OSPEDALE MAGGIORE DELLA CARITÀ
NOVARA

Stimolazione da siti alternativi: bifocale, parahisiana..

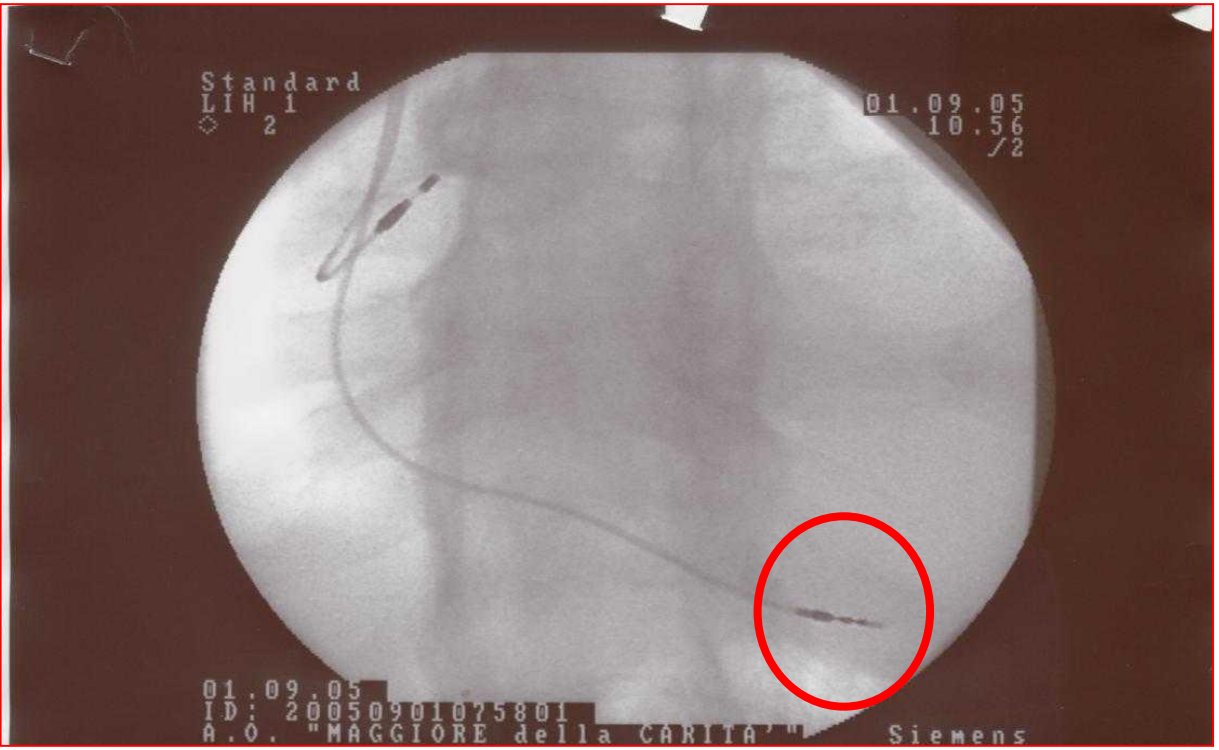
Gabriele Dell'Era

Clinica Cardiologica AOU "Maggiore della carità" - Novara

Seymour Furman - 1958

Primo impianto di catetere transvenoso (Pincus Shapiro - mantenuto in sede 96 giorni) – Montefiore Hospital, NY
Il primo obbiettivo erano la STABILITA’ e l’AFFIDABILITA’
La procedura di impianto endocavitario diventa standard nel 1974

Pacemaker DDDR: Stimolazione fisiologica?



Negative effects of apical Right Ventricular Pacing

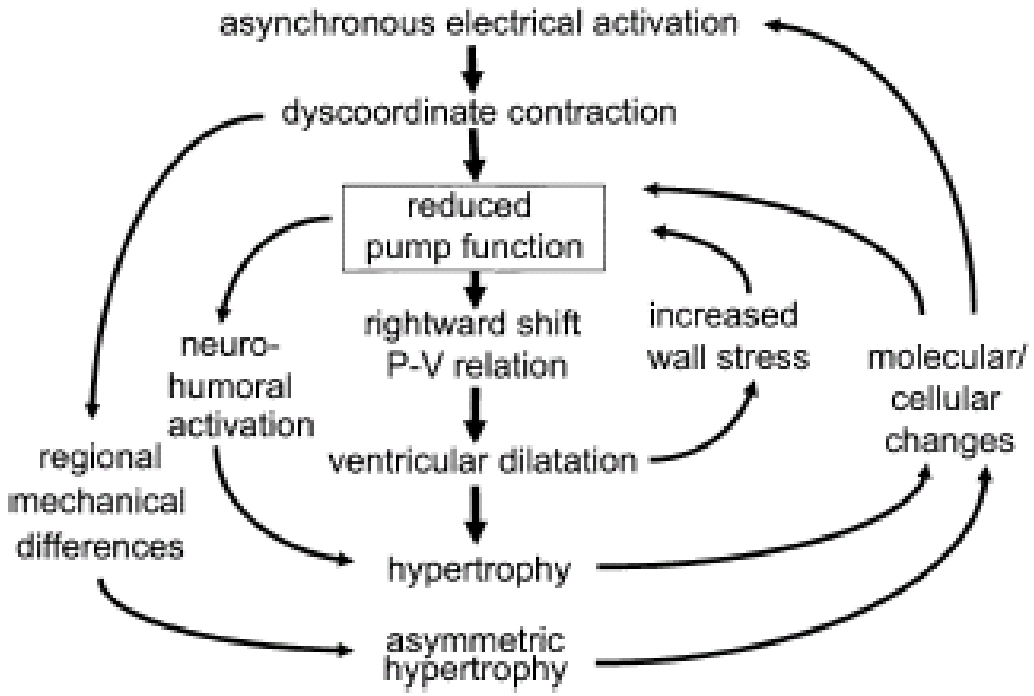


Figure 2. Mechanisms of ventricular remodeling and progressive reduction in pump function during right ventricular apex pacing. For details, see text. P-V = pressure-volume.

Sweeney M, Prinzen F. "A new paradigm for physiologic V pacing". JACC 2006: 47: 282-288

Da molto tempo si cercano alternative..

PACE
Pacing And Clinical Electrophysiology

The Right Ventricular Outflow Tract as an Alternative Permanent Pacing Site: Long-Term Follow-Up

EDWARD S. BARIN, SUSAN M. JONES, DAVID E. WARD, A. JOHN CAMM, ANTHONY W. NATHAN

First published: January 1991 | https://doi.org/10.1111/j.1540-8159.1991.tb04040.x | Cited by: 44

Dr. Nathan and Professor Camm are supported by the British Heart Foundation.

PACE
Pacing And Clinical Electrophysiology

Right Ventricular Outflow Tract Pacing: Practical and Beneficial. A 9-Year Experience of 460 Consecutive Implants

STEPHEN C. VLAY M.D.

First published: 12 October 2006 | https://doi.org/10.1111/j.1540-8159.2006.00498.x | Cited by: 36

Pacing Clin Electrophysiol. 1995 Jan;18(1 Pt 2):179-81.

Alternative lead positioning in the right ventricular outflow tract in transvenous implantation of ICDs.

Wolfhard UF[1], Jäger HP, Knocks M, Doetsch N.

Siti «alternativi»: quali?

- Setto interventricolare
  - RVOT
  - His
  - ParaHis
- Bifocale
- Stimolazione del ventricolo sinistro

Stimolazione settale «monofocale»

Heart Rhythm. 2017 Dec 20. pii: S1547-5271(17)31456-X. doi: 10.1016/j.hrthm.2017.12.022. [Epub ahead of print]

Permanent His-bundle pacing: Long-term lead performance and clinical outcomes.

Vijayaraman P[1], Naperkowski A[2], Subzposh FA[2], Abdelrahman M[2], Sharma PS[3], Oren JW[4], Dandamudi G[5], Ellenbogen KA[6].

ELSEVIER

Journal of the American College of Cardiology

Available online 10 March 2018

In Press, Accepted Manuscript

Original Investigations

Clinical Outcomes of His Bundle Pacing Compared to Right Ventricular Pacing

Mohamed Abdelrahman MD *, Faiz A. Subzposh MD *, Dominik Beer DO #, Brendan Durr DO #, Angela Naperkowski RN, CEPS, CCDS, FHRS *, Haiyan Sun MS $, Jess W. Oren MD #, Gopi Dandamudi MD, FHRS ^, Pugazhendhi Vijayaraman MD, FACC *

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June 1, 2018 Volume 260, Pages 107–108

Next A

Permanent his bundle pacing: A physiological alternative to conventional right ventricular pacing or just a futile artifice?

Giuseppe Ricciardi, Luca Checchi

Azienda Ospedaliero Universitaria Careggi, University of Florence, Florence, Italy

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February 2015 Volume 12, Issue 2, Pages 305–312

Next Article >

Permanent His-bundle pacing is feasible, safe, and superior to right ventricular pacing in routine clinical practice

Parikshit S. Sharma, MD, MPH, Gopi Dandamudi, MD, FHRS, Angela Naperkowski, RN, FHRS, CCDS, CEPS, Jess W. Oren, MD, Randle H. Storm, MD, FHRS, Kenneth A. Ellenbogen, MD, FHRS, Pugazhendhi Vijayaraman, MD, FHRS

Heart Rhythm. 2018 Mar;15(3):460-468. doi: 10.1016/j.hrthm.2017.10.039. Epub 2017 Oct 28.

Permanent His bundle pacing: Recommendations from a Multicenter His Bundle Pacing Collaborative Working Group for standardization of definitions, implant measurements, and follow-up.

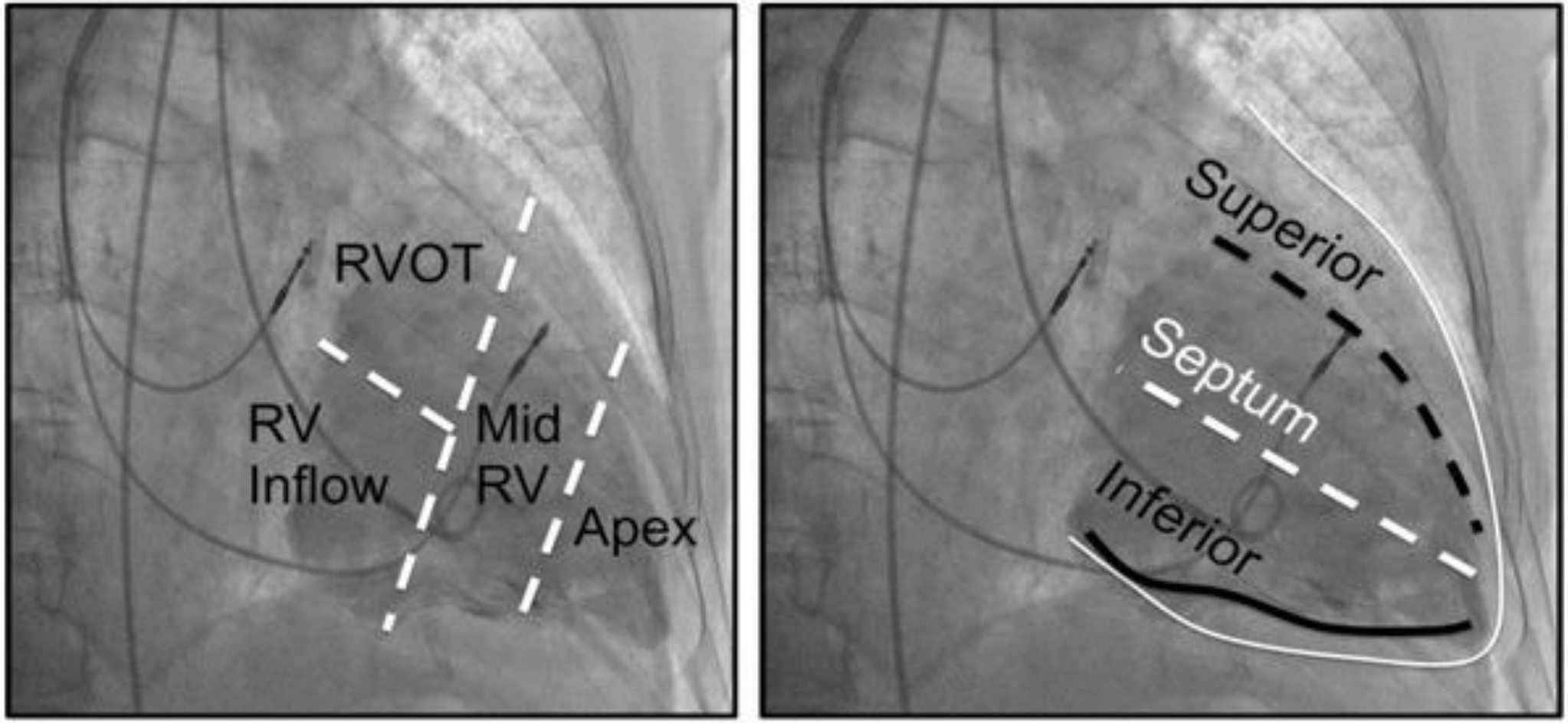
Vijayaraman P[1], Dandamudi G[2], Zanon F[3], Sharma PS[4], Tung R[5], Huang W[6], Koneru J[7], Tada H[8], Ellenbogen KA[7], Lustgarten DL[9].

Author information

Abstract

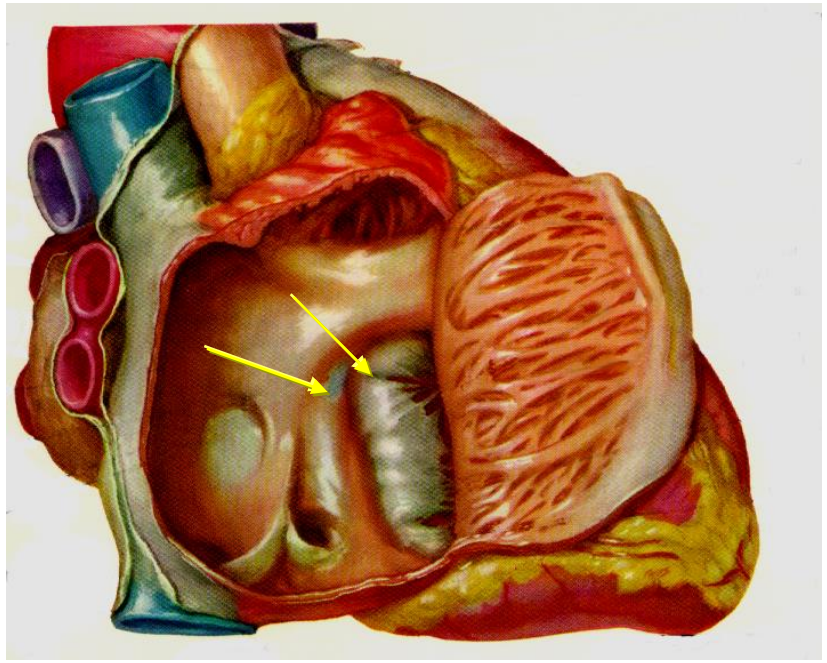
His bundle pacing (HBP) prevents ventricular dyssynchrony and its long-term consequences by preserving normal electrical activation of the ventricles. Since the original description of permanent HBP in 2000, the adoption of HBP has increased over the past several years. However, the reporting of procedural and clinical outcomes to date is not uniform. This article is a collaboration between several implanters with significant experience in HBP to establish a uniform set of definitions encompassing the different forms of HBP as well as define a standardized approach to gathering data end points to ensure consistency in reported outcomes.

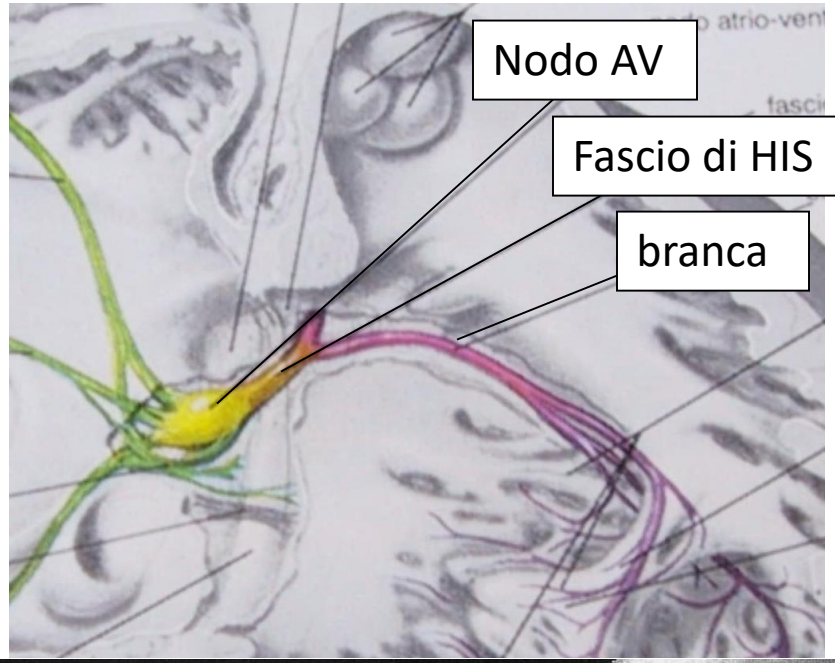
C’è setto e setto…

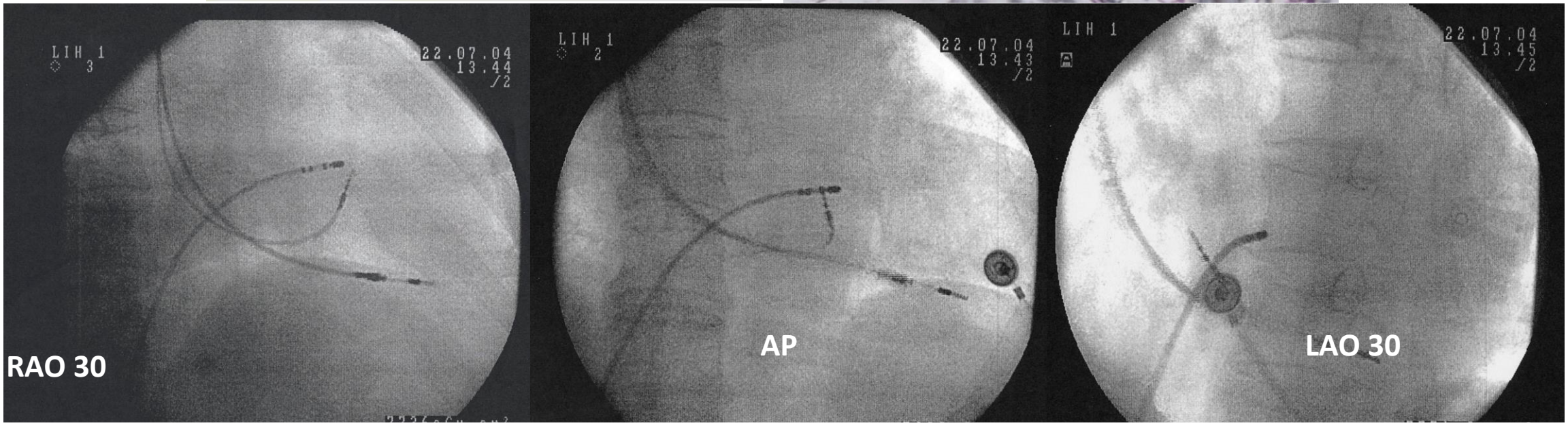


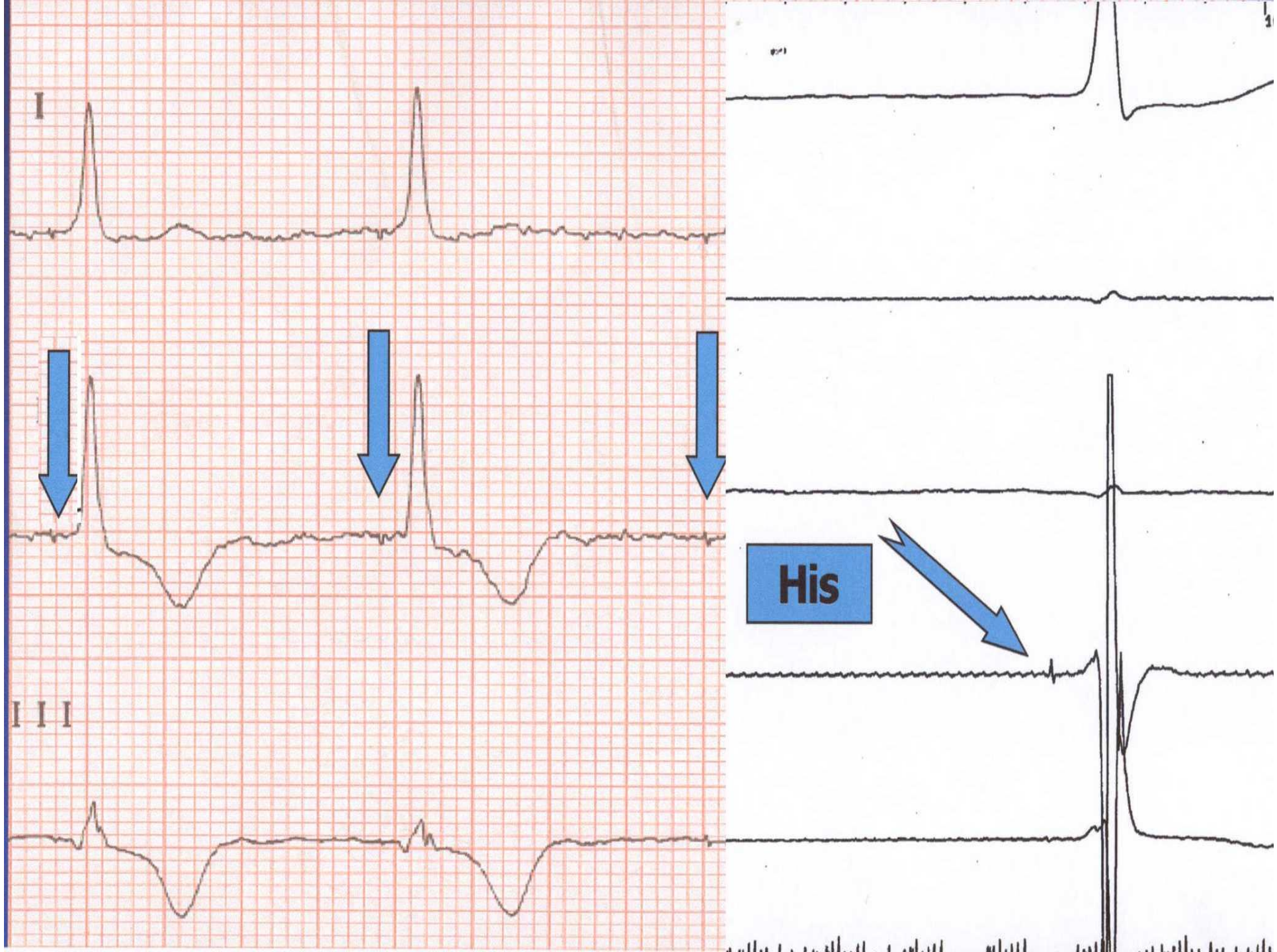
Dove stimolare?

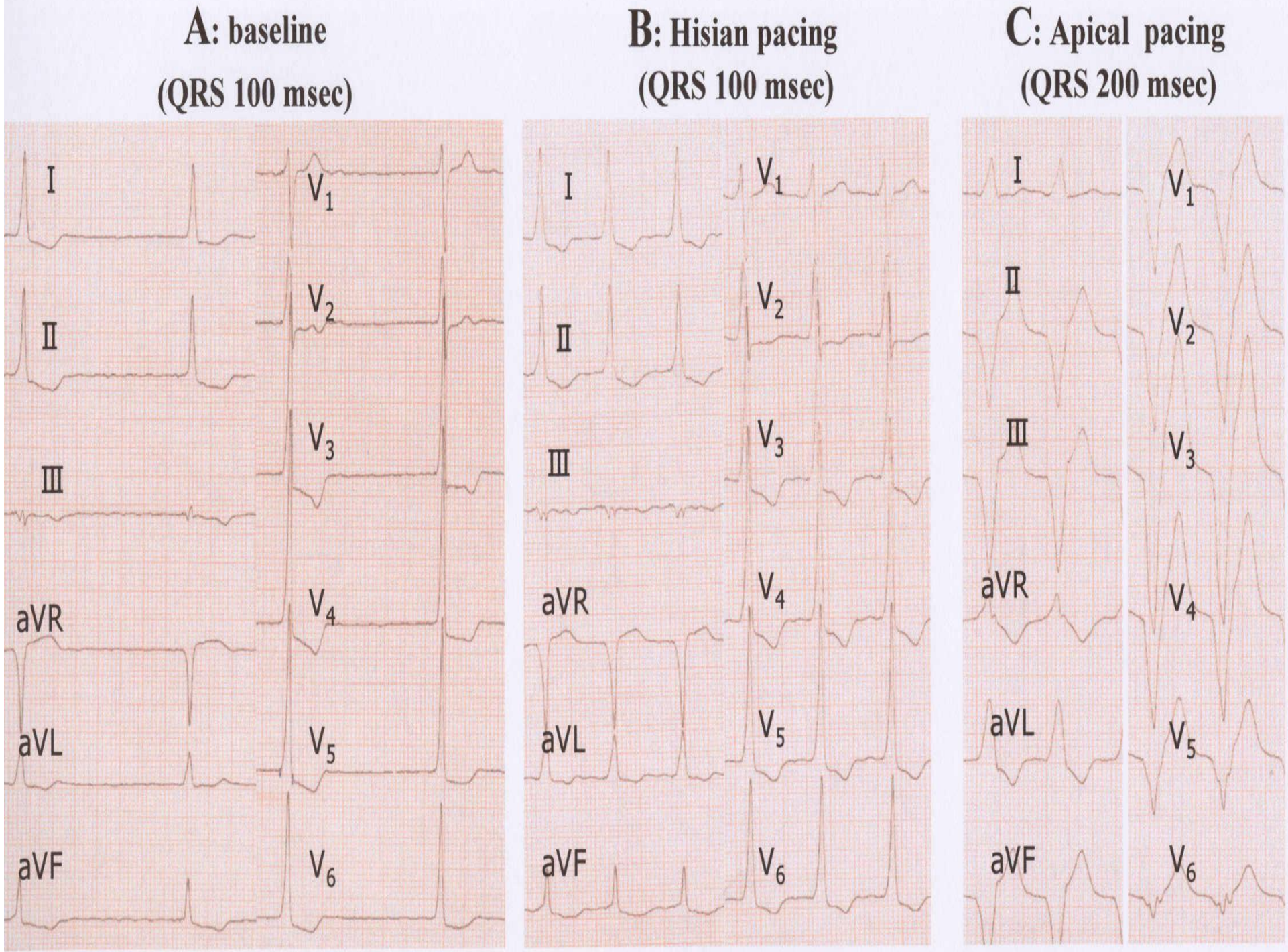
HIS BUNDLE AREA








I
I I I
His


A: baseline
(QRS 100 msec)
B: Hisian pacing
(QRS 100 msec)
C: Apical pacing
(QRS 200 msec)
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

Elettrocatetere SelectSecure™

- Dimensioni ridotte **solo 4.1 Fr**
- Bipolare
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  - 59 cm
  - 69 cm
- Rilascio di Steroide
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Struttura Avanzata

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- Versione Atriale e Ventricolare
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- Diametro interno 5.7 Fr

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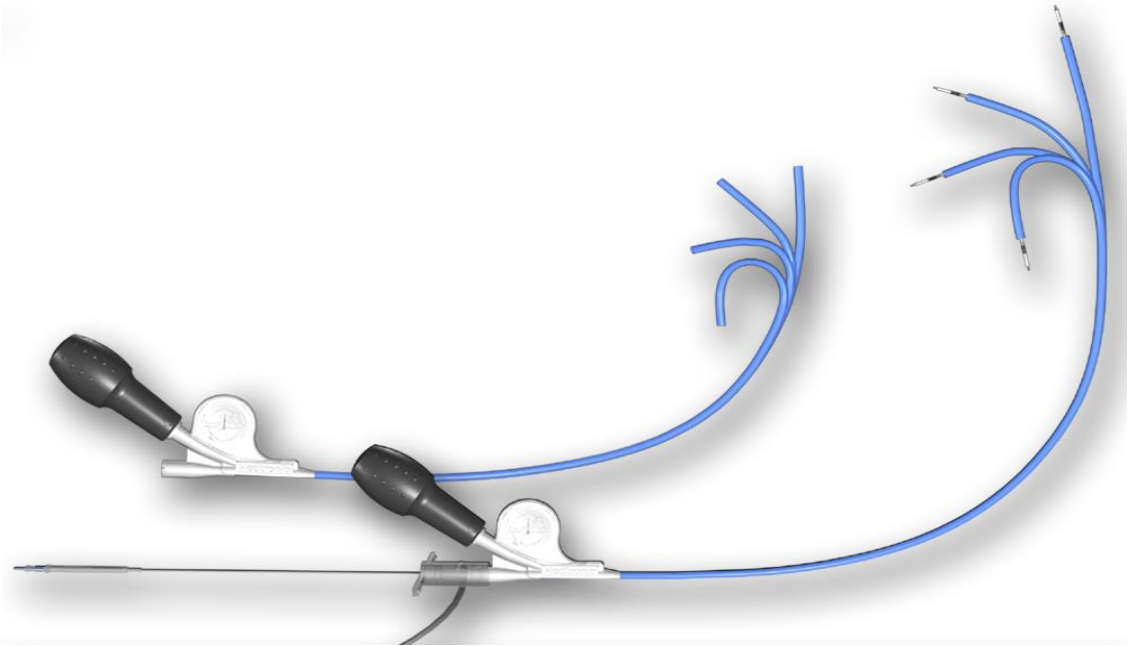

Strumento di impianto

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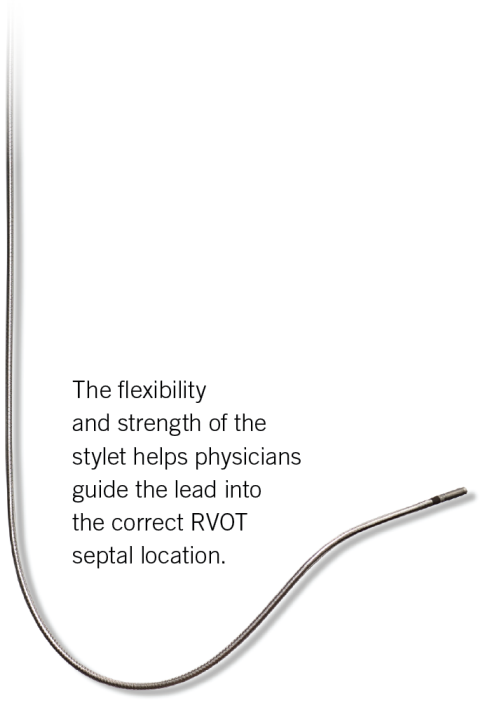
- La curvatura 3-D dello stiletto Mond™ RVOT con angolatura posteriore aiuta a posizionare l'elettrocatetere nel setto a livello di RVOT o setto medio



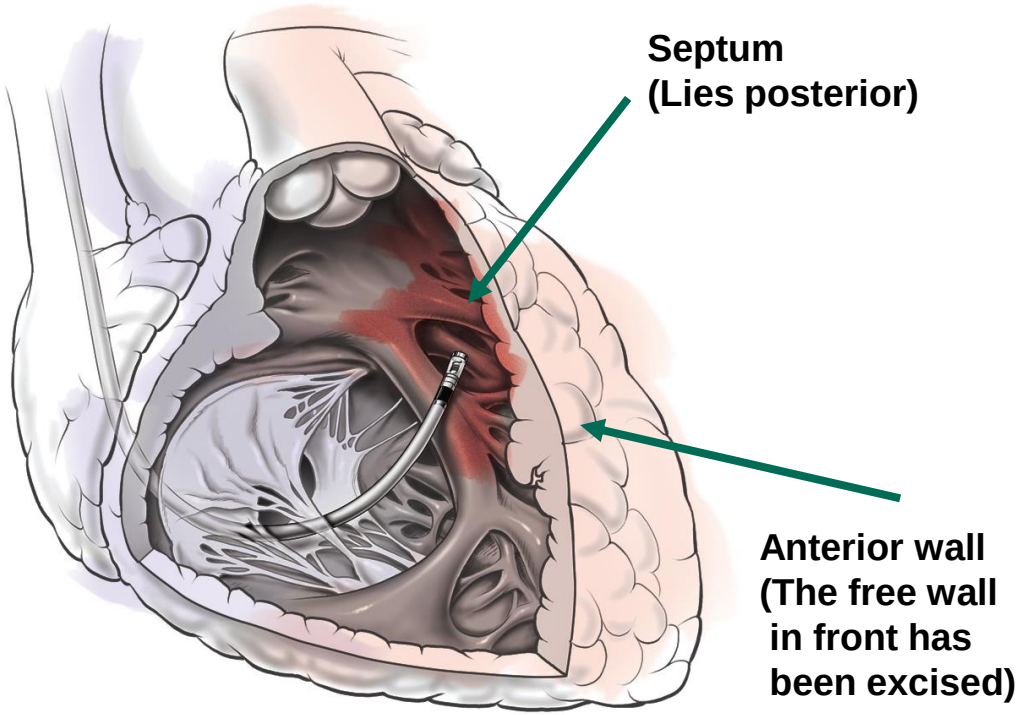


Image courtesy of Harry G. Mond, MD, FACC
The Royal Melbourne Hospital Victoria, Australia

HIS BUNDLE AREA

HIS

•Identica morfologia e durata del QRS nativo e stimolato sulle 12 derivazioni

•Uguaglianza tra la distanza H-V sul segnale nativo e la distanza spike-QRS nel segnale stimolato (la differenza di 5 msec è considerata accettabile)

•Raggiungimento dello stesso target individuato tramite il catetere EP che sente e stimola il fascio di His (controllare nelle proiezioni LAO e RAO)

•stimolando a basse uscite viene catturato solo l'HIS, mentre a alte uscite viene catturato anche il ventricolo e il QRS si slarga (presenza anche di onda delta di pre-eccitazione ventricolare)

PARA-HIS

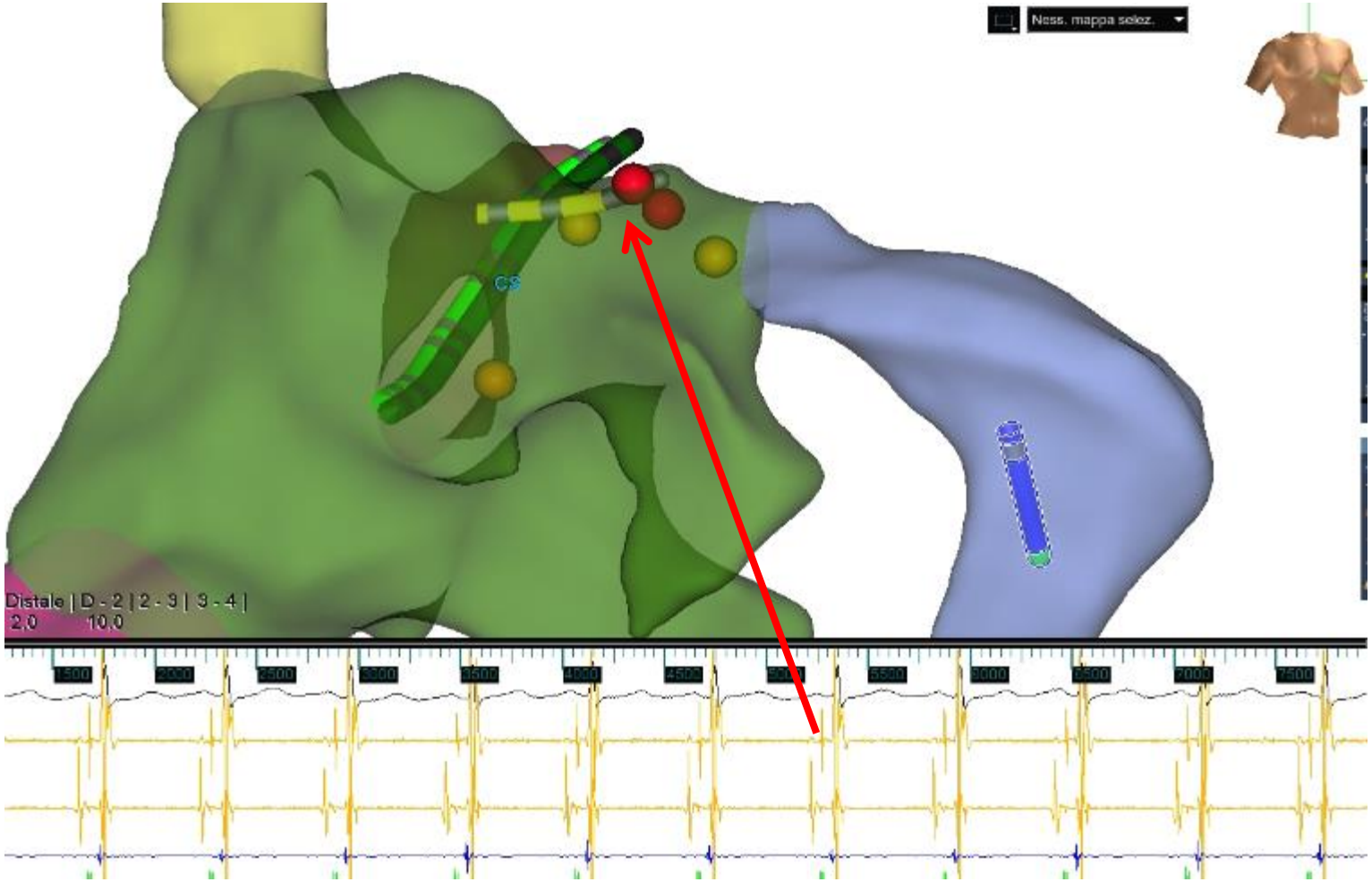
•il QRS è leggermente più largo di quello nativo, ma mantiene la stessa morfologia

•l'asse elettrico è identico a quello nativo

•la distanza spike-QRS è maggiore di 10 msec rispetto all'H-V

•stimolando a basse uscite viene catturato il ventricolo locale e il QRS è leggermente più largo mentre aumentando l'uscita viene catturato anche l'HIS.

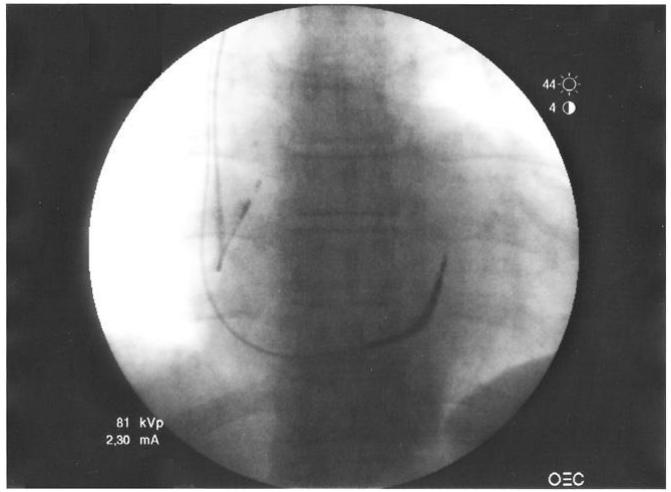
Zero X-ray His bundle mapping

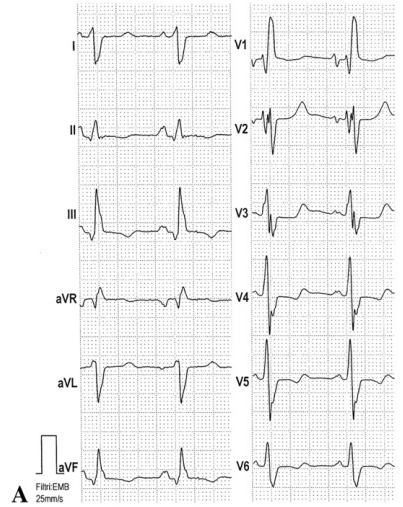


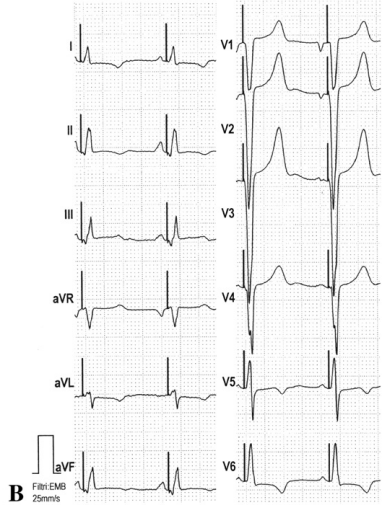

File Amplificatore Tasti di scelta rapida Guida
06 feb 2018 12:24:17
ABL
D
Ness. mappa selez.
60 s
60 s
40 s
10 s
0 s
Velocità
Respirazione
Spaziatura interelettrodica: | Distale | D - 2 | 2 - 3 | 3 - 4 |
Nominale (mm) 4,0 2,5 2,5 2,5
Misurata (mm) 2,8 2,3 2,1
Tempo(s)
Potenza (W)
37
Temp (C)
Superfici
Destra
Superficie
Superficie
SVC
RV
IVC
Termina modello
Da EnGuide attivo
Raccogli punti
Nome Superficie
Gruppo Destra
Tipo Alta Bassa OneModel
Riempimento 40
Forza 10 50
Punti Nessuno NavX SE
Elimina punti
Annulla eliminazione
Ignora modifiche
Automatico Applica
100 mm/s
0 ms
ECG aVF (52)
ECG V2 (52)
HIS D-2 (71)
ABL D-2 (70)
ABL 3-4 (70)
Arresta
ablazione
01:10:23

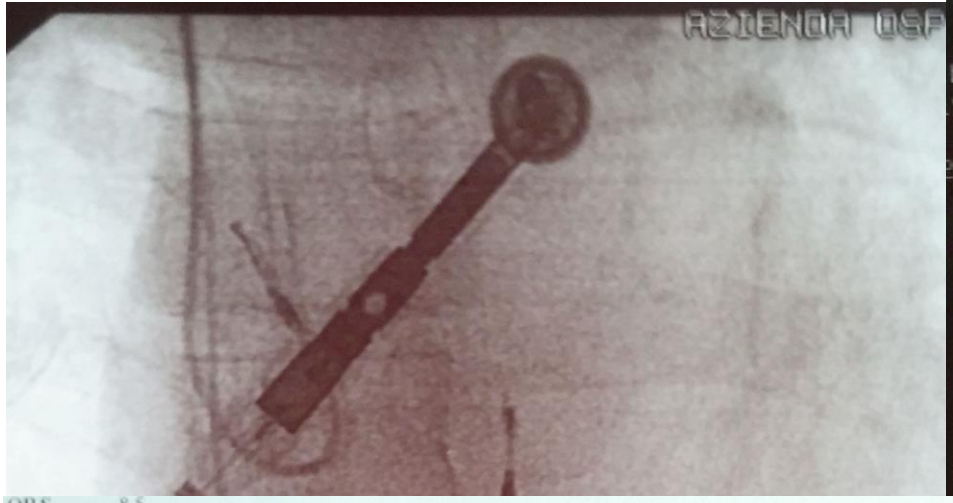
”Provocazione”: pacing solo destro?

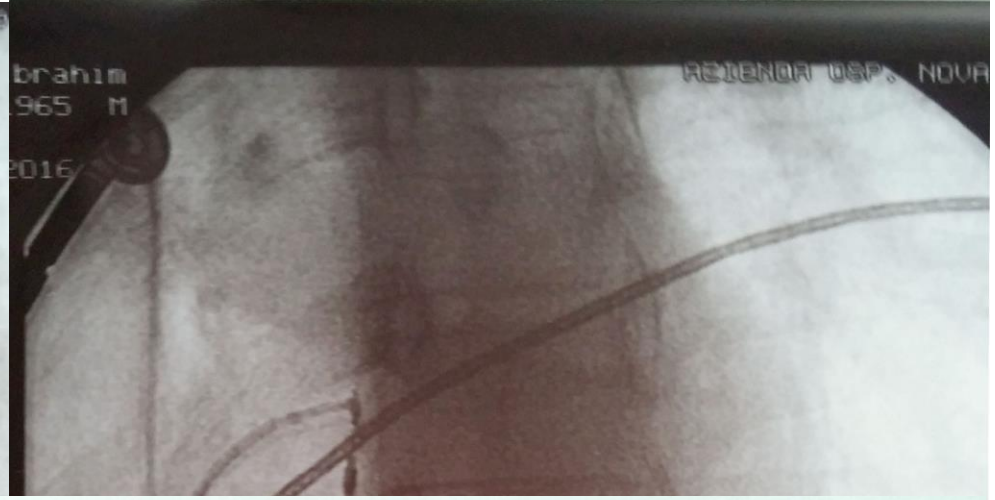
- *Crea P, Andò G, Zagari D, Giordano A, Picciolo G, Oreto G. Do patients with heart failure and right bundle branch block need biventricular pacing? A case of significant QRS narrowing by right ventricular pacing alone. J Electrocardiol 2014*
- Stimolazione mediosettale in un paziente con BBD e CP ischemica con severo scadimento di FE ha determinato la comparsa di QRS stretto 180->100 ms (a tutti gli effetti una “CRT”)

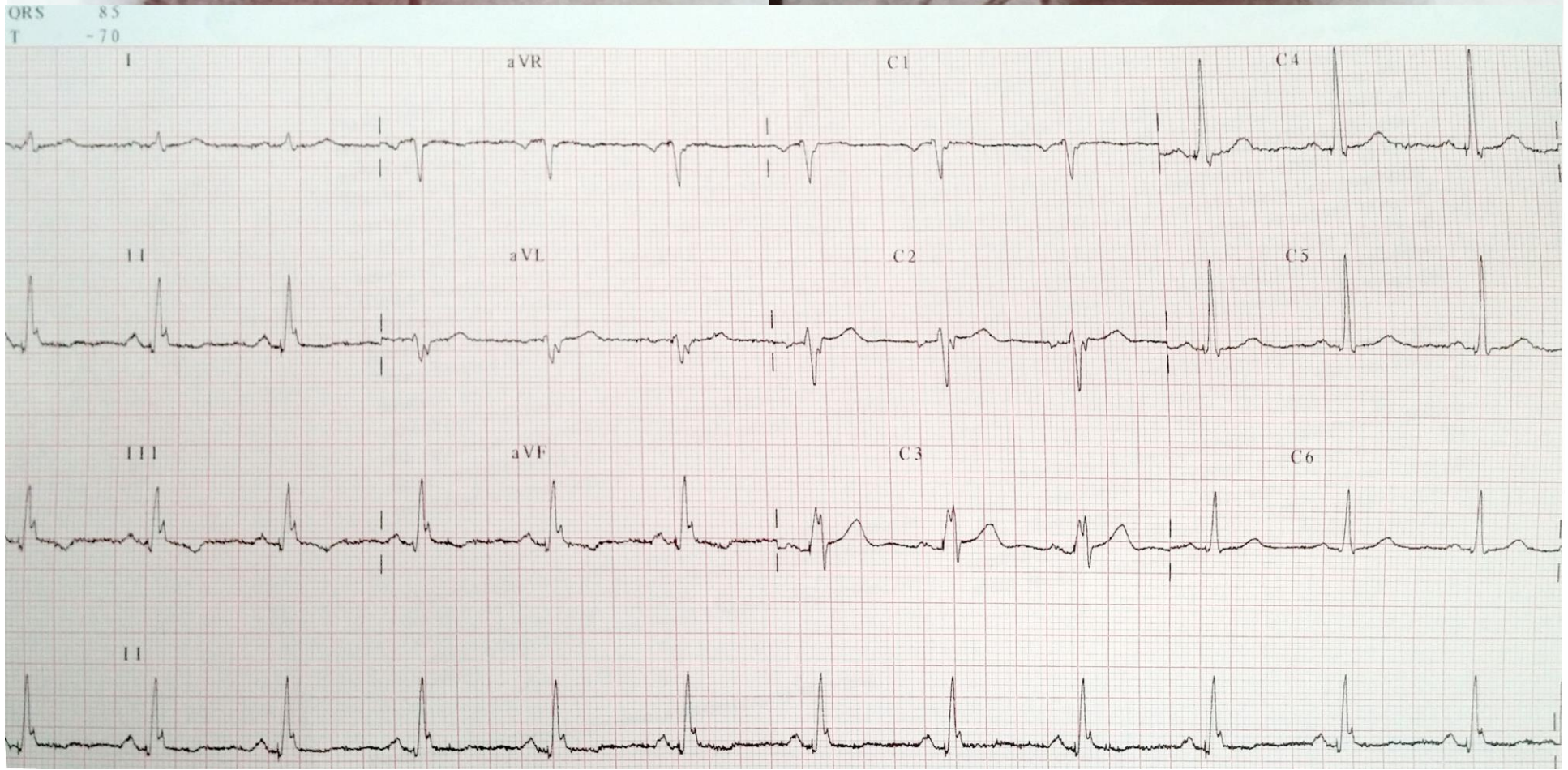







AZIENDA OSP


brahim
965 M
2016
AZIENDA OSP. NOVA


QRS 85
T -70
I
aVR
C1
C4
II
aVL
C2
C5
III
aVF
C3
C6
II

Stimolazione bifocale

Unisce la stimolazione settale all’apicale..

Stimolazione bifocale

- Prime esperienze di Pachòn (1999) – 39 pz (17 con Chagas) con CMPD trattati efficacemente con pacing bifocale
- Studio BRIGHT (Bifocal RIGHT ventricular resynchronization therapy, Res JC, Europace 2007): effetto di pacing bifocale in 42 pazienti eleggibili a CRT con fase di crossover di 6 mesi (bifocale on vs off). Nella fase attiva, miglioramento significativo di QoL, 6' walking test, durata QRS e FE, oltre a miglioramento non significativo di insuff. Mitralica e ospedalizzazioni.
- *Editoriale di* Barold SS, Audoglio R, Ravazzi PA , Diotallevi P. Is Bifocal Right Ventricular Pacing a Viable Form of Cardiac Resynchronization? Pacing Clin Electrophysiol 2008; 31:789-794.

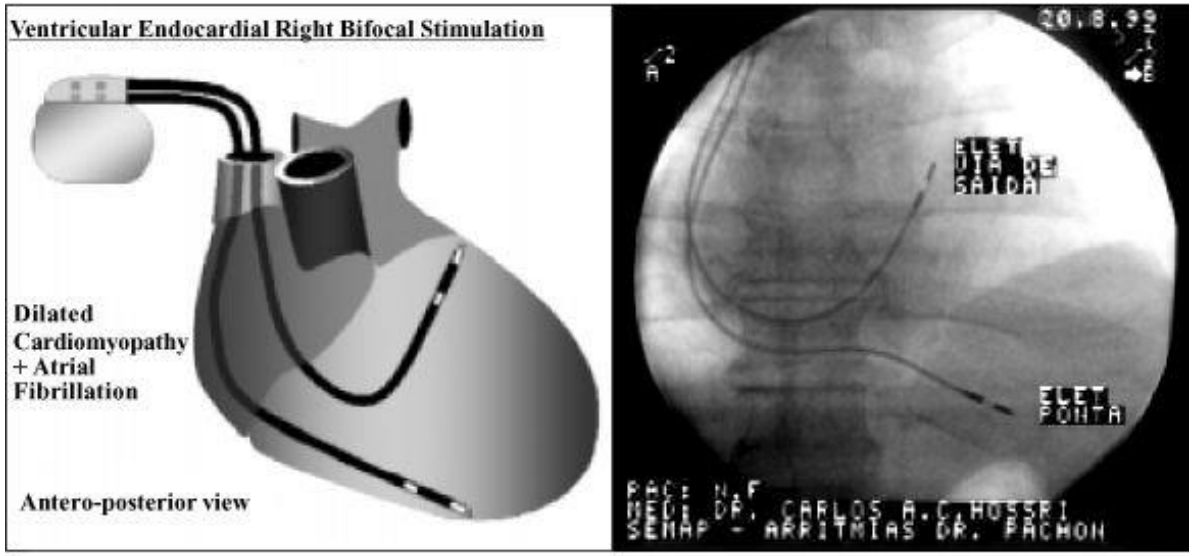


Fig. 1 - Left panel: scheme of the leads' positions for the 3 stimulation modes used in this study: right ventricular septal, bifocal and apex (conventional). Right panel: radioscopy showing the positions of the leads in a definitive bifocal system.

Inizialmente utilizzata nelle CRT fallite…

Pacing Clin Electrophysiol. 1997 Apr;20(4 Pt 1):909-15.

Acute hemodynamic effects of atrioventricular pacing at differing sites in the right ventricle individually and simultaneously.

Buckingham TA[1], Candinas R, Schläpfer J, Aebischer N, Jeanrenaud X, Landolt J, Kappenberger L.

Author information

Abstract

We hypothesized that pacing, which provided a rapid uniform contraction of the ventricles with a narrower QRS, would produce a better stroke volume and cardiac output (CO). We sought to study whether pacing simultaneously at two sites in the right ventricle (right ventricular apex and outflow tract) would provide a narrower QRS and improved CO in 11 patients undergoing elective electrophysiology studies. Pat n normal sinus rhythr icular outflow trac +/- 1.97, 5.67 +/- 1.6 iance [ANOVA]). The QRS durations were 0.09 +/- 0.02, 0.09 +/- 0.02, 0.13 +/- 0.027, 0.13 +/- 0.03, and 0.11 +/- 0.03 secs respectively. Repeated measures ANOVA showed that the QRS duration significantly increased with right ventricular apex or right ventricular outflow tract pacing compared to sinus rhythm and AOO pacing ($P < 0.001$) but then diminished with pacing at both sites ($P < 0.01$). QRS duration was not correlated with CO, however the change in QRS duration correlated significantly with the change in CO when pacing was performed at the two right ventricular sites simultaneously. In conclusion, during DOO pacing, there was a trend for pacing in the right ventricular outflow tract or both sites to improve the CO compared to the right ventricular apex. With simultaneous pacing at both ventricular sites, the QRS narrowed. Further studies will be required to see if this approach has value in patients with poor left ventricular function or congestive heart failure.

Pacing bifocale determina QRS più stretto e miglioramento di portata rispetto a pacing apicale (e settale singolo)

Journal of Interventional Cardiac Electrophysiology
October 2012, Volume 35, Issue 1, pp 85–91 | Cite as

Bifocal right ventricular pacing: an alternative way to achieve resynchronization when left ventricular lead insertion is unsuccessful

Authors Authors and affiliations

Skevos Sideris, Constantina Aggeli, Emmanouil Poulidakis ✉, Kostas Gatzoulis, Ioannis Vlaseros, Katerina Avgeropoulou, Ioannis Felekos, Ilias Sotiropoulos, Christodoulos Stefanadis, Ioannis Kallikazaros

- From 13 patients (age 68 ± 9 years, nine male), 10 improved clinically. New York Heart Association classification was reduced by one grade (from 3.6 ± 0.5 to 2.8 ± 0.8, $p < 0.005$ and respectively), while hospitalizations in 6-month time were reduced from three to one ($p < 0.001$). Six-minute walk test (in meters) increased from 176 ± 86 to 297 ± 91 ($p < 0.001$) and quality of life improved (EQ-VAS scale changed from 42 ± 12.5 % to 70.8 ± 20.3 %, $p < 0.001$). Mean shortening in QRS duration was 31.3 ms (from 165.1 ± 16.3 to 133.8 ± 12.7, $p < 0.001$) and B-type natriuretic peptide (in picograms per milliliter) dropped from 834 ± 350 to 621 ± 283 ($p < 0.001$). Ejection fraction (in percent) increased from 27.5 ± 4.6 to 33.3 ± 4.4 ($p < 0.001$), and mitral regurgitation severity decreased by one grade (from 2.7 ± 0.9 to 1.8 ± 0.7, $p < 0.05$).
- RV bifocal pacing seems to offer a substantial clinical benefit to heart failure patients with traditional CRT indications and could be an alternative option when LV access is unsuccessful.

PACE
Pacing And Clinical Electrophysiology

Is Bifocal Right Ventricular Pacing a Viable Form of Cardiac Resynchronization?

S. SERGE BAROLD M.D., ROBERTO AUDOGLIO Sc.D., PIER ANTONIO RAVAZZI M.D., PAOLO DIOTALLEVI M.D.

First published: 09 July 2008 | https://doi.org/10.1111/j.1540-8159.2008.01093.x | Cited by: 8

- Riportati numerosi studi con effetti emodinamici favorevoli sia in fase acuta che cronica

Cor et Vasa

Volume 58, Issue 4, August 2016, Pages e391-e395

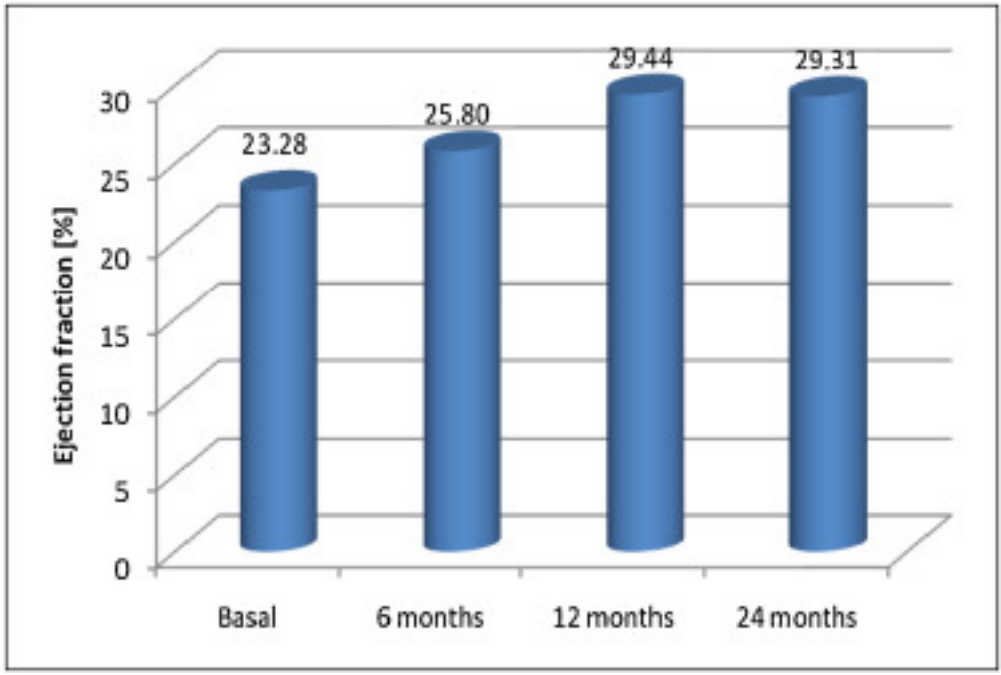
Original research article

Right bundle branch block and heart failure: Can a bifocal right ventricular pacing be an alternative to biventricular pacing?

Eraldo Occhetta, Gabriele Dell'Era, Chiara Sartori, Anna Degiovanni, Elisa Maggi, Paolo Marino

Show more

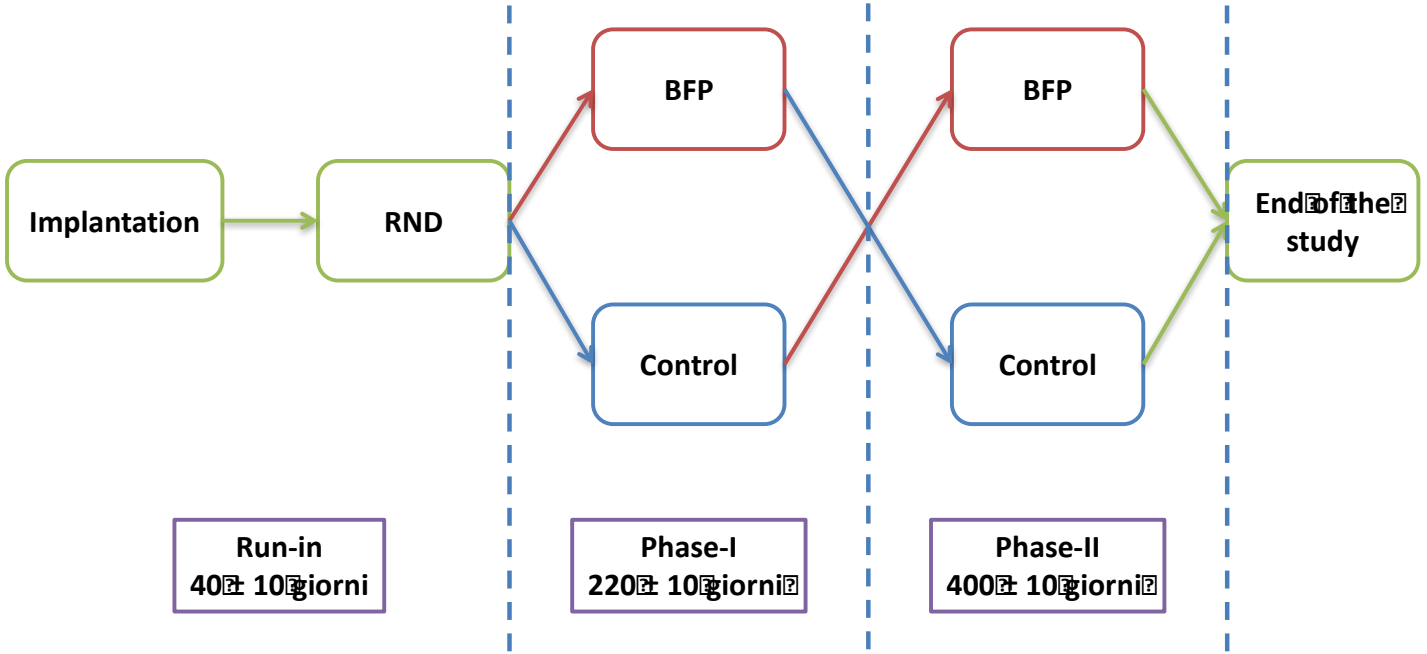
https://doi.org/10.1016/j.crvasa.2016.01.016



- Right ventricular bifocal pacing could be an alternative to conventional biventricular pacing in patients with RBBB and advanced HF, ensuring a more rational electric "resynchronization", even if hemodynamic and functional benefit remains to be demonstrated.

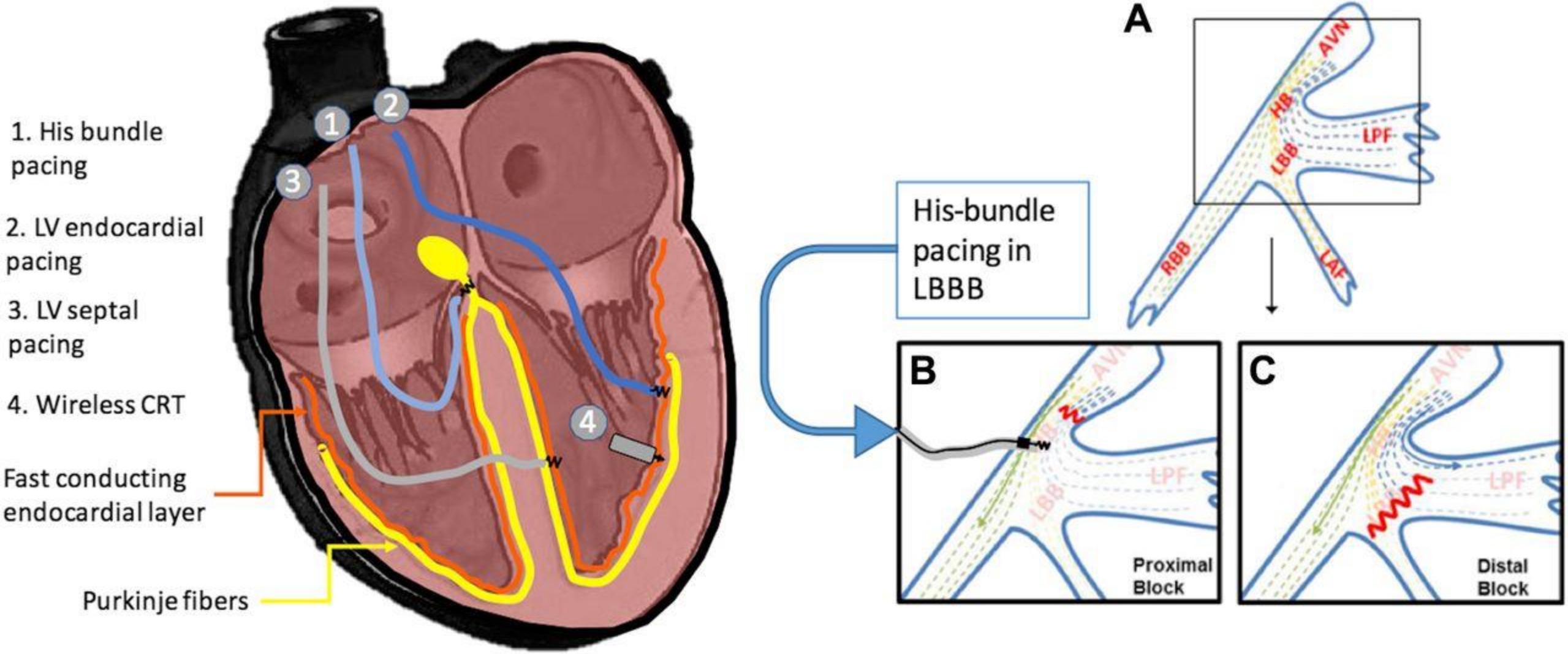
BiPARK-HF

Study Design



- Enpoint primario: distanza percorsa al 6MWT.
- Endpoint secondario: valutazione "responder" secondo definizioni accettate per la CRT-->almeno 1 criterio tra miglioramento CF NYHA, miglioramento >30% distanza percorsa al 6MWT, miglioramento FE del 25% o riduzione VTS del 15%.

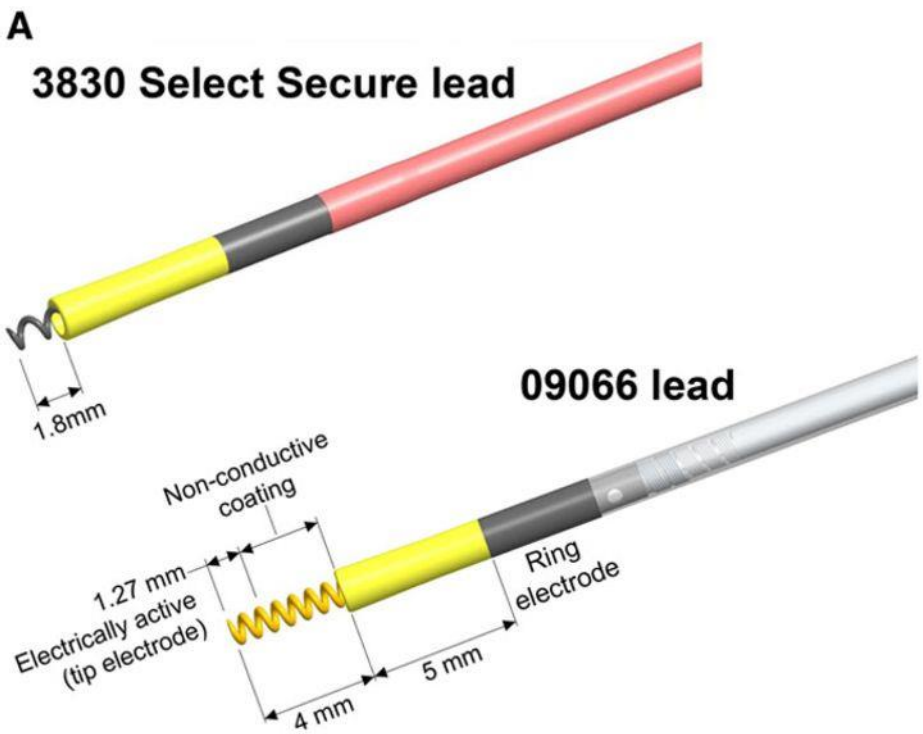
Nuovi «siti alternativi»

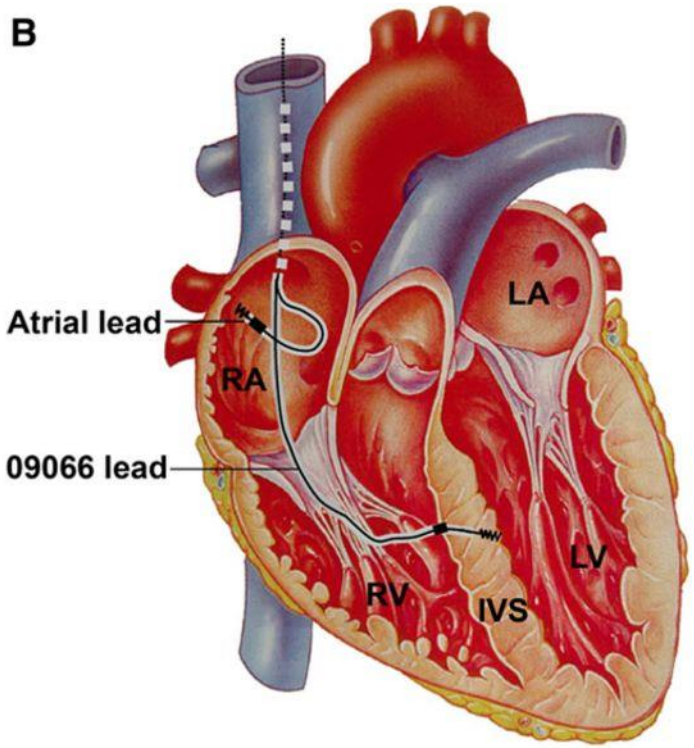


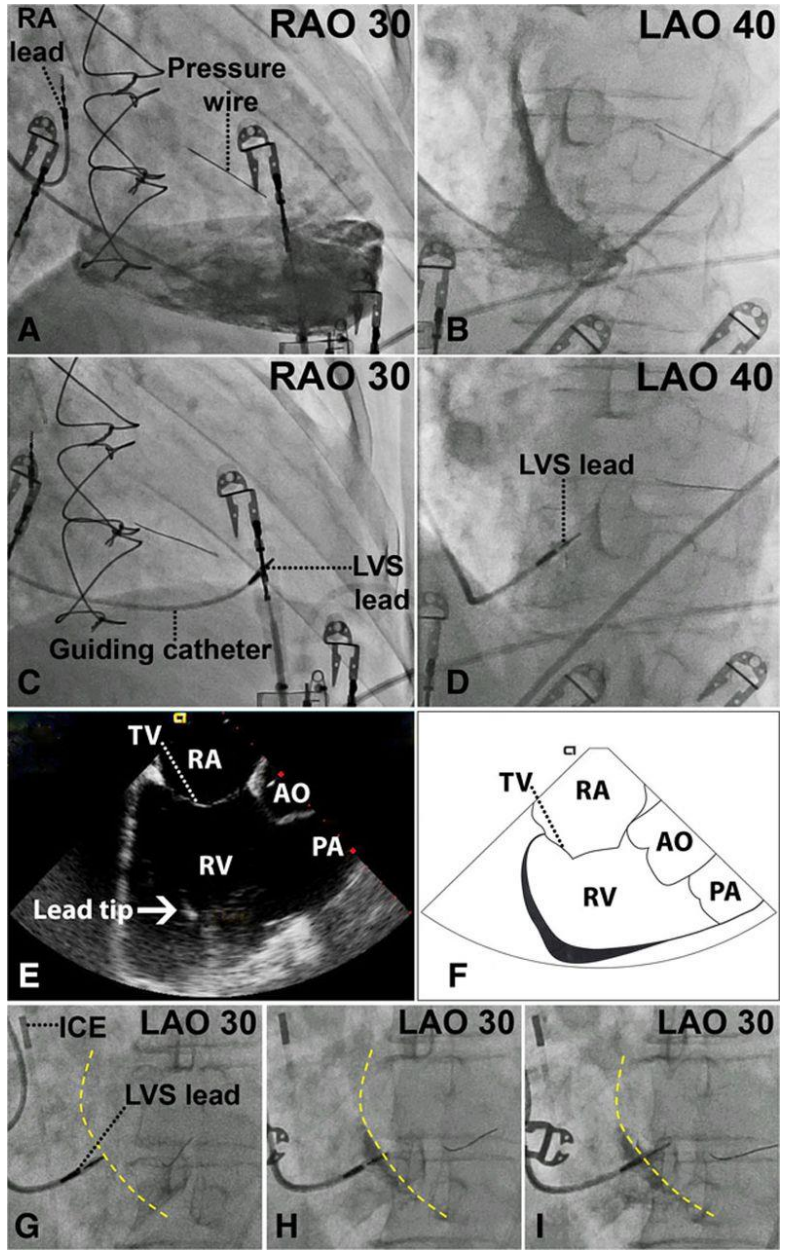
Angelo Auricchio, and Frits W. Prinzen JACEP 2017;j.jacep.2017.08.005

JACC Clinical Electrophysiology

Masih Mafi-Rad et al. Circ Arrhythm Electrophysiol. 2016;9:e003344



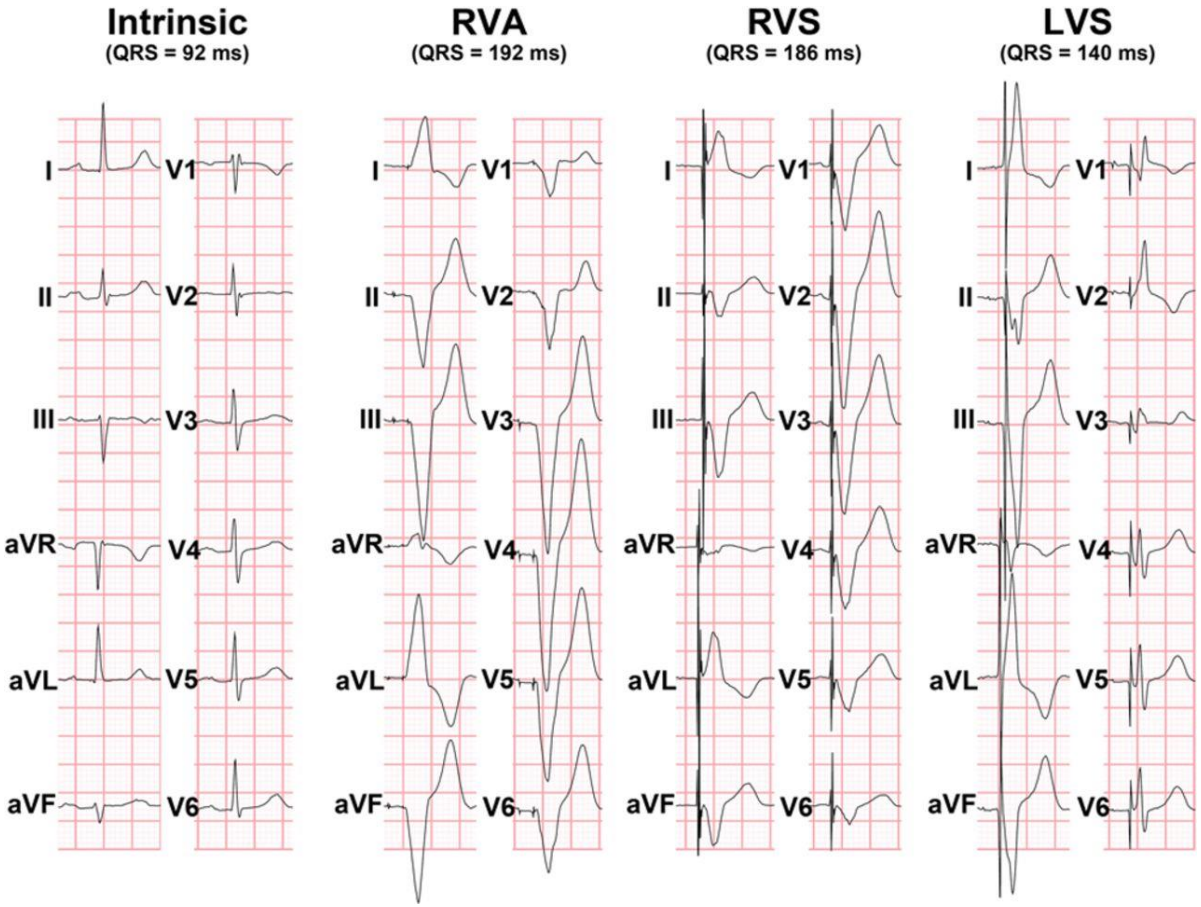




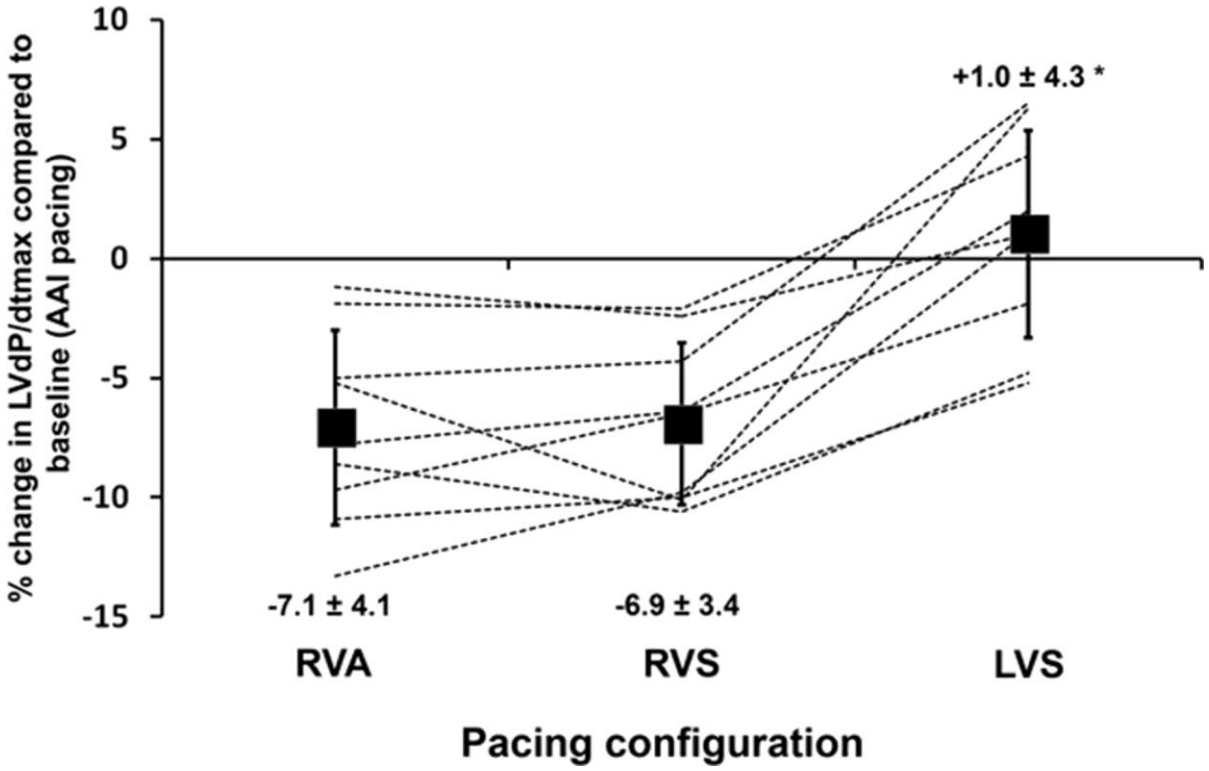
10 pazienti con malattia NSA e impianto PM DDD

American Heart Association.

Twelve-lead ECG from patient 2 (Table 1) during intrinsic activation, right ventricular apex (RVA), right ventricular septal (RVS), and left ventricular septal (LVS) pacing.

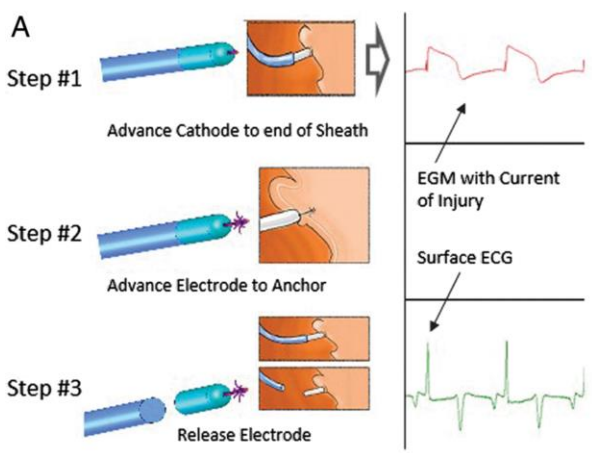


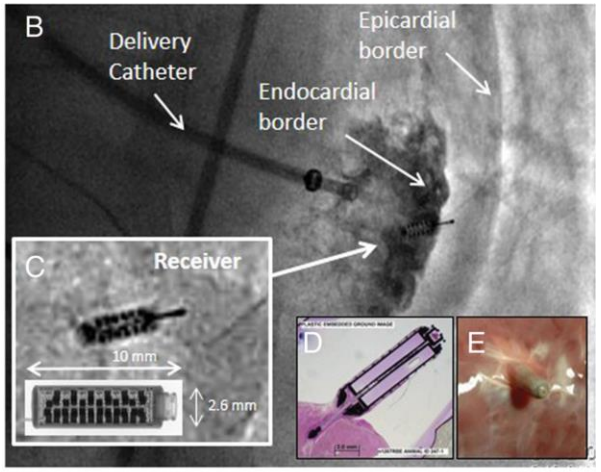
Acute change in left ventricular (LV)dP/dtmax (mean±SD) during pacing at different ventricular sites relative to baseline atrial pacing.

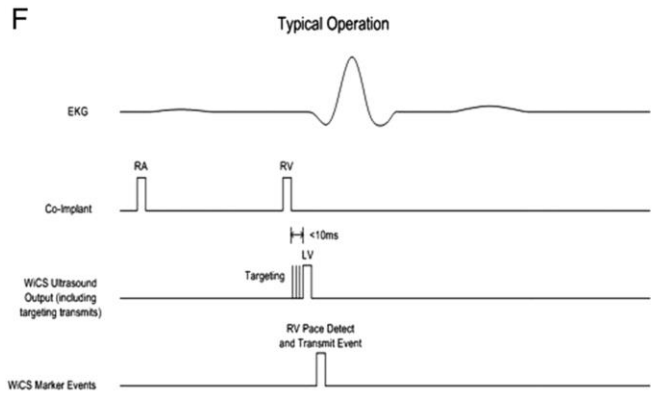


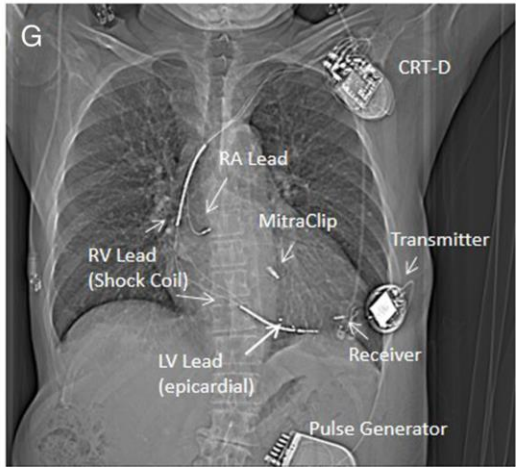
Masih Mafi-Rad et al. Circ Arrhythm Electrophysiol. 2016;9:e003344

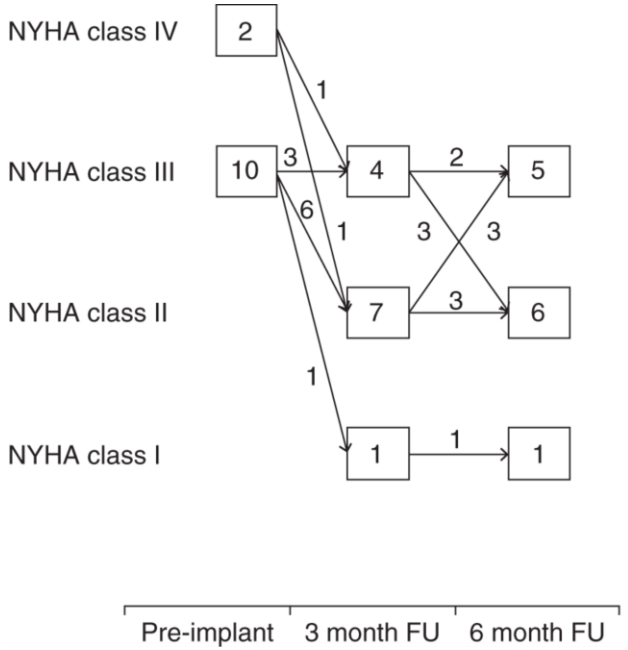
17 pazienti con indicazione a CRT e impianto fallito

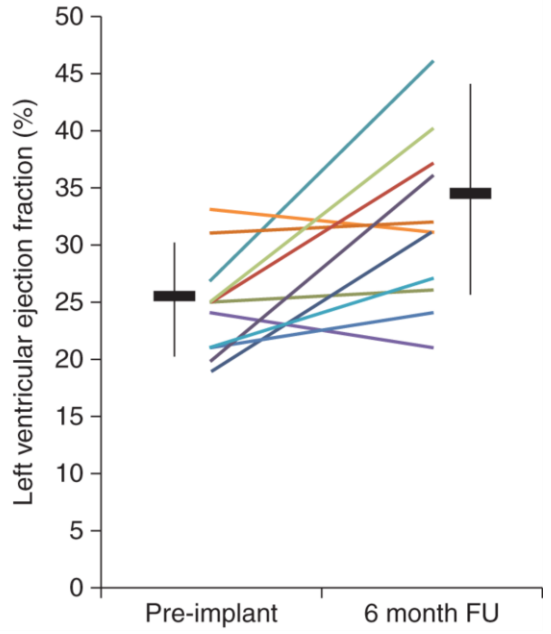






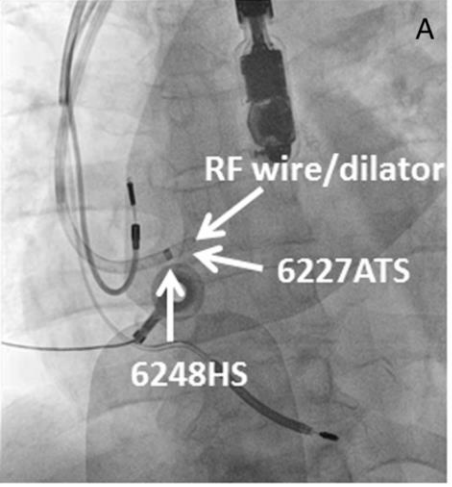


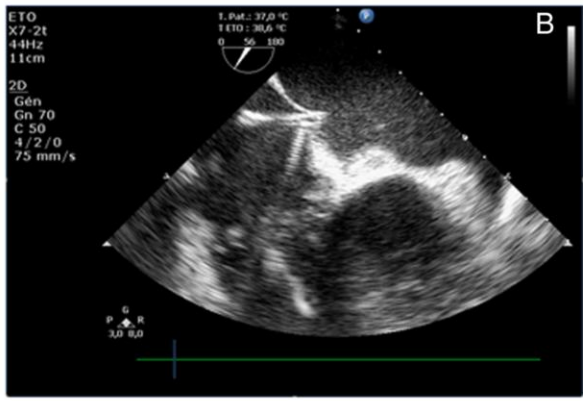


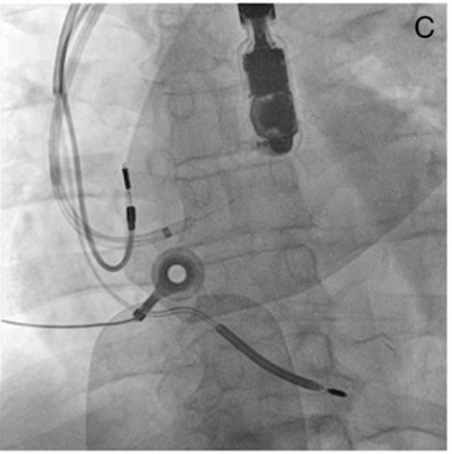


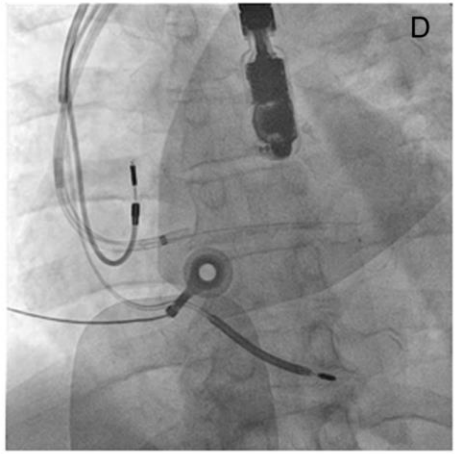
Problemi di sicurezza legati a delivery: 3 tamponamenti

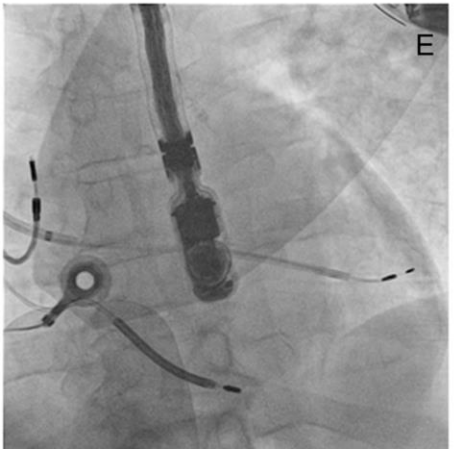
From: Feasibility, safety, and short-term outcome of leadless ultrasound-based endocardial left ventricular resynchronization in heart failure patients: results of the Wireless Stimulation Endocardially for CRT (WiSE-CRT) study
Europace. 2014;16(5):681-688. doi:10.1093/europace/eut435

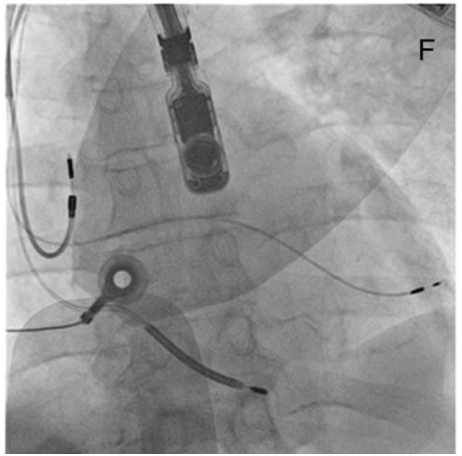












	Baseline (*n* = 118)	6 months (*n* = 105)	Change	*P*-value*	Response definition	Response rate for all patients (*n* = 118)	Response rate for non-responders with prior CRT (*n* = 31)
LVESV	149 ± 79 mL	121 ± 74 mL	29 ± 60 mL reduction	<0.0001	≥15% relative reduction	55%	47%
					≥30% relative reduction	33%	5%
LVEF	29 ± 10%	36 ± 12%	7 ± 10% increase	<0.0001	≥5% absolute increase	64%	61%
Mitral regurgitation	Moderate/severe: 41%	Moderate/severe: 30%		0.035	≥1 class improvement	33%	43%
NYHA class	I/II/III/IV: 3%/20%/69%/7%	I/II/III/IV: 19%/51%/28%/2%		<0.0001	≥1 class improvement	59%	52%
Six-minute walking test	332 ± 117 m	388 ± 135 m	47 ± 87 m increase	0.004	≥60 m increase	44%	42%

Conclusion

The ALSYNC study demonstrates clinical feasibility, and provides an early indication of possible risks and benefits of LVEP. This approach to CRT warrants a comparative study designed to evaluate the clinical effectiveness and safety of LVEP to other alternatives for LV epicardial pacing.

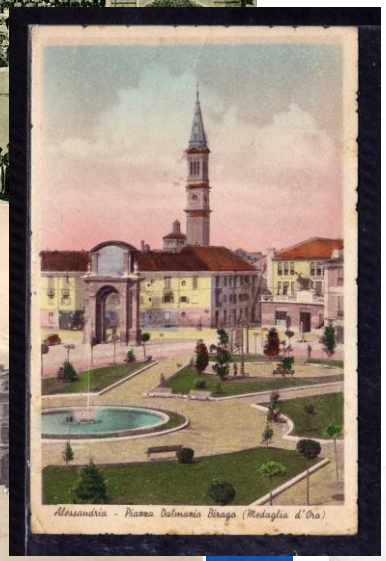
Circa 20% di complicanze ischemiche cerebrali nonostante TAO!

From: ALternate Site Cardiac ResYNChronization (ALSYNC): a prospective and multicentre study of left ventricular endocardial pacing for cardiac resynchronization therapy

Eur Heart J. 2016;37(27):2118-2127. doi:10.1093/eurheartj/ehv723

AIAC

Associazione Italiana Aritmologia e Cardiostimolazione



Grazie per l'attenzione!