Ασθενής με επιδείνωση της συσταλτικότητας της αριστερής κοιλίας μετά βηματοδότηση

ΜΙΛΗΛΗΣ ΠΑΝΑΓΙΩΤΗΣ
ΕΙΔΙΚΕΥΟΜΕΝΟΣ Β' ΚΑΡΔΙΟΛΟΓΙΚΗΣ ΚΛΙΝΙΚΗΣ
ΓΝΑ "ΕΥΑΓΓΕΛΙΣΜΟΣ"

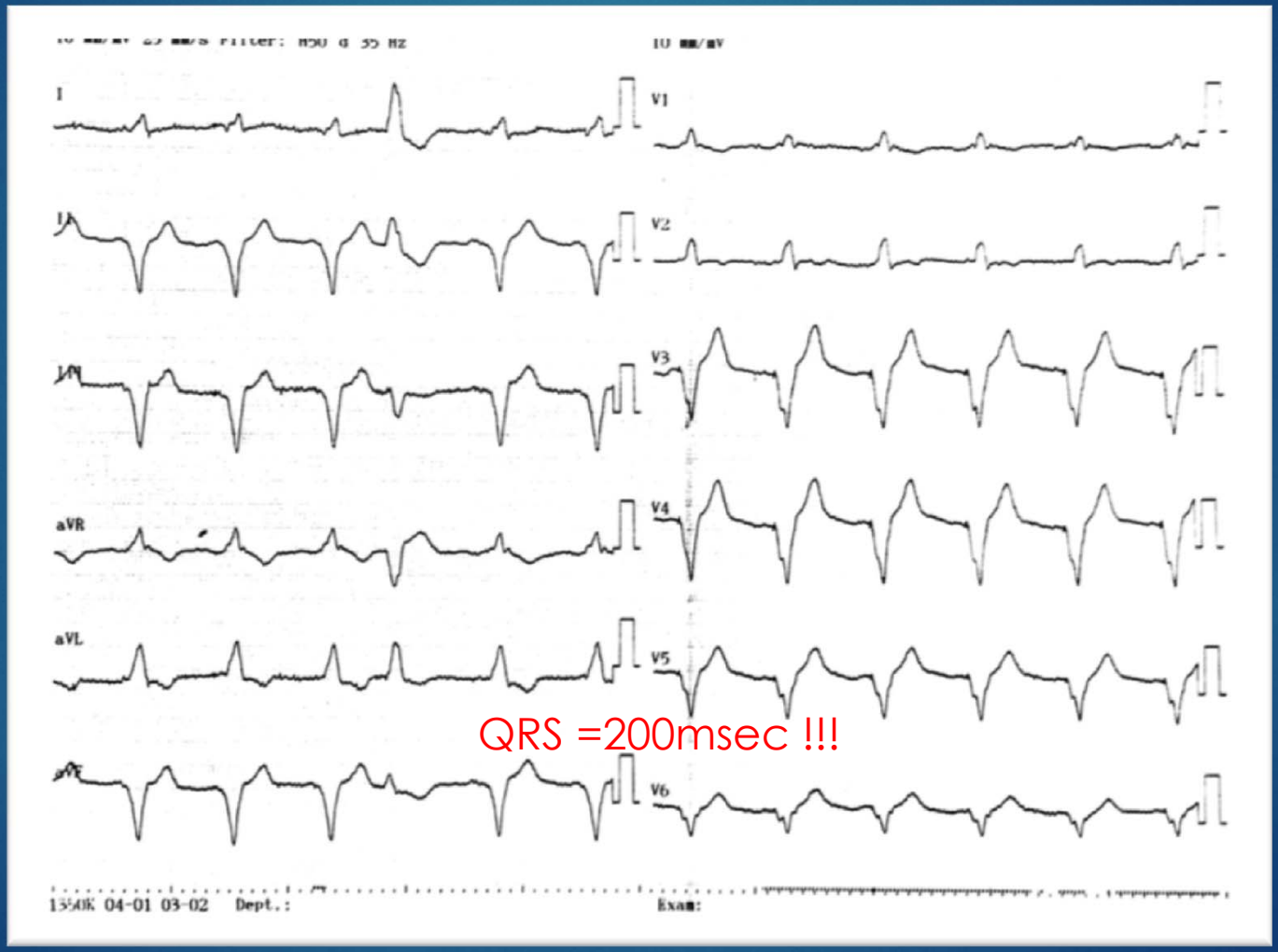
80 YEARS OLD MALE

- 2010 DCM (EFLV 40-45%)
- 2017 PPM (3rd degree AV Block)

- NYHA III
- CKD (GFR=21.6ml/min)
- Multiple hospitalizations related to HF

- 2019 Echo: EFLV~25%
  Coronary Angiography: Normal

ECG



- Αποφασίσθηκε η θεραπεία καρδιακού επανασυγχρονισμού υπό τη μορφή βηματοδότησης από το δεμάτιο του His.

His Pacing

Permanent, Direct His-Bundle Pacing

A Novel Approach to Cardiac Pacing in Patients With Normal His-Purkinje Activation

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Mary Romanyshyn, CRNP; Kathleen Anderson, BSN

Permanent DHBP is feasible in select patients who have chronic atrial fibrillation and dilated cardiomyopathy. Long-term, DHBP results in a reduction of left ventricular dimensions and improved cardiac function.

Circulation. 2000 Feb 29;101(8):869-77

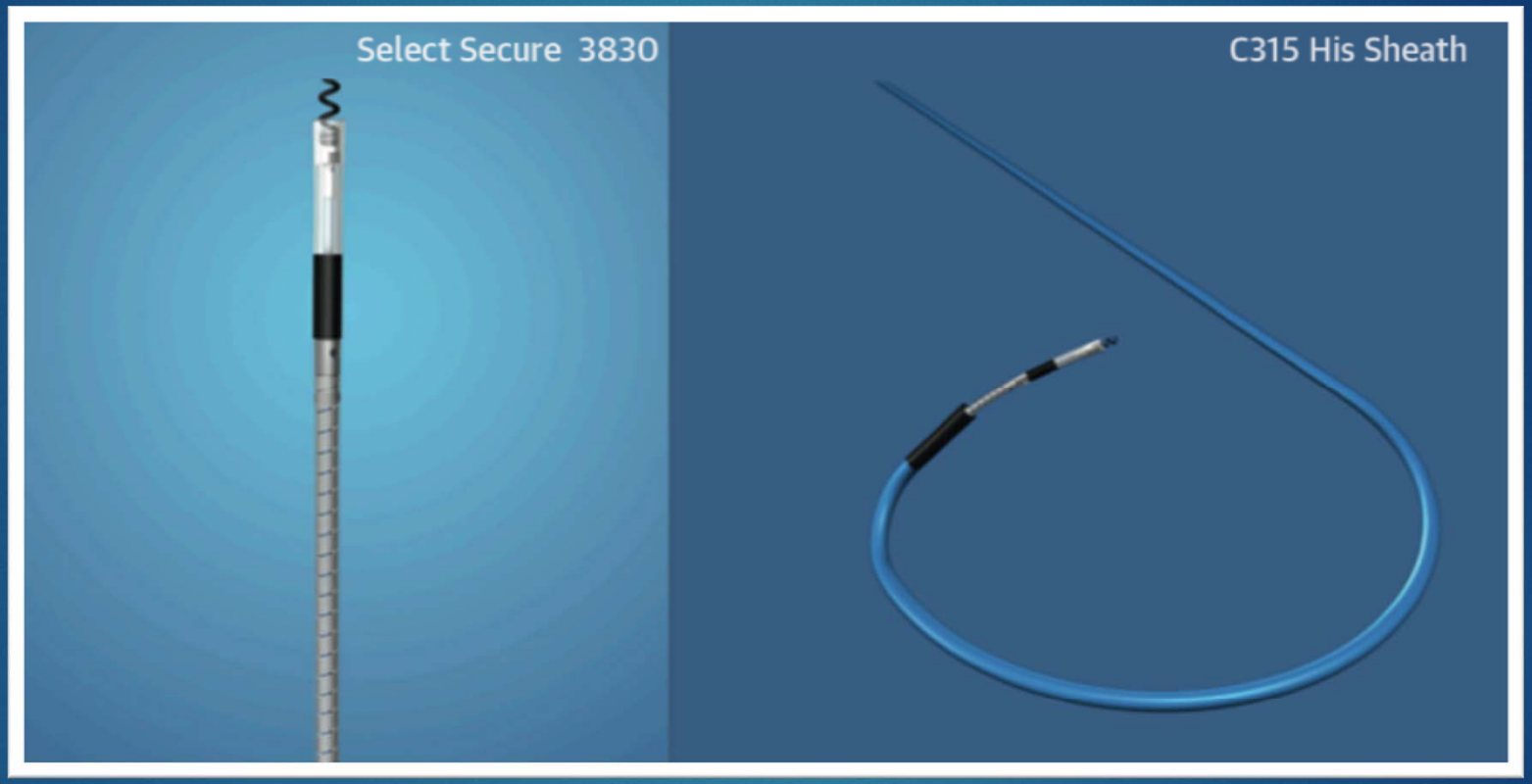
First Author, Year (Ref. #)	Patients	AV Nodal Block (Success %)	Infranodal Block	Lead Type	Delivery Sheath
Deshmukh et al. 2000 (26) (N = 18)	Chronic AF, AV node ablation, DCM	12 of 18 (66%)	0	Stylet-driven	0
Occhetta et al., 2006 (27) (N = 18)	Chronic AF, AV node ablation	16 of 18 (89%) DHBP: 25% PHP: 75%	0	Stylet-driven	0
Occhetta et al., 2007 (28) (N = 68)	AF, AV node ablation (n = 52) AV block (n = 16)	63 of 68 DHBP: 21% PHP: 79%	0	Stylet-38 SS 25	C304
Barba-Pichardo 2010 (29) (N = 182)	HBP attempted in 91 (AVB with HB recruitment with temporary pacing)	44 of 65 (68%)	15 of 26 (57%)	Stylet-driven	0
Kronborg et al., 2014 (30) (N = 38)	AV node block QRS duration <120 ms LVEF >40% Crossover, randomized	32 of 36 (85%) DHBP: 4 PHP: 28	0	SS	C304
Zanon et al., 2011 (31) (N = 307)	SSS: 126 AVB: 181	95% DHBP: 28% PHP: 72%	0	SS	C304
Vijayaraman et al., 2015 (32) (N = 67)	SSS: 40%, AVB: 60% HB IC positive: 37% HB IC negative: 63%	60 of 67 (90%) S-HBP: 45% NS-HBP: 55%		SS	C315His
Sharma et al., 2015 (33) (N = 95)	SSS: 41% AVB: 59%	75 of 95 (80%) S-HBP: 45% NS-HBP: 55%	21 of 26	SS	C315Hls
Vijayaraman et al., 2015 (34) (N = 100)	Advanced AVB AVN: 46, infranodal: 54	43 of 46 (93%) S-HBP: 44% NS-HBP: 56%	41 of 54 (76%) S-HBP 7%	SS	C315His

J Am Coll Cardiol. 2018 Aug 21;72(8):927-947

Case series of permanent HBP in CRT-eligible patients with prior bundle branch block

Author, Year	n	Indication	His Bundle Lead	Implant Success, %	Primary Outcome
Barba-Pichardo et al,[19] 2013	16	CRT implant failure	Tendril 1488T, 1788 TC, 1888 TC	56	During mean follow-up of 31.3 ± 21.5 mo, NYHA Class improved III→II and LVEF improved from 29%→36% ($P<.05$)
Lustgarten et al,[19] 2015	29	Crossover study of HBP and CS lead	SelectSecure 3830	59	Patients demonstrated similar NYHA Class reduction (2.0→1.9, $P<.001$) and LVEF improvement from 26%→32% ($P = .043$)
Su et al,[21] 2016	16	CRT implant failure	SelectSecure 3830	100	Clinical outcomes not reported. HB tip-RV coil configuration demonstrated better capture thresholds and R-wave sensing than dedicated bipolar or unipolar
Ajijola et al,[22] 2017	21	Primary HBP	SelectSecure 3830	76	NYHA Class III→II ($P<.001$) and LVEF improved from 27% ± 10% to 41% ± 13% ($P<.001$)
Sharma et al,[23] 2018	106 (48 with BBB)	CRT implant failure and primary HBP	SelectSecure 3830	90	Among all patients, NYHA Class 2.8 ± 0.5→1.8 ± 0.6 ($P = .0001$) and LVEF improved from 30% ± 10% to 43% ± 13% ($P = .0001$)

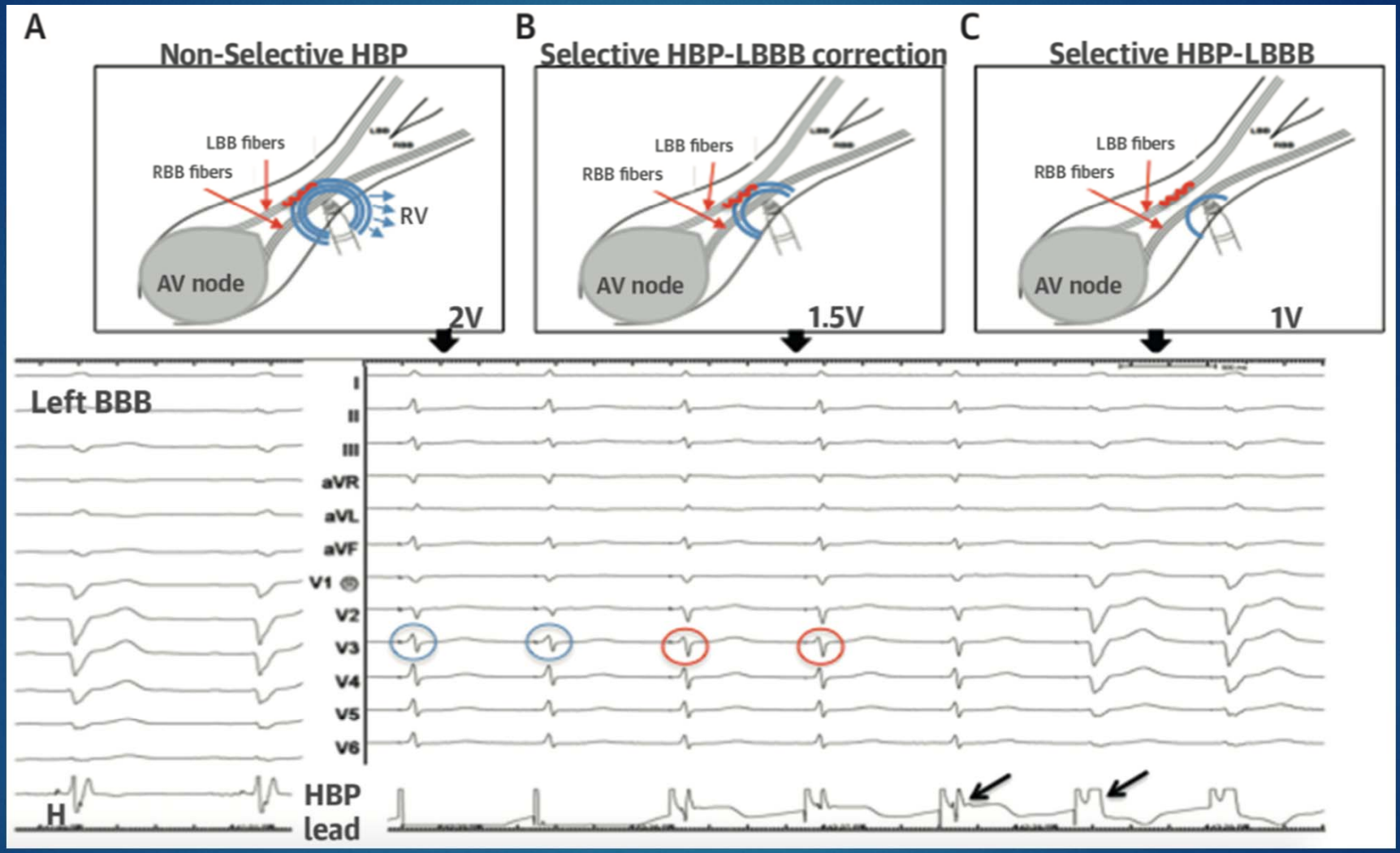
Card Electrophysiol Clin 10 (2018) 511–517


Select Secure 3830
C315 His Sheath

His pacing

Forms of His bundle capture:

- Selective capture: His bundle is the only tissue captured by the pacing stimulus
- Nonselective capture: Fusion capture of the His bundle and adjacent ventricular tissues.



J Am Coll Cardiol. 2018 Aug 21;72(8):927-947

TABLE 1 Criteria for His Bundle Pacing

Baseline	Normal QRS	His-Purkinje Conduction Disease	
		With correction	Without correction
Selective HBP	• S-QRS = H-QRS with isoelectric interval • Discrete local ventricular electrogram in HBP lead with S-V = H-V • Paced QRS = native QRS • Single capture threshold (His bundle)	• S-QRS ≤ H-QRS with isoelectric interval • Discrete local ventricular electrogram in HBP lead • Paced QRS < native QRS • 2 distinct capture thresholds (HBP with BBB correction, HBP without BBB correction)	• S-QRS ≤ or > H-QRS with isoelectric interval • Discrete local ventricular electrogram in HBP lead • Paced QRS = native QRS • Single capture threshold (HBP with BBB)
Nonselective HBP	• S-QRS < H-QRS (S-QRS usually 0, $S\text{-}QRS_{end}$ = $H\text{-}QRS_{end}$) with or without isoelectric interval (Pseudodelta wave +/−) • Direct capture of local ventricular electrogram in HBP lead by stimulus artifact (local myocardial capture) • Paced QRS > native QRS with normalization of precordial and limb lead axes with respect to rapid dV/dt components of the QRS • 2 distinct capture thresholds (His bundle capture, RV capture)	• S-QRS < H-QRS (S-QRS usually 0, $S\text{-}QRS_{end}$ < $H\text{-}QRS_{end}$) with or without isoelectric interval (Pseudodelta wave +/−) • Direct capture of local ventricular electrogram in HBP lead by stimulus artifact • Paced QRS ≤ native QRS • 3 distinct capture thresholds possible (HBP with BBB correction, HBP without BBB correction, RV capture)	• S-QRS < H-QRS (S-QRS usually 0) with or without isoelectric interval (Pseudodelta wave +/−) • Direct capture of local ventricular electrogram in HBP lead by stimulus artifact • Paced QRS > native QRS • 2 distinct capture thresholds (HBP with BBB, RV capture)

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S-HBP vs NS-HBP

- There is little hemodynamic and clinical difference between the two forms of capture, possibly due to rapid conduction of the His-Purkinje system relative to ventricular myocardial conduction.

- both S-HBP and NS-HBP could restore cardiac physiological electrical synchrony and LV mechanical synchrony.

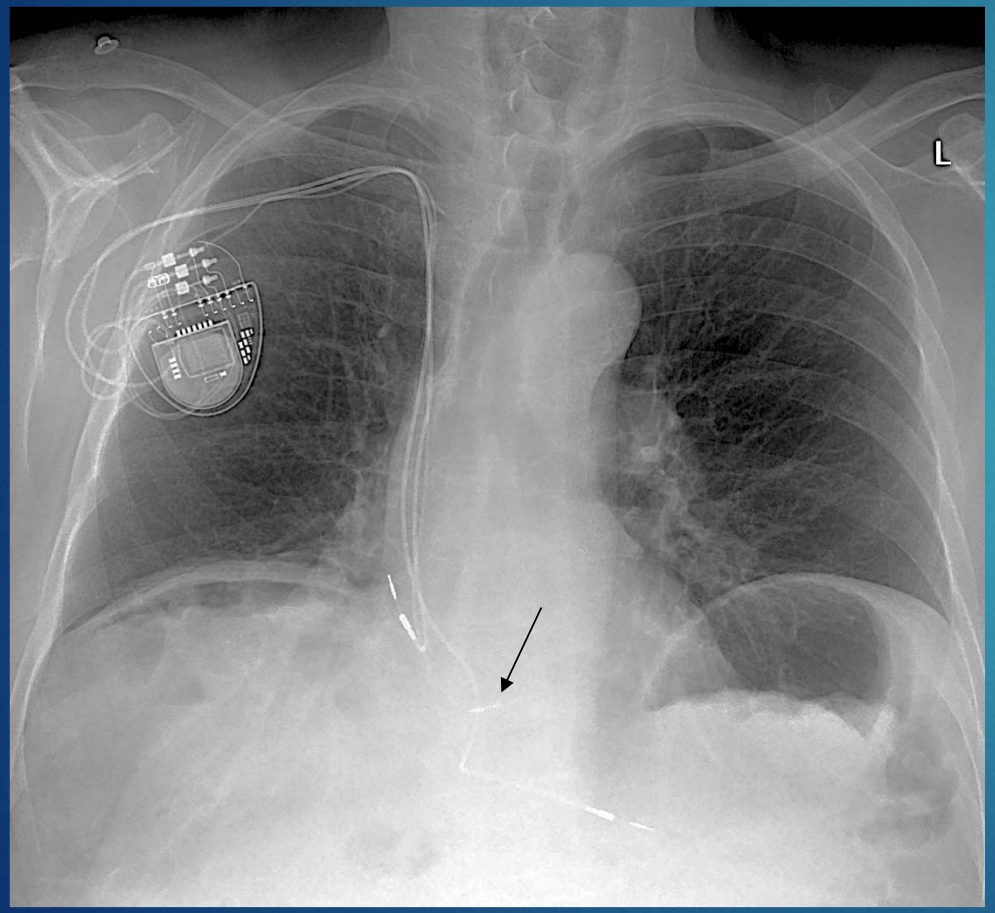
EP Europace, Volume 20, Issue 6, June 2018, 1010–1017

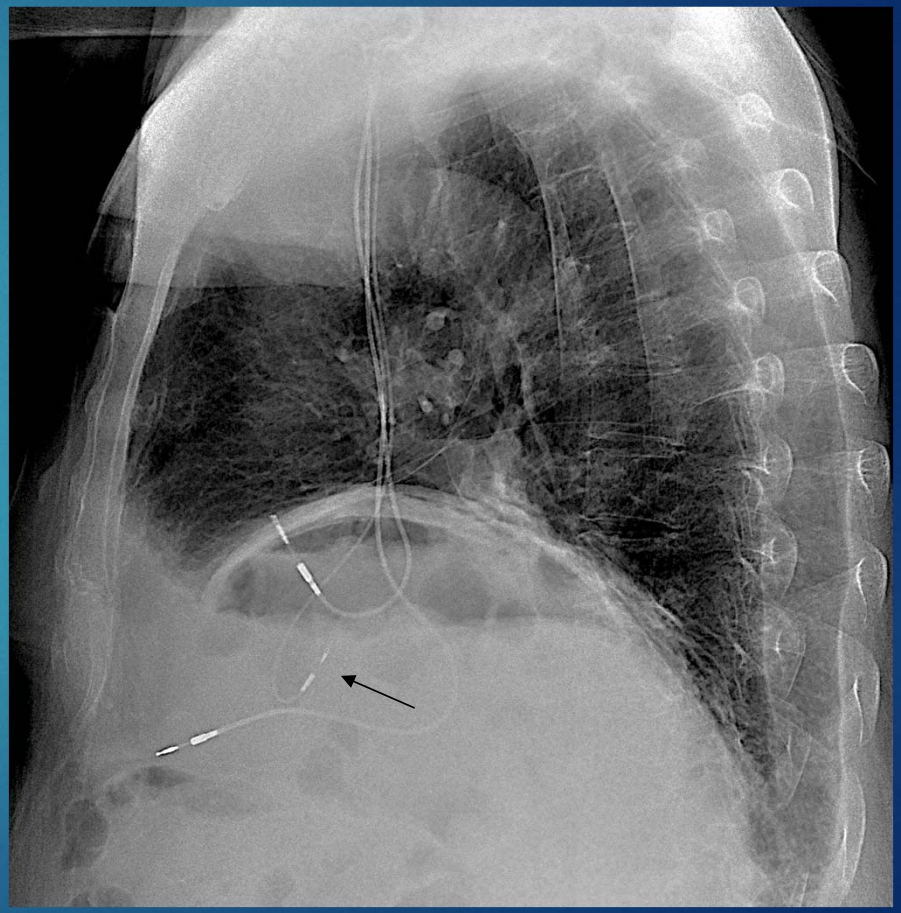
RVA pacing in our patient

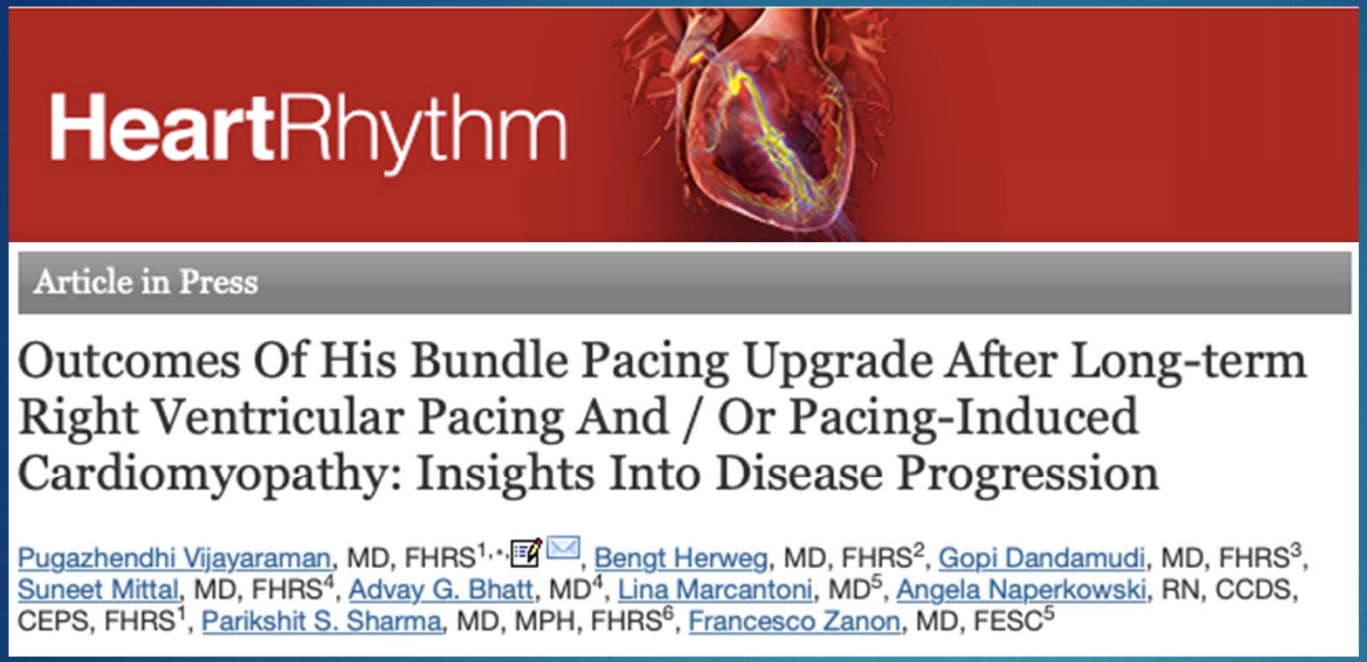
His pacing


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
55
56
84 ms
124 ms
Page: HIS MAP Speed: 100 mm/s 1 mm = 10 msec

CRT-P implantation – HBP





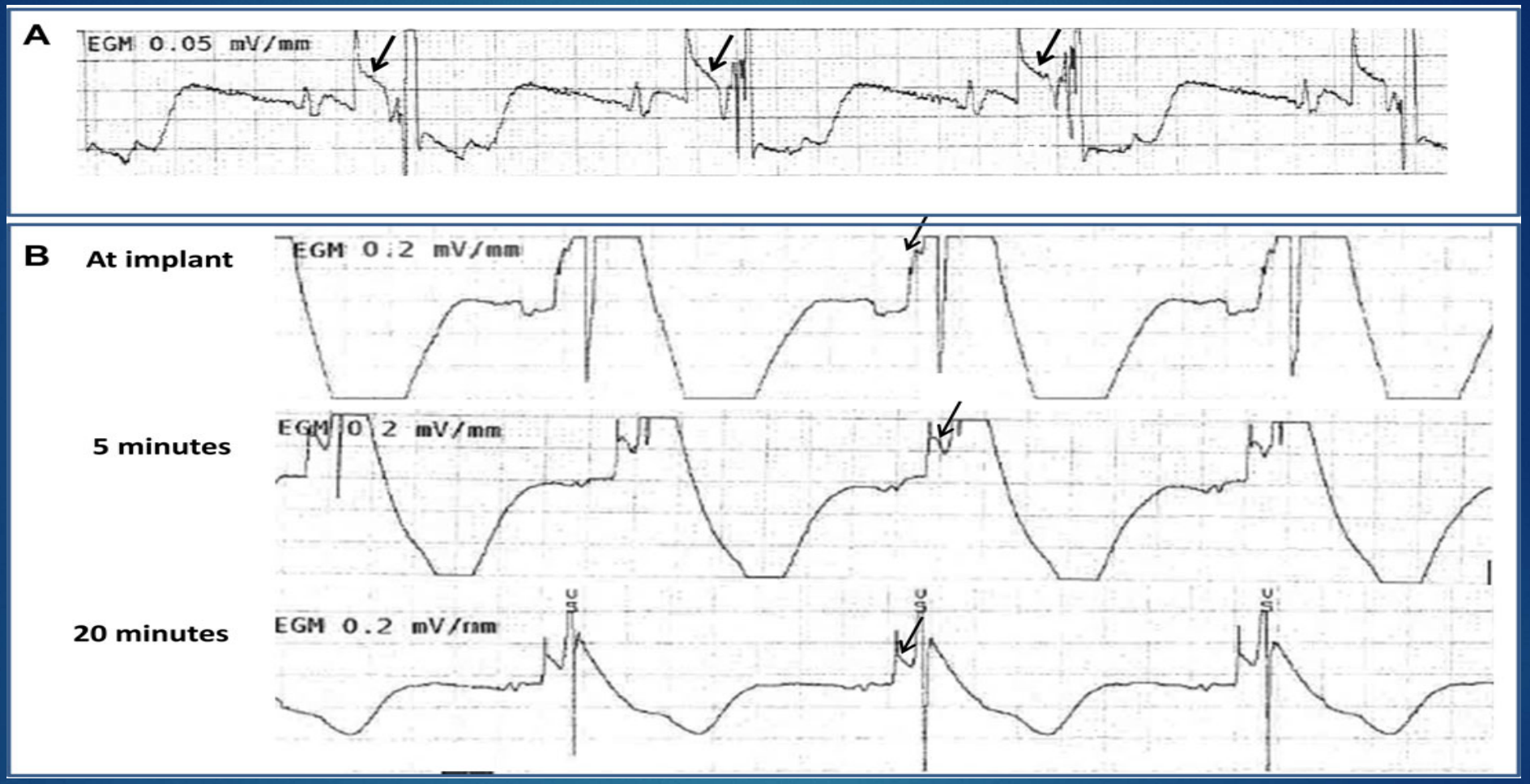


Despite a long duration of AV block and chronic RVP, HBP normalized QRS complexes and T waves with stable thresholds, suggesting that progression of distal conduction disease is uncommon in this population. Electrical and structural changes induced by chronic RVP were consistently reversed with HBP.

Heart Rhythm. 2019 Mar 28. pii: S1547-5271(19)30295-4

HBP Lead capture threshold

- ≤2.0 V at 1ms is acceptable
- Higher threshold accepted with HPCD patients if RV threshold is significantly lower (NS-HBP)
- His bundle injury current (~40% pts) predicts excellent acute and long term thresholds.

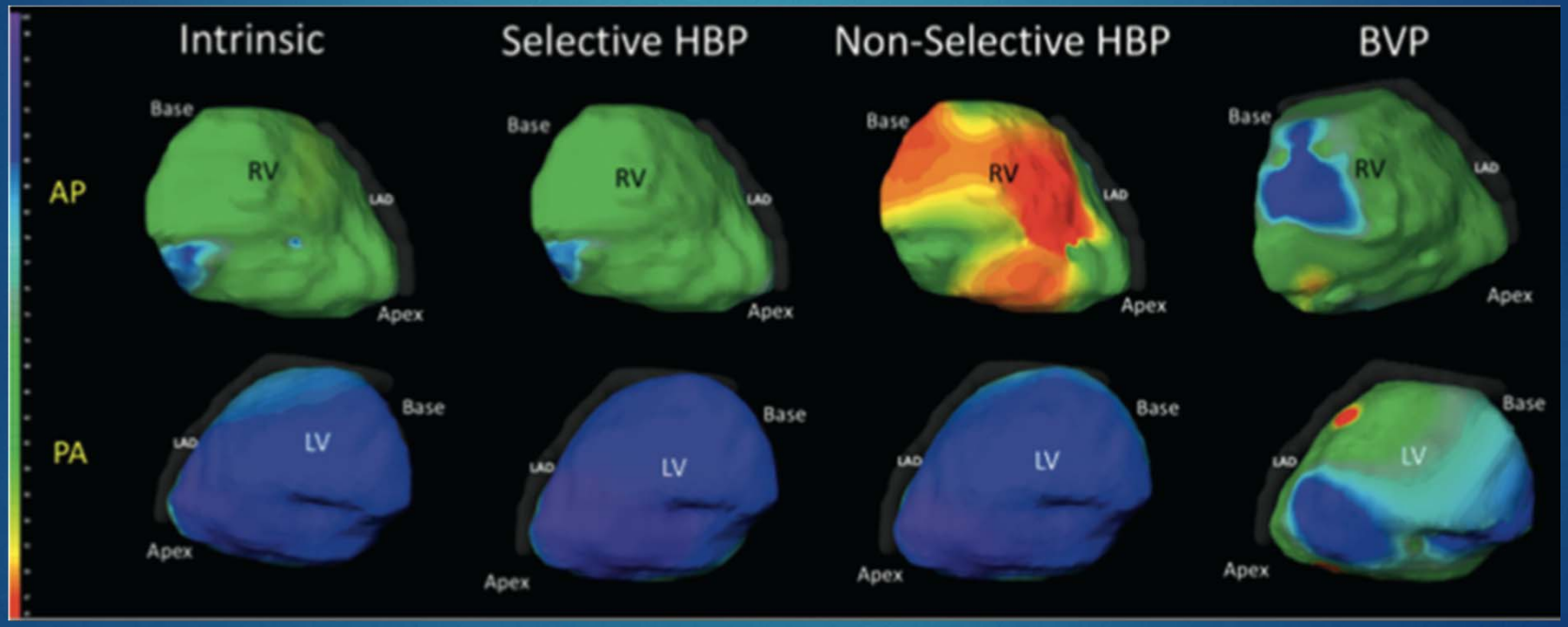


Pacing Clin Electrophysiol. 2015 May;38(5):540-6

HBP procedural outcomes

- With increased procedural experience feasibility of PHBP is >90%
- Recent studies suggest similar fluoroscopy times compared to RVP

Activation maps for intrinsic QRS



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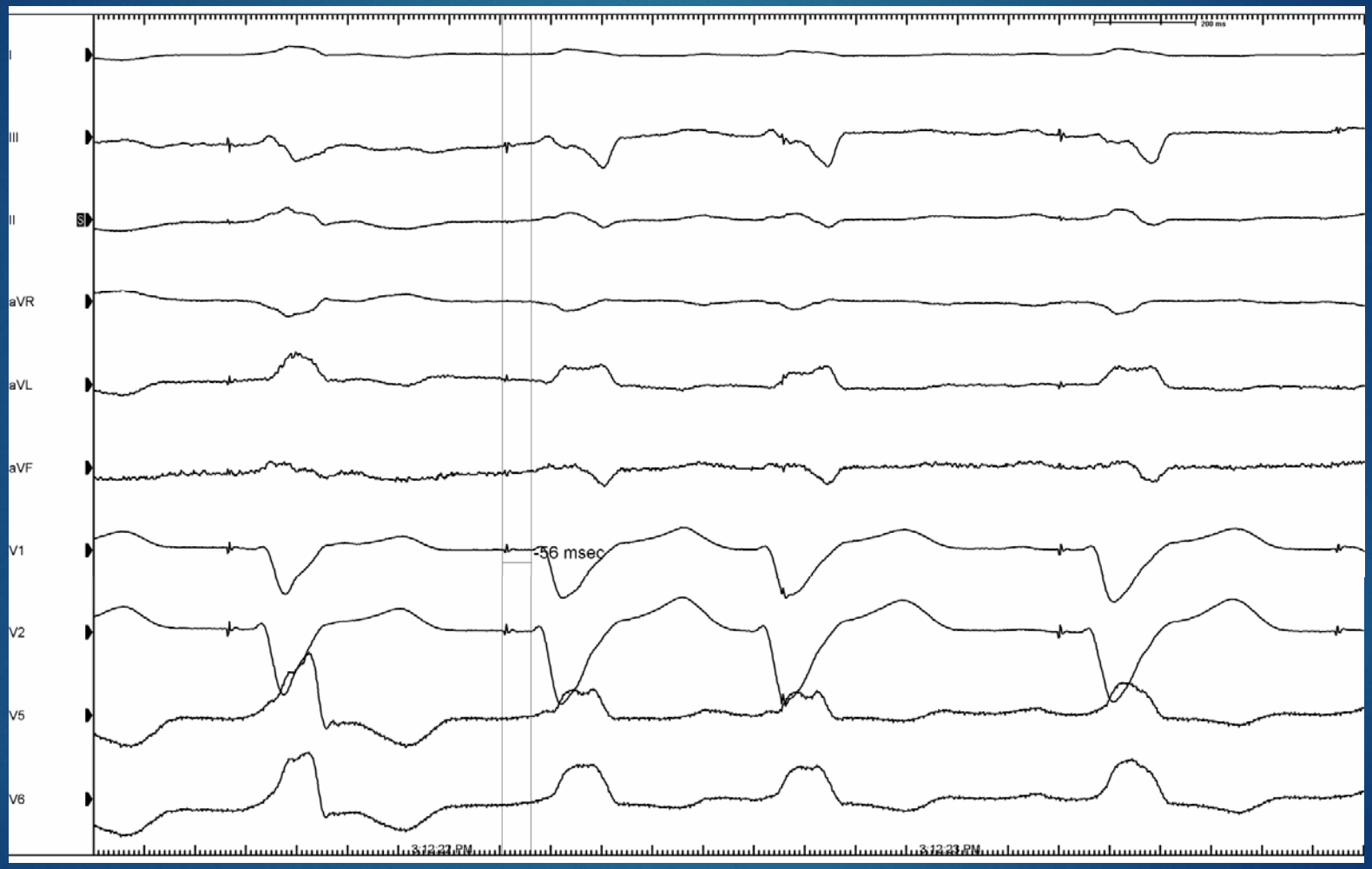
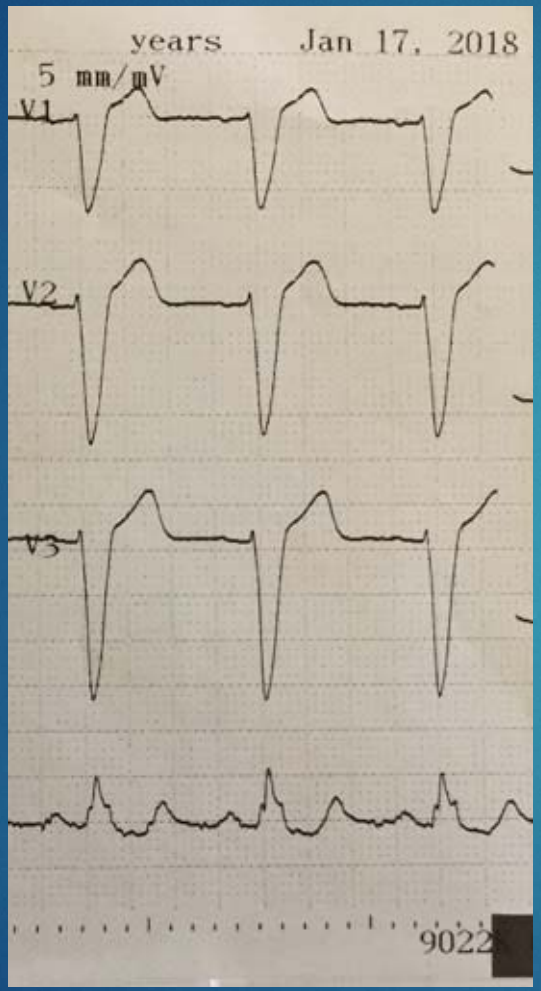
HBP for CRT

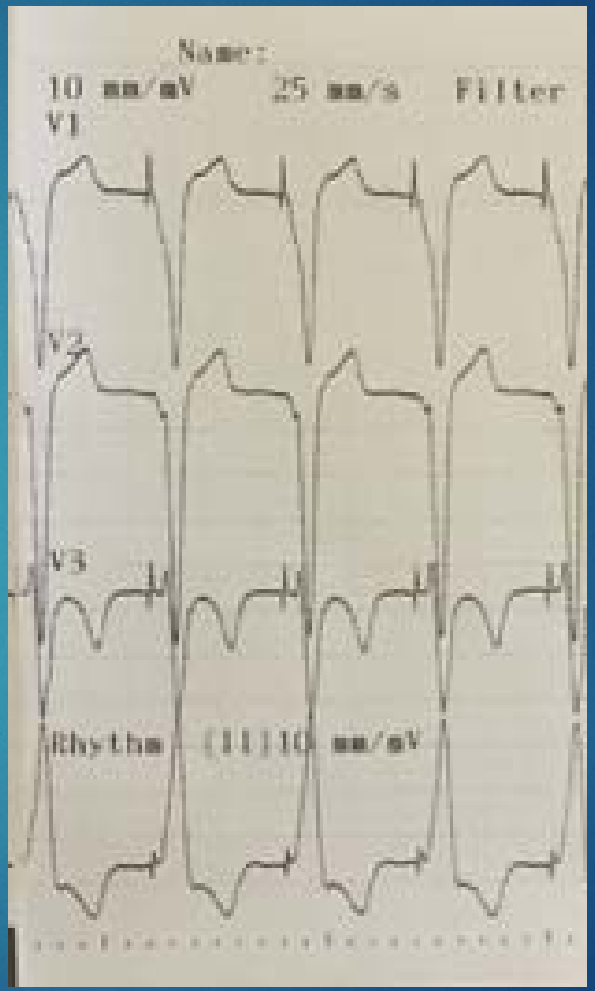
HBP can improve echocardiographic and clinical outcomes in patients who failed traditional LV lead implantation and CRT non-responders.

Permanent HBP may be a reasonable primary alternative to BVP for CRT

Heart Rhythm 2017;14:1353-1361
Heart Rhythm 2018;15:413-420


I
III
II
aVR
aVL
aVF
V1
V2
V5
V6
-56 msec


years
Jan 17, 2018
5 mm/mV
V1
V2
V3


Name:
10 mm/mV
25 mm/s
Filter
V1
V2
V3
Rhythm

Future directions

- HIS-SYNC Pilot: Comparison of HBP to conventional CRT
- HOPE-HF: Evaluation of HBP in paitents with HF with Long AV delay and without BBB

- Use of HBP in patients with IVCD remains uncertain.

Σας ευχαριστώ πολύ για την προσοχή σας.