Not so idiopathic Ventricular Tachycardia

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מרכז הלב המשולב ע"ש יסלזון
מרכז רפואי שערי צדק, ירושלים

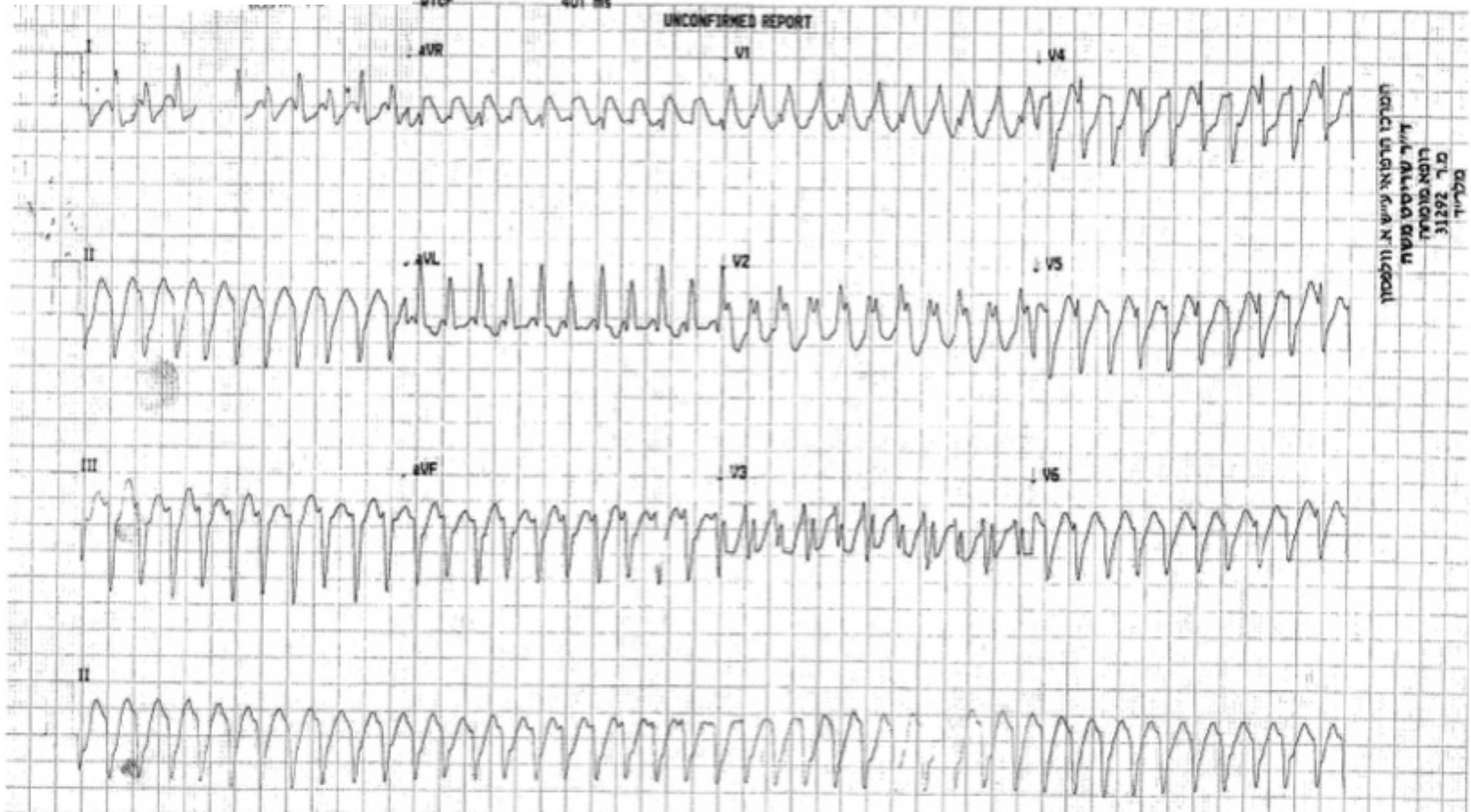
Case Description

- 29yo female patient
- No family history of Sudden Cardiac Death or Heart Disease
- No significant disease in medical history, no medication
- Asymptomatic untill the clinical event
- Admitted to ER for first episode of palpitation and pre syncope, started during an effort

Vent rate	252	BPM
PR int	*	ms
QRS dur	257	ms
QT/QTc	249/357	ms
P-R-T axes	* -85	°
Avg RR	238	ms
QTcB	510	ms
QTcF	401	ms

UNCERTAIN REGULAR RHYTHM
RIGHT BUNDLE BRANCH BLOCK (120+ ms QRS DURATION, UPRIGHT V1, 40+ ms S IN I/aVL/V4/V5/V6)
INFERIOR MYOCARDIAL INFARCTION (40+ ms Q WAVE AND/OR ST/T ABNORMALITY IN II/aVF), PROBABLY OLD
ANTEROLATERAL MYOCARDIAL INFARCTION (40+ ms Q WAVE IN I/aVL/V3-V6), OF INDETERMINATE AGE
ST DEPRESSION, CONSIDER SUBENDOCARDIAL INJURY (0.1+ mV ST DEPRESSION)
ABNORMAL ECG
INTERPRETATION BASED ON A DEFAULT AGE OF 40 YEARS

UNCONFIRMED REPORT



- ECG showing Wide complex tachycardia
  - 250bpm
  - RBBB morphology Left Axis
  - AV dissociation?
  - Small QRS morphology changes
- No effect of Adenosine
- Reduced by external electrical cardioversion after sedation
- Hospitalized for further investigation

- *TTE*: Normal heart, normal function
- *Coronary CT:* no coronary artery disease, no malformation
- *Cardiac MRI*: normal heart function, no LGE, T1 slightly elevated (non specific)
- *EPS under general anesthesia*: Prolonged HV interval up to 85ms, no sustained arrythmia inducible, non sustained VT with LBBB morphology

- Referred for second opinion, new procedure decided under local anesthesia

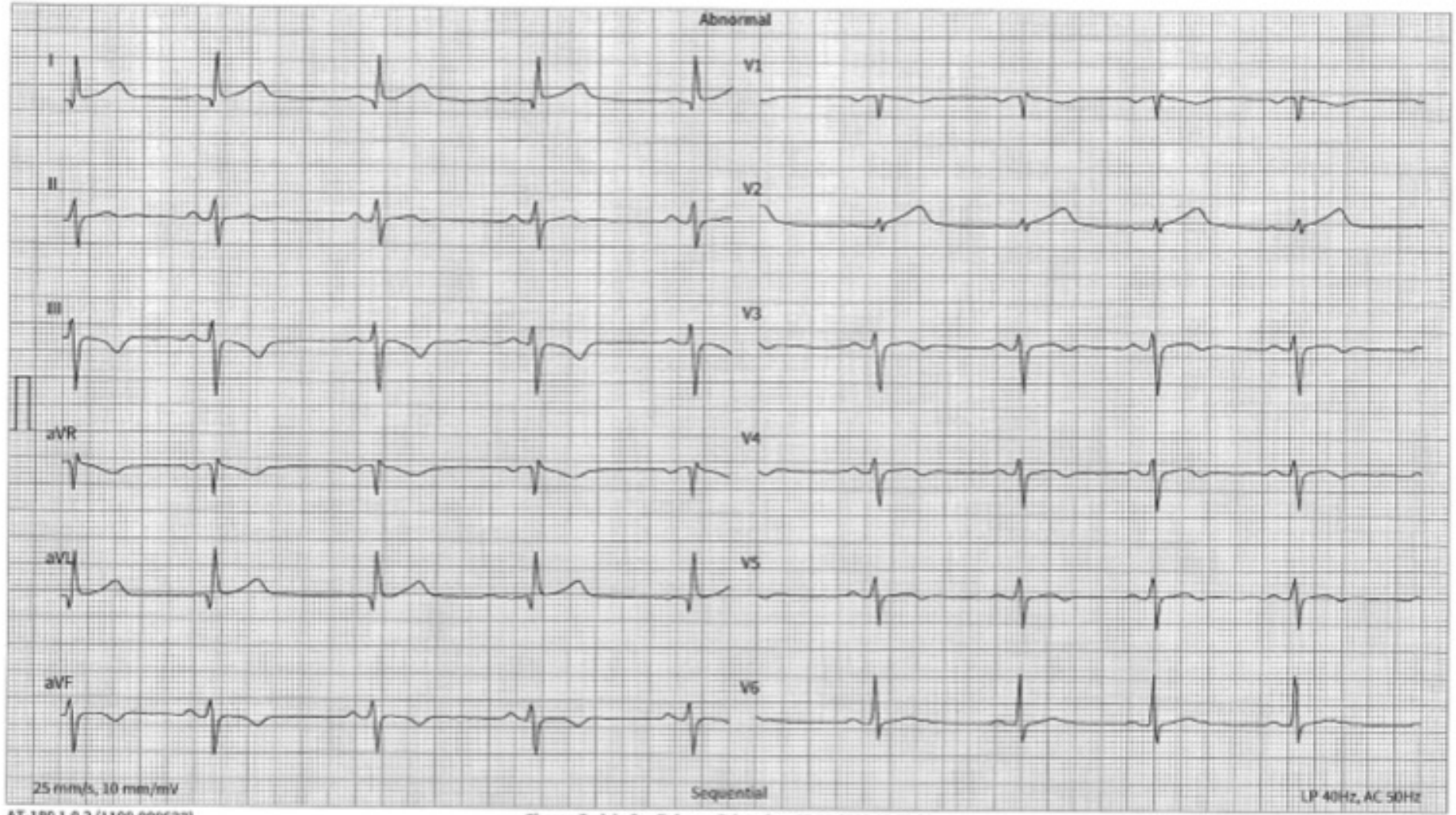
Baseline ECG

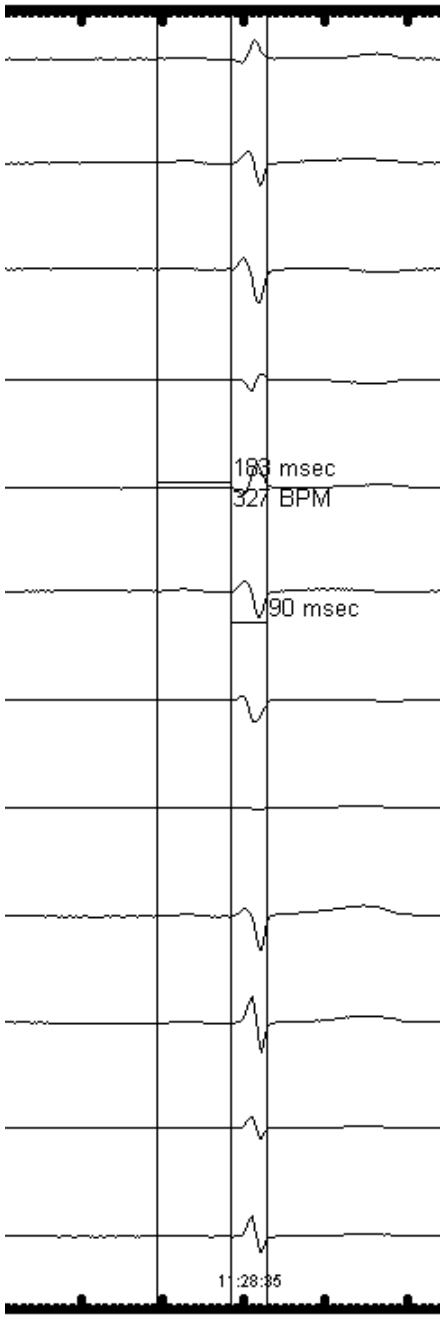
Date of birth	22.08.1994	Visit ID		HR	53 bpm	RR	1139 ms
Age	29 years	Room				P	117 ms
Gender	Female	Order ID				PR	172 ms
Ethnicity	Undefined	Ord. prov.		P axis	67 °	QRS	98 ms
Height		Ref. phys.		QRS axis	-28 °	QT	463 ms
Weight		Device ID	cardio1	T axis	-18 °	QTcB	434 ms

Medication
Remark

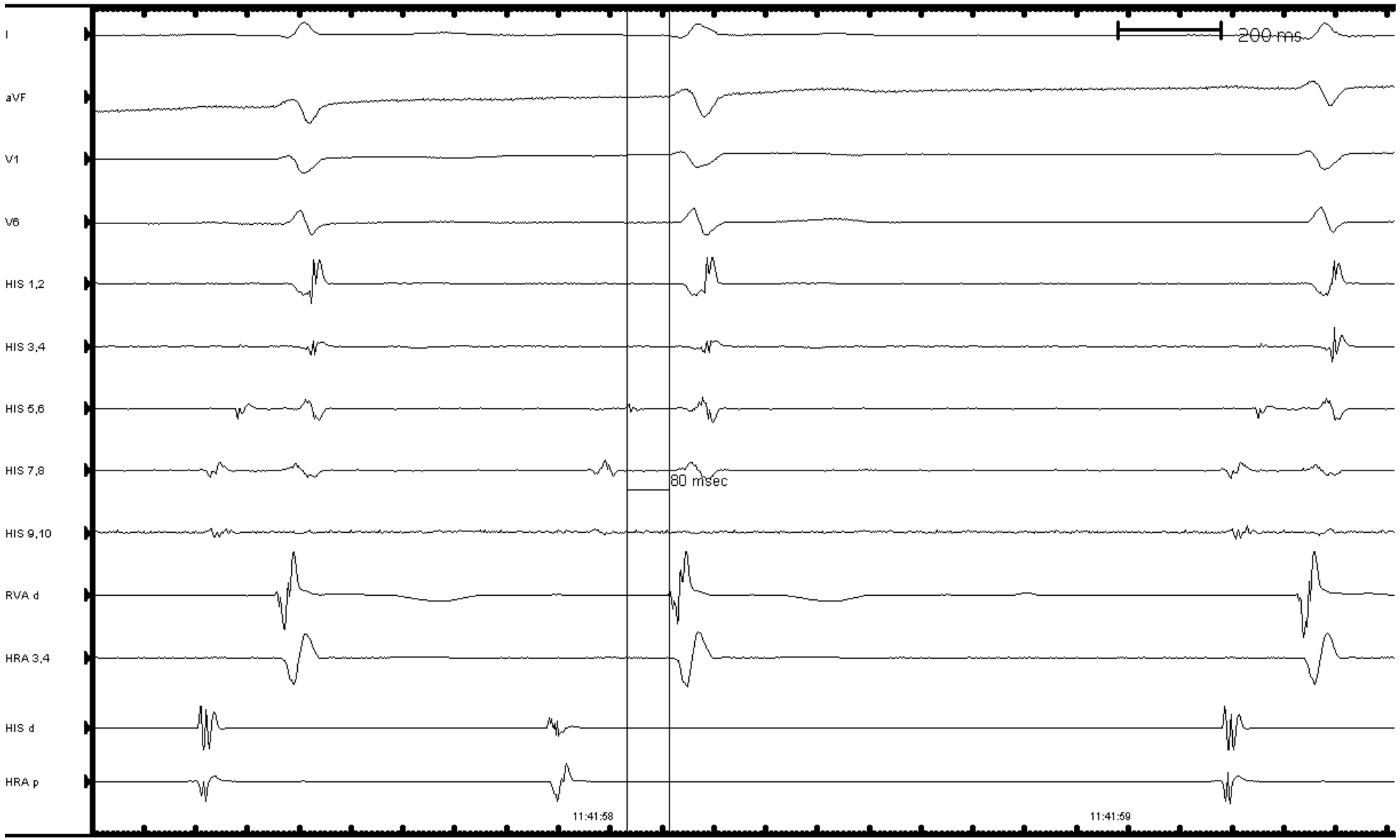
Interpretation too long to fit, please see separate page

Unconfirmed report





Prolonged HV at baseline



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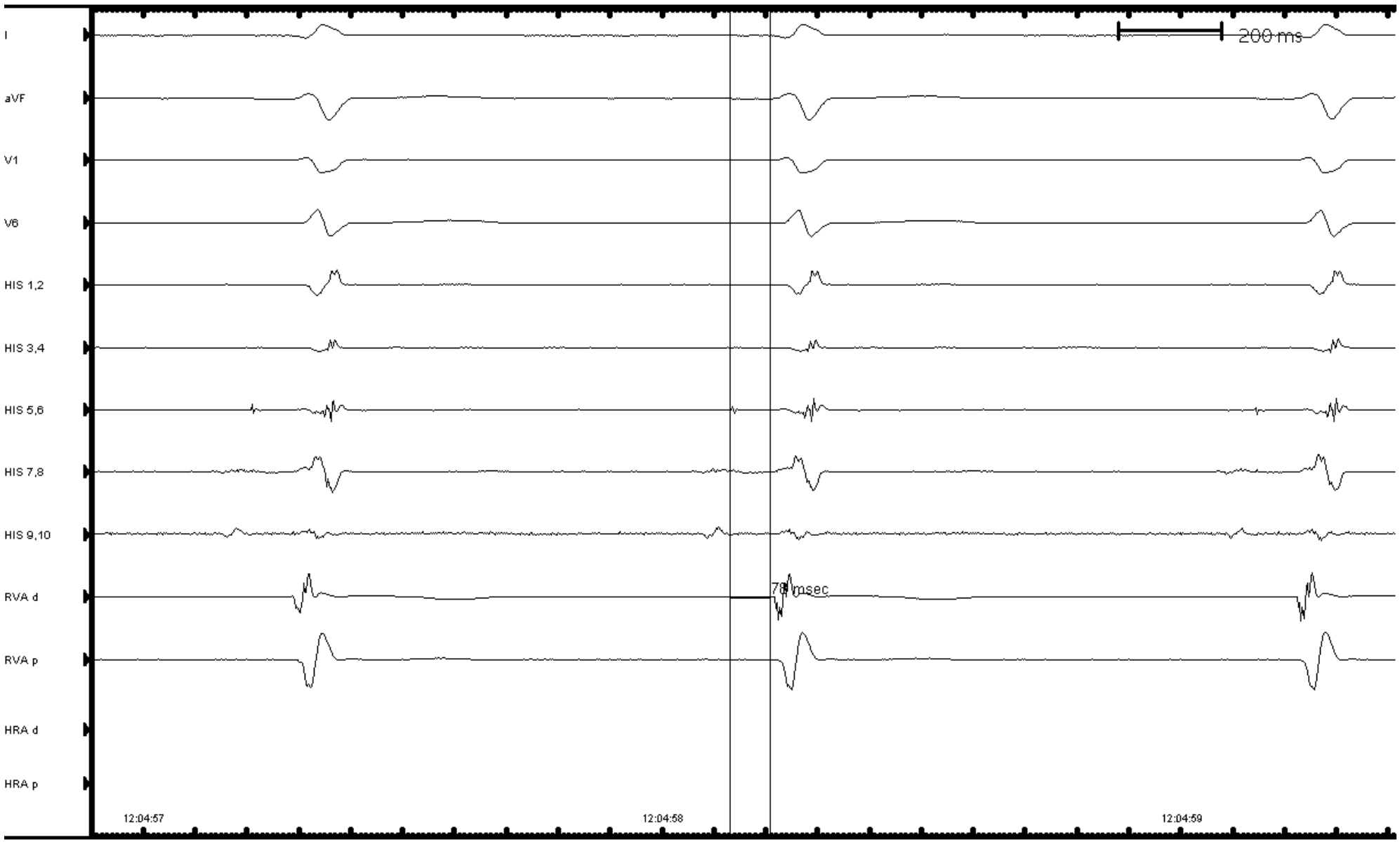
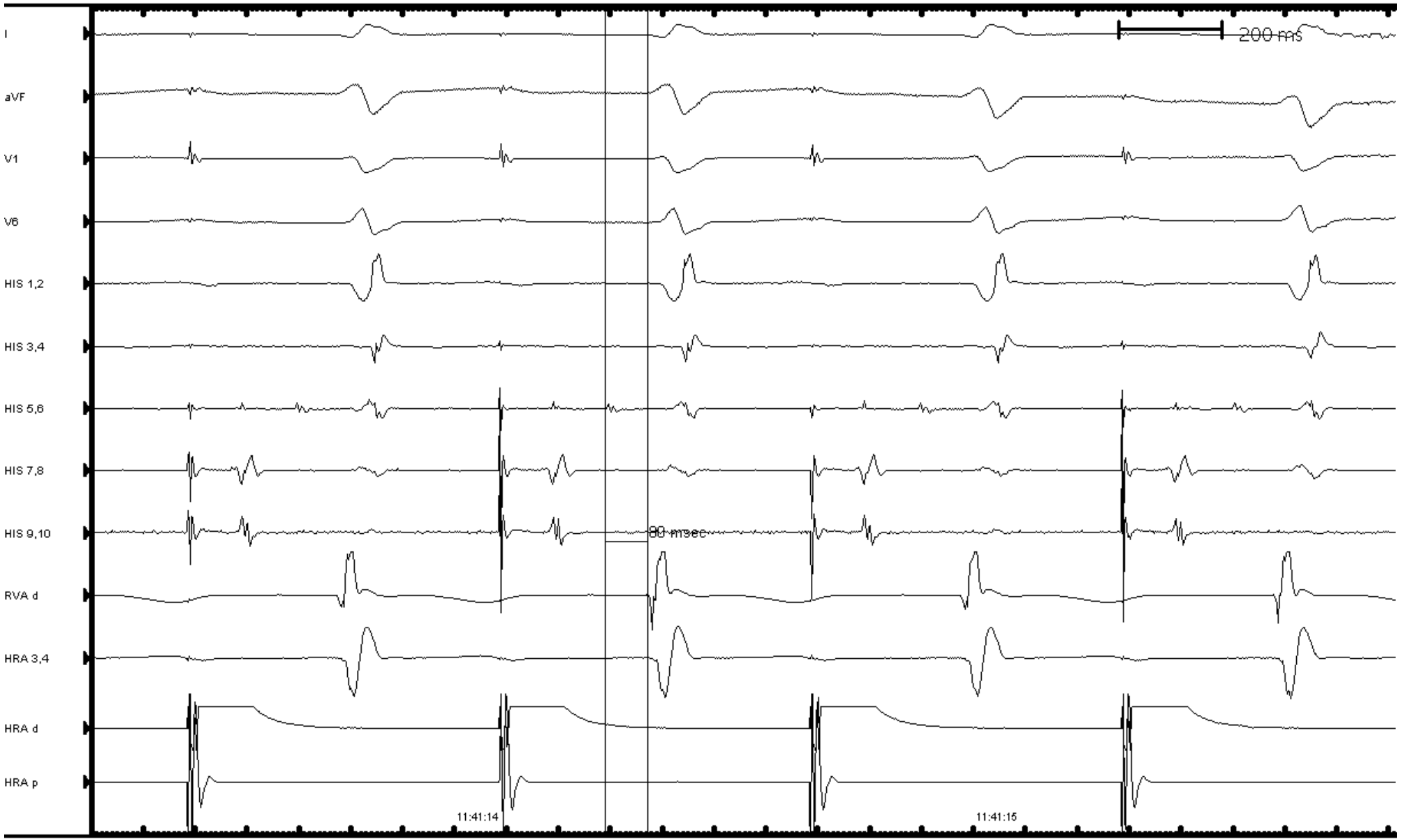
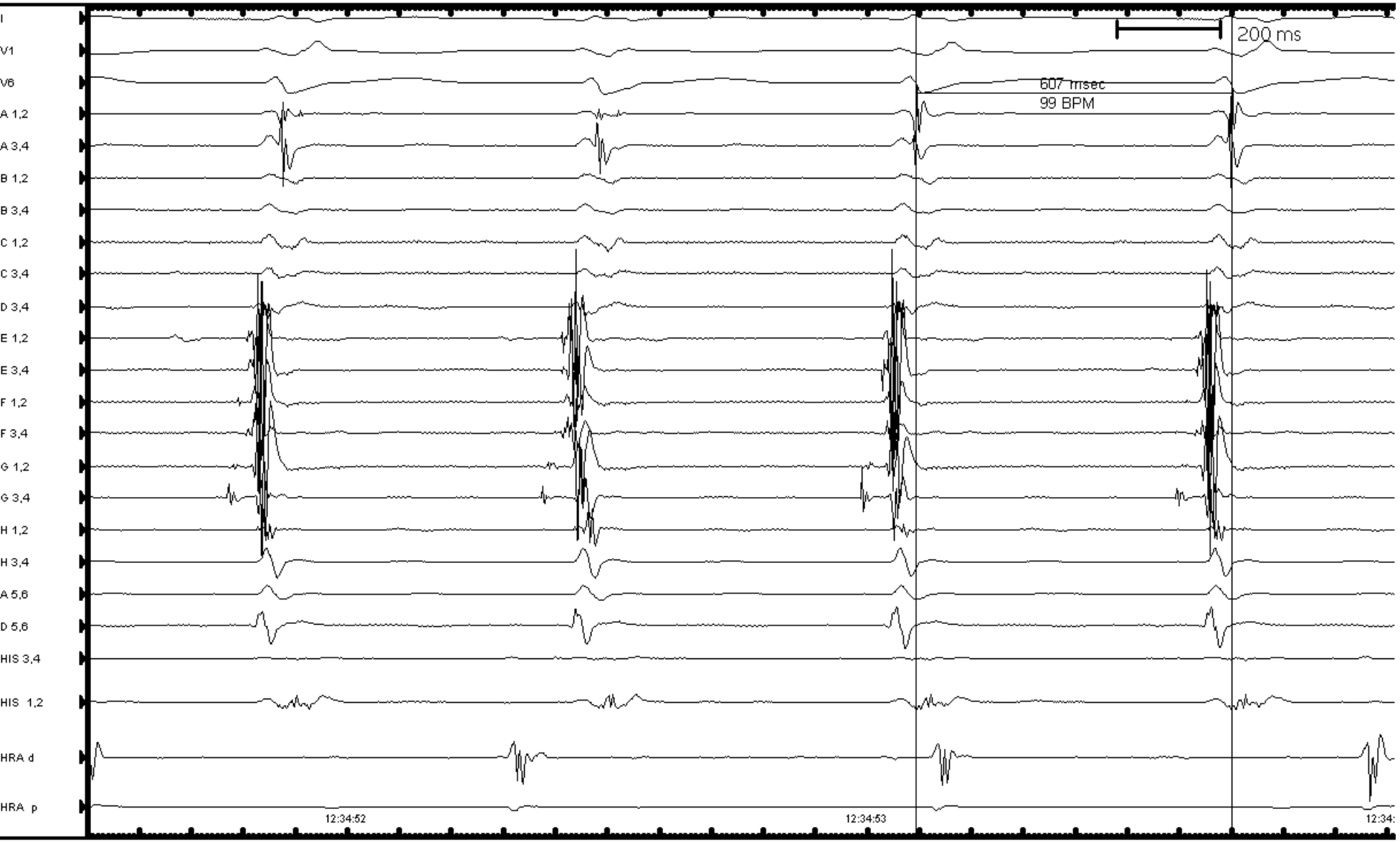


Prolonged HV at baseline



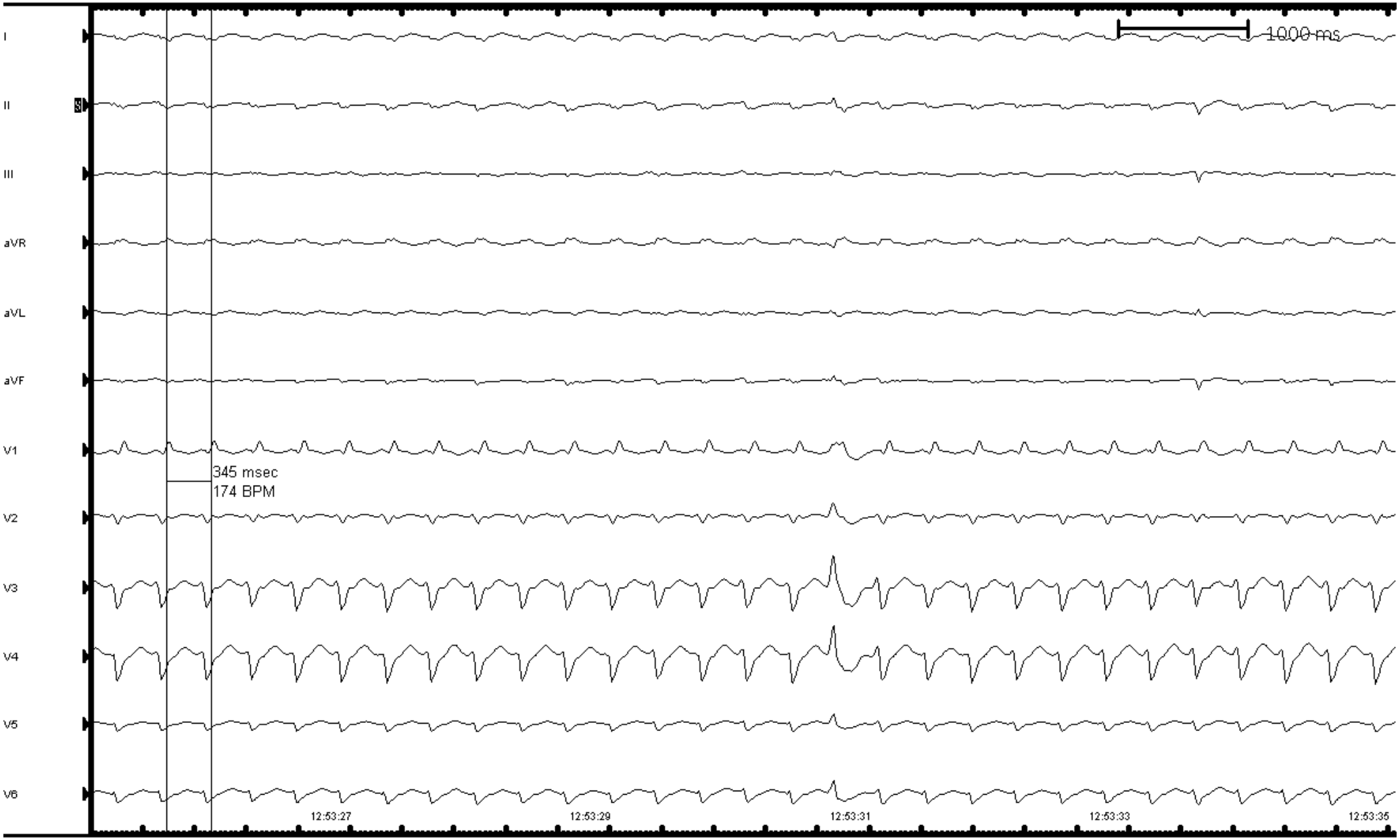
VT1 – slow VT with RBBB Left Axis

VT1 – slow VT with RBBB Left Axis

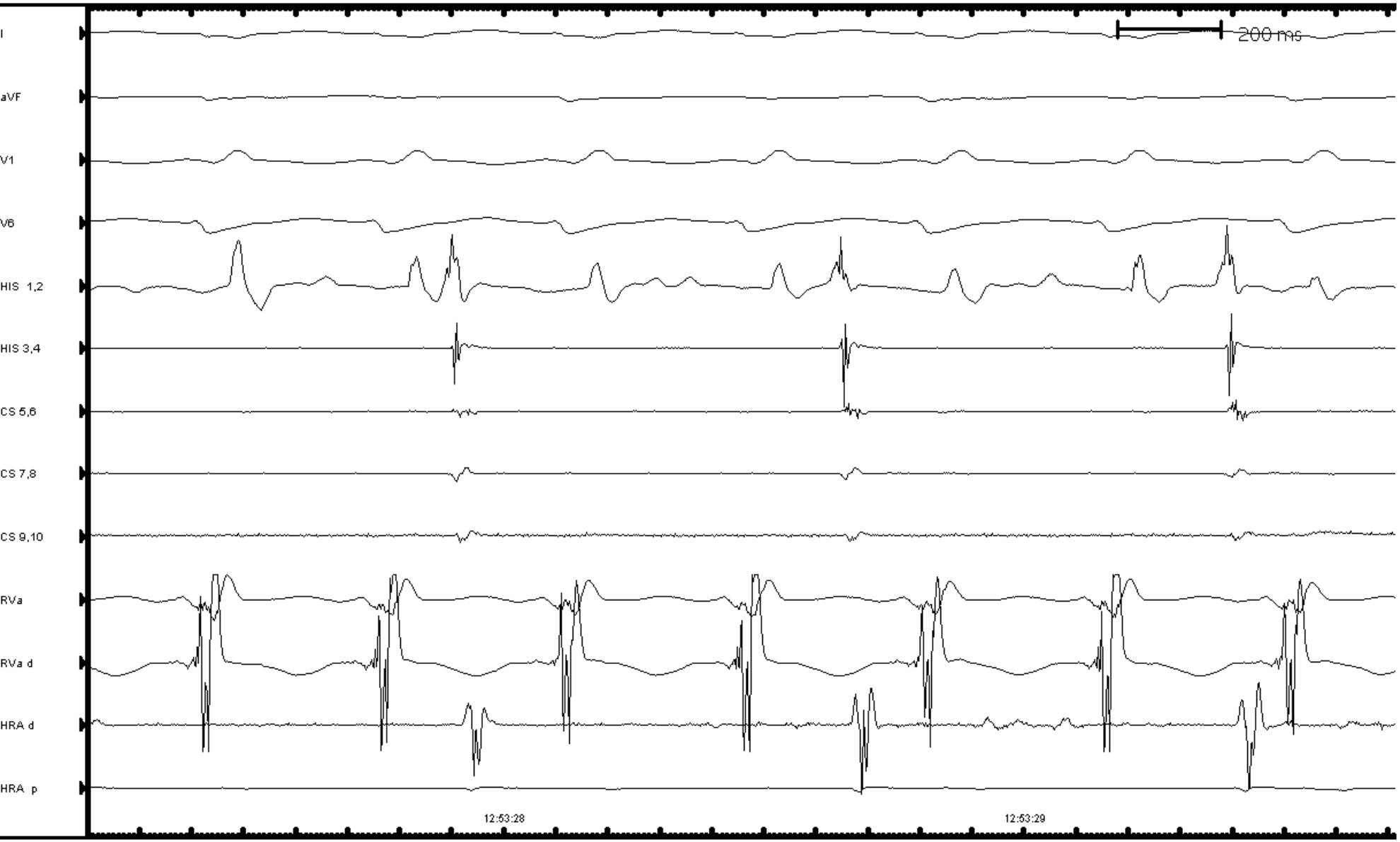


- VA Dissociation
- Local signal registered with Octaray close to Left Posterior Fascicle

VT2 – close morphology with RBBB but Right upper axis



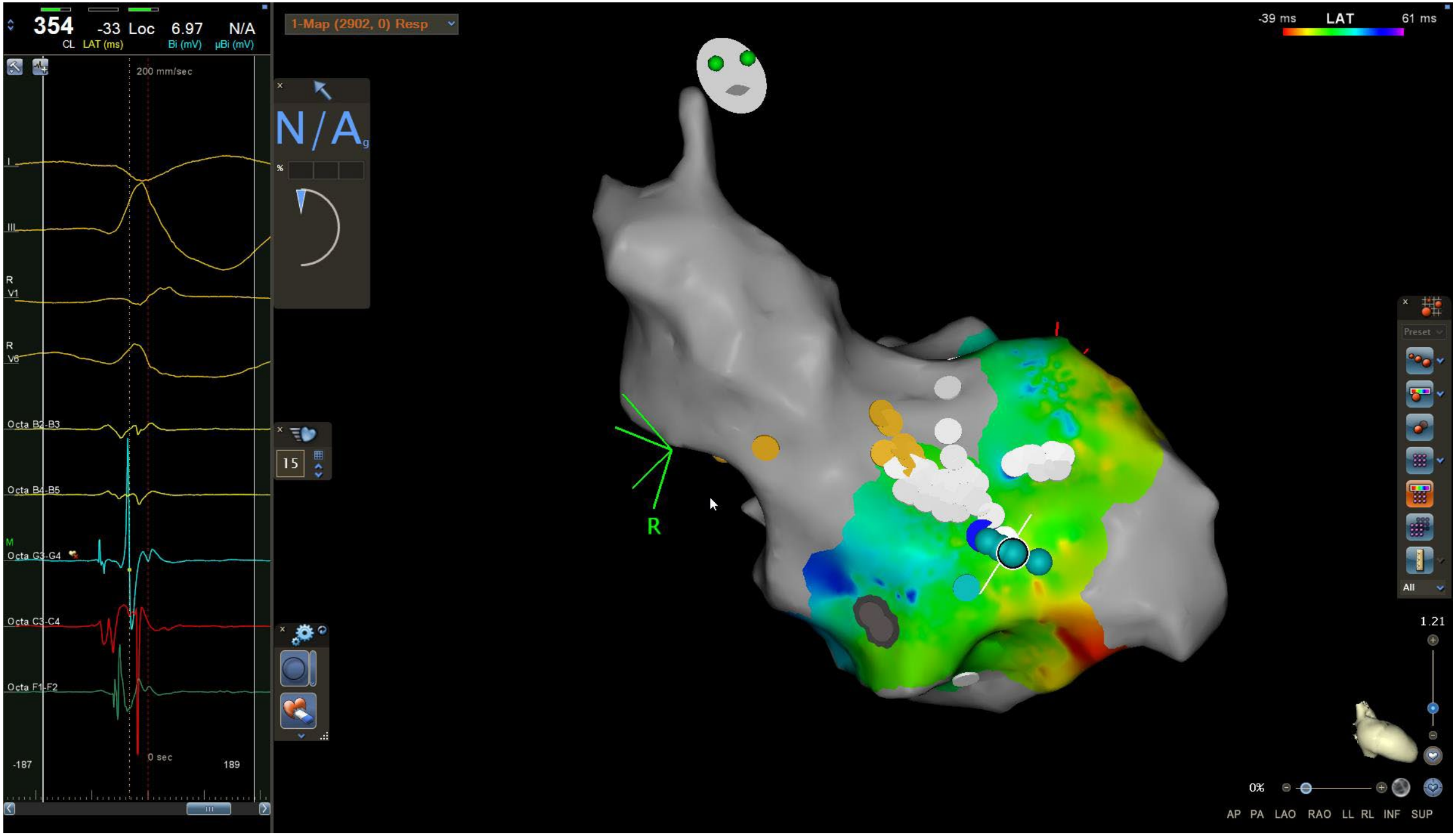
VT2 – close morphology with RBBB but Right upper axis



- VA Dissociation
- No His seen on His Catheter

VT2 – close morphology with RBBB but Right upper axis

- VA Dissociation
- Local signal registered with Octaray close to Left Posterior Fascicle


354
CL
-33 Loc
LAT (ms)
6.97
Bi (mV)
N/A
µBi (mV)
200 mm/sec
I
III
R V1
R V6
Octa B2-B3
Octa B4-B5
M
Octa G3-G4
Octa C3-C4
Octa F1-F2
-187
0 sec
189
1-Map (2902, 0) Resp
-39 ms
LAT
61 ms
N/A
%
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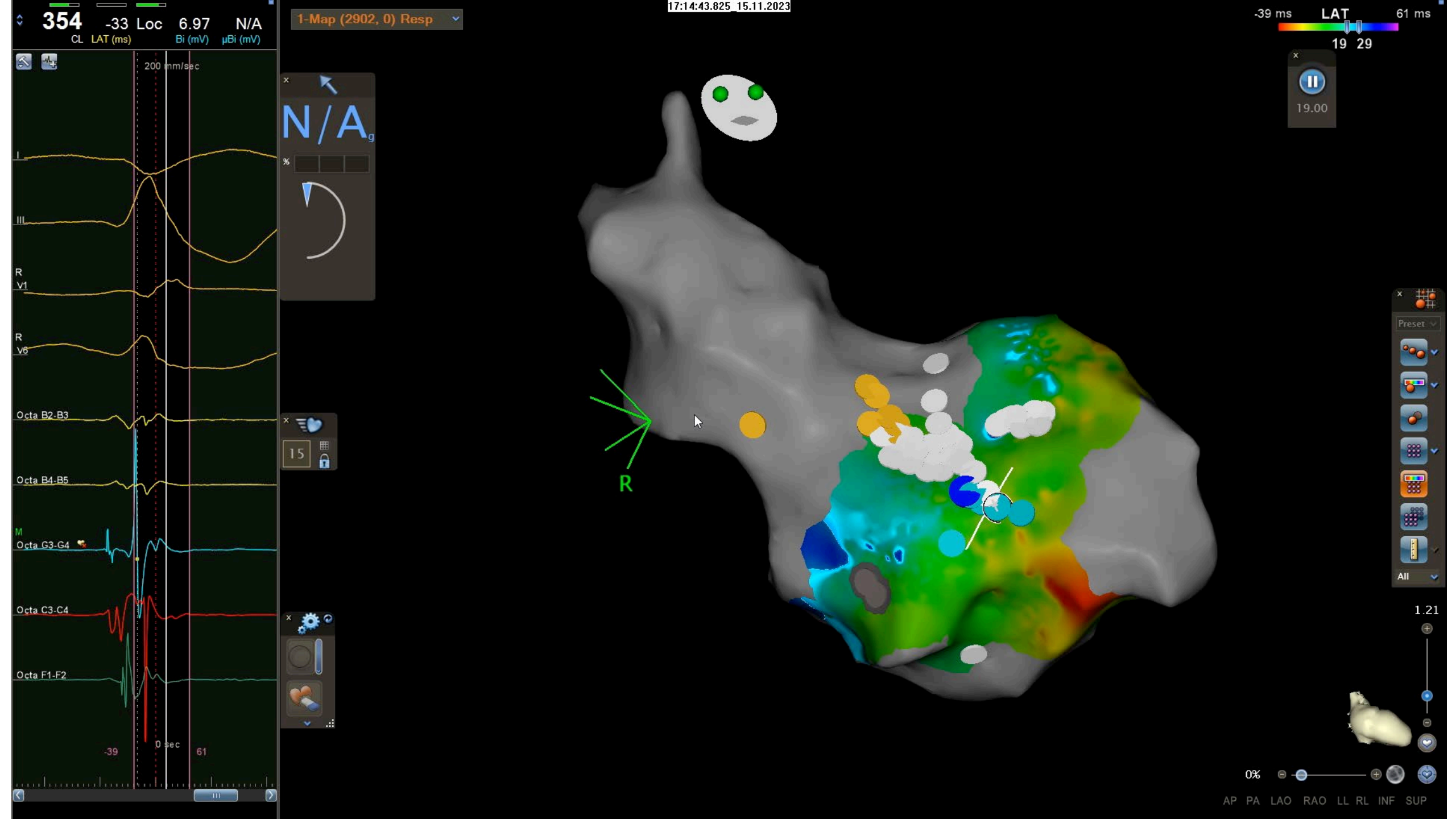
R
Preset
All
1.21
0%
AP PA LAO RAO LL RL INF SUP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M Octa G3-G4
Octa C3-C4
Octa F1-F2
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All
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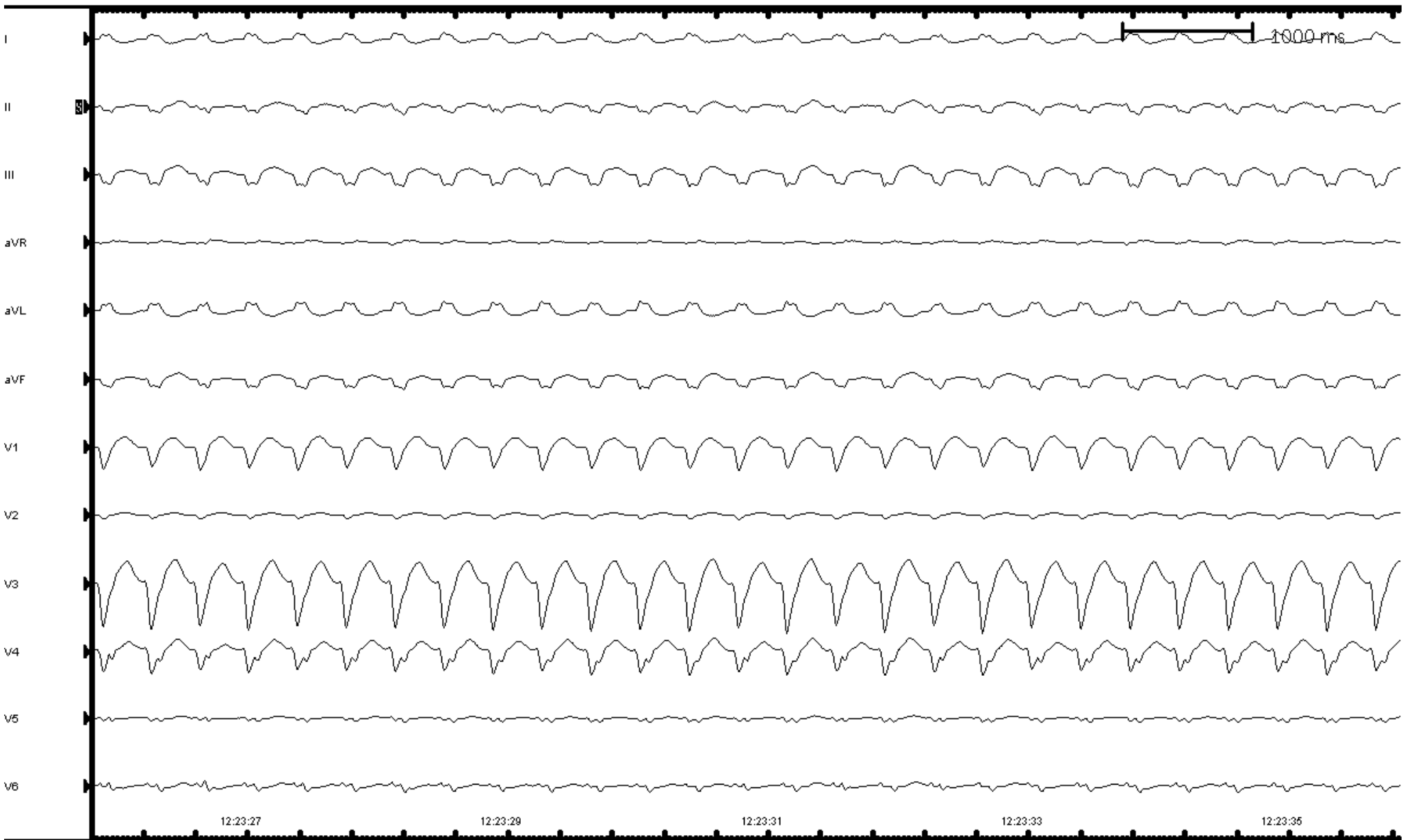
0%
AP PA LAO RAO LL RL INF SUP

VT3 – LBBB Morphology



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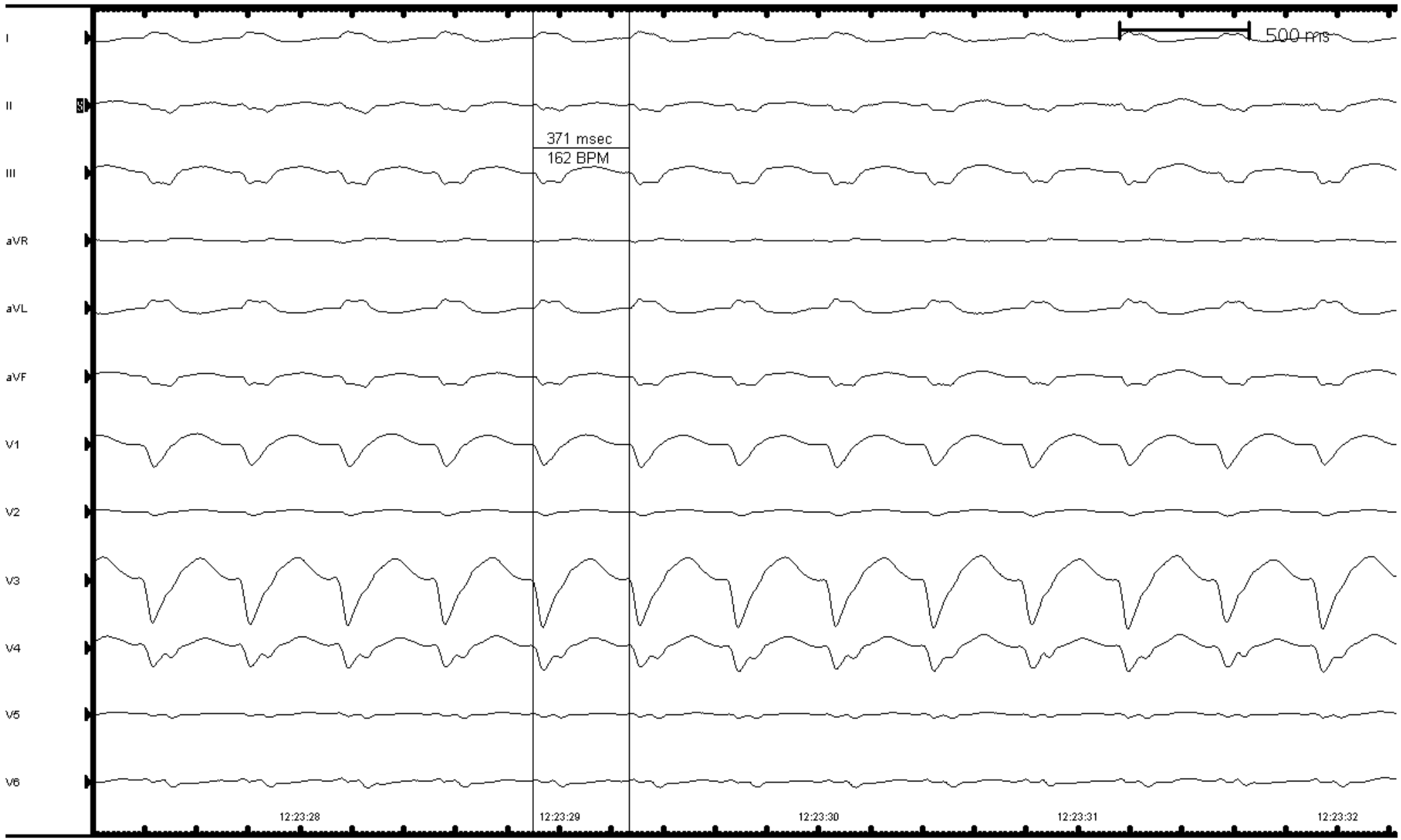
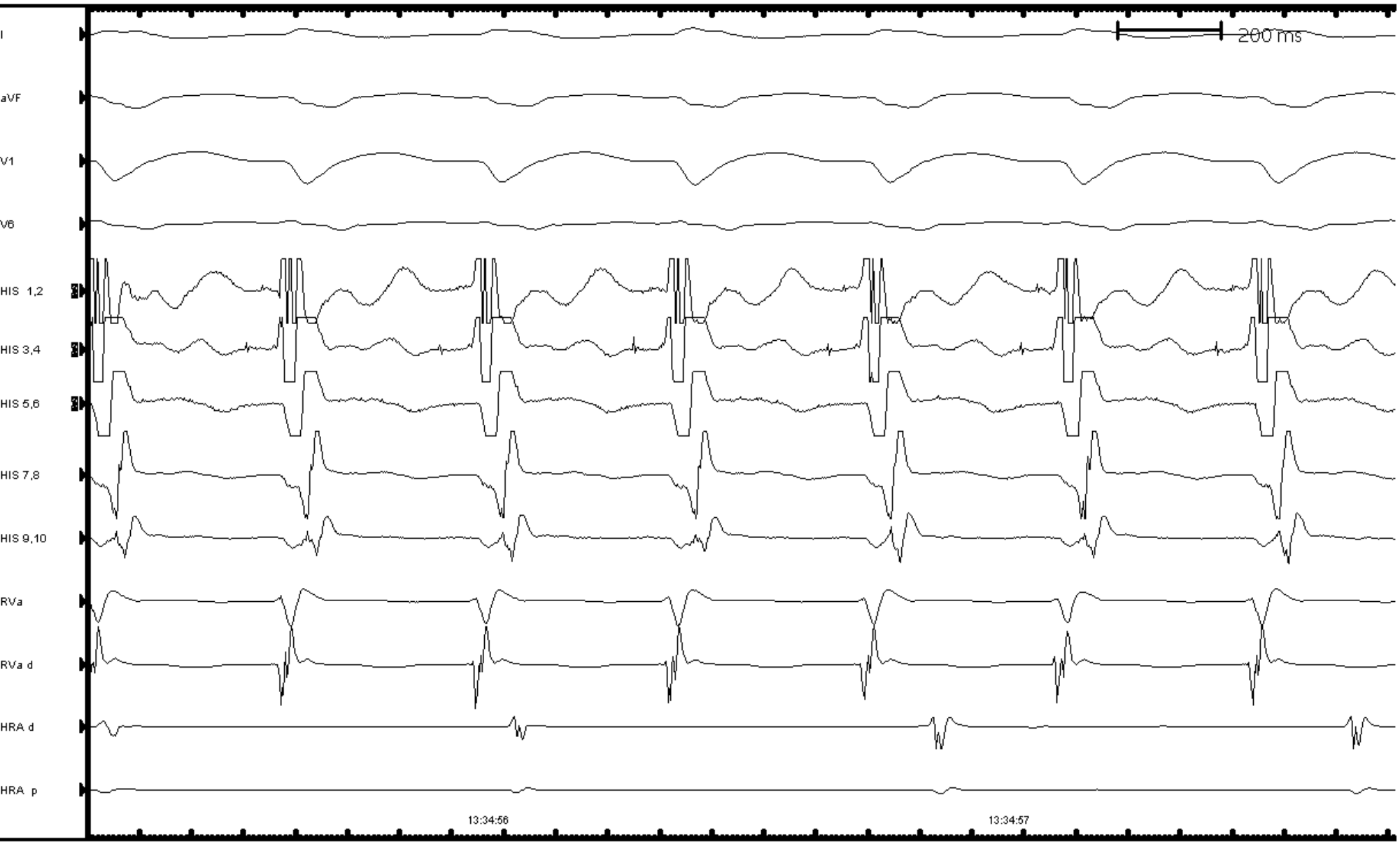


VT3 – LBBB Morphology

- VA Dissociation
- His potential preceed V during VT
- HV in tachycardia > HV in sinus

VT3 – LBBB Morphology => Bundle Branch Re-Entrant VT

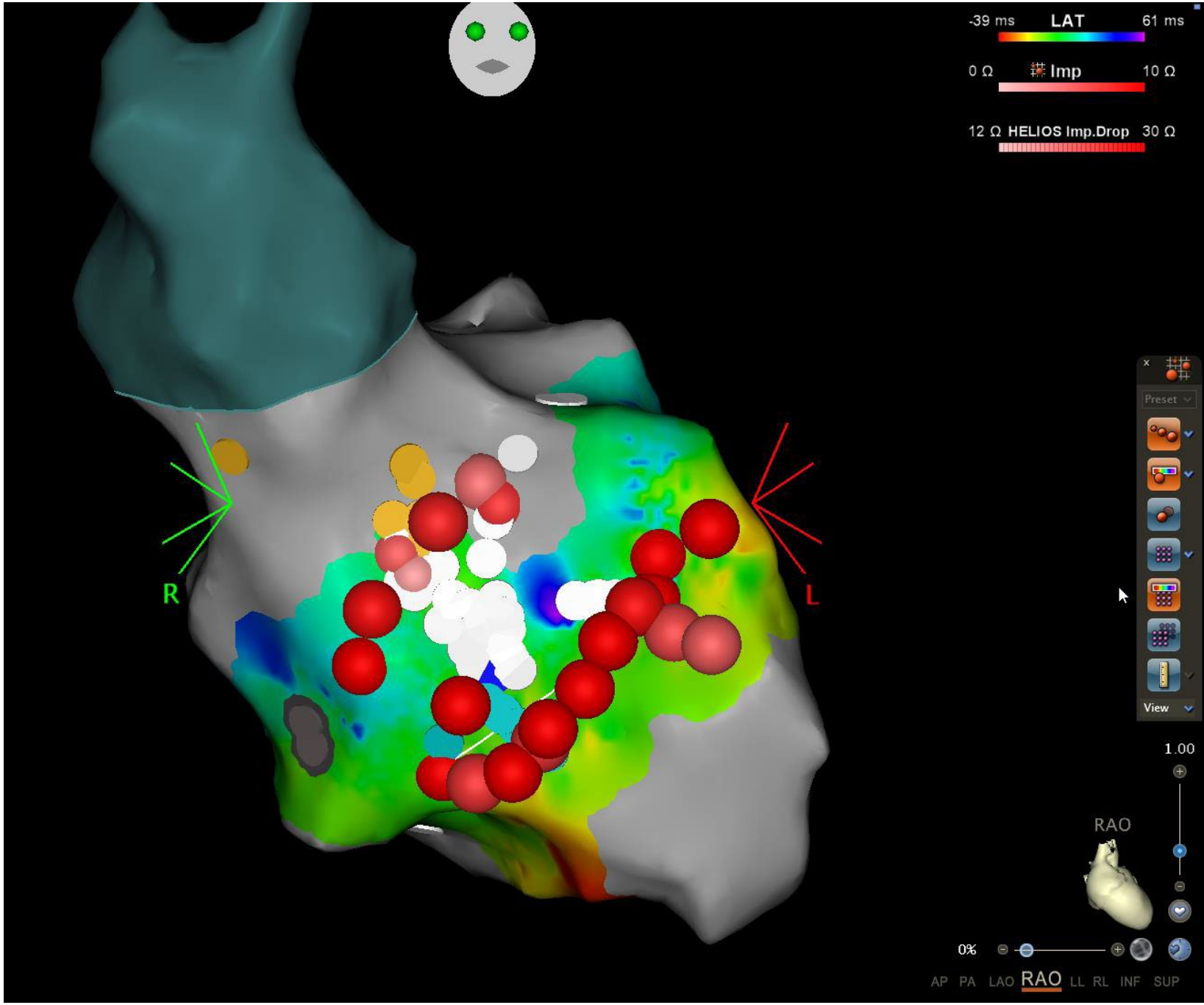


- VA Dissociation
- His potential preceed V during VT
- HV in tachycardia > HV in sinus
- RBBB potential registered with basal to apex activation (prox to distal)

- Prolonged HV interval
- VT1 –VT2: Highly suggestive of Left fascicular / Purkinje related VT
- VT3: Diagnostic of Bundle Branch Re-Entrant VT

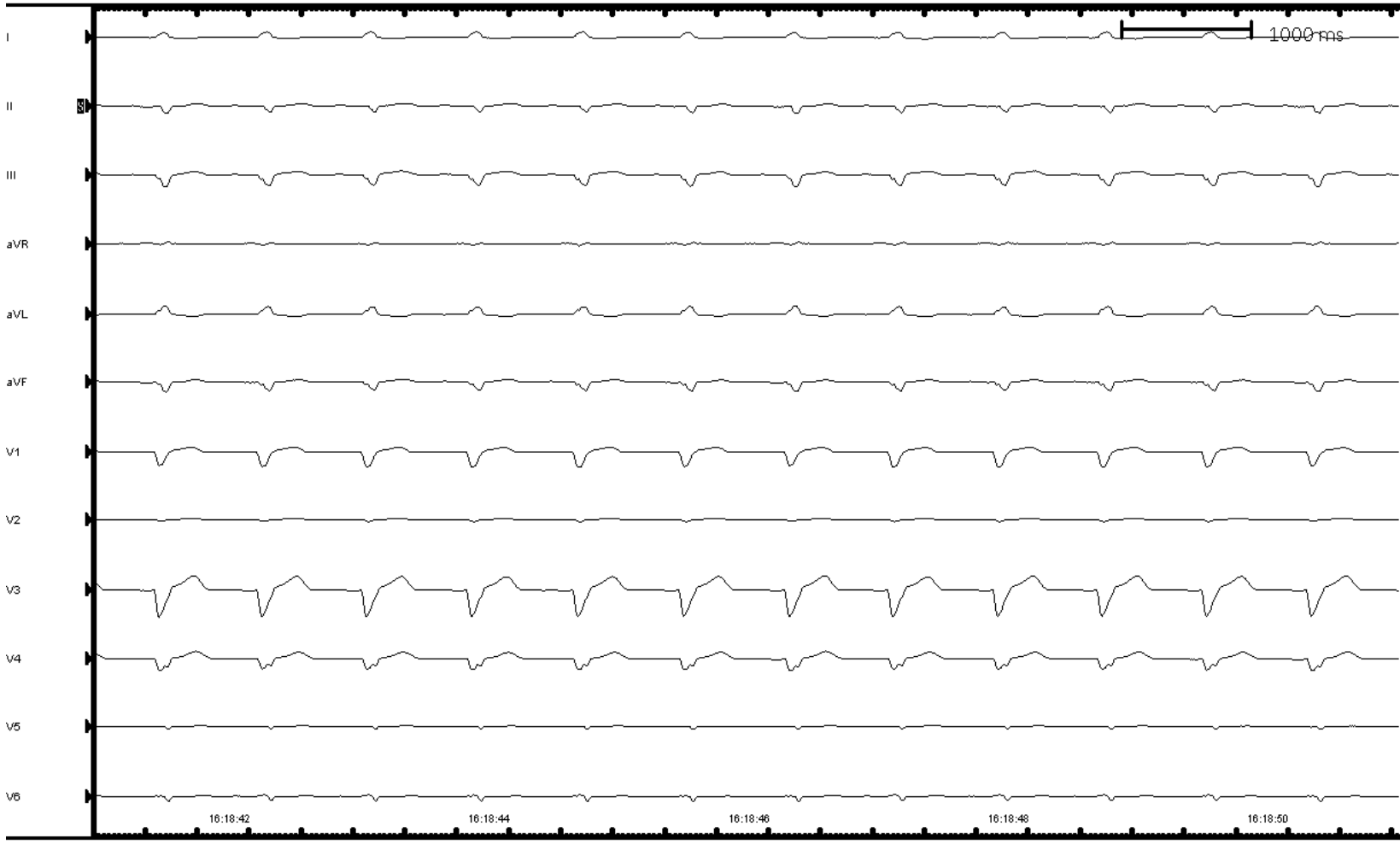
What would you do?

- Decision to ablate on the left side to treat both VT, first distally but still inducible for BBR VT so ablated more proximaly



At the end of procedure

- Sinus Rythm, LBBB left axis
- Non inducible for VT
- Unchanged conduction intervals



Post ablation management

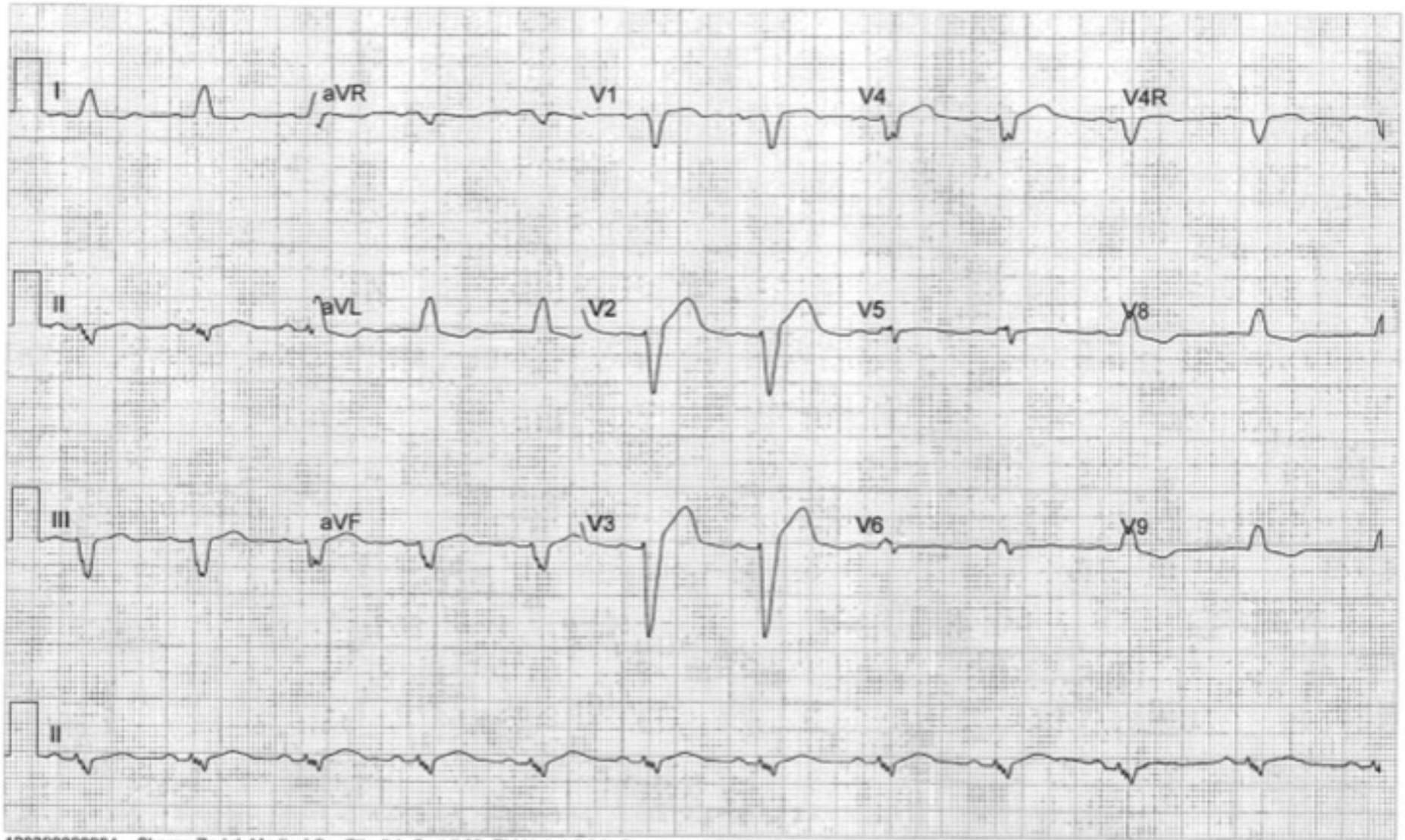
- Monitoring: no episode of arrythmia or
- Holter: permanent LBBB, no arrythmia or AV block
- TTE: normal
- Exercise test: 8min, up to 144bpm = 75%, no arrythmia or AV block, permanent LBBB

15-Nov-2023 08:11:17

Vent rate:	68	BPM
PR int:	193	ms
QRS dur:	164	ms
QT/QTc:	470 / 487	ms
P-R-T axes:	64 -39 81	

SINUS RHYTHM
LEFT AXIS DEVIATION [QRS AXIS < -30]
LEFT BUNDLE BRANCH BLOCK [120+ ms QRS DURATION, 80+ ms Q/S IN V1/V2, 85+ ms R IN I/aVL/V5/V6]
ABNORMAL ECG

UNCONFIRMED REPORT



120390000984 Sharee Zedek Medical Centre # 1 Cart # 35 ELI Link 4.5.0.2 Sequence # 7007 25mm/s 10mm/mV 0.05-300 Hz

What would you do?

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Bundle Branch Re-Entrant Ventricular Tachycardia

Novel Genetic Mechanisms in a Life-Threatening Arrhythmia

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TABLE 1 Clinical, Electrophysiological, and Genetic Features of BBRVT Study Participants

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Clinical features						
Age at diagnosis, yrs	17	18	38	37	22	29
Sex	F	M	F	M	M	M
Family history of arrhythmic disorder	Negative	Negative	CCD	Negative	Negative	Negative
Presentation	Syncope	ACA	ACA	Pre-syncope	Syncope	Syncope
Structural heart disease	Negative	Negative	BAE	BAV	BAV	Negative
Arrhythmia features						
Presenting rhythm	BBRVT	BBRVT	BBRVT	AVB	AVB	BBRVT
Baseline ECG	QRS 120 ms	Indet axis	AF & LBBB	AVB	AVB	iRBBB
Baseline HV, ms	61	79	62	60	78	75
BBRVT morphology	RBBB & LBBB	LBBB	LBBB	LBBB	RBBB & LBBB	LBBB
BBRVT HV, ms	74	91	75	66	86	115
BBRVT rate, beats/min	260, 240	170	250	200	270, 230	220
Follow-up						
Years	15	3	8	3	4	7
Other arrhythmias	SND, AFl	Negative	Negative	Negative	Negative	Negative
Clinical status	Alive	Alive	Deceased	Alive	Alive	Alive
Genetic mutation						
Gene	*SCN5A*	*SCN5A*	*LMNA*	-	-	-
Nucleotide change	C > G	C > T	C > G	-	-	-
Mutation type	Missense	Splice Site	Missense	-	-	-
Amino acid change	Ala1905Gly	N/A	Leu327Val	-	-	-
In silico analysis						
PolyPhen-2 score	0.999	N/A	0.566	-	-	-
SIFT score	0	N/A	0.05	-	-	-
Mutation Taster score	Disease-causing	Disease-causing	Disease-causing	-	-	-

Circulation: Arrhythmia and Electrophysiology

ORIGINAL ARTICLE

Electrophysiological Characteristics of Bundle Branch Reentry Ventricular Tachycardia in Patients Without Structural Heart Disease

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Bing Yang, MD
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Gang Yang, MD
Kai Gu, MD
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Kejiang Cao, MD, PhD
Feifan Ouyang, MD
Minglong Chen, MD

Table 1. Baseline Characteristics of Patients With BBR-VT

Patient No.	Gender	Age, y	Symptom	Left Atrial Diameter	LVDd	LVEF, %	Baseline QRS Morphology	VT Morphology	Addi VT	Previous Device Implantation	Previous Ablation	Ablation Arrhythmia
1	M	44	Palpitation	40	54	62.3	LBBB	LBBB/LAD	PRVT		+	LPFVT
2	M	47	Palpitation	36	48	61.9	LBBB	LBBB/LAD	…		–	…
3	M	48	Presyncope	37	53	57.1	NQRS	LBBB/LAD	PRVT	ICD	–	…
4	F	27	Presyncope	38	49	60.3	NQRS	LBBB/LAD	…		–	…
5	M	20	Palpitation	27	45	62.1	NQRS	LBBB/LAD	…		–	…
6	M	16	Syncope	28	47	65.8	LBBB	LBBB/LAD	PRVT	DDD	–	…
7	M	20	Syncope	29	50	67.9	NQRS	LBBB/LAD	…		+	AFL
8	F	27	Palpitation	30	49	60.9	NQRS	LBBB/LAD RBBB/RAD	PRVT		+	MCT-AT
9	M	17	Palpitation	32	43	67.5	LBBB	LBBB/LAD	PRVT		–	
Mean		29.6		33	48.7	62.8						
STD		13.2		4.8	3.5	3.6						

– indicates not previous ablation; +, previous ablation; addi VT, additional ventricular tachycardia; AFL, atrial flutter; AT, atrial tachycardia; BBR-VT, bundle branch reentry ventricular tachycardia; DDD, dual-chamber pacemaker; ICD, implanted cardiac defibrillator; LAD, left axis deviation; LBBB, left bundle branch block; LPFVT, left posterior fascicular ventricular tachycardia; LVDd, left ventricular diastolic diameter; LVEF, left ventricular ejection fraction; MCT, middle crista terminalis; NQRS, narrow QRS morphology; PRVT, Purkinje-related ventricular tachycardia; and RAD, right axis deviation.

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Long-Term Outcome of Catheter Ablation for Treatment of Bundle Branch Re-Entrant Tachycardia

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- LBB Ablation in 13 (41%) – pre existing LBBB or mechanical LBBB
- 6 patients died (3 CHF, 1 PE, 1 sepsis, 1 malignancy)
- 26 patients (81%) with 88+/- 36months follow up: no recurrence of BBRT – 4 patients with different myocardial VT (inducible during procedure)
- **Normal LV function and no other VT inducible: no need for ICD**

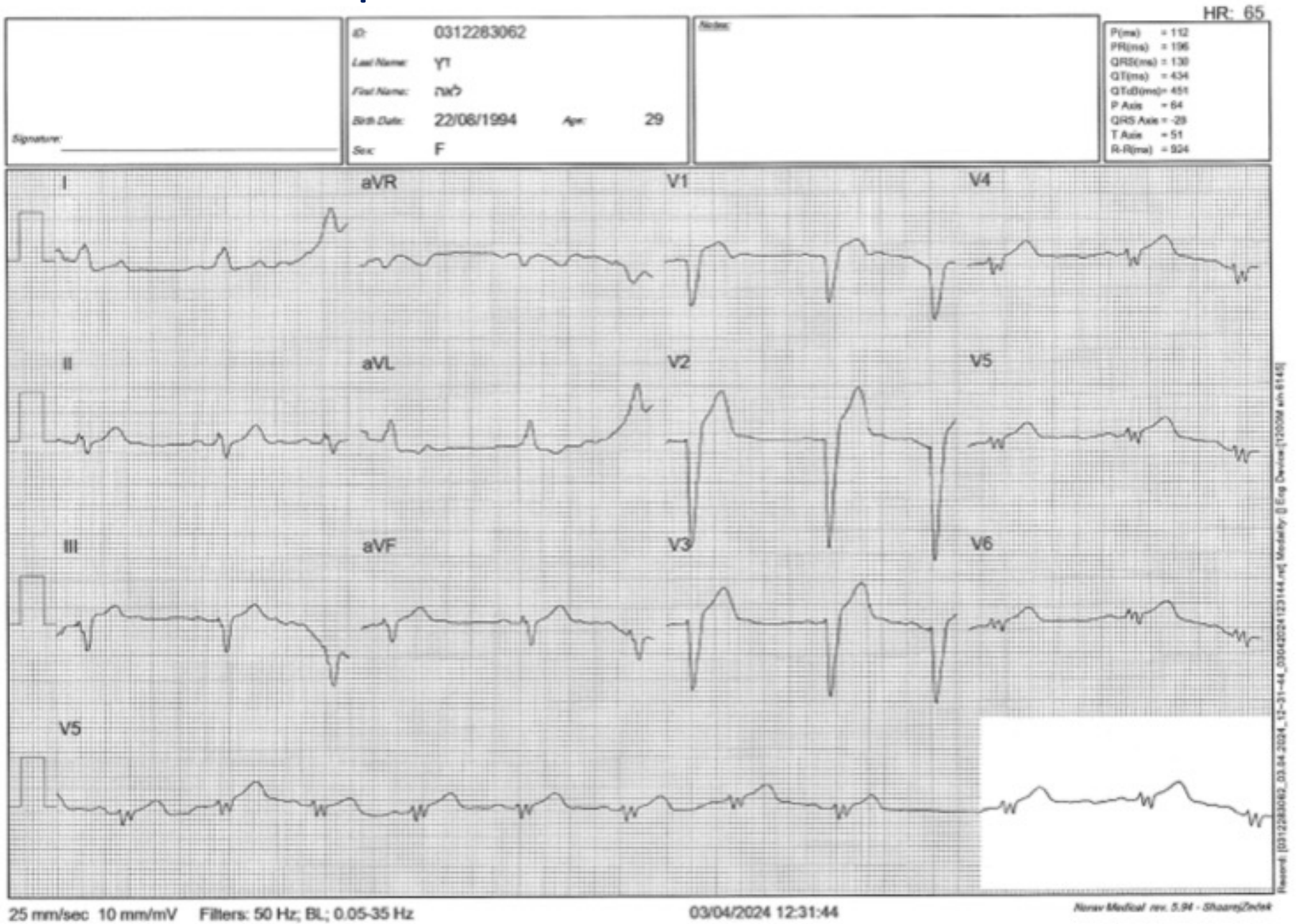
TABLE 1 Baseline Characteristics

Age (yrs)	69.1 ± 13.2
Males	26 (81)
History of atrial fibrillation/flutter	3 (9)
History of coronary artery disease	18 (56)
History of hypertension	19 (59)
History of myocardial infarction	10 (31)
History of diabetes mellitus	18 (56)
Clinical history of syncope	17 (53)
History of valve replacement	5 (15)
Type of cardiomyopathy	
ICM	13 (41)
NICM	8 (25)
No cardiomyopathy	11 (34)
2-dimensional echocardiography	
LVEF %	38.7 ± 17.5
LVEF ≤55%	22 (69)
LVEDD	5.9 ± 1.0
Interventricular septum	0.98 ± 0.23
Medical therapy	
Beta-blockers	26 (81)
ACE inhibitor/ARB	17 (53)
Failed antiarrhythmic drug	30 (94)
Amiodarone before procedure	14 (44)

Post ablation management

- No ICD
- No PM
- No medical therapy
- ILR implantation
- Genetic evaluation
- Close follow up and control EPS 1-2 months after procedure

6 months follow up



6 months follow up

- No clinical episode
- ILR: no episode of arrythmia or AV block
- Not interested in control EPS
- Didn’t do genetic evaluation
- Brother: diagnostic of muscular disease

Thank you for your attention