PLACE
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

ROMA
Centro Congressi di Confindustria
Auditorium della Tecnica

9ª Edizione

30 Settembre
1 Ottobre
2022

CARDIOSTIMOLAZIONE: NUOVE EVIDENZE

COMPLICANZE DELLA STIMOLAZIONE DEL SISTEMA DI CONDUZIONE

Grigorios Katsouras MD, MSc, FHRS, FCCS

Complicazioni His

- Microdislocazione elettrodo con aumento dei tempi operatori
- Blocco di branca destra (temporaneo?)
- Blocco completo (temporaneo?)
- Danno alla tricuspide (estremamente raro)
- **Aumento della soglia, under-oversensing, revisione elettrodo**

Complicazioni LBBAP

Complications attributed to the transseptal route of the pacing lead	
Intraprocedural perforation into the LV cavity	93 (3.67%)
Delayed perforation into the LV cavity	2 (0.08%)
Acute chest pain	25 (0.98%)
Acute ST-segment elevation in multiple leads	6 (0.24%)
Acute coronary syndrome [c]	11 (0.43%)
Coronary vein fistula	7 (0.28%)
Coronary artery fistula	2 (0.08%)
Painful pacing/chest pain	4 (0.16%)
LBBAP lead unscrewable/trapped/damaged helix	11 (0.43%)
LBBAP lead dislodgement	38 (1.5%)
Threshold rise to an absolute value > 2 V	17 (0.67%)
Threshold rise > 1 V from baseline	18 (0.71%)
Threshold rise leading to re-intervention	4 (0.16%)
Stroke/TIA	0 (0)
Summary	209 (8.25%)

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DOI: 10.1111/jce.14063

WILEY

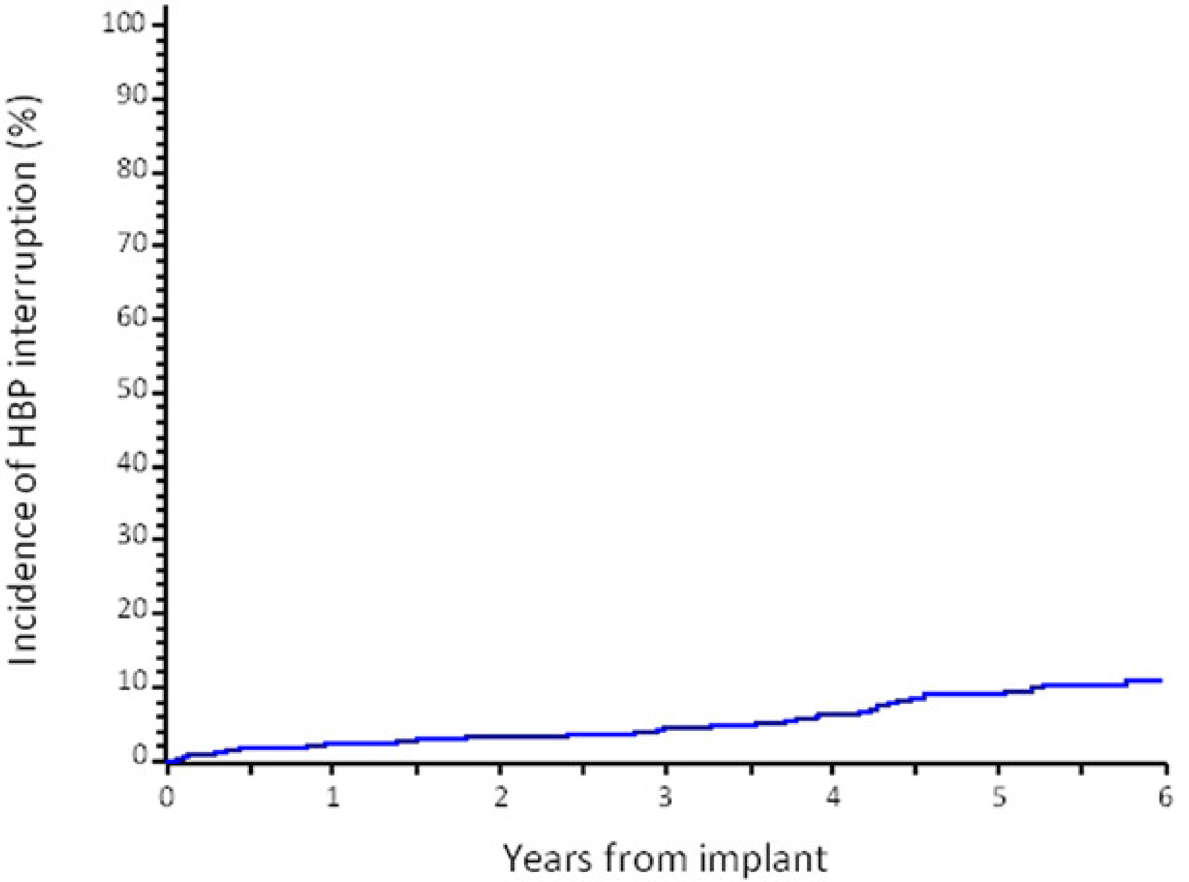
ORIGINAL ARTICLE

Long term performance and safety of His bundle pacing: A multicenter experience

Francesco Zanon MD, FHRS, FESC, FHERA[1] | Mohamed Abdelrahman MD[2] | Lina Marcantoni MD[1] | Angela Naperkowski RN, FHRS, CEPS, CCDS[2] | Faiz A Subzposh MD[2] | Gianni Pastore MD[1] | Enrico Baracca MD[1] | Graziano Boaretto RN[1] | Paola Raffagnato RN[1] | Antonella Tiribello RN[1] | Gopi Dandamudi MD, FHRS[2] | Pugazhendhi Vijayaraman MD, FHRS[2]

TABLE 3 Safety endpoints at follow-up

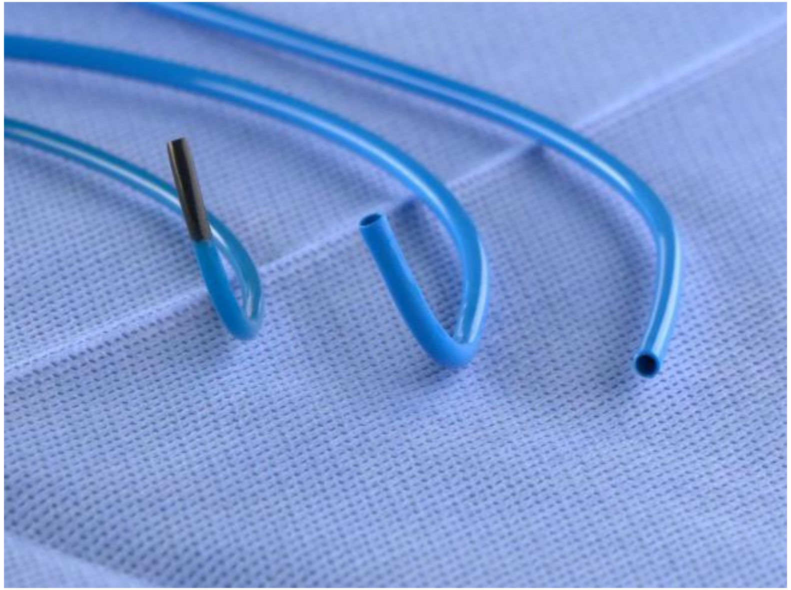
Capture threshold ≥ 2.5 V	**27.6% (233/844)**
Capture threshold > 2.5 V	23.3 (197/844)
Capture threshold = 2.5 V	4.3% (36/844)
Interruption of HIS pacing	7.6% (64/844)
Capture threshold ≥ 5 V	2.6% (22/844)
Capture threshold ≥ 3.5 V and < 5 V	3.4% (29/844)
Sensing issues	0.2% (2/844)
Infection	0.5% (4/844)
Upgrading to biventricular device	0.6%(5/844)
Lead fracture	0.1% (1/844)
Lead dislodgement	0.1% (1/844)

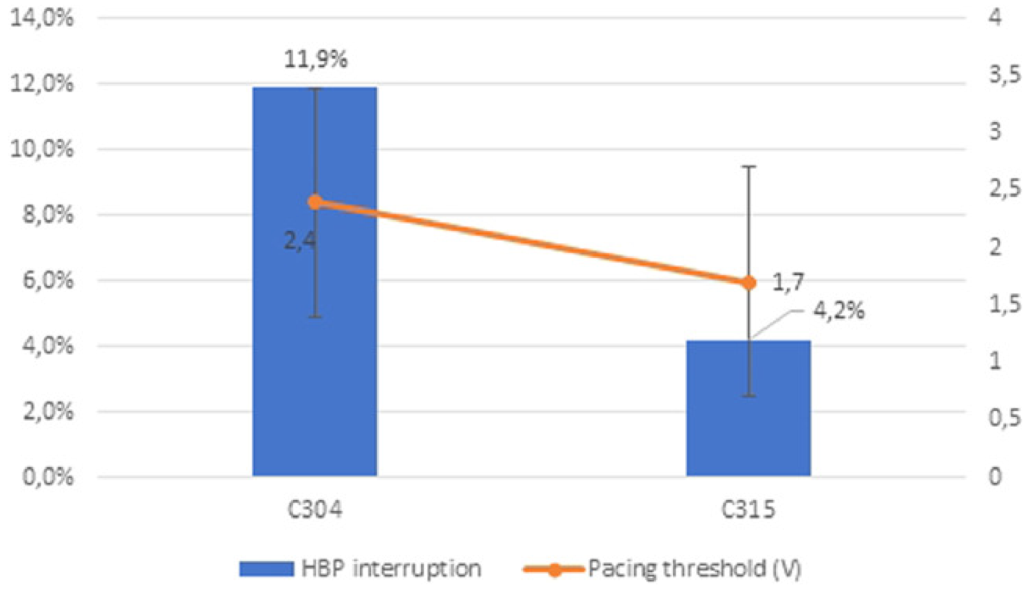


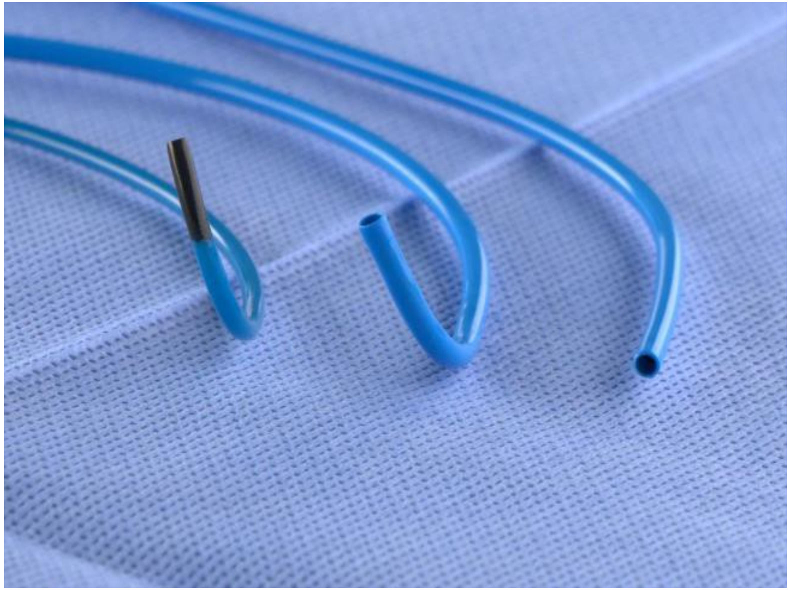
No. at Risk	844	676	544	447	296	202	146

3.5 | Outcomes using C304 vs C315

Out of 844, in the first 368 patients (43.6%), HBP was achieved using a C304 deflectable curve delivery system, while in 476 (56.4%) patients using C315 His fixed curve sheath. The interruption of HBP occurred in 44 patients (11.9%) in the deflectable group, while in 20 (4.2%) in the fixed curve group, $P < .001$. The HB capture threshold and sensed R wave at follow up in the C304 group was 2.4 ± 1.0 V and 3.0 ± 2.9 mV, respectively, while 1.7 ± 1.1 V and 5.8 ± 5.1 mV in the C315His group (Figure 3).




14,0%
12,0%
10,0%
8,0%
6,0%
4,0%
2,0%
0,0%
4
3,5
3
2,5
2
1,5
1
0,5
0
11,9%
2,4
1,7
4,2%
C304
C315
HBP interruption
Pacing threshold (V)



ESC European Society of Cardiology
Europace (2020) **22**, ii19–ii26
doi:10.1093/europace/euaa306

CLINICAL RESEARCH

Long-term performance and risk factors analysis after permanent His-bundle pacing and atrioventricular node ablation in patients with atrial fibrillation and heart failure

Lan Su[1,2†], Mengxing Cai[1,2†], Shengjie Wu[1,2], Songjie Wang[1,2], Tiancheng Xu[1,2], Pugazhendhi Vijayaraman[3], and Weijian Huang[1,2*]

[1]Department of Cardiology, The First Affiliated Hospital of Wenzhou Medical University, Nanbaixiang, Wenzhou 325000, China; [2]The Key Lab of Cardiovascular Disease of Wenzhou, Science and Technology of Wenzhou, Wenzhou, China; and [3]Department of Cardiac Electrophysiology, Geisinger Commonwealth School of Medicine, Wilkes-Barre, PA, USA

Received 19 May 2020; editorial decision 12 September 2020

Aims His-bundle pacing (HBP) combined with atrioventricular node (AVN) ablation has been demonstrated to be effective in patients with atrial fibrillation (AF) and heart failure (HF) during medium-term follow-up and there are limited data on the risk analysis of adverse prognosis in this population. In this study, we aimed to evaluate the long-term performance of HBP following AVN ablation in AF and HF.

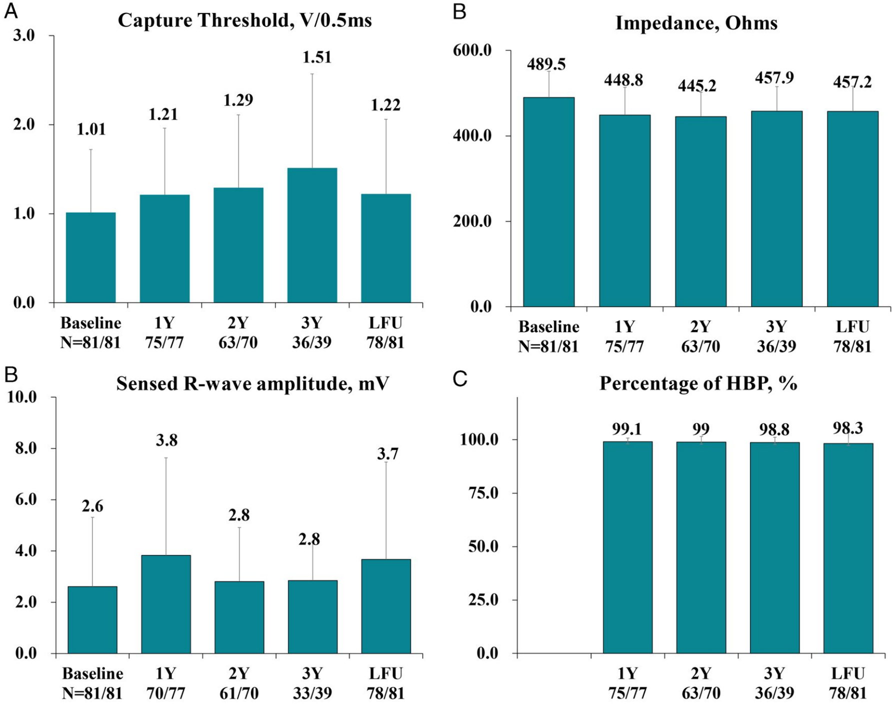
Methods and results From August 2012 to December 2017, consecutive AF patients with HF and narrow QRS who underwent AVN ablation and HBP were enrolled. The clinical and echocardiographic data, pacing parameters, all-cause mortality, and heart failure hospitalization (HFH) were tracked. A total of 94 patients were enrolled (age 70.1 ± 10.5 years; male 57.4%). Acute HBP were achieved in 89 (94.7%) patients with successful permanent HBP combined with AVN ablation in 81 (86.2%) patients. Left ventricular ejection fraction (LVEF) improved from 44.9 ± 14.9% at baseline to 57.6 ± 12.5% during a median follow-up of 3.0 (IQR: 2.0–4.4) years ($P < 0.001$). Heart failure hospitalization or all-cause mortality occurred in 21 (25.9%) patients. The LVEF ≤ 40%, pulmonary artery systolic pressure (PASP) ≥40 mmHg, or serum creatinine (Scr) ≥97 μmol/L at baseline was significantly associated with higher composite endpoint of HFH or death ($P < 0.05$). The His capture threshold was 1.0 ± 0.7 V/0.5 ms at implant and remained stable during follow-up.

Conclusion His-bundle pacing combined with AVN ablation was effective in patients with AF and drug-refectory HF. High PASP, high Scr, or low LVEF at baseline was independent predictors of composite endpoint of all-cause mortality or HFH.

Study patients

Consecutive patients from August 2012 to December 2017 who met the following inclusion criteria were enrolled: (i) long-lasting persistent AF with symptomatic HF and narrow QRS despite optimal medical therapy or failed atrial fibrillation ablation. (ii) Patients >18 years old and not pregnant. (iii) AVN ablation and HBP patients with any of the following conditions were excluded: (i) intraventricular conduction block or delay on 12-lead electrocardiograph, (ii) severe mitral or aortic valve regurgitation, (iii) congenital heart disease requiring cardiac surgery, (iv) chronic kidney disease with dialysis, and (v) severe chronic obstructive pulmonary disease. The present study was a single-centre prospective study approved by the Institutional Review Board of The First Affiliated Hospital of Wenzhou Medical University. All patients provided written informed consent.

Figure 3 Electrical parameters of HBP and the percentage of HBP during the follow-up period. (A) HBP threshold, (B) ...



Europace, Volume 22, Issue Supplement_2, December 2020, Pages ii19–ii26, https://doi.org/10.1093/europace/euaa306

Complication

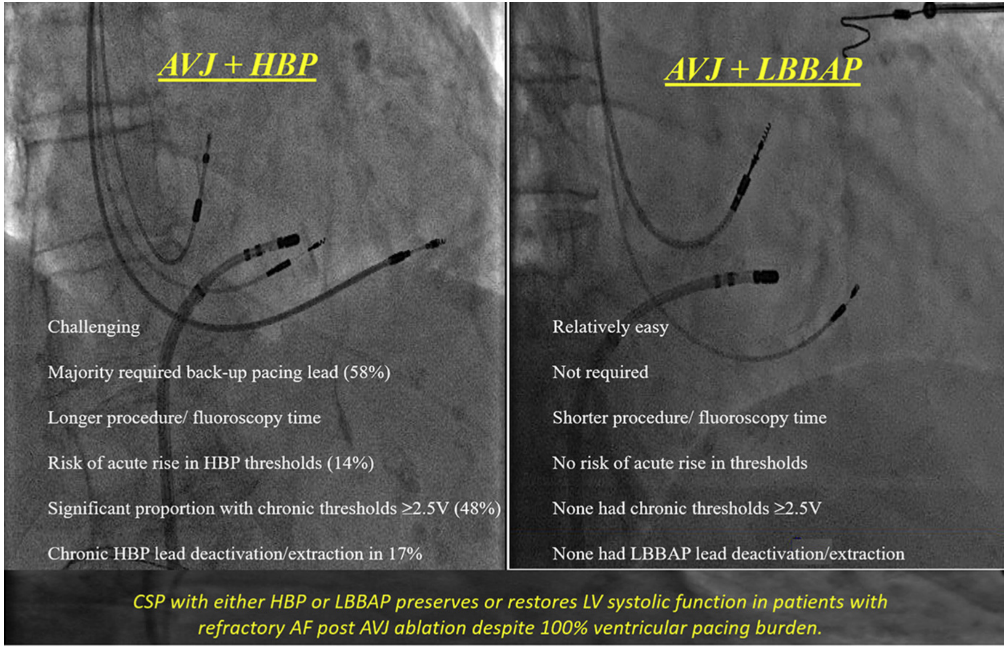
Five patients (6.2%) had significant increase in HBP capture threshold (>1 V/0.5 ms) from 1.05 ± 0.09 V/0.5 ms at implant to 3.25 ± 0.27 V/0.5 ms at a median follow-up of 192 (IQR: 132–195) days, three patients had lead revision. Pocket infection after the implantation of PM occurred in one patient (1.2%) and had lead revision. No lead displacements occurred during follow-up.

Atrioventricular junction ablation in patients with conduction system pacing leads: A comparison of His-bundle vs left bundle branch area pacing leads

Ajay Pillai, MD, Jeffrey Kolominsky, MD, Jayanthi N. Koneru, MD, Jordana Kron, MD, Richard K. Shepard, MD, Gautham Kalahasty, MD, Weijian Huang, MD, Atul Verma, MD, FHRS, Kenneth A. Ellenbogen, MD, FHRS

Heart Rhythm

DOI: 10.1016/j.hrthm.2022.03.1222


AVJ + HBP
Challenging
Majority required back-up pacing lead (58%)
Longer procedure/ fluoroscopy time
Risk of acute rise in HBP thresholds (14%)
Significant proportion with chronic thresholds ≥2.5V (48%)
Chronic HBP lead deactivation/extraction in 17%
AVJ + LBBAP
Relatively easy
Not required
Shorter procedure/ fluoroscopy time
No risk of acute rise in thresholds
None had chronic thresholds ≥2.5V
None had LBBAP lead deactivation/extraction
CSP with either HBP or LBBAP preserves or restores LV systolic function in patients with refractory AF post AVJ ablation despite 100% ventricular pacing burden.

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[*]

From the [*]Division of Cardiac Electrophysiology, Virginia Commonwealth University, Richmond, Virginia, [†]Department of Internal Medicine, Virginia Commonwealth University, Richmond, Virginia, [‡]Department of Cardiology, Virginia Commonwealth University, Richmond, Virginia, and [§]Division of Cardiac Electrophysiology, Hunter Holmes McGuire VA Medical Center, Richmond, Virginia.

BACKGROUND The short-term safety, feasibility, and performance of His-bundle pacing (HBP) leads have been reported; however, their longer-term performance beyond 1 year remains unclear.

OBJECTIVE The purpose of this study was to examine the intermediate-term performance and safety of HBP.

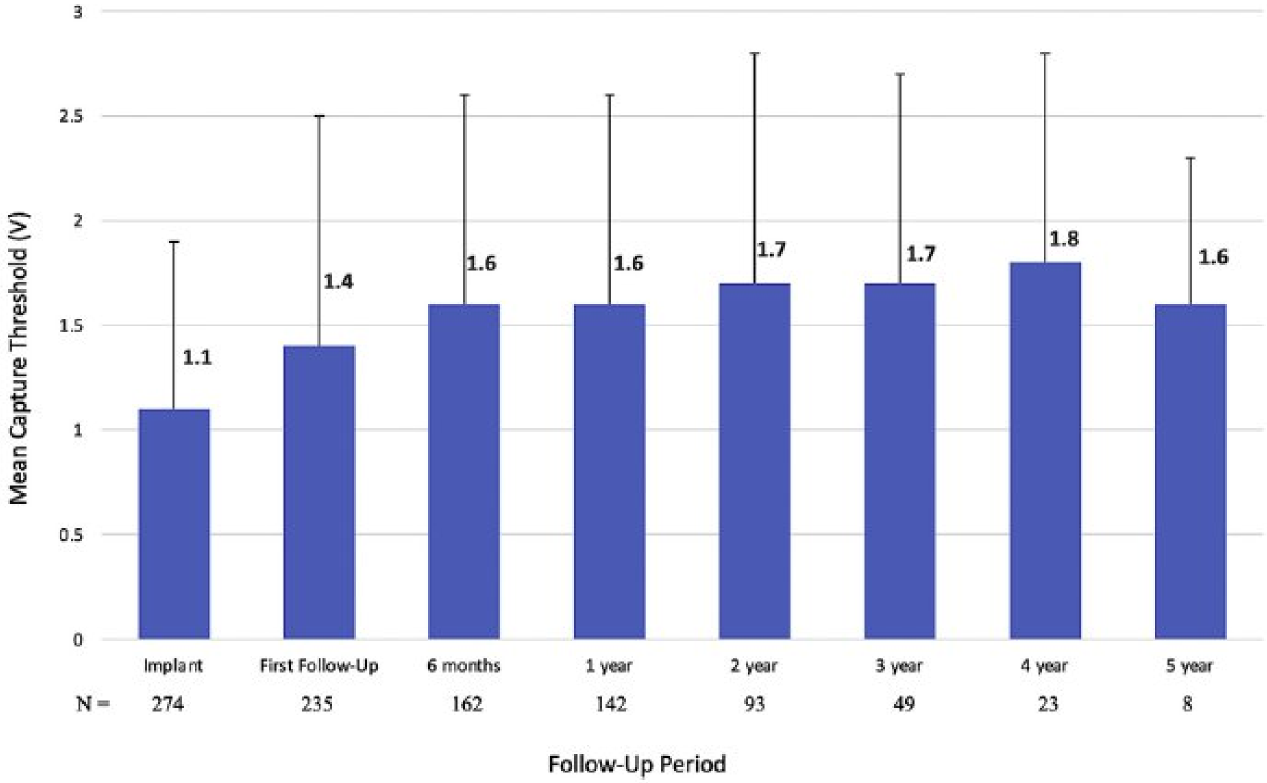
METHODS All HBP lead implants at Virginia Commonwealth University between January 2014 and January 2019 were analyzed. HBP was performed using a Medtronic SelectSecure 3830-69 cm pacing lead.

RESULTS Of 295 attempts, successful HBP implantation (selective or nonselective) was seen in 274 cases (93%). Mean follow-up duration was 22.8 ± 19.5 months (median 19.5; interquartile range 11–33). Mean age was 69 ± 15 years; 58% were males; and ejection fraction <50% was noted in 30%. Indications for pacemaker included sick sinus syndrome in 41%, atrioventricular block in 36%, cardiac resynchronization therapy in 7%, and refractory atrial fibrillation in 15%. Selective HBP was achieved in 33%. Mean HBP capture threshold at implant was 1.1 ± 0.9 V at 0.8 ± 0.2 ms, which significantly increased at chronic follow-up to 1.7 ± 1.1 V at 0.8 ± 0.3 ms ($P < .001$). Threshold was ≥2.5 V in 24% of patients, and 28% had an increase in HBP threshold ≥1 V. Loss of His-bundle capture at follow-up (septal right ventricular pacing) was seen in 17%. There was a total of 31 (11%) lead revisions, primarily for unacceptably high thresholds.

CONCLUSION Although HBP can prevent or improve pacing-induced cardiomyopathy, the elevated capture thresholds, loss of His-bundle capture, and lead revision rates at intermediate follow-up are of concern. Longer-term follow-up data from multiple centers are needed.

KEYWORDS Capture threshold; Cardiac resynchronization; His-bundle pacing; Lead revision; Physiological pacing

(Heart Rhythm 2021;18:743–749)


3
2.5
2
1.5
1
0.5
0
Mean Capture Threshold (V)
1.1
1.4
1.6
1.6
1.7
1.7
1.8
1.6
Implant
First Follow-Up
6 months
1 year
2 year
3 year
4 year
5 year
N =
274
235
162
142
93
49
23
8
Follow-Up Period

ESC
European Society
of Cardiology

Europace (2021) **23**, 757–766
doi:10.1093/europace/euaa350

CLINICAL RESEARCH
Pacing and cardiac resynchronization therapy

His bundle pacing capture threshold stability during long-term follow-up and correlation with lead slack

Dominik Beer , Faiz A. Subzposh, Shaun Colburn, Angela Naperkowski, and Pugazhendhi Vijayaraman *

Geisinger Commonwealth School of Medicine Director, Cardiac Electrophysiology Geisinger Heart Institute MC 36-10, 1000 E Mountain Blvd Wilkes-Barre, PA 18711, USA

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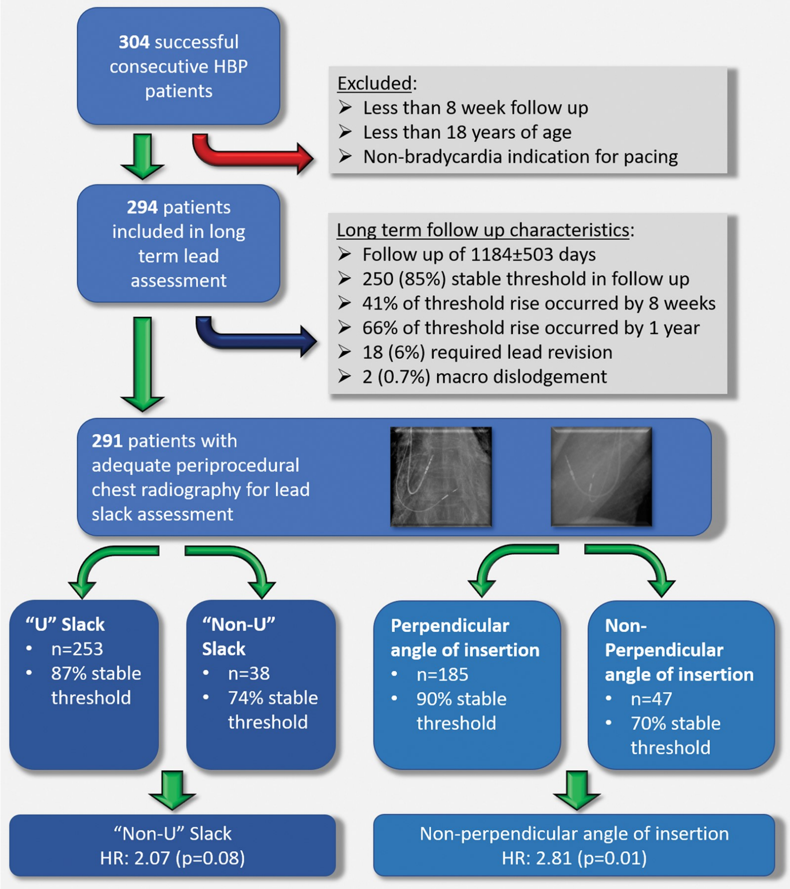
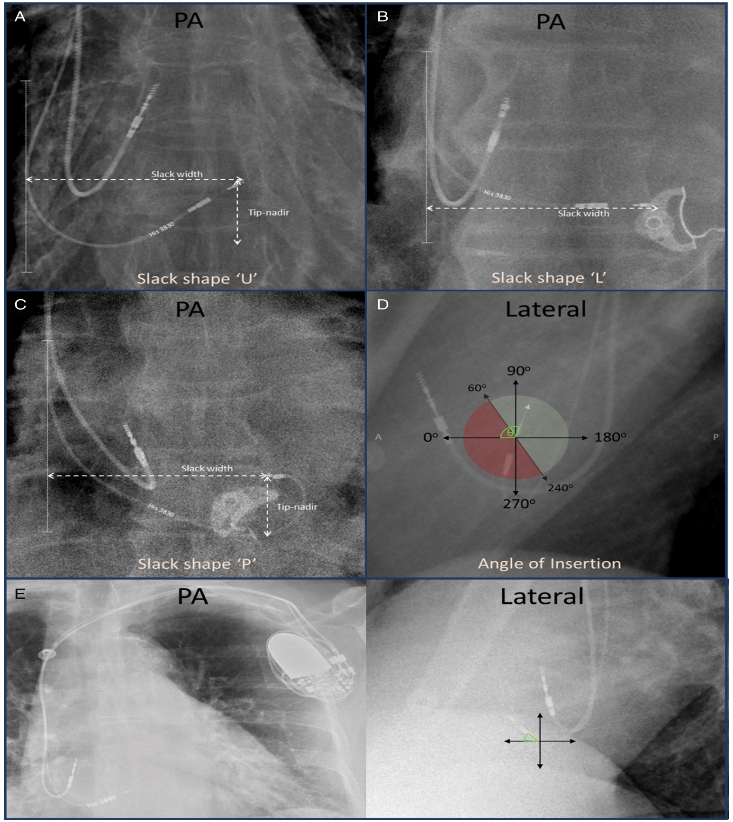


EHRA
European Heart Rhythm Association
European Society of Cardiology

Europace, Volume 23, Issue 5, May 2021, Pages 757–766, https://doi.org/10.1093/europace/euaa350

OXFORD UNIVERSITY PRESS

Figure 1 Lead slack shape and angle of insertion.

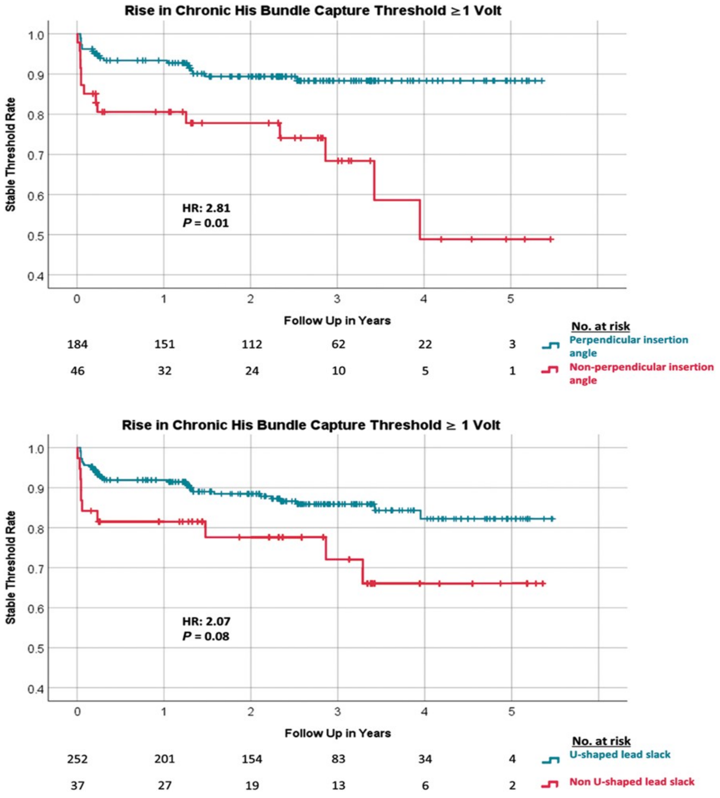


Europace, Volume 23, Issue 5, May 2021, Pages 757–766, https://doi.org/10.1093/europace/euaa350

Methods and results

Consecutive patients with successful HBP for bradycardia indications were identified from the Geisinger HBP registry. His bundle capture thresholds, baseline comorbidities, and radiographic lead slack characteristics were analysed. An increase in HB capture threshold ≥1 V above implant values at any time during follow-up was tracked. Forty-four of the 294 studied (15%) experienced HB capture threshold increase by ≥ 1 V. Threshold increase was seen early (41% by 8 weeks, 66% by 1 year). Eighteen (6%) patients required lead revision in follow-up. Abnormal slack shape was associated with a trend toward capture threshold increase [hazard ratio (HR) 2.07; 95% confidence interval (CI) 0.9–4.6; $P = 0.08$]. Non-perpendicular angle of lead insertion on radiography was associated with the capture threshold increase (HR 2.81, 95% CI 1.4–5.8; $P < 0.01$).

Figure 5 HBP capture threshold stability.



Europace, Volume 23, Issue 5, May 2021, Pages 757–766,
https://doi.org/10.1093/europace/euaa350

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DOI: 10.1111/jce.13256

ORIGINAL ARTICLE

WILEY

Right ventricular pacemaker lead position is associated with differences in long-term outcomes and complications

Chance M. Witt MD[1] | Charles J. Lenz MD[1] | Henry H. Shih MD[2] | Elisa Ebrille MD[1] | Andrew N. Rosenbaum MD[1] | Martin van Zyl MBChB[2] | Htin Aung MD[1] | Kevin K. Manocha MD[2] | Abhishek J. Deshmukh MBBS[1] | David O. Hodge MS[3] | Siva K. Mulpuru MD[1] | Yong-mei Cha MD[1] | Raul E. Espinosa MD[1] | Samuel J. Asirvatham MD[1] | Christopher J. Mcleod MBChB, PhD[1]

TABLE 3 Complication Rates at 5 Years

Variable	Apical (n = 2479)	Septal (n = 238)	P Value	Nonseptal Nonapical (n = 733)	P Value
Lead dislodgement	21 (2%)	1 (0.7%)	0.43	14 (4%)	0.005
Perforation	14 (1.0%)	1 (0.4%)	0.75	4 (0.8%)	0.86
Tamponade	27 (2%)	2 (1%)	0.68	5 (1%)	0.49
Lead revision	61 (5%)	8 (5%)	0.65	30 (8%)	0.005
Any complication	94 (6%)	10 (6%)	0.84	34 (8%)	0.05

All values given are Kaplan–Meier probability estimates at 5 years.

ORIGINAL ARTICLE

Pros and Cons of Left Bundle Branch Pacing

A Single-Center Experience

Venkatesh Ravi, MD; Jillian L. Hanifin, RN; Timothy Larsen, DO; Henry D. Huang, MD; Richard G. Trohman, MD, MBA; Parikshit S. Sharma, MD, MPH

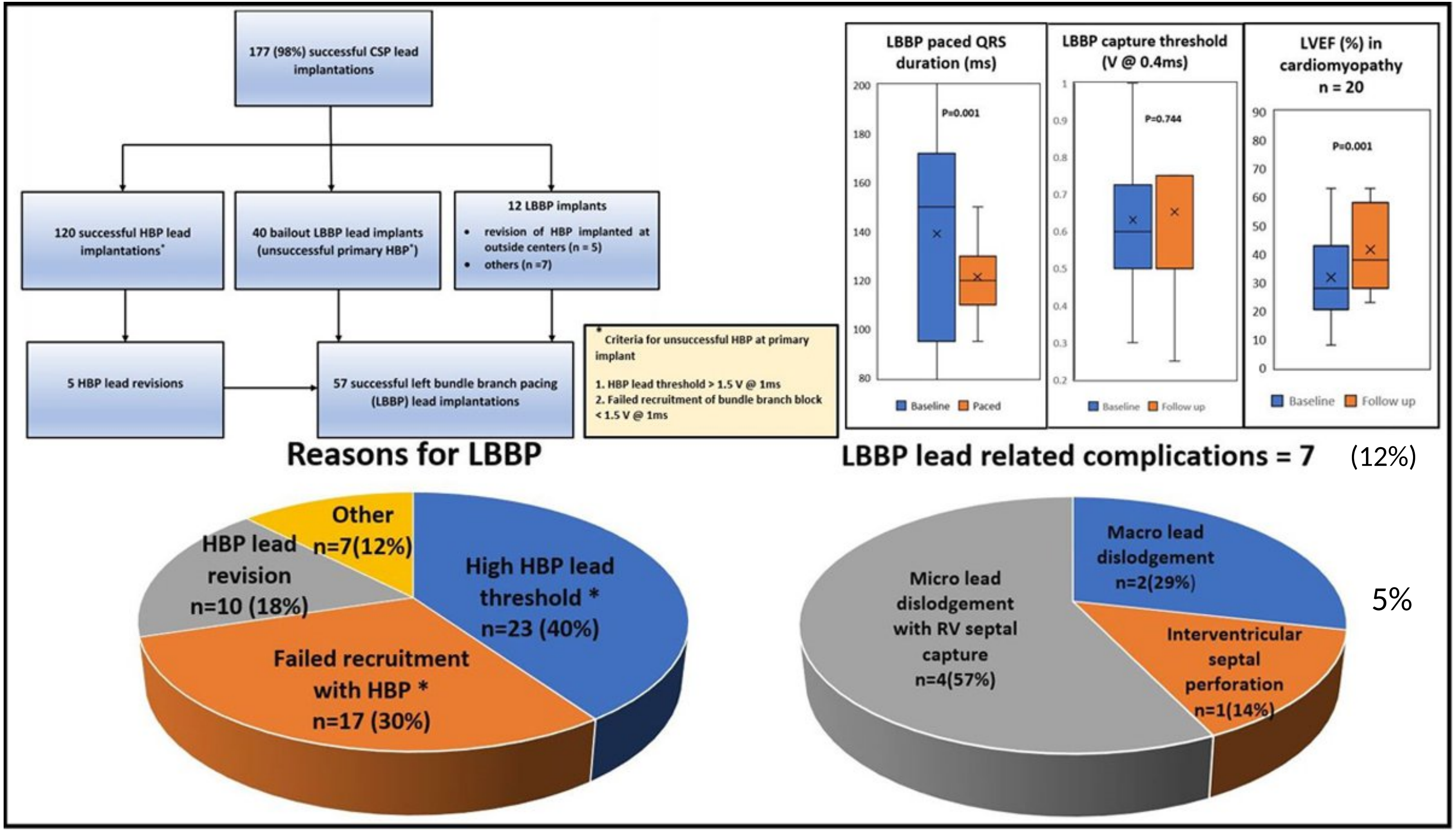
BACKGROUND: Left bundle branch pacing (LBBP) has recently emerged as a promising alternative modality for conduction system pacing. However, limited real-world data exists on the advantages and complications associated with LBBP. We analyzed the Rush conduction system pacing registry on LBBP to assess the success rates and complications associated with LBBP.

METHODS: All patients with an indication for permanent pacemaker or cardiac resynchronization therapy that underwent LBBP for various reasons from June 2018 to April 2020 were included in the analysis.

RESULTS: A total of 57 of 59 patients underwent successful LBBP (success rate 97%). The average follow-up duration was 6.2±5 months. The implanted devices included 38 dual-chamber pacemakers, 17 cardiac resynchronization therapy defibrillators, and 2 cardiac resynchronization therapy pacing systems. The most common reason for performing LBBP was a high His-Bundle pacing threshold (n=23) at implant. The mean LBBP capture threshold at implant was 0.62±0.21 V at 0.4 ms which remained stable during follow-up at 0.65±0.68 V at 0.4ms. In 21 patients with cardiomyopathy, there was a significant improvement in left ventricle ejection fraction from 30±11% to 42±15%. A total of 7 lead-related complications (12.3%) were noted in the follow-up period. Three patients (5.3%) required lead revision during the follow-up period. Interventricular septal perforation occurred (as late sequela) after 2 weeks in one patient.

CONCLUSIONS: LBBP can be achieved with a high success rate and low capture thresholds. Left ventricular dysfunction improved significantly during follow-up. Lead-related complications were relatively common occurring in 12.3% of initially successful implants. Lead revision was required in 3 (5%) of patients.

GRAPHIC ABSTRACT: A graphic abstract is available for this article.


177 (98%) successful CSP lead implantations
120 successful HBP lead implantations*
40 bailout LBBP lead implants (unsuccessful primary HBP*)
12 LBBP implants
• revision of HBP implanted at outside centers (n = 5)
• others (n =7)
5 HBP lead revisions
57 successful left bundle branch pacing (LBBP) lead implantations
* Criteria for unsuccessful HBP at primary implant
1. HBP lead threshold > 1.5 V @ 1ms
2. Failed recruitment of bundle branch block < 1.5 V @ 1ms
LBBP paced QRS duration (ms)
P=0.001
Baseline
Paced
LBBP capture threshold (V @ 0.4ms)
P=0.744
Baseline
Follow up
LVEF (%) in cardiomyopathy n = 20
P=0.001
Baseline
Follow up
Reasons for LBBP
Other n=7(12%)
HBP lead revision n=10 (18%)
High HBP lead threshold * n=23 (40%)
Failed recruitment with HBP * n=17 (30%)
LBBP lead related complications = 7
(12%)
Macro lead dislodgement n=2(29%)
5%
Micro lead dislodgement with RV septal capture n=4(57%)
Interventricular septal perforation n=1(14%)

ESC European Society of Cardiology

European Heart Journal (2022) **00**, 1–14
https://doi.org/10.1093/eurheartj/ehac445

CLINICAL RESEARCH
Arrhythmias

Left bundle branch area pacing outcomes: the multicentre European MELOS study

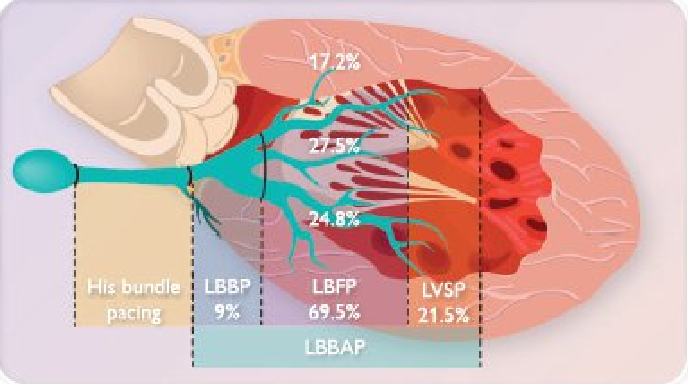
Marek Jastrzębski [1*], Grzegorz Kiełbasa [1], Oscar Cano [2,3], Karol Curila [4], Luuk Heckman [5], Jan De Pooter [6], Milan Chovanec [7], Leonard Rademakers [8], Wim Huybrechts [9], Domenico Grieco [10], Zachary I. Whinnett [11], Stefan A.J. Timmer [12], Arif Elvan [13], Petr Stros [4], Paweł Moskal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

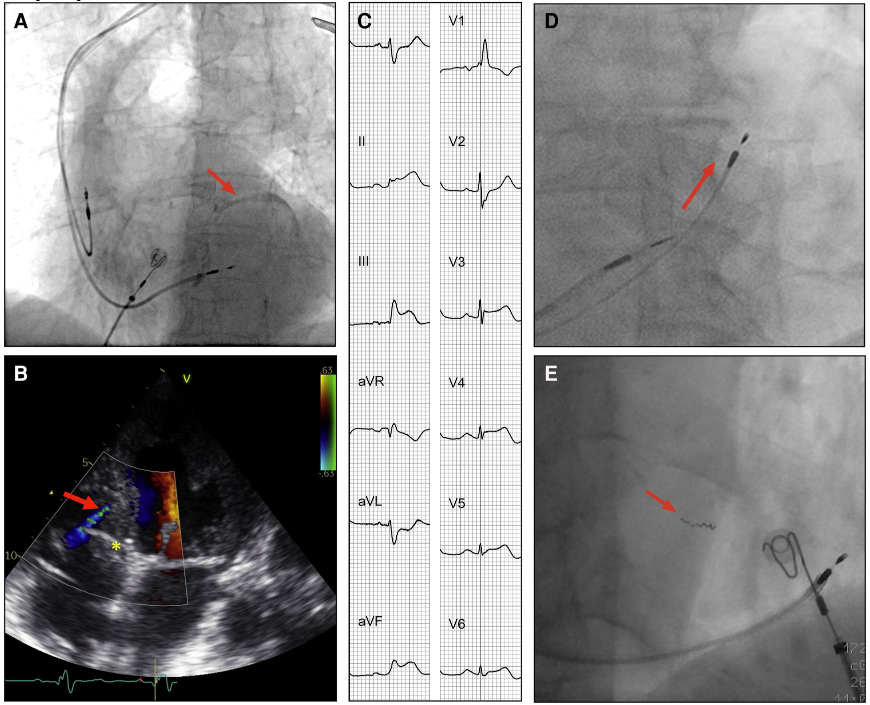
Independent predictors of LBBAP lead implantation failure

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

3% revisioni?
FU? Giugno 2018-Novembre 2021

Complications attributed to the transseptal route of the pacing lead	
Intraprocedural perforation into the LV cavity	93 (3.67%)
Delayed perforation into the LV cavity	2 (0.08%)
Acute chest pain	25 (0.98%)
Acute ST-segment elevation in multiple leads	6 (0.24%)
Acute coronary syndrome [c]	11 (0.43%)
Coronary vein fistula	7 (0.28%)
Coronary artery fistula	2 (0.08%)
Painful pacing/chest pain	4 (0.16%)
LBBAP lead unscrewable/trapped/damaged helix	11 (0.43%)
LBBAP lead dislodgement	38 (1.5%)
Threshold rise to an absolute value > 2 V	17 (0.67%)
Threshold rise > 1 V from baseline	18 (0.71%)
Threshold rise leading to re-intervention	4 (0.16%)
Stroke/TIA	0 (0)
Summary	209 (8.25%)

Figure 4 Illustrations of the complications of the transseptal route of the left bundle branch area pacing lead. (A) ...

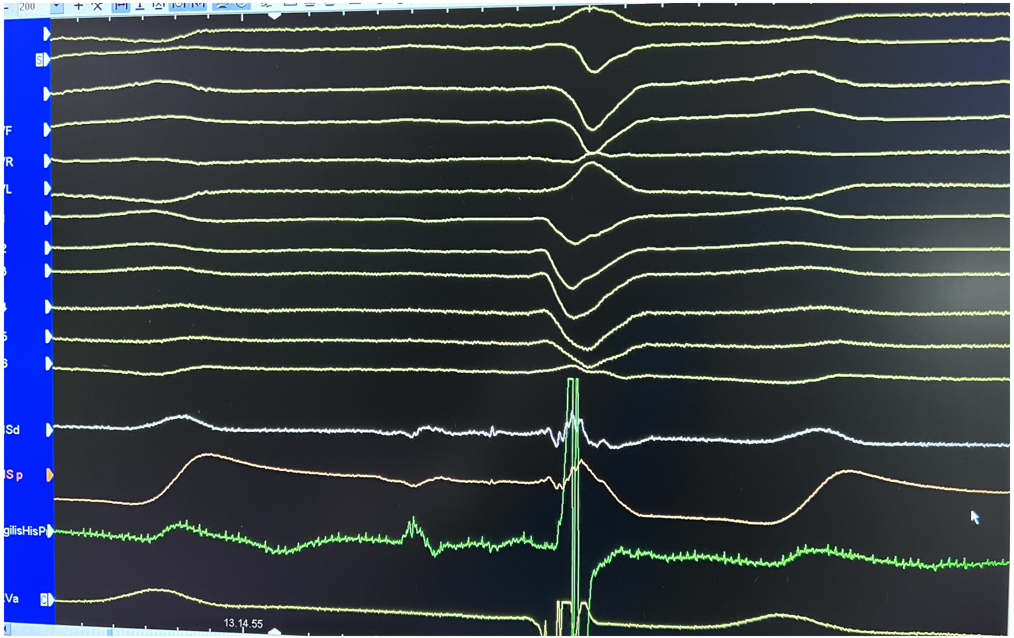


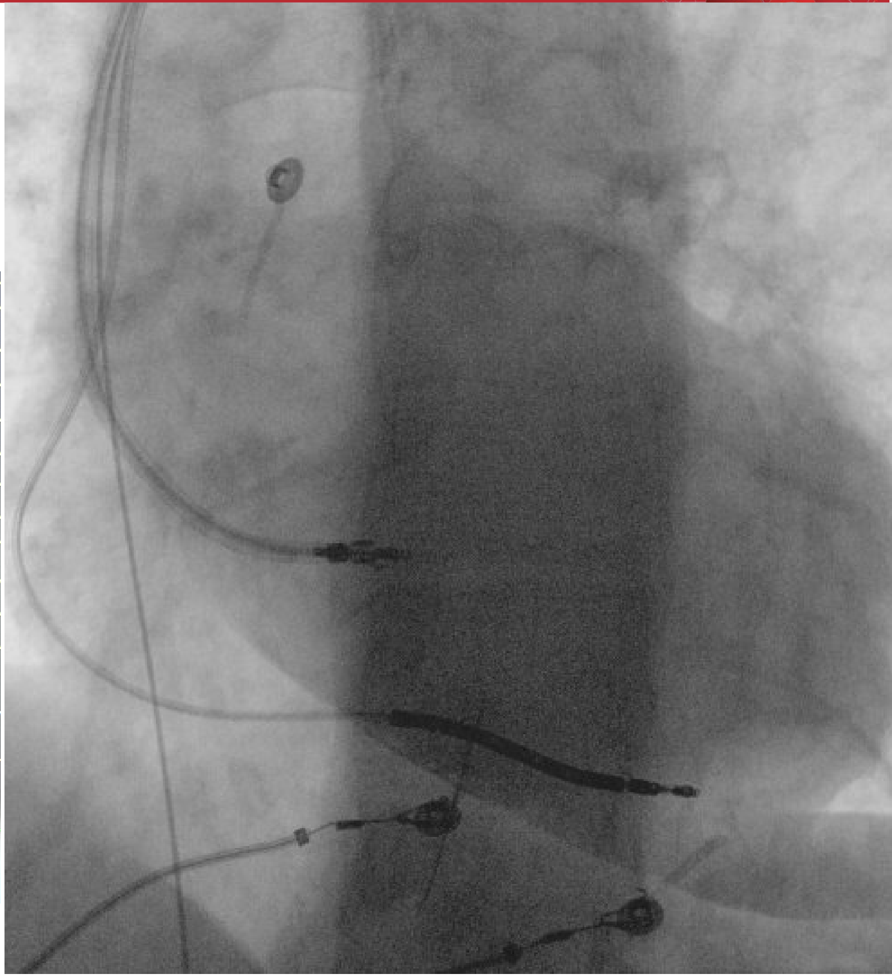
Eur Heart J, ehac445, https://doi.org/10.1093/eurheartj/ehac445

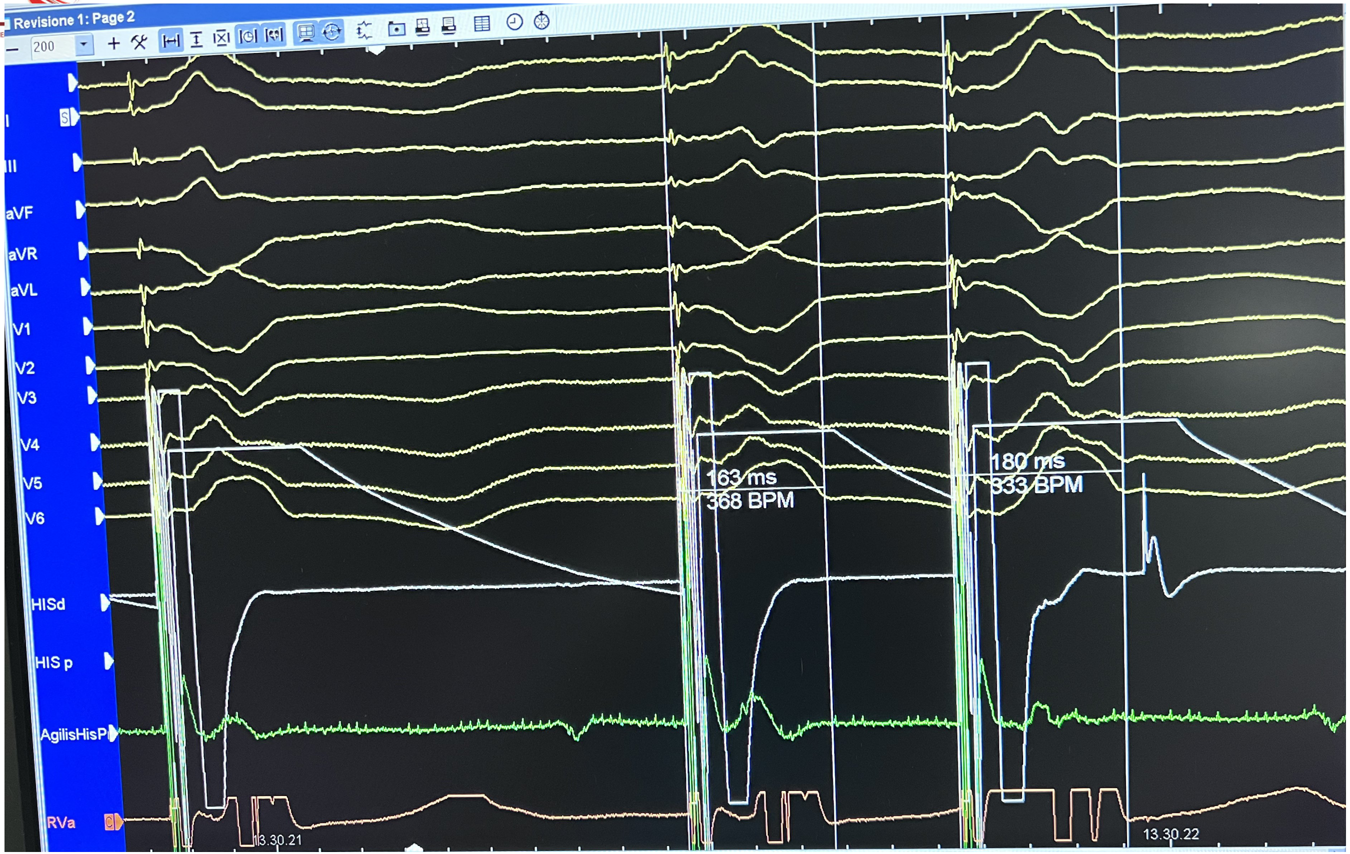
Caso clinico

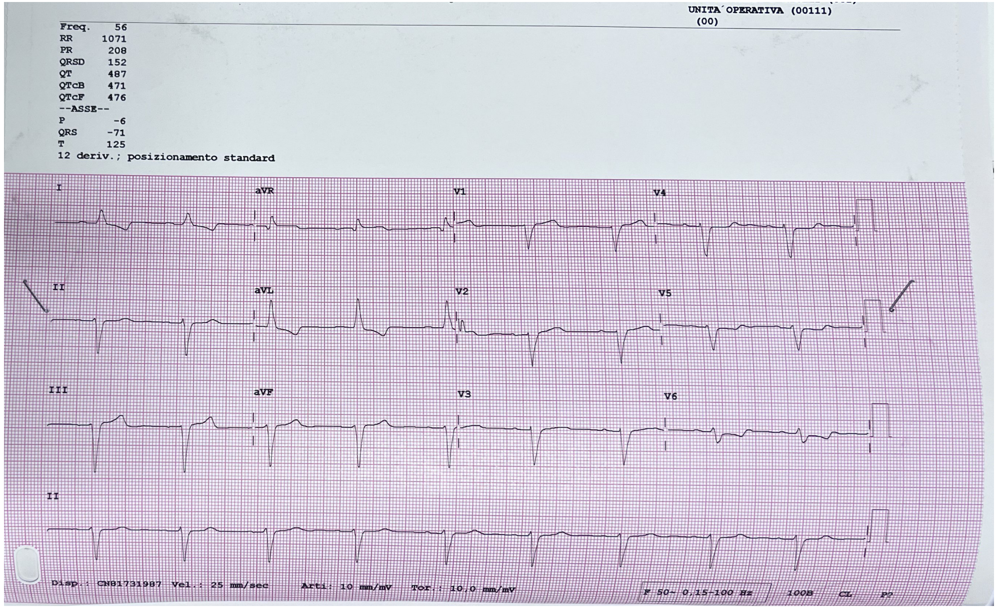
- Donna 66 anni
- Cardiopatia ipertensiva ad evoluzione dilatativa. FE:35%
- Maggio 2022 coronarografia: 40% IVA prossimale
- ECG: turbe della conduzione intraventricolare
- Luglio 2022: malgrado terapia medica ottimale FE:35%, TVNS
- 19/07/2022: impianto ICD-CRT con stimolazione fascio di His
- Stimolazione non selettiva con correzione parziale

PLACE 9ª Edizione
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE






Revisione 1: Page 2
200
I
III
aVF
aVR
aVL
V1
V2
V3
V4
V5
V6
HISd
HIS p
AgilisHisP
RVa
163 ms
368 BPM
180 ms
333 BPM
13.30.21
13.30.22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(00)
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QT 487
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QRS -71
T 125
12 deriv.; posizionamento standard
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
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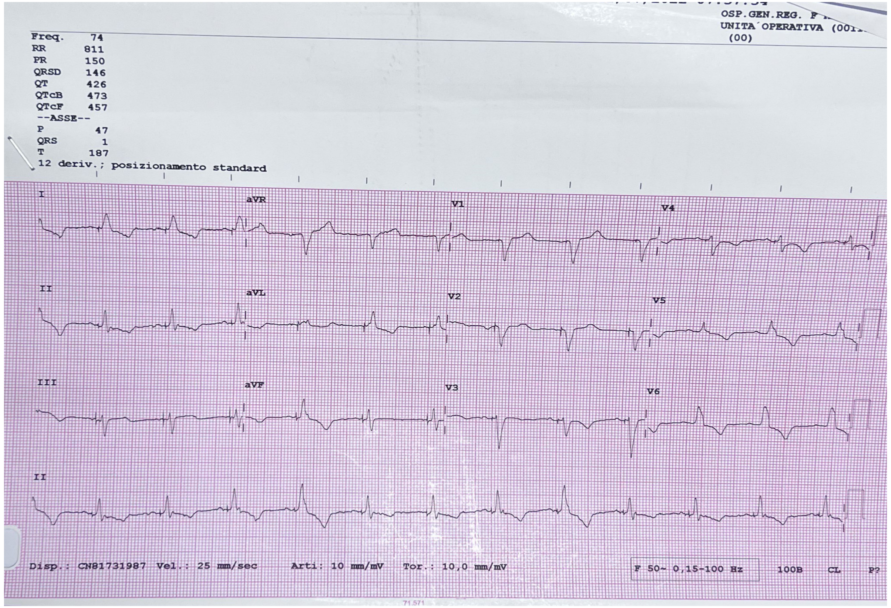
Arti: 10 mm/mV
Tor.: 10,0 mm/mV
F 50~ 0,15-100 Hz
100B
CL
P?


OSP.GEN.REG.
UNITA´OPERATIVA
(00)
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P 47
QRS 1
T 187
12 deriv.; posizionamento standard
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aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
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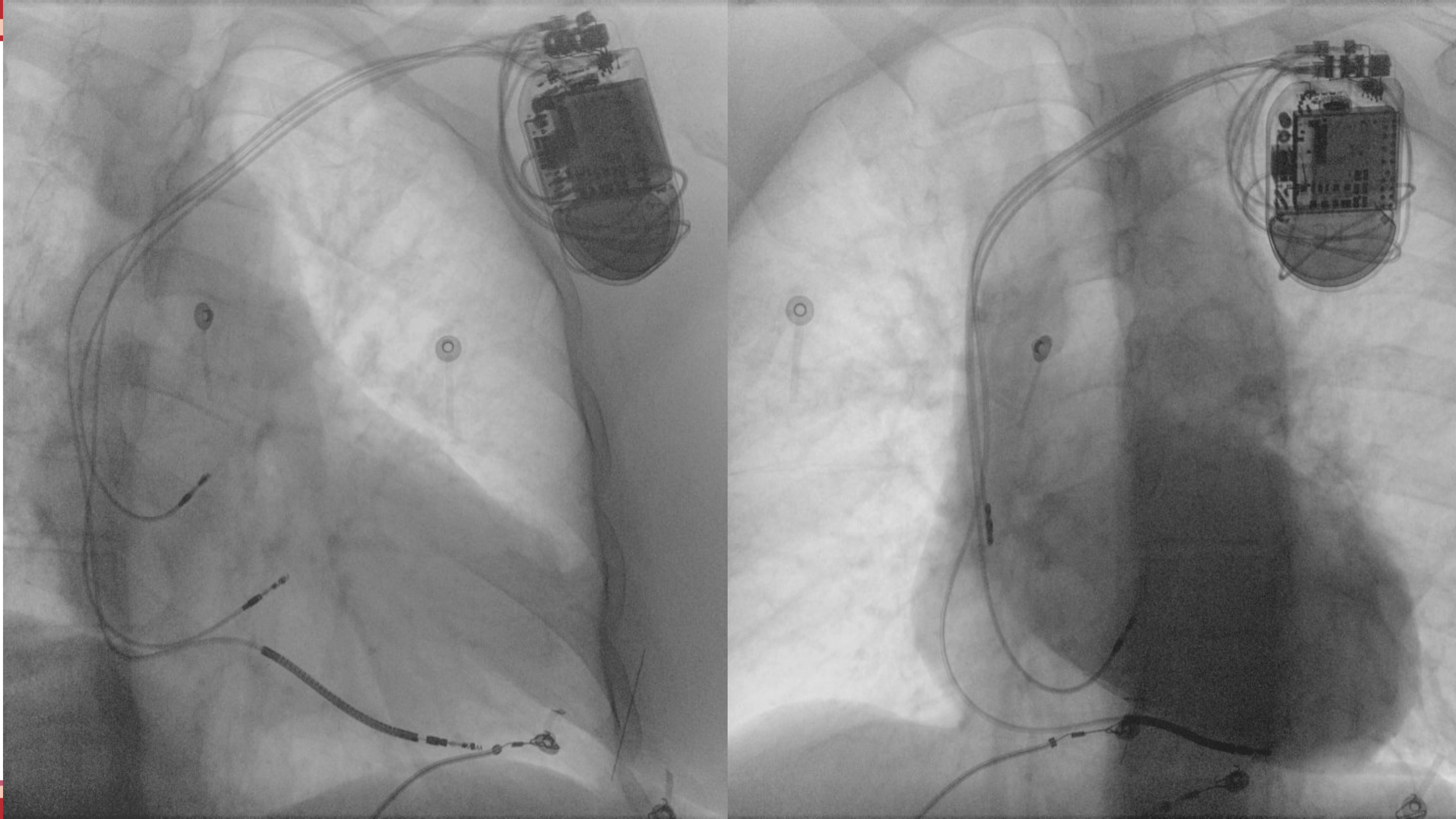
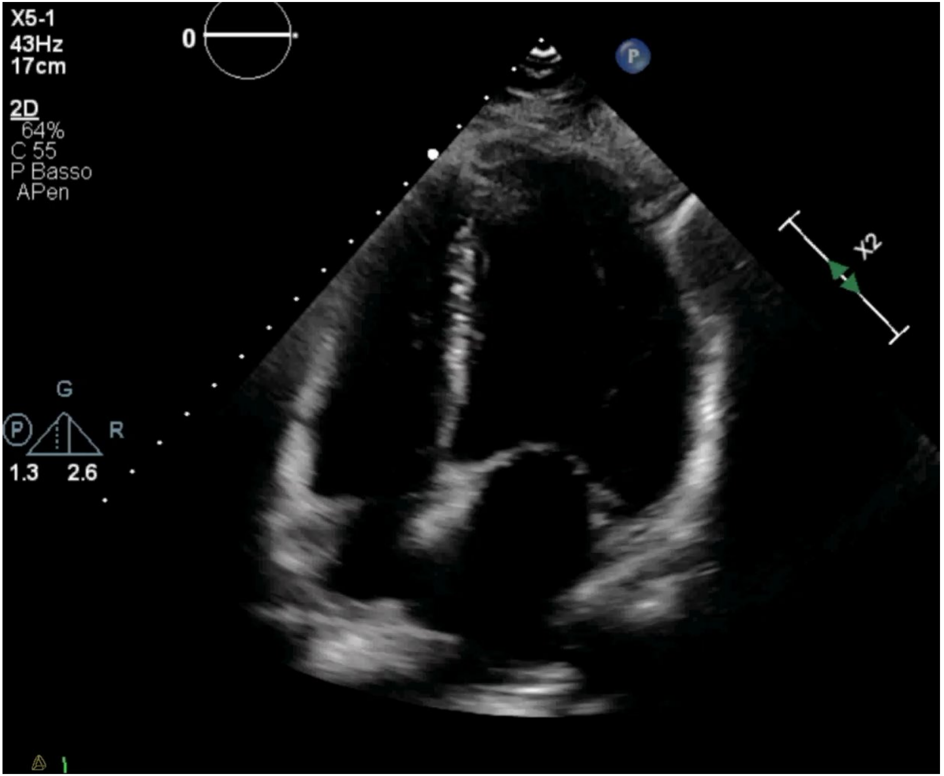
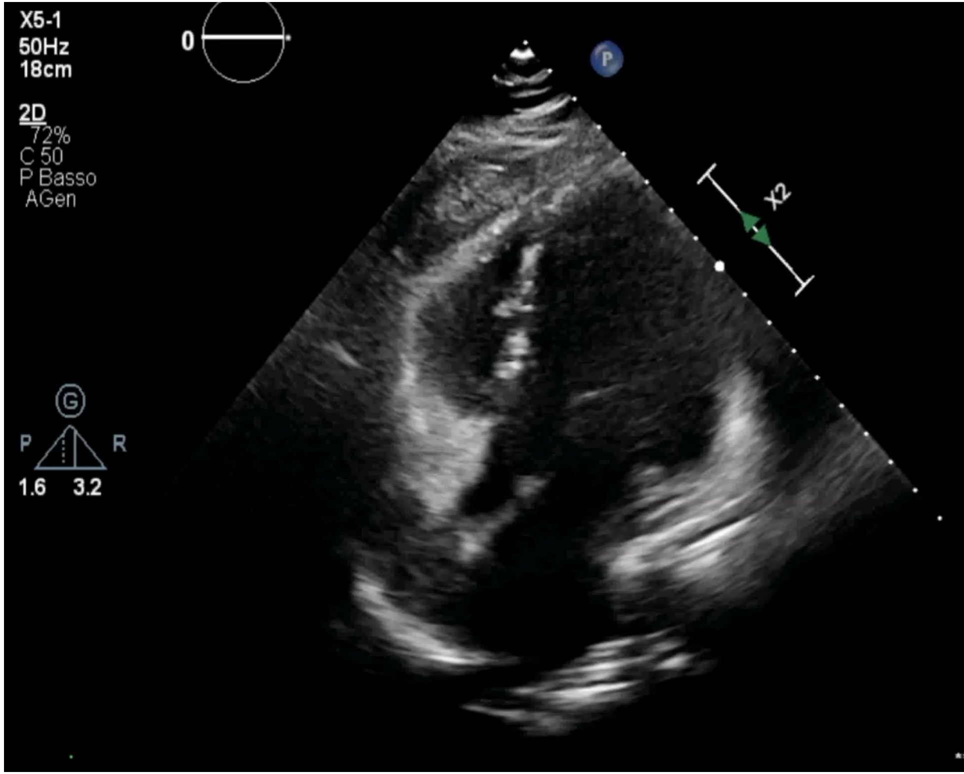
Arti: 10 mm/mV
Tor.: 10,0 mm/mV
F 50~ 0,15-100 Hz
100B
CL
P?



Pre-impianto

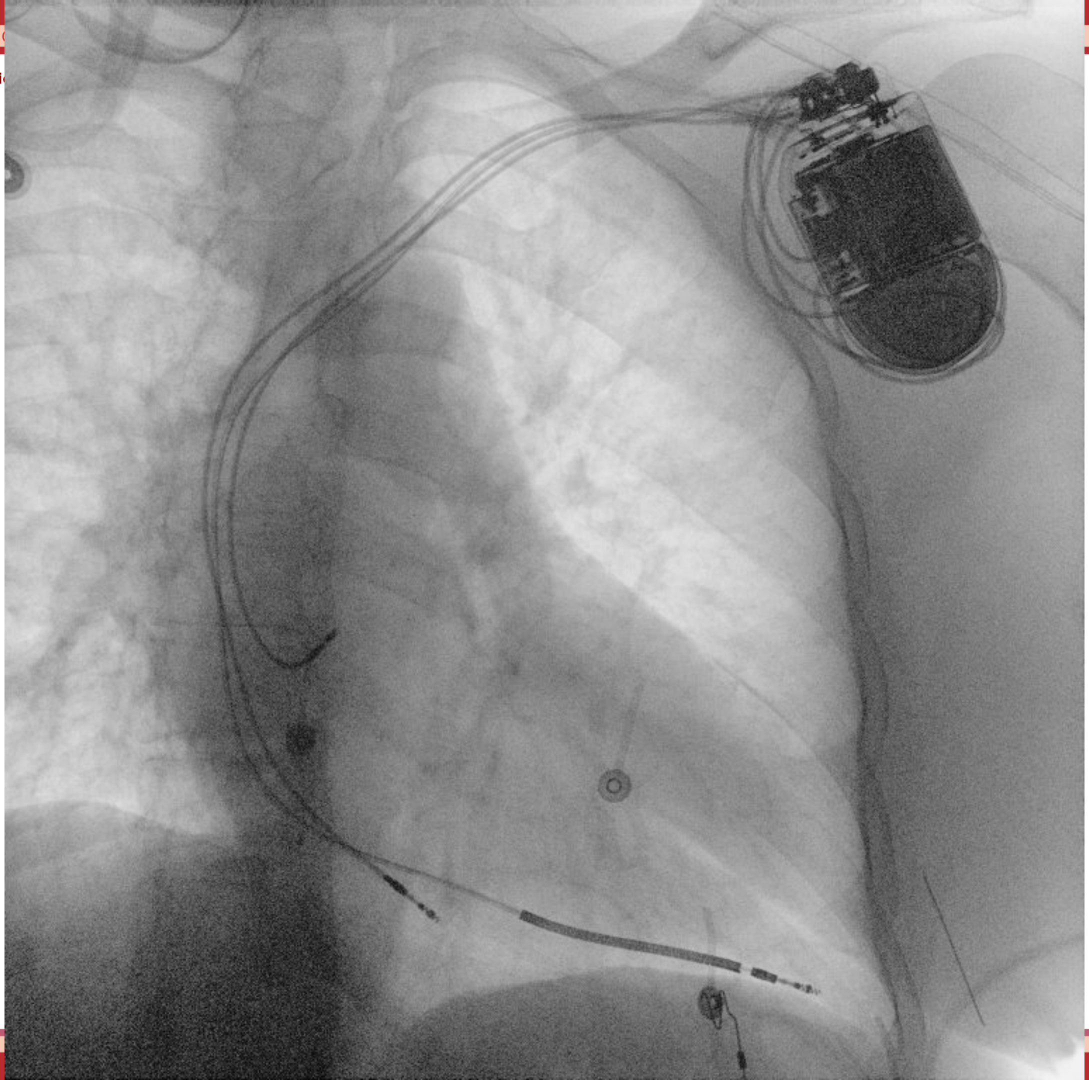


Post- primo impianto



Caso clinico

- In data 15/08/22 la paziente accusa dolore acuto pericardico.
- Ecocardiogramma assenza di versamento
- Elettrodo ventricolare nel pericardio ed elettrodo hissiano in ventricolo destro

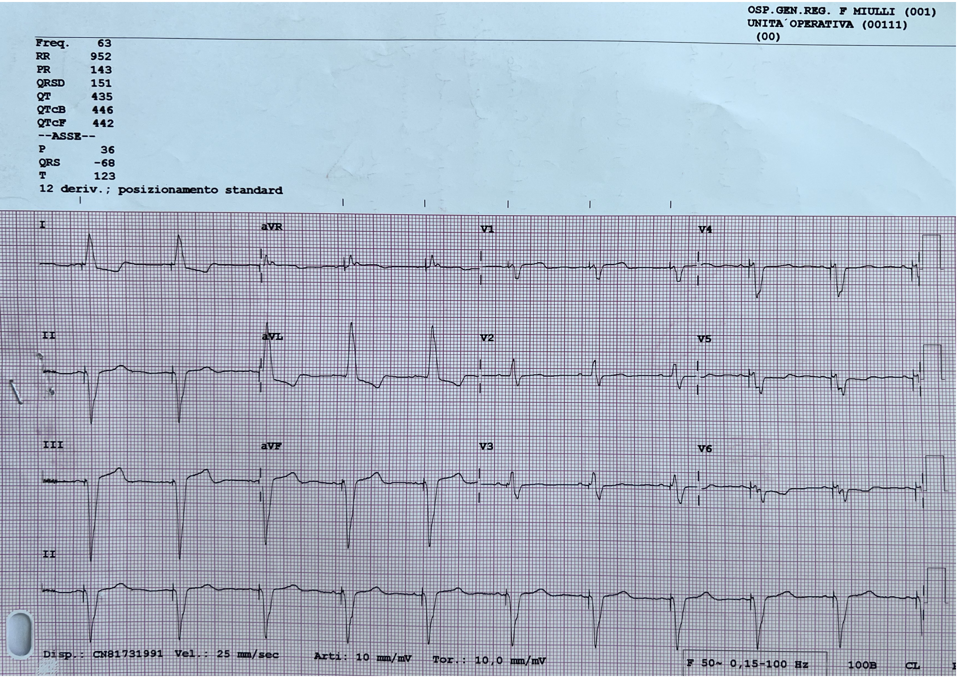


ROMA 30 Settembre - 1 Ottobre 2022 Centro Congressi di Confindustria Auditorium della Tecnica

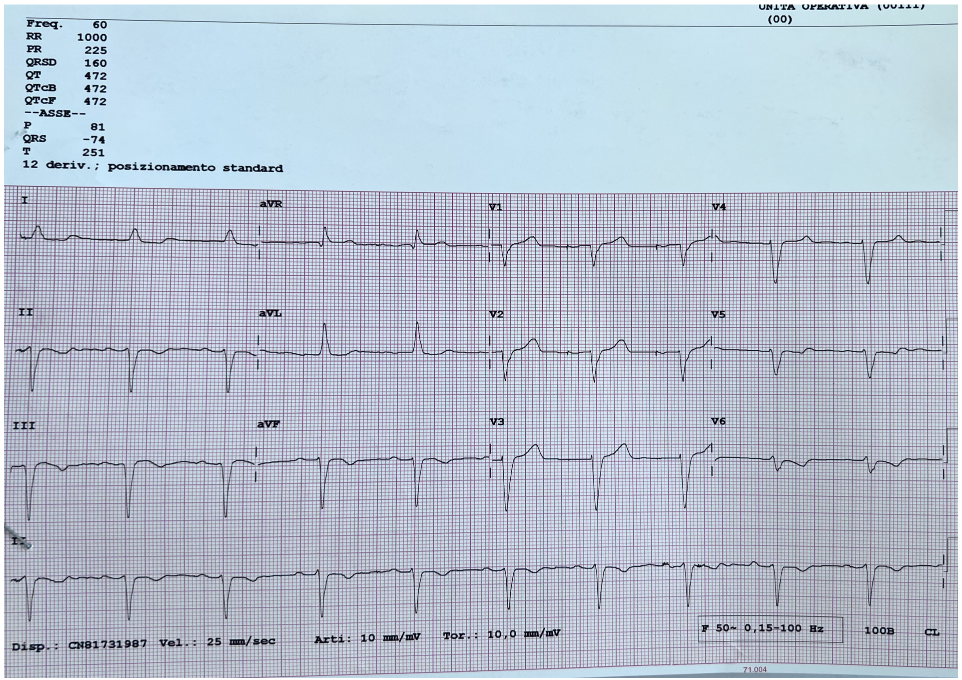
PLACE 9ª Edizione

PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

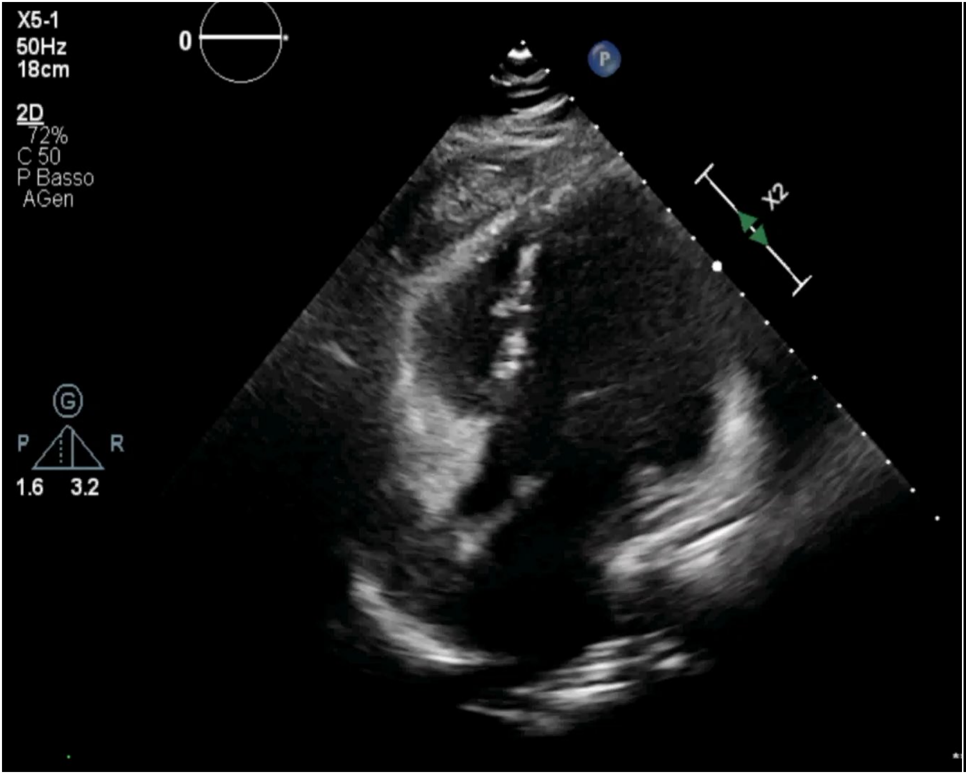
Ingresso



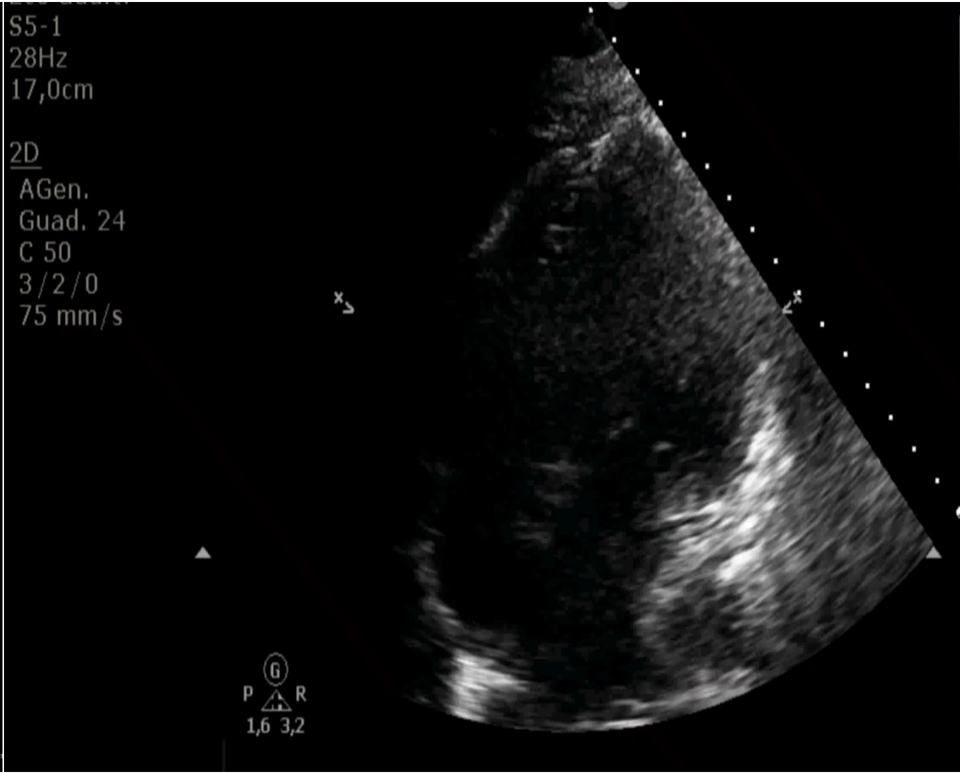
Post-riprogrammazione

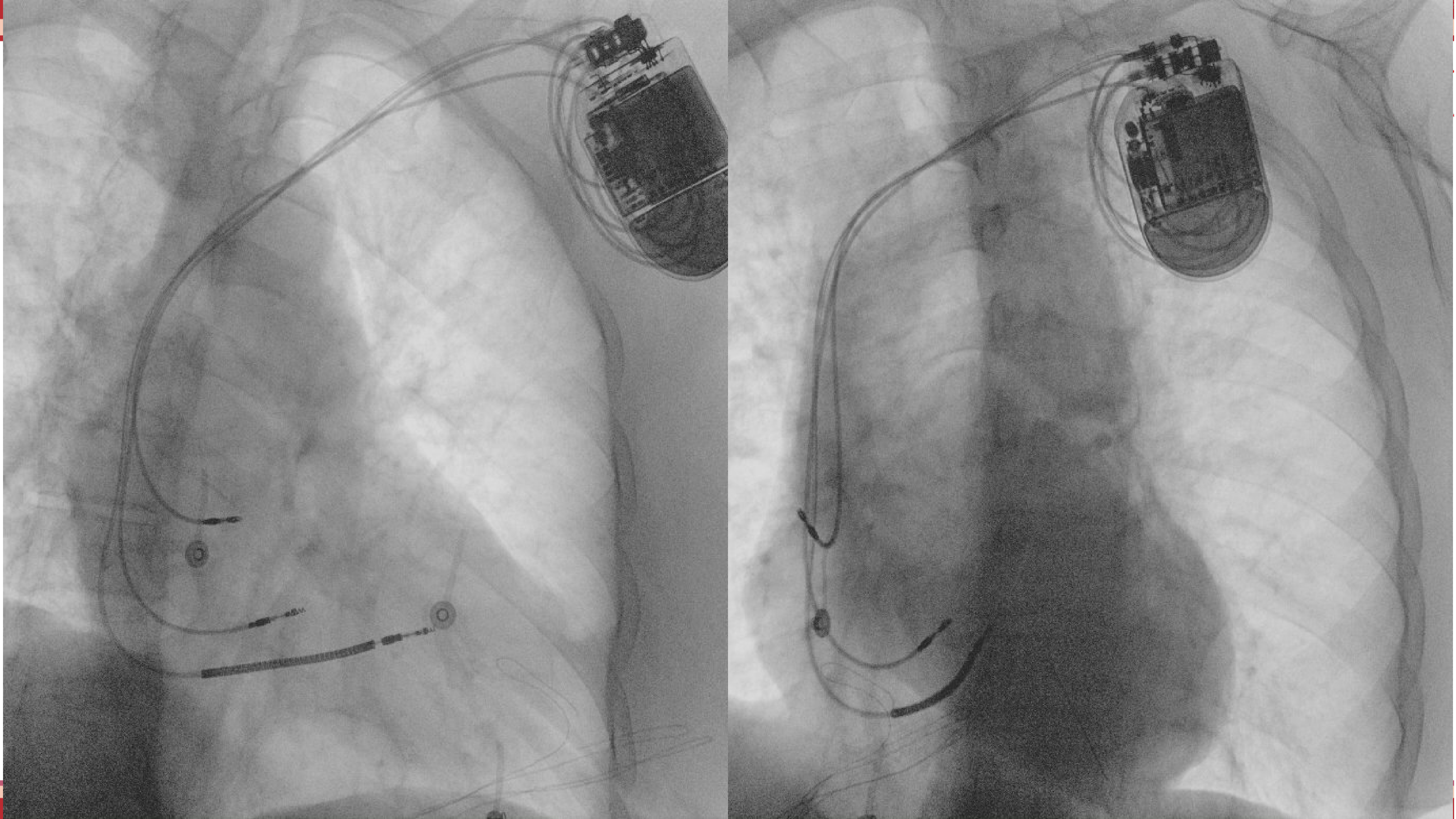


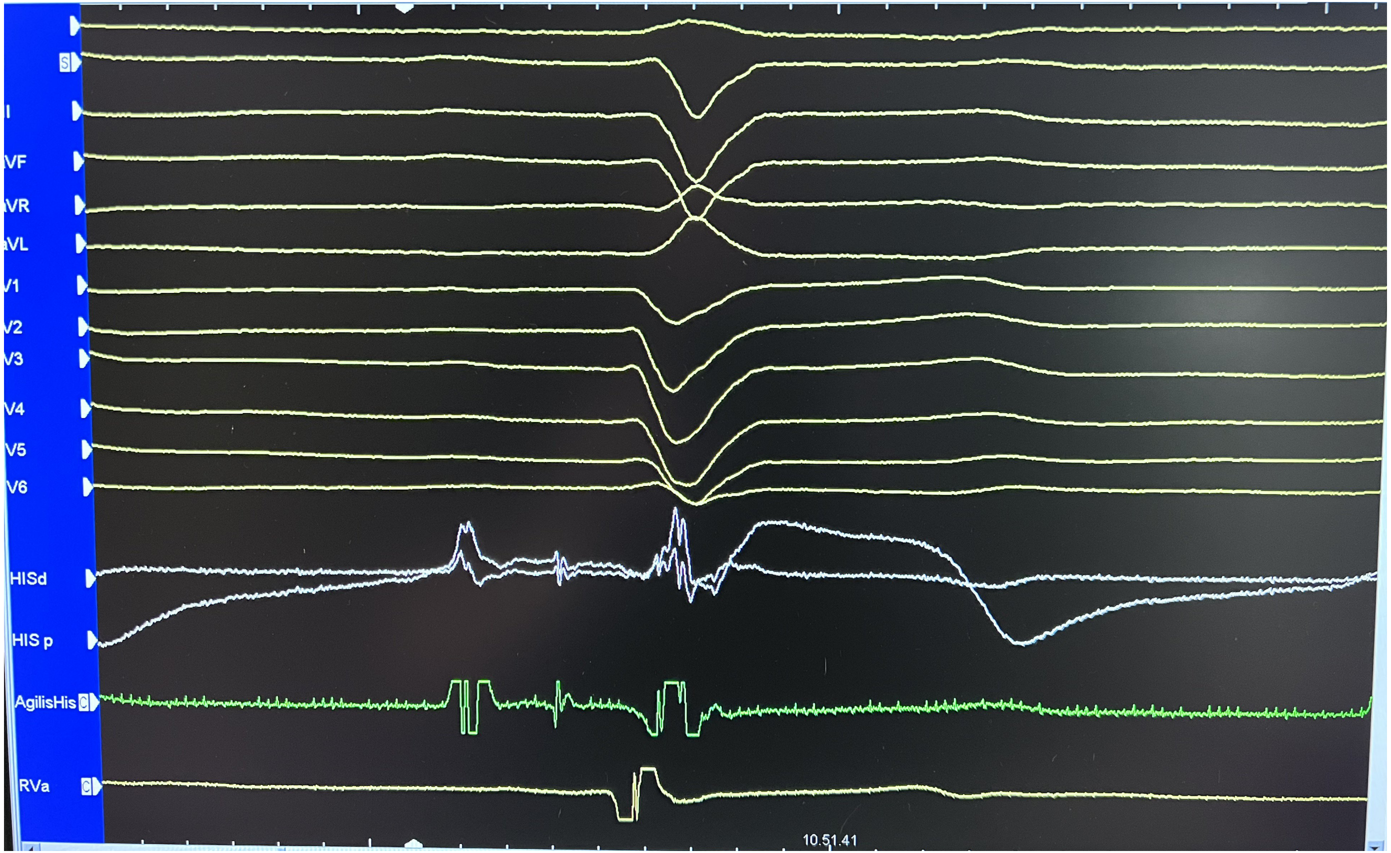
Post primo impianto



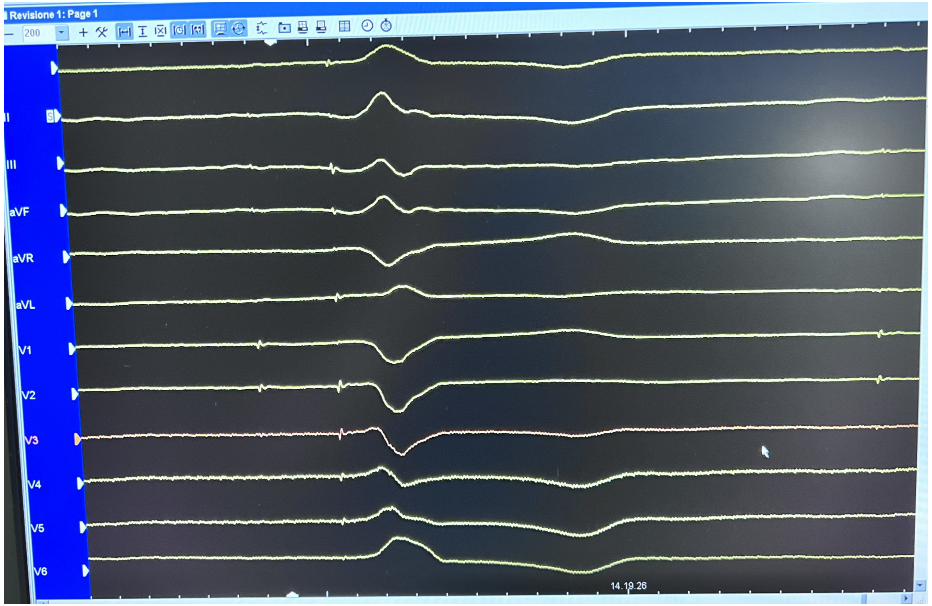
Post-dislocamento



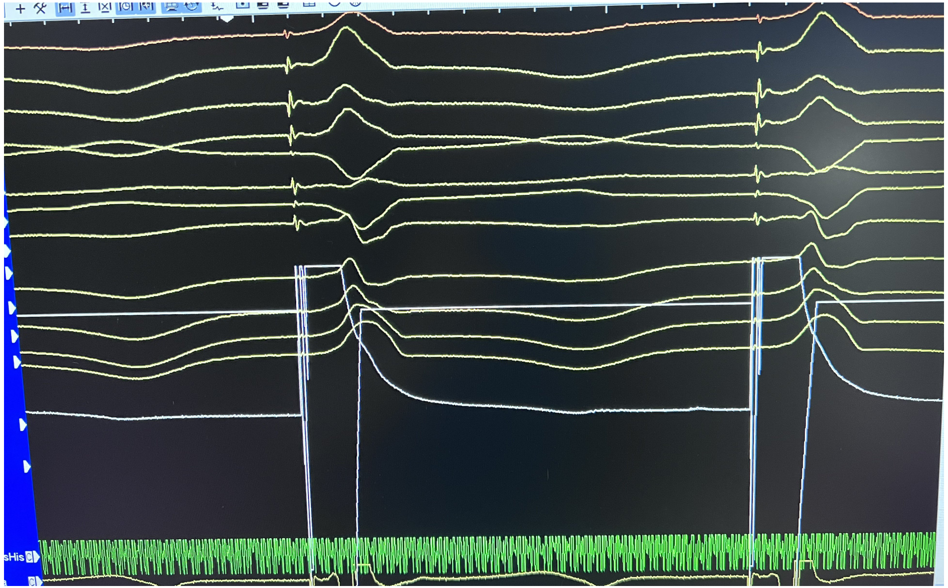



S
I
VF
VR
aVL
V1
V2
V3
V4
V5
V6
HISd
HIS p
AgilisHis
RVa
10.51.41

Primo impianto

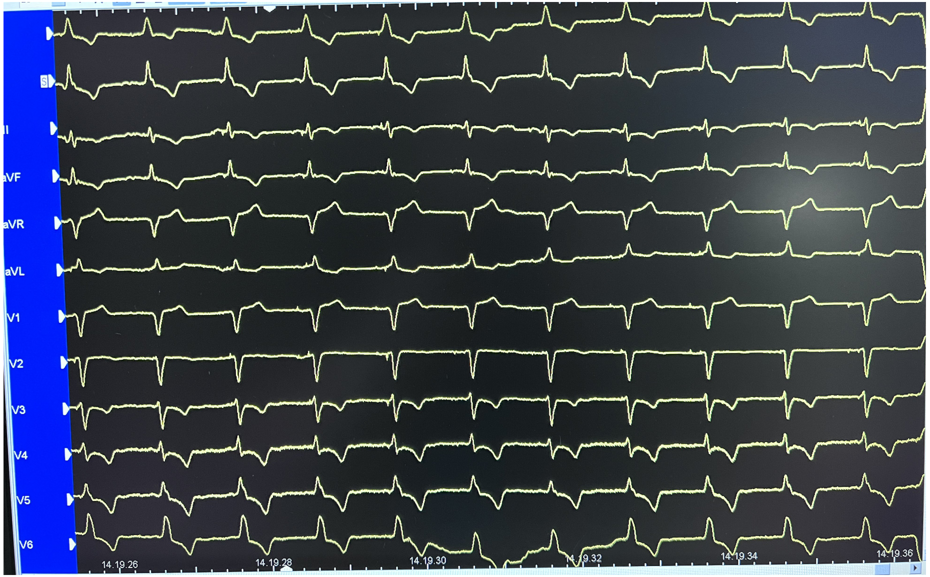


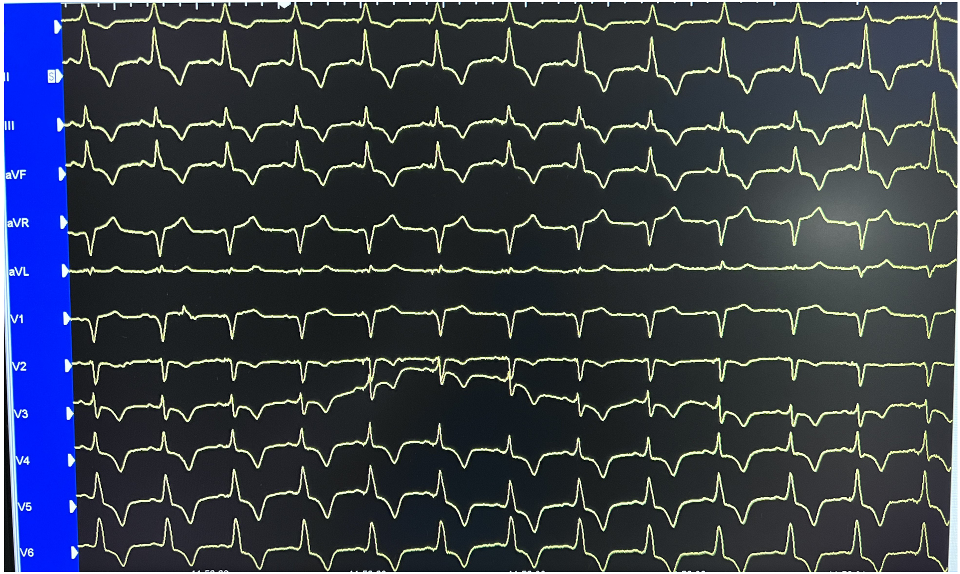
Secondo impianto



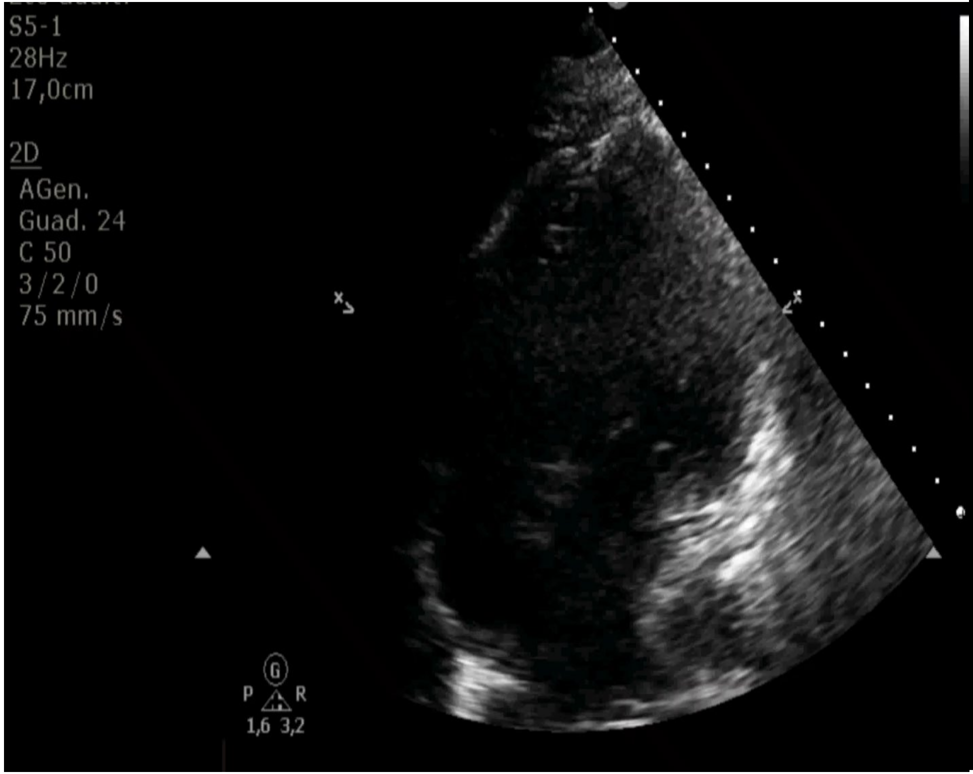
Primo impianto

Secondo impianto

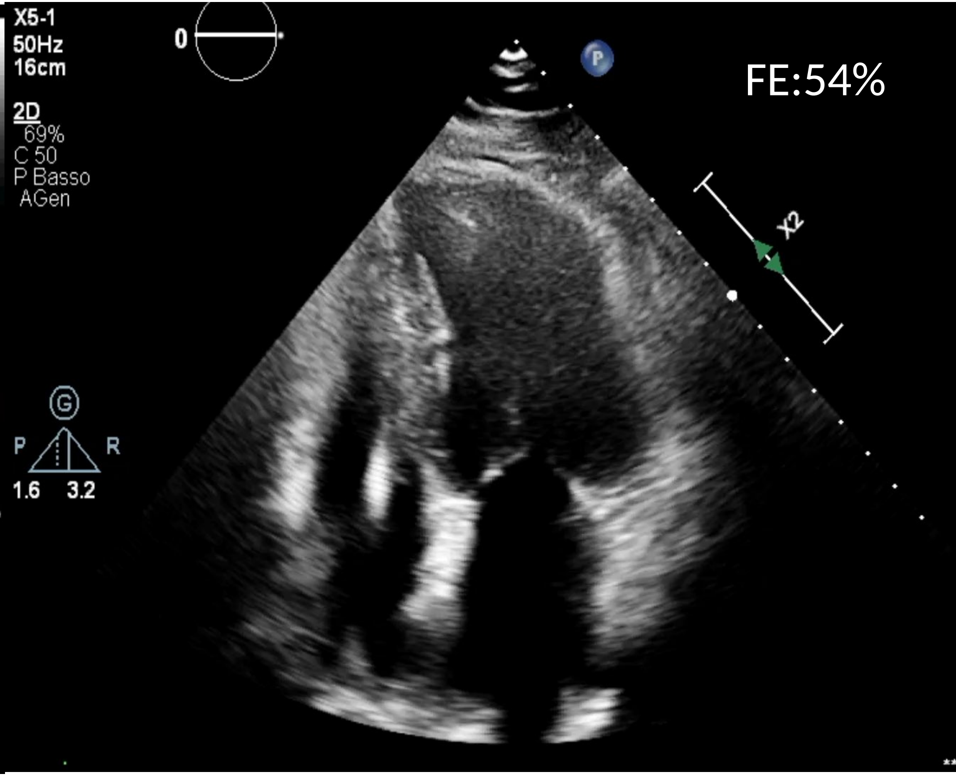




Post dislocamento



Post secondo impianto



Conclusioni

- Le complicazioni della stimolazione del sistema di conduzione dagli studi effettuati in passato sono intorno al 5-6%
- Diverse complicazioni abbiamo nella stimolazione del fascio di His da quelli della stimolazione dell' area della branca sinistra
- Complicazioni acute più preoccupanti per la stimolazione dell' area della branca sinistra
- Complicazioni croniche maggiori nella stimolazione del fascio di His
- Necessità di studi randomizzati