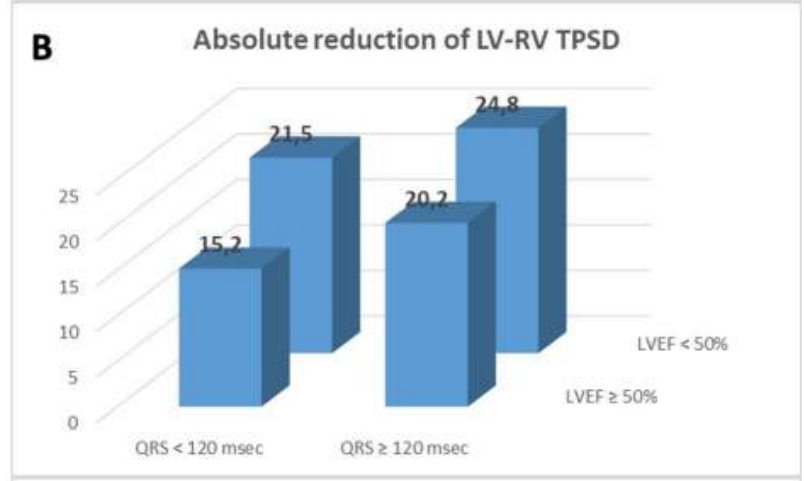

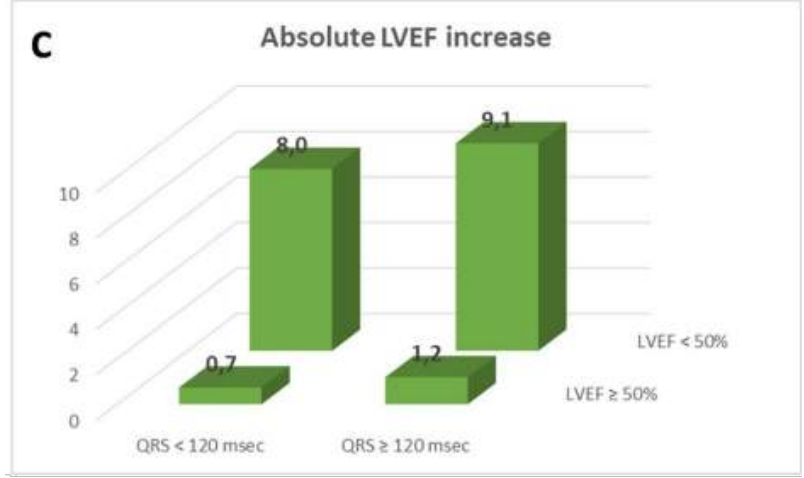

Received: 17 March 2023 | Revised: 8 April 2023 | Accepted: 15 April 2023

DOI: 10.1111/pace.14707

PACE

DEVICES

Left bundle branch area pacing prevents pacing induced cardiomyopathy in long-term observation

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Aleksandra Ostrowska MD | Adam Bednarski MD | Tomasz Sondej MD |
Aleksander Kusiak MD | Marek Rajzer MD | Marek Jastrzębski MD

A 24 mesi, nessun paziente con PICM

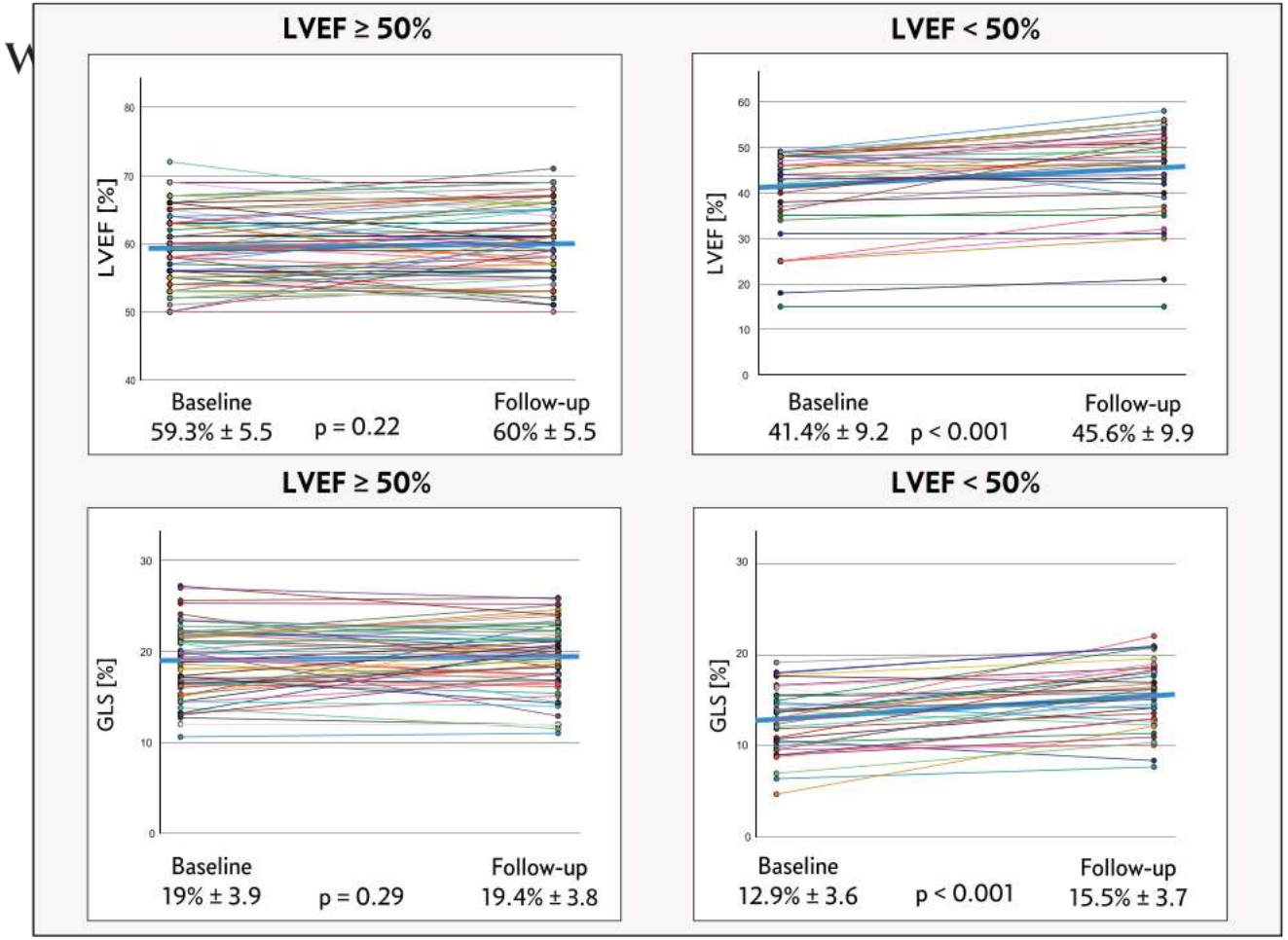


FIGURE 2 Changes in LVEF and GLS during follow-up separately in the group with preserved LVEF (≥50%) and reduced LVEF (<50%). GLS, global longitudinal strain; LVEF, left ventricular ejection fraction. [Color figure can be viewed at wileyonlinelibrary.com]

Conclusion: LBBAP prevents PICM in patients with preserved LVEF and improves left ventricle function in subjects with depressed LVEF. LBBAP might be the preferred pacing modality for bradyarrhythmia indications.

Provocazione: malattia del nodo del seno isolata

- Nessun motivo per stimolare il ventricolo
- Se si impianta il catetere ventricolare, la posizione è indifferente (bisogna ottenere MVP)
- E' una buona «palestra» per imparare LBBAP: in caso di difficoltà, si ripiega su un pacing settale convenzionale

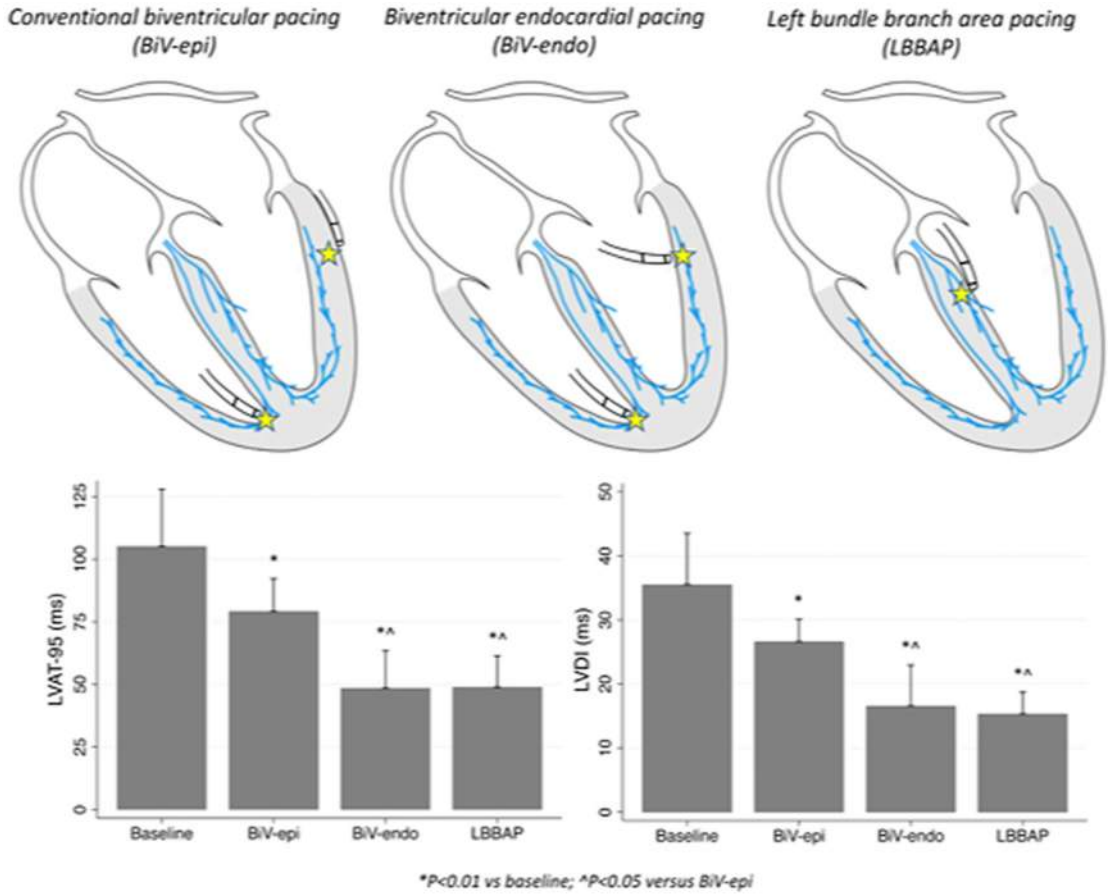
E per la CRT?

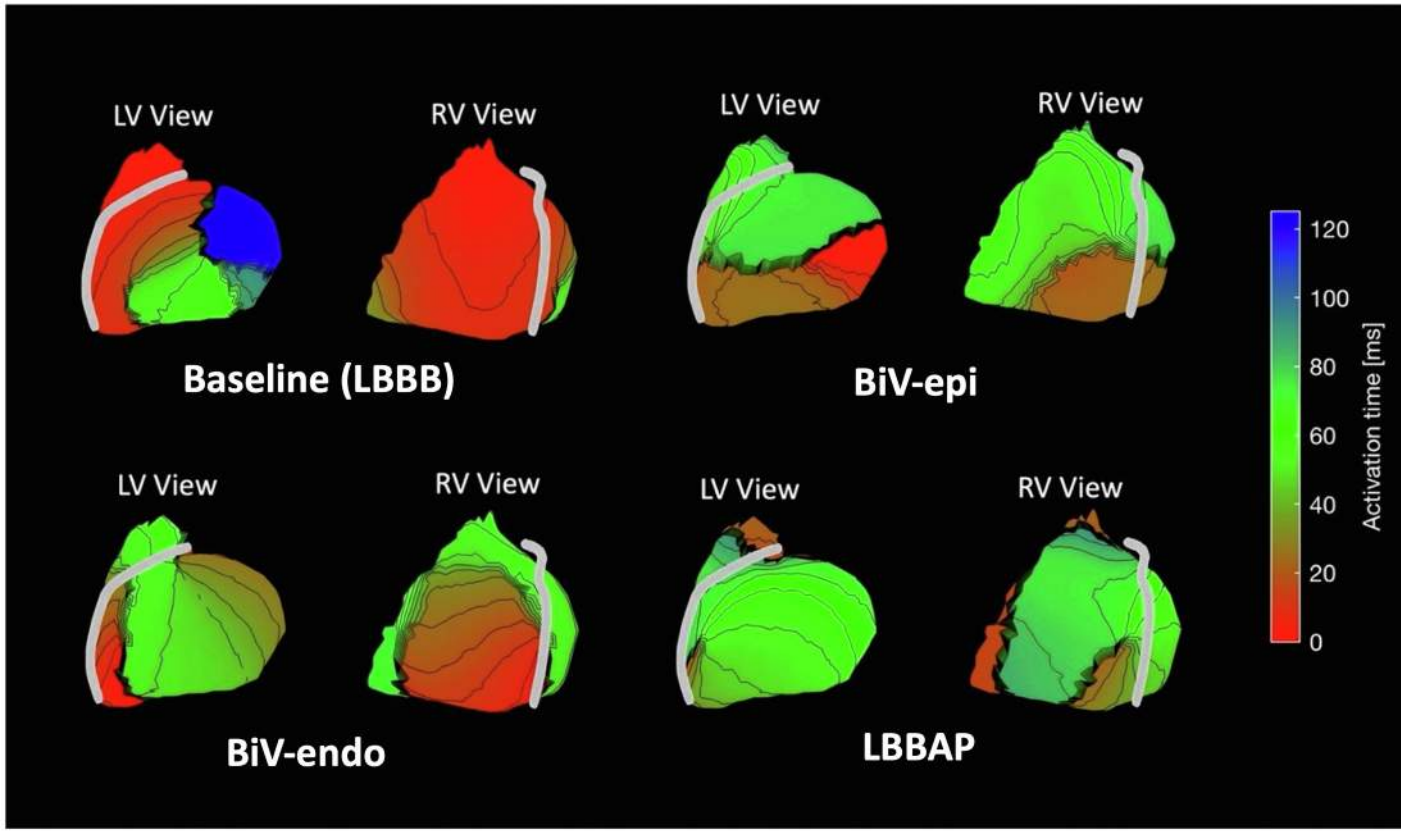
Heart Rhythm
Volume 20, Issue 2, February 2023, Pages 207-216

Clinical

Biventricular endocardial pacing and left bundle branch area pacing for cardiac resynchronization: Mechanistic insights from electrocardiographic imaging, acute hemodynamic response, and magnetic resonance imaging

Mark K. Elliott MBBS *†, Marina Strocchi PhD *, Benjamin J. Sieniewicz MBChB, PhD *†,





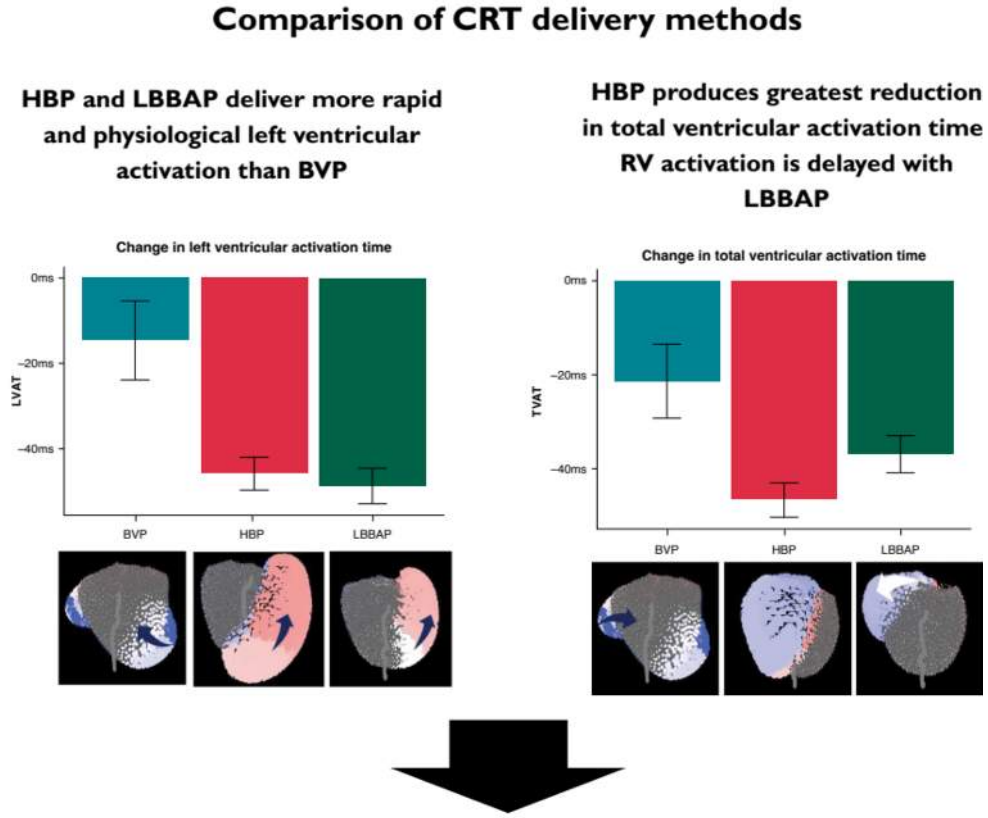
ESC European Society of Cardiology
Europace (2023) **25**, 1060–1067
https://doi.org/10.1093/europace/euac245

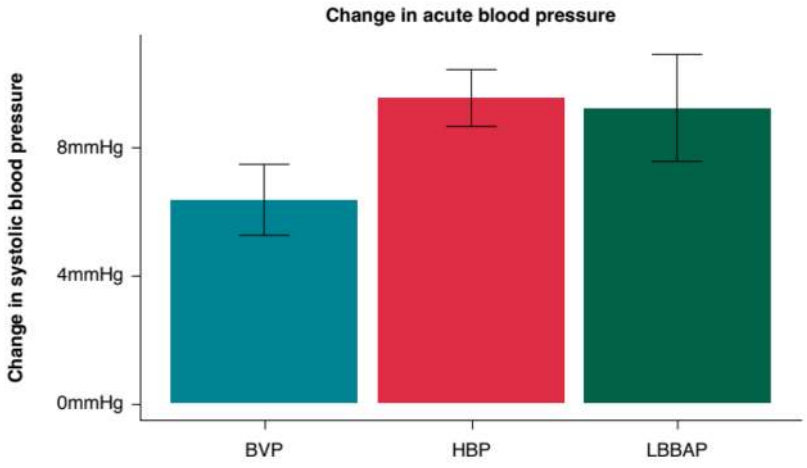
CLINICAL RESEARCH
Cardiac pacing

Comparison of methods for delivering cardiac resynchronization therapy: an acute electrical and haemodynamic within-patient comparison of left bundle branch area, His bundle, and biventricular pacing

Nadine Ali [1], Ahran D. Arnold [1], Alejandra A. Miyazawa [1], Daniel Keene [1], Ji-Jian Chow [1], Ian Little[2], Nicholas S. Peters [1], Prapa Kanagaratnam [1], Norman Qureshi [1], Fu Siong Ng [1], Nick W. F Linton [1], David C. Lefroy [1], Darrel P. Francis [1,3], Lim Phang Boon [1], Mark A. Tanner [3], Amal Muthumala[4], Matthew J. Shun-Shin [1], Graham D. Cole [1], and Zachary I. Whinnett [1]*

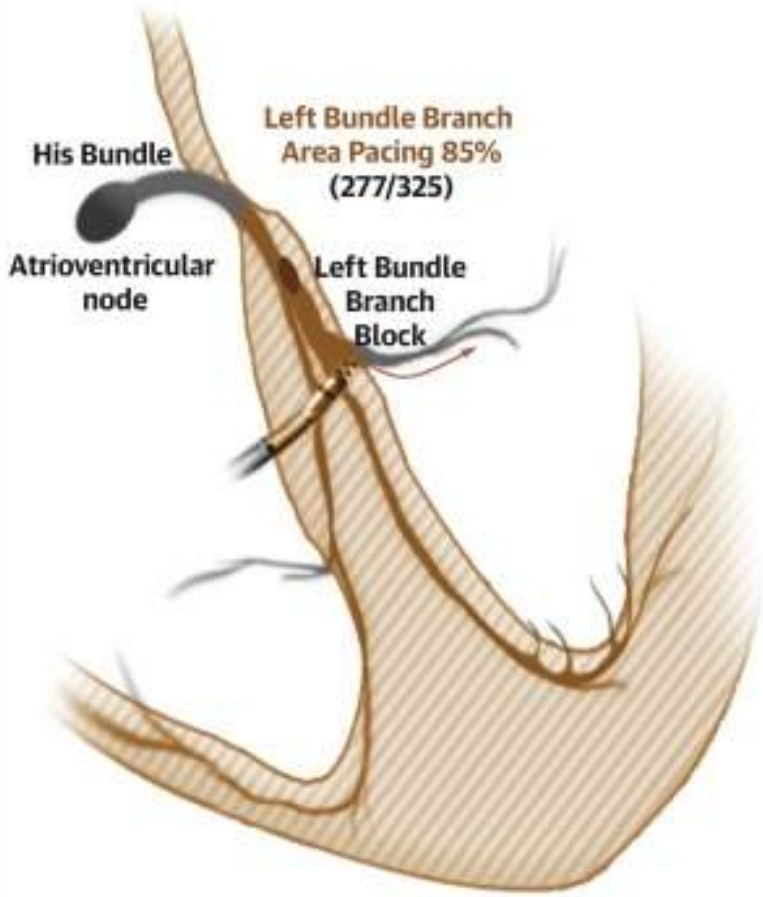
Analisi su 19 pazienti, ischemici e non ischemici



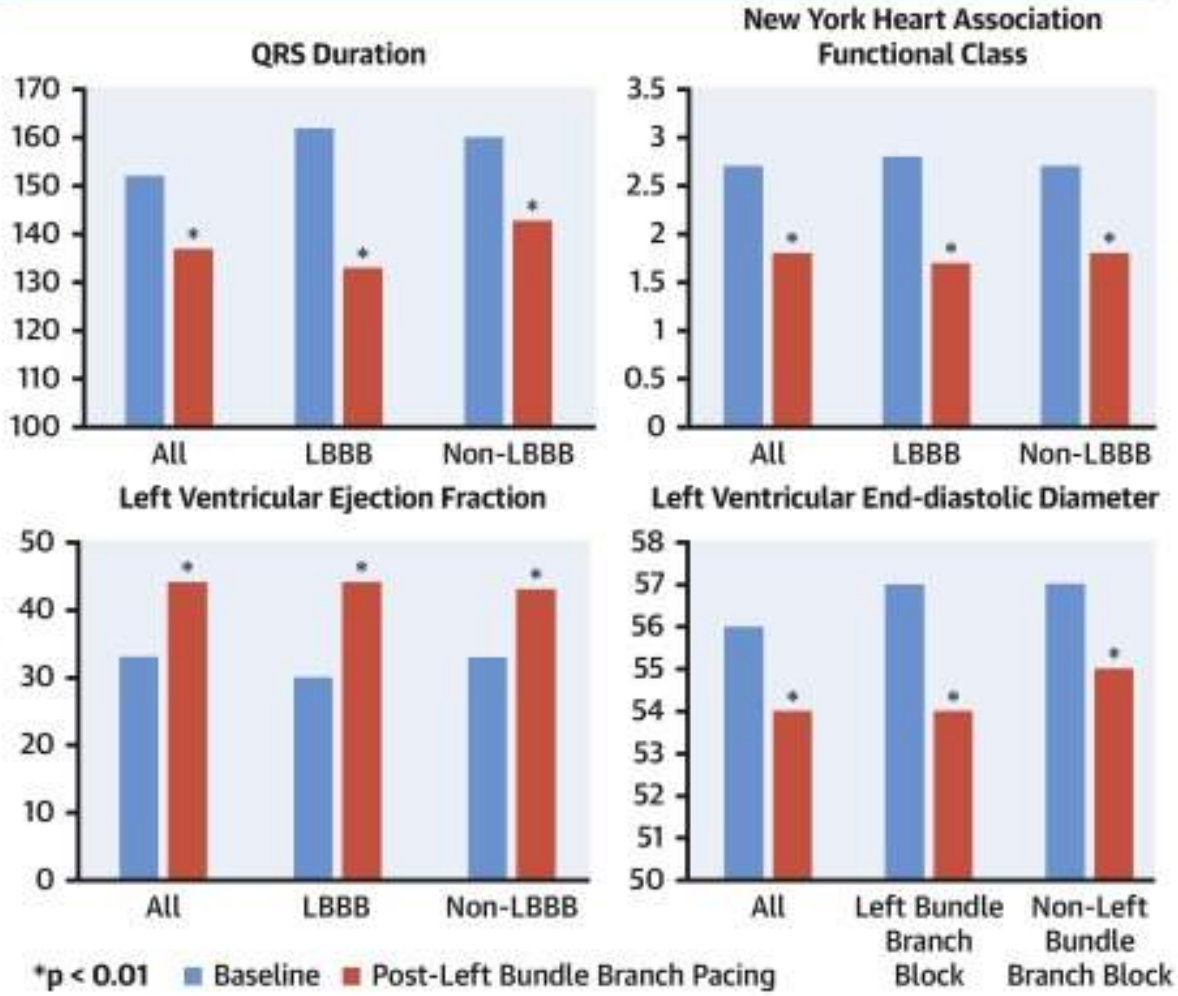


CENTRAL ILLUSTRATION: Left Bundle Branch Area Pacing for Cardiac Resynchronization Therapy

Left Bundle Branch Area Pacing for Cardiac Resynchronization Therapy

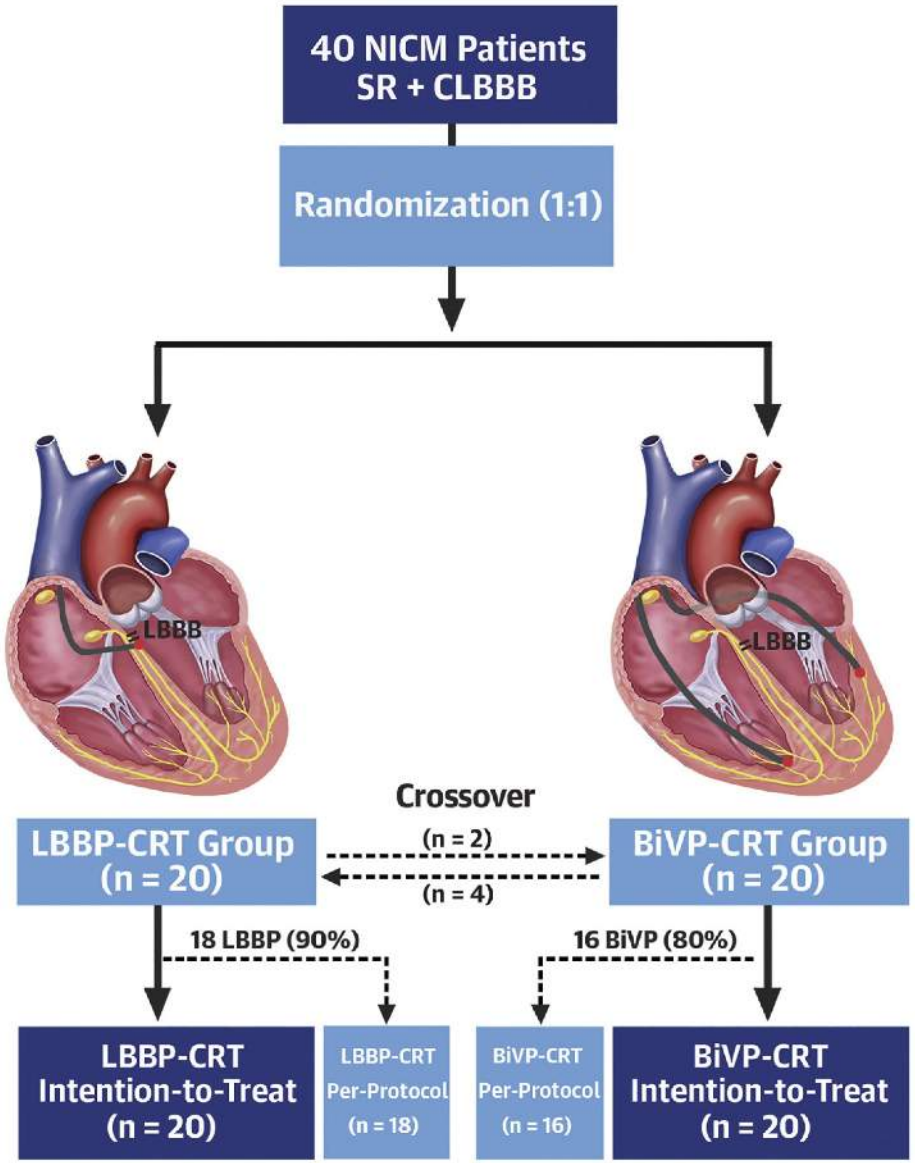


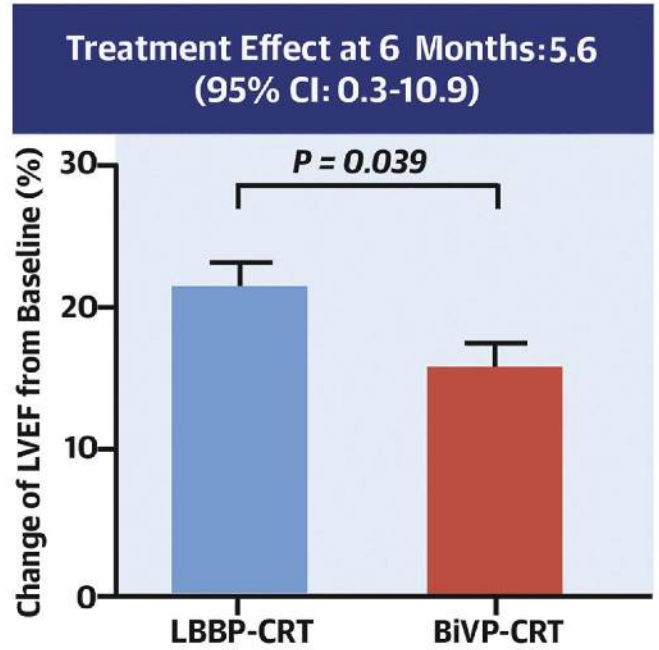
Changes in Cardiac Variables



Vijayaraman, P. et al. J Am Coll Cardiol EP. 2021;7(2):135-47.

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





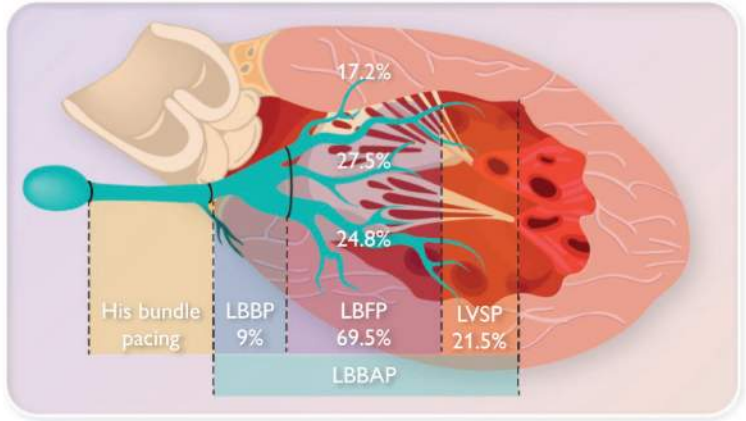
Wang Y, et al. J Am Coll Cardiol. 2022;80(13):1205-1216.

MELOS — MULTICENTER EUROPEAN LEFT BUNDLE BRANCH AREA PACING OUTCOMES STUDY

Prospective, multicenter, registry-based observational study

2533 Participants

14 European centres



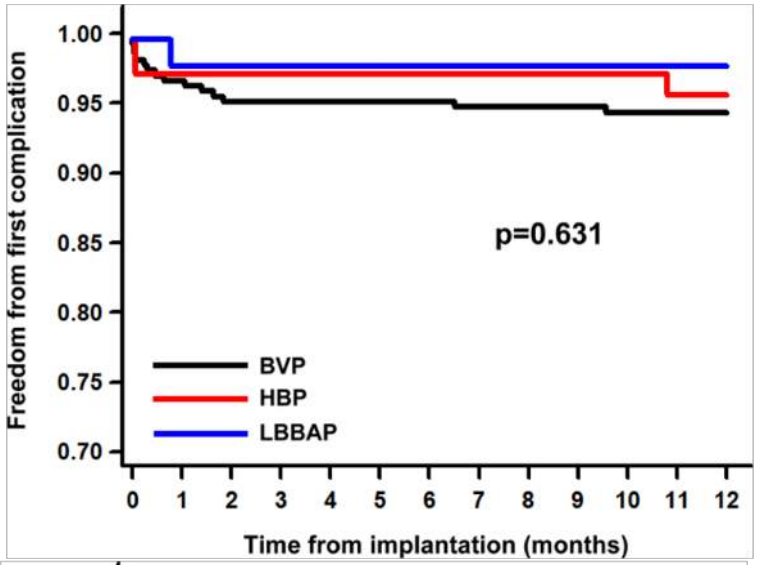
LBBAP implantation success	
Bradycardia indication success	92.4%
Heart failure indication success	82.2%

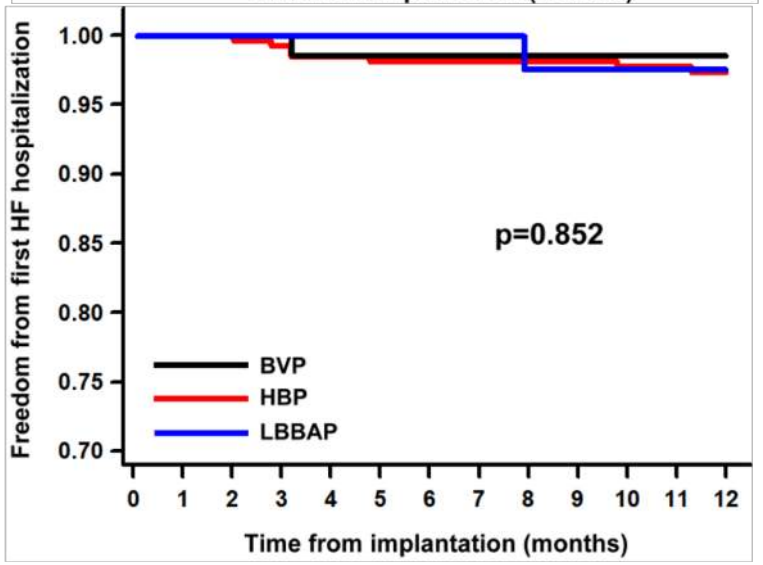
LBBAP lead complications	8.3%
• Acute perforation to LV	3.7%
• Lead dislodgement	1.5%
• Acute chest pain	1.0%
• Capture threshold rise	0.7%
• Acute coronary syndrome	0.4%
• Trapped/damaged helix	0.4%
• Delayed perforation to LV	0.1%
• Other	0.7%

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

Jastrzebski M. et al. Eur Heart J 2022; 00:1-14





Received: 8 May 2023 | Revised: 20 July 2023 | Accepted: 22 August 2023
DOI: 10.1111/pace.14813

PACE WILEY

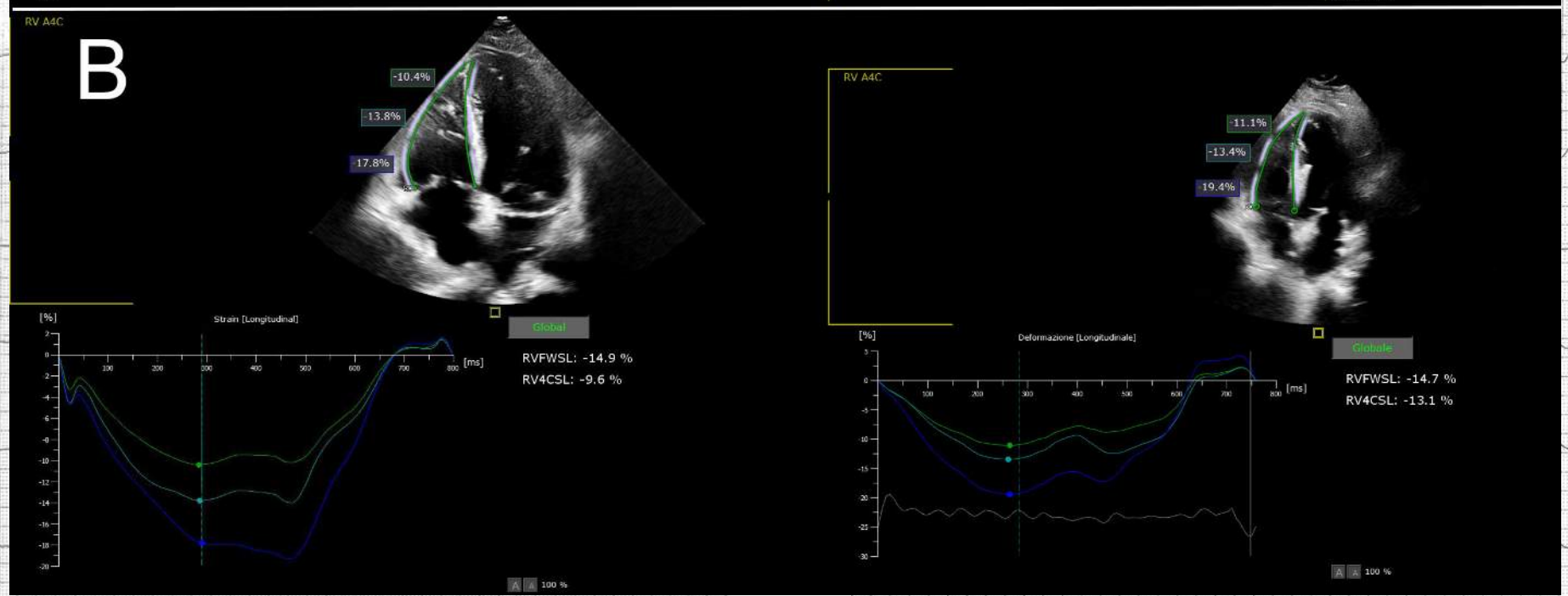
ORIGINAL ARTICLE

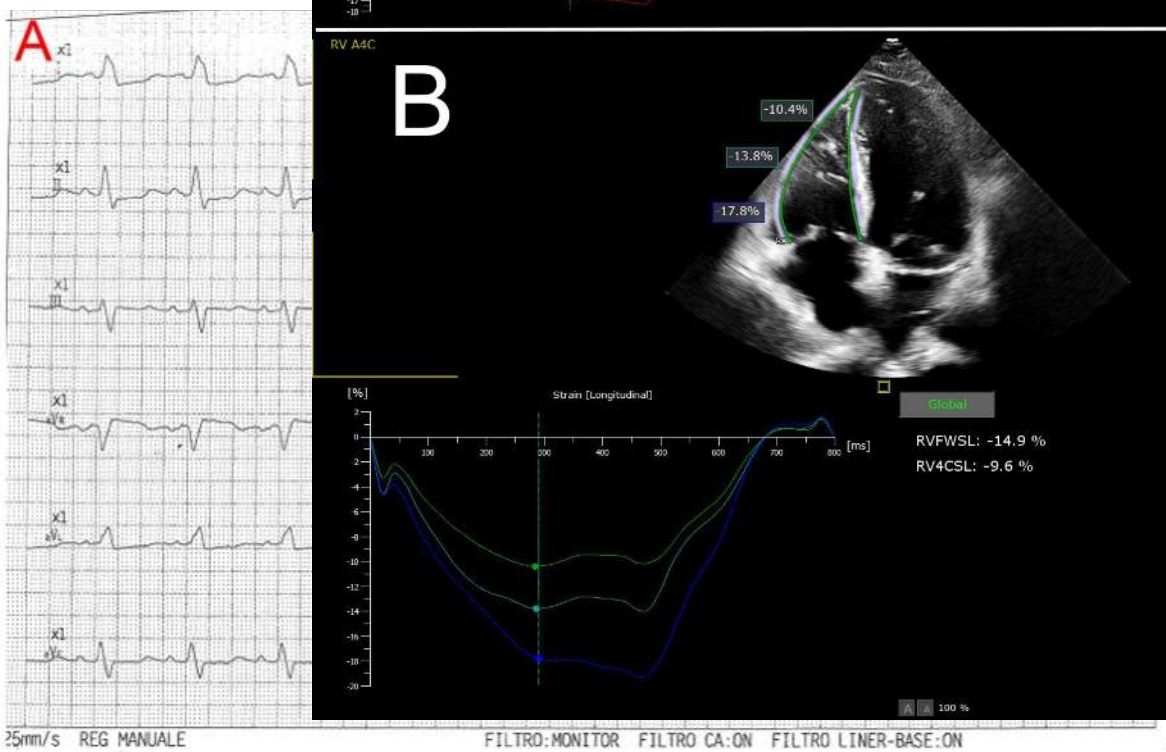
Ablate and pace: Comparison of outcomes between conduction system pacing and biventricular pacing

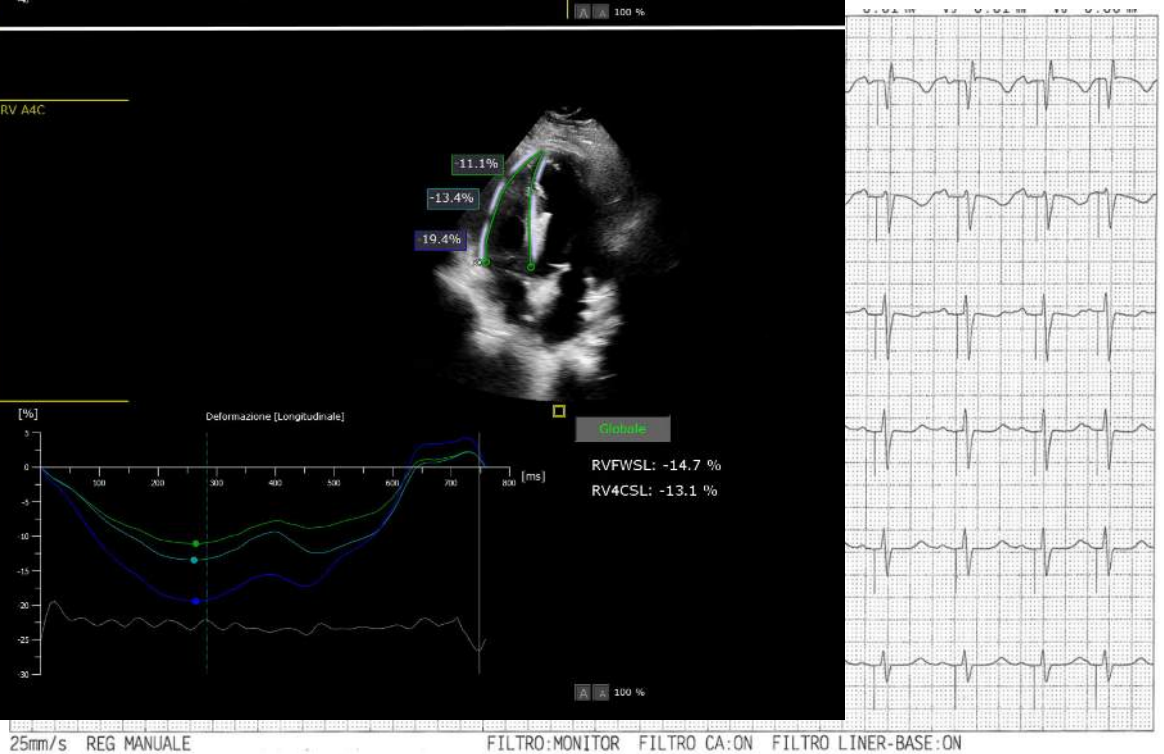
Pietro Palmisano MD[1] | Matteo Ziacchi MD[2] | Gabriele Dell'Era MD[3] | Paolo Donateo MD[4] | Ernesto Ammendola MD[5] | Vittorio Aspromonte MD[6] | Pier Lugi Pellegrino MD[7] | Giuseppe Del Giorno MD[8] | Giovanni Coluccia MD[1] | Lorenzo Bartoli MD[2] | Giuseppe Patti MD[3] | Jacopo Senes MD[4] | Antonio Parlavecchio MD[9] | Francesco Di Fraia MD[5] | Natale Daniele Brunetti MD[7,10] | Angelo Carbone MD[8] | Gerardo Nigro MD, PhD[5] | Mauro Biffi MD[2] | Michele Accogli MD[1]

- Assenza di differenze significative di funzione LV
  Assenza in termini di scompenso cardiaco
- Vantaggio per LBBAP riguardo le complicanze (prevalentemente lead-related)


A
A4C
-2.5%
-6.6%
-3.4%
-6.1%
-5.0%
-16.3%
Global
LV Length
GLS_Endo_Peak_A4C: -6.9 %
Strain [Longitudinal]
[%]
[ms]
A4C
-16.1%
-6.9%
-14.7%
-2.7%
-8.8%
-27.0%
Globale
Lunghezza LV
A4C Endo GLS picco: -12.7 %
Deformazione [Longitudinale]
[%]
[ms]
100 %


B
RV A4C
-10.4%
-13.8%
-17.8%
Global
RVFWSL: -14.9 %
RV4CSL: -9.6 %
Strain [Longitudinal]
[%]
[ms]
RV A4C
-11.1%
-13.4%
-19.4%
Globale
RVFWSL: -14.7 %
RV4CSL: -13.1 %
Deformazione [Longitudinale]
[%]
[ms]
100 %


A
x1
I
II
aVR
aVL
aVF
25mm/s REG MANUALE
FILTRO:MONITOR FILTRO CA:ON FILTRO LINER-BASE:ON


25mm/s REG MANUALE
FILTRO:MONITOR FILTRO CA:ON FILTRO LINER-BASE:ON

Received: 9 December 2023 | Revised: 27 January 2024 | Accepted: 6 February 2024

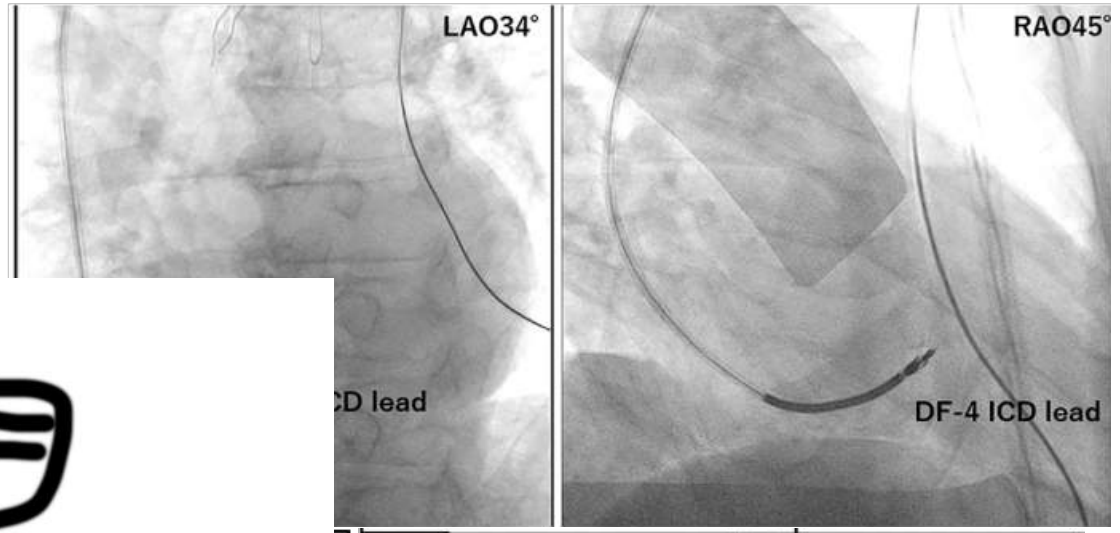
DOI: 10.1111/pace.14953

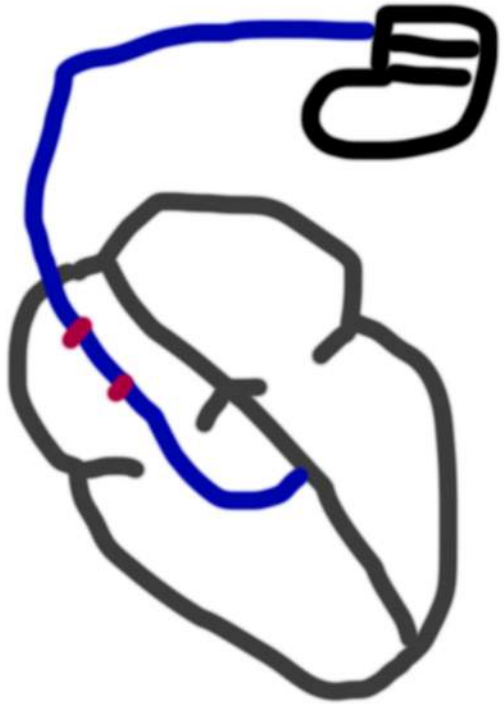
PACE WILEY

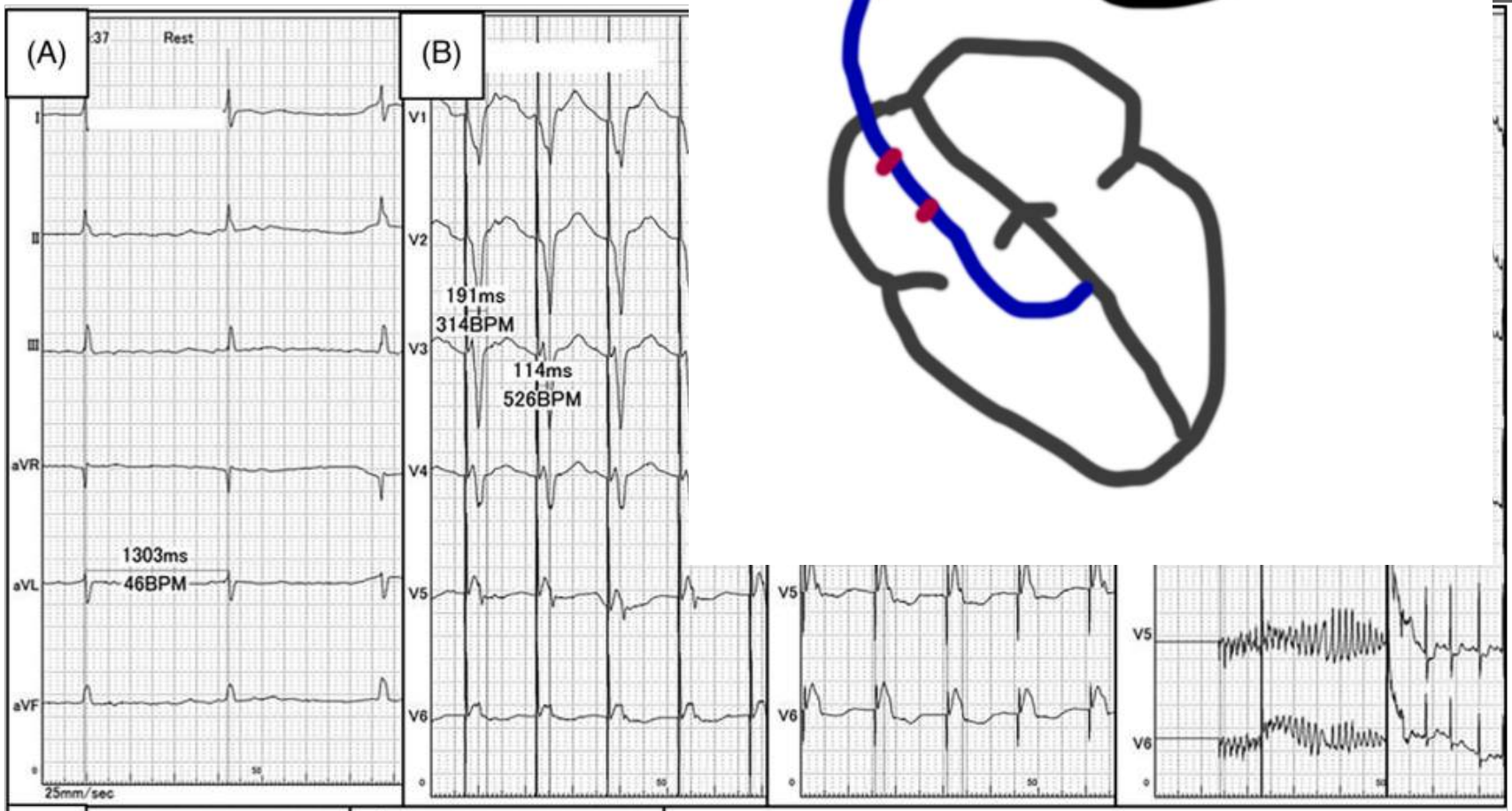
CASE REPORT

Successful direct pacing of the left bu lead using steerable delivery sheath

Mitsuru Yoshino MD | Kanade Yanagihara MD | Kenta Yoshida MD | Hiroshi Tasaka MD







- Supera i limiti della stimolazione Hisiana
- Evita gli svantaggi del pacing convenzionale miocardico
- Più semplice e fisiologico della CRT biventricolare

Campi di applicazione?

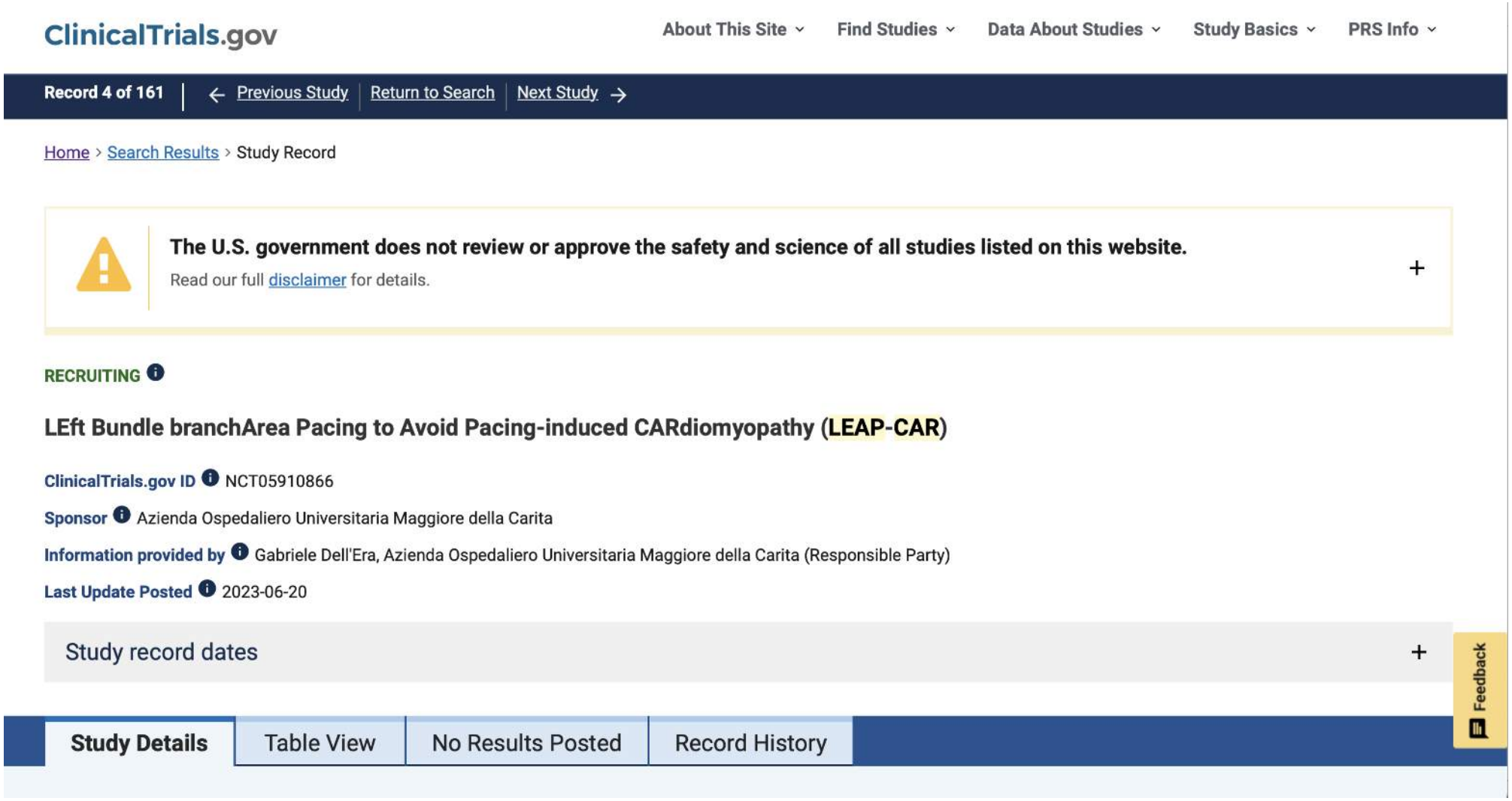
- Ablate and pace (già in linee guida, anche se preferito HBP)
- Pacing «brady» convenzionale (assenza di maleficio, evidenza di beneficio in corso di costruzione)
- CRT (indicazione più «spettacolare», ma pazienti e procedure più co[illegible]e pubblicate e in corso di pubblica

Conduction-System pacing Italian Network Group (C-SING)

Ragusa, Treviso, Verona Borgo Trento, Piove di Sacco, Rovigo, Vicenza, Sant'Andrea Rom, Terni, Taranto, Acquaviva delle Fonti, Tricase, Federico II Napoli, Nola, CNR Pisa, Firenze SMN, Grosseto, AOU Cona, AOU Cisanello Pisa, Aosta, Molinette Torino, Vercelli, Biella, Novara, Orbassano, Savigliano, Lavagna, Vimercate, Humanitas Rozzano, Sacco, Monza, San Raffaele Milano, Lodi, Humanitas Gavazzeni, Humanitas Mater Domini Castellanza, Niguarda Milano, Desio, Auxologico….

- *Obiettivo: descrivere come il CSP viene eseguito in Italia, confrontando diverse esperienze di diversi centri, valutando le indicazioni reali, i tassi di successo, i risultati e le complicazioni, e fornendo dati per confermare o mettere in discussione i dati precedentemente pubblicati.*
- *Il registro potrà costituire una piattaforma per ogni eventuale sottoanalisi non programmata.*

Costruire evidenze!



Graphical Abstract

EHRA
European Heart Rhythm Association
European Society of Cardiology

PhysioVP-AF trial - Conduction system pacing versus managed ventricular pacing for persistent atrial fibrillation prevention in patients with prolonged atrioventricular conduction

Inclusion Criteria:

- Baseline PR interval > 180 ms
- Sinus Node Disease and/or
- Paroxysmal II degree AV Block (type 1 or 2)

Pacing Strategies:

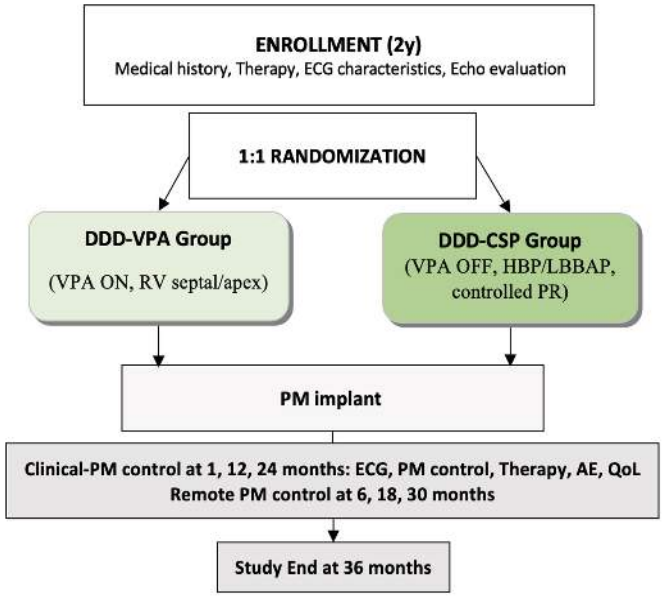
- **DDD-VPA** group: atrial-synchronized, dual chamber pacing with Ventricular Pacing Avoidance (VPA) algorithms switched ON after PM implantation.

- **DDD-CSP** group: atrial-synchronized, dual-chamber conduction system pacing (CSP) with a programmed AV-delay to control the PR interval. The VPA algorithms are switched OFF after PM implantation.

Lead placement:

- **DDD-VPA**: standard RV septum, RVOT, or RV apex.

- **DDD-CSP**: His Bundle (HBP) or Left Bundle Branch area (LBBAP).



Primary Endpoint:

Persistent AF occurrence: first episode of AT/AF lasting >7 days detected by the PM after a 1 month post-implantation or the occurrence of AT/AF terminated by cardioversion or AF ablation.

Secondary Endpoints:

Echo evaluation at 12 months, clinical evaluations (NYHA, hospitalizations, Quality of Life), ECG parameters, battery longevity, safety (adverse events, fluoroscopy time, re-interventions).

Europace, Volume 25, Issue 5, May 2023, euad082, https://doi.org/10.1093/europace/euad082

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