

To Ablate or Not to Ablate Asymptomatic Preexcitation



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Korean Heart Rhythm Society COI Disclosure

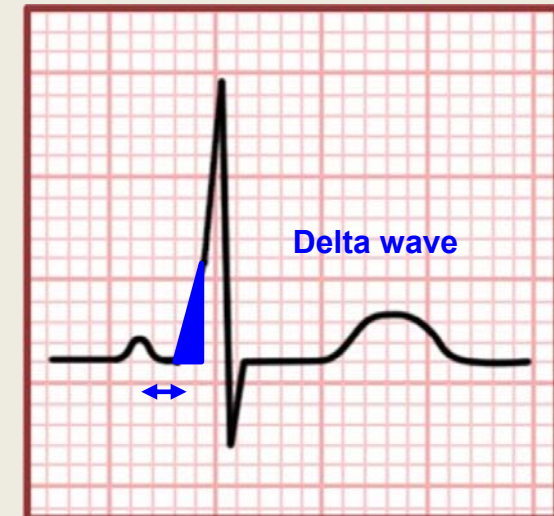
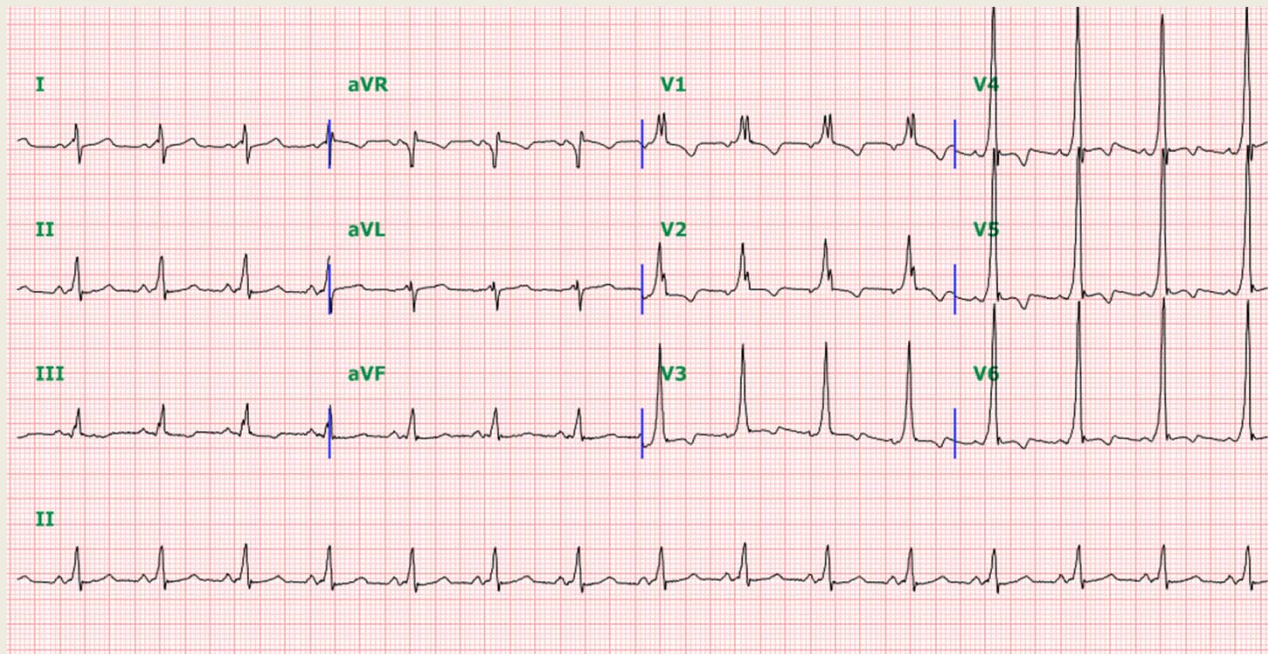
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The authors have no financial conflicts of interest
to disclose concerning the presentation

Pre-excitation

Pre-excitation or WPW syndrome EKG

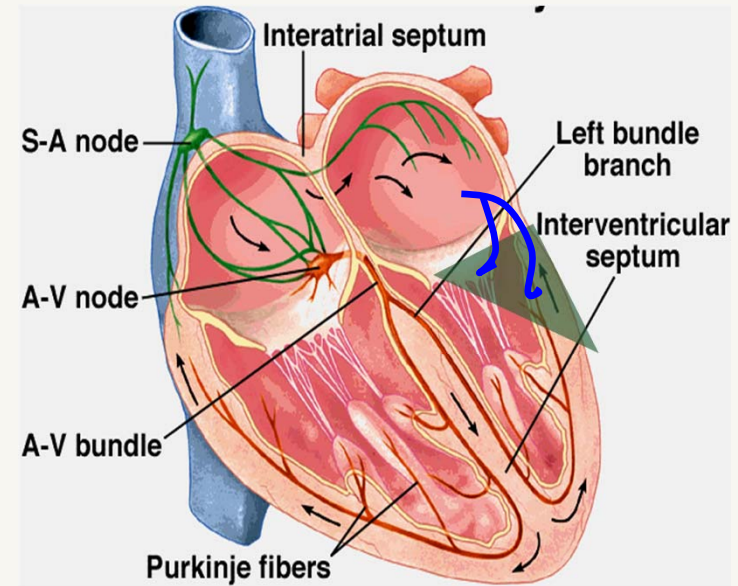
- Short PR interval
- Delta wave



Short PR interval

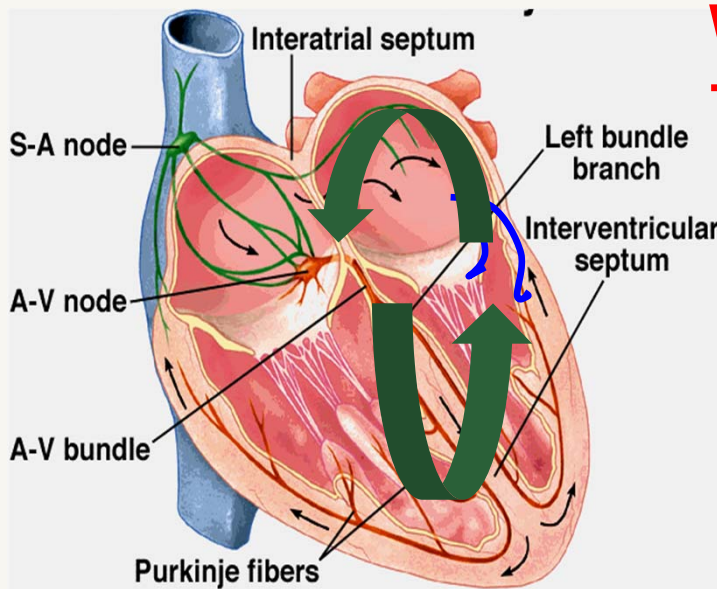
Pre-excitation syndrome

- Ventricular pre-excitation

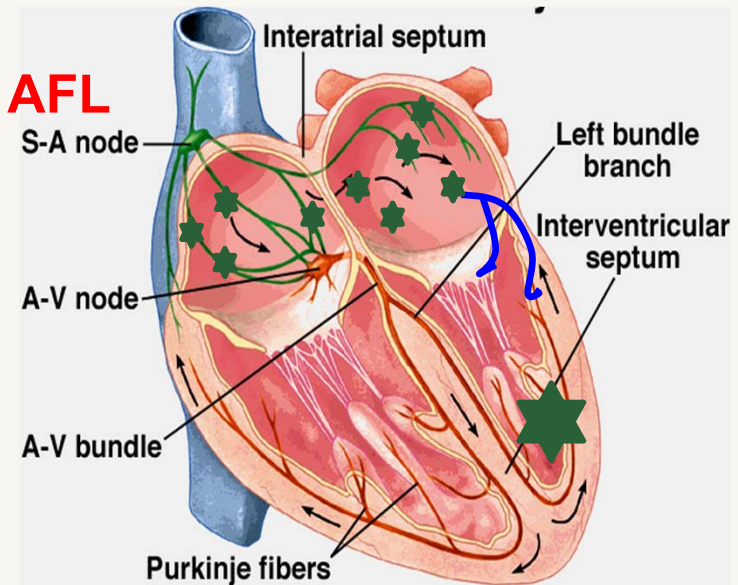


- Pre-excitation syndrome

**PSVT
(AVRT)**



**WPW
+ AF, AT, AFL**



Epidemiology

- The incidence of manifest pre-excitation on ECG tracings in the general population
 - 0.1~0.3%
- PSVT is the most common tachyarrhythmia in pre-excitation
 - 90~95% orthodromic AVRT, 5% antidromic AVRT
- WPW + Atrial arrhythmias can be serious situation
- **Not all patients** with manifest ventricular pre-excitation develop tachyarrhythmias

Management

- **Symptomatic: EPS & RFCA**

Medical treatment

- **Asymptomatic:**

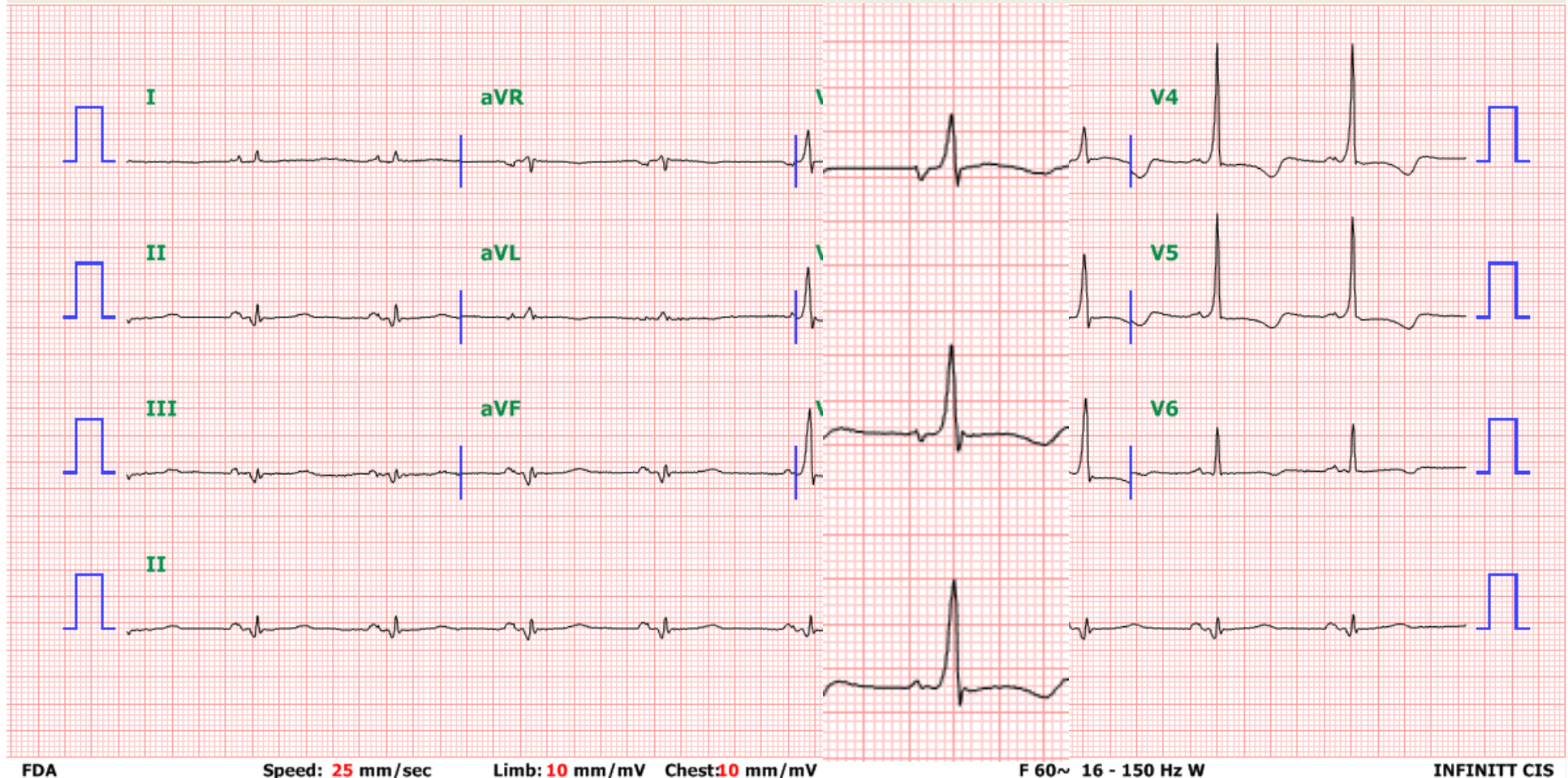
(65% of adolescents and 40% of individuals >30 yrs)

- **Observation & reassurance**
- **Follow up EKG check**
- **Ambulatory EKG and exercise test**
- **EPS**
- **RFCA**

Heart Rhythm 2012;9:1006–1024

Case 1

26 years old / male. Referred for EKG abnormality.
Intermittent severe palpitation since adolescent

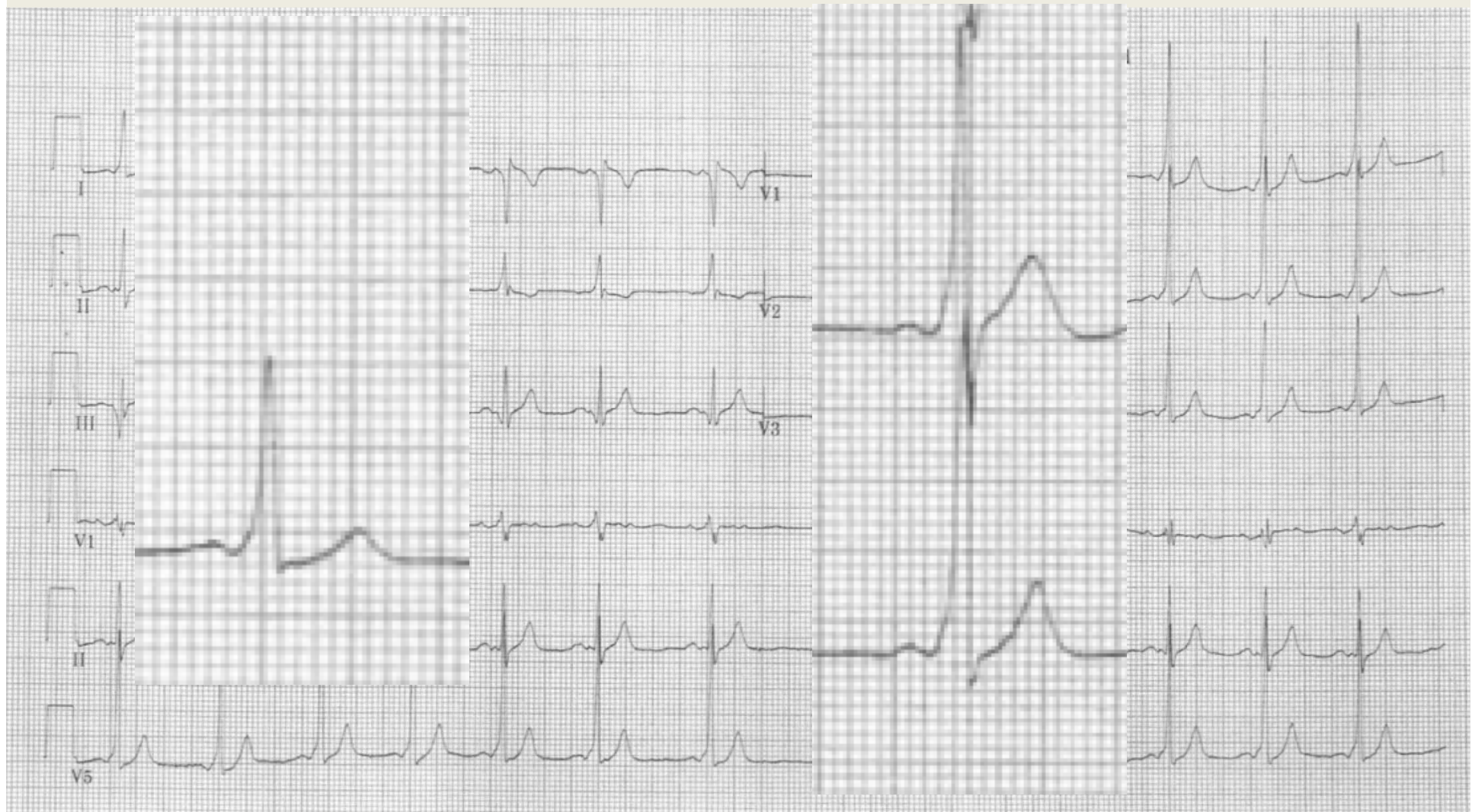


Pre-excitation EKG with symptom

→ **EPS ± RFCA**

Case 2

56 years old, female. Health check-up. Asymptomatic



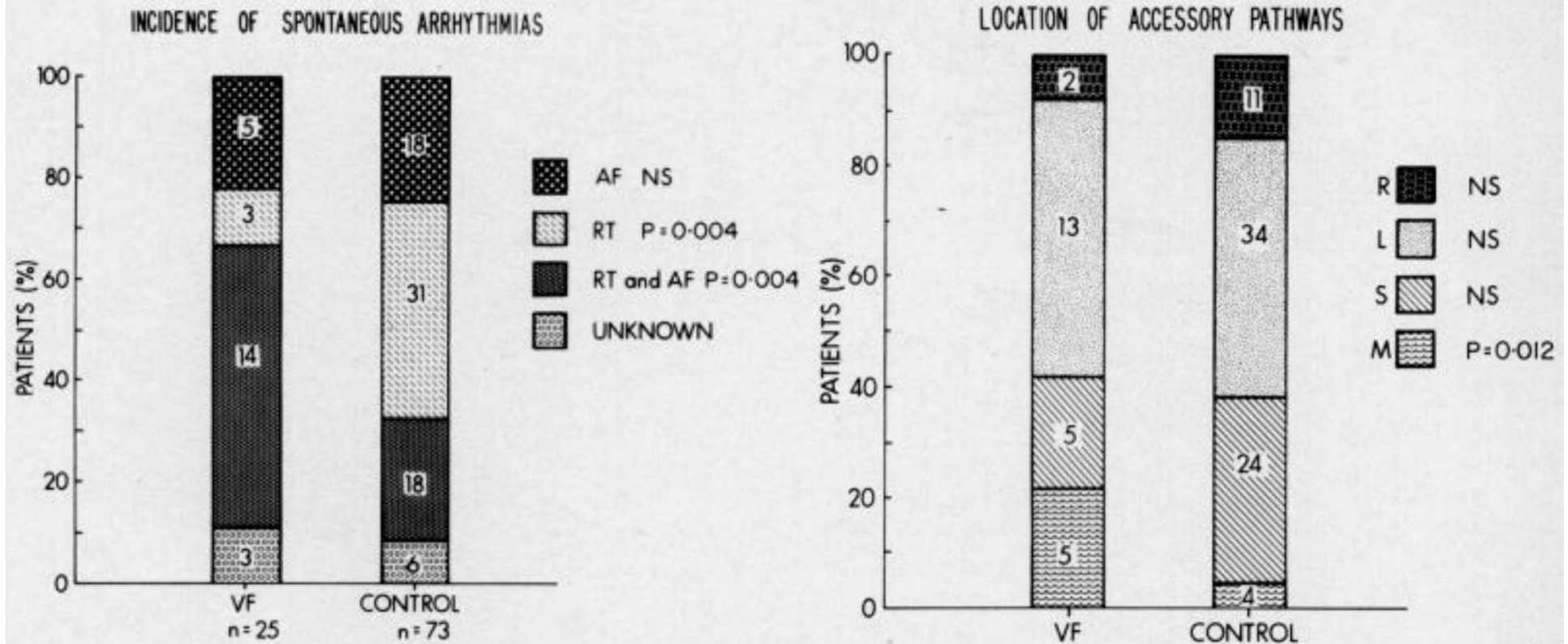
Asymptomatic pre-excitation

- **Malignant potency? (Fatal arrhythmias)**
- **Prediction of accessory pathway properties**

Ventricular fibrillation in WPW

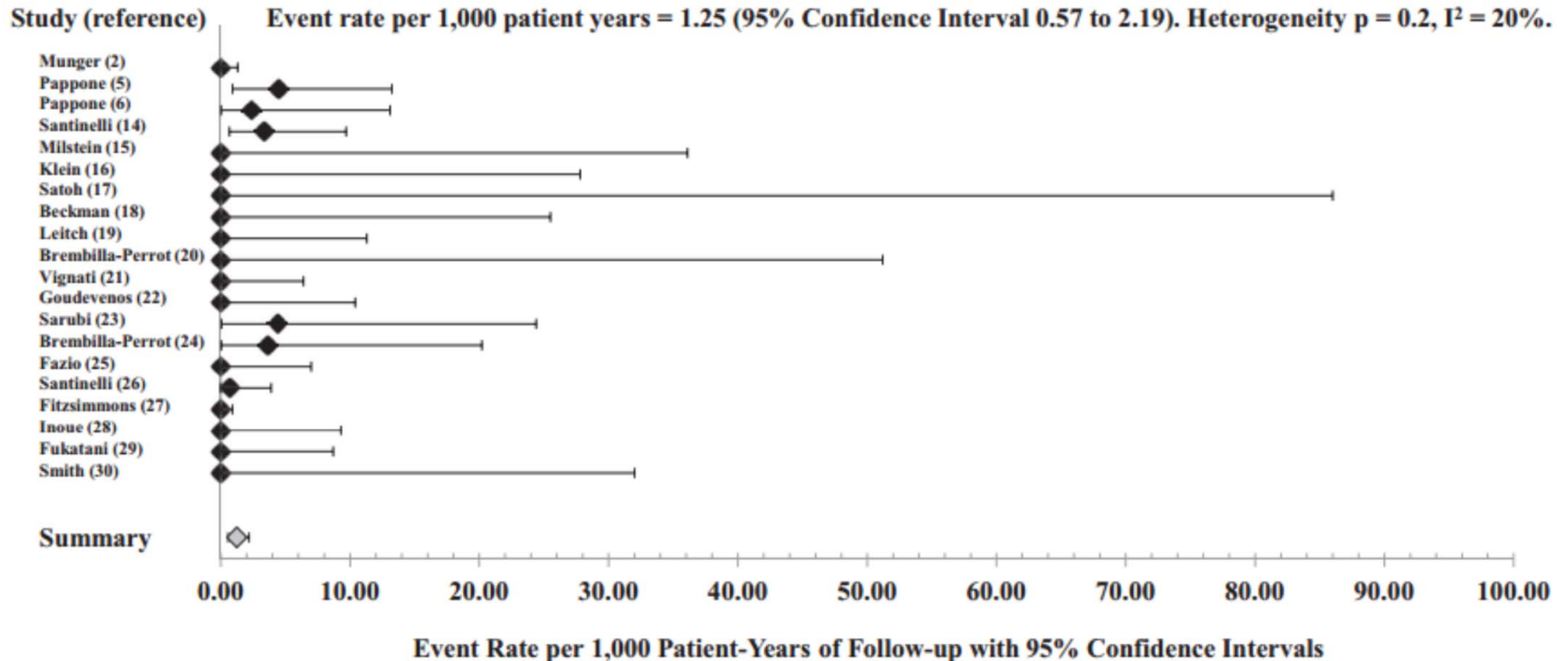
VENTRICULAR FIBRILLATION IN THE WOLFF-PARKINSON-WHITE SYNDROME

GEORGE J. KLEIN, M.D., THOMAS M. BASHORE, M.D., T. D. SELLERS, M.D., EDWARD L. C. PRITCHETT, M.D.,
WILLIAM M. SMITH, PH.D., AND JOHN J. GALLAGHER, M.D.



Fatal arrhythmias and SCD

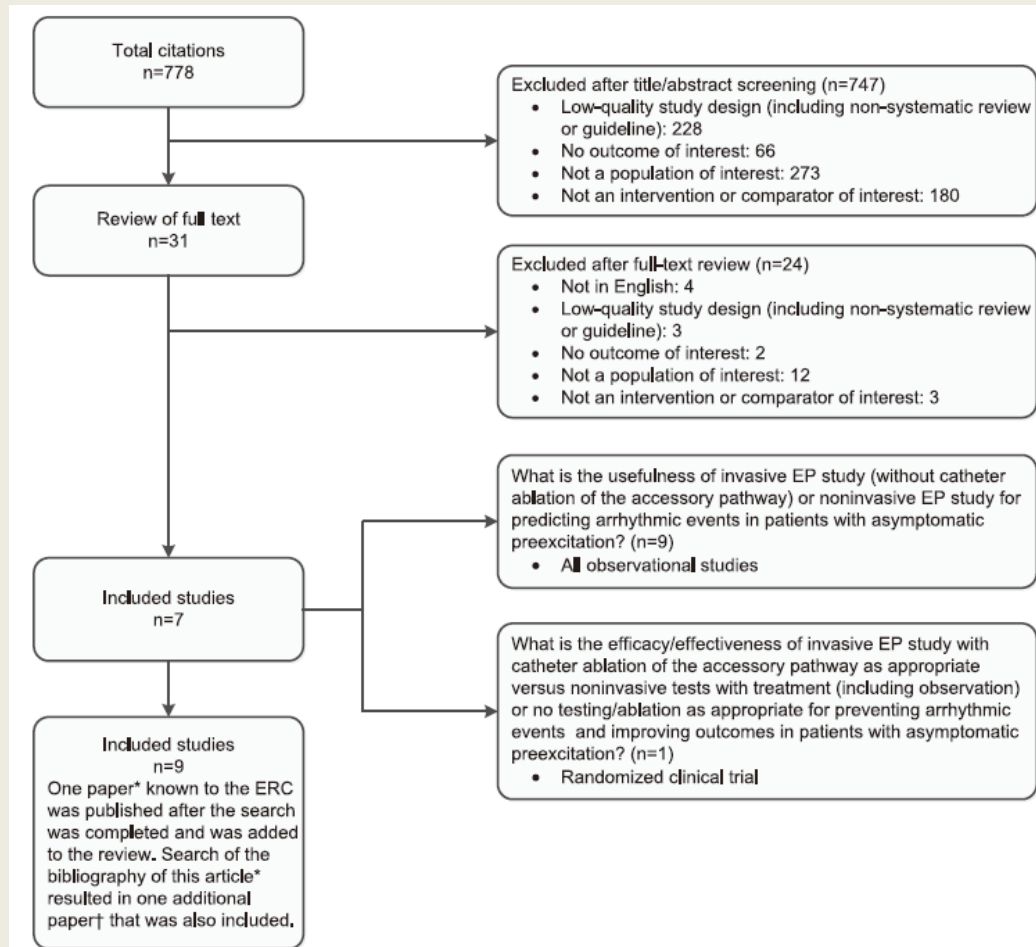
Overall Risk of Sudden Cardiac Death



SCD risk in asymptomatic pre-excitation: 0.6~1.3%

vs General population: 0.1%

Fatal arrhythmias and SCD



N=1,594 Asymptomatic preexcitation patients, 5yr K-M estimation

Malignant AF: 0~9%, VF: 0~2%

Fatal arrhythmias and SCD

Population	Sudden Cardiac Death Rate*
<i>Asymptomatic pre-excitation</i>	
Including Italian studies ⁵⁵	2.4
• Excluding Italian studies ⁵²	0.05–0.94
<i>General population</i>	
• 0–35 years ⁷²	0.09
• 1–35 years ⁷³	0.028
• 14–35 years ⁷⁴	0.032
• 35–49 years ⁷⁵	0.13

When some populations are excluded, the rate of SCD is similar to that observed in the general population.

Real incidence of SCD is still unknown

J Brugada et al. Arrhythm Electrophysiol Rev. 2018; 7(1): 32–38.

Fatal arrhythmias and SCD

Wolff-Parkinson-White Syndrome in the Era of Catheter Ablation

Insights From a Registry Study of 2169 Patients

Table 1. Characteristics of the Study Population

	Untreated (n=1001)	Treated (n=1168)	<i>P</i>
Age at enrollment, y	19 (10–37.5)	19 (12–35)	0.341
Male sex, n (%)	600 (59.9)	701 (60.0)	0.971
SHD, n (%)	55 (5.5)	76 (6.5)	0.324
AP-AERP, ms	280 (250–300)	280 (250–300)	0.945
Symptomatic, n (%)	451 (45.1)	962 (82.4)	<0.001
AVRT-AF, n (%)	47 (4.7)	73 (6.3)	0.114
Multiple APs, n (%)	59 (5.9)	80 (6.8)	0.365
MAs, n (%)	78 (7.8)	0 (0)	<0.001
VF, n (%)	15 (1.5)	0 (0)	<0.001
Follow-up, mo	96 (50–96)	96 (48–96)	0.525

Fatal arrhythmias and SCD

Patient	Asymptomatic/Symptomatic	Age at Enrollment, y	Sex	SHD	Multiple	AP Location	AP-AERP, ms	AVRT-AF	Follow-up, mo
1	Asymptomatic	11	Male	-	-	PS	230	+	12
2	Asymptomatic	32	Male	-	-	PS	200	-	22
3	Asymptomatic	32	Female	-	-	LFW	200	+	15
4	Asymptomatic	10	Male	-	-	PS	220	+	25
5	Asymptomatic	10	Male	-	+	LFW+PS	220	+	31
6	Asymptomatic	12	Male	-	+	LFW+PS	210	+	15
7	Asymptomatic	8	Male	-	-	PS	220	+	22
8	Asymptomatic	10	Male	-	+	LFW+PS	220	-	41
9	Asymptomatic	10	Male	-	-	PS	210	+	15
10	Asymptomatic	14	Male	-	-	RFW	220	-	28
11	Asymptomatic	14	Male	-	+	LFW+PS	220	+	21
12	Asymptomatic	10	Male	-	-	PS	240	+	55
13	Asymptomatic	11	Male	-	-	PS	230	-	53
14	Symptomatic	9	Female	-	-	PS	230	+	12
15	Symptomatic	11	Male	-	+	LFW+PS	230	+	65

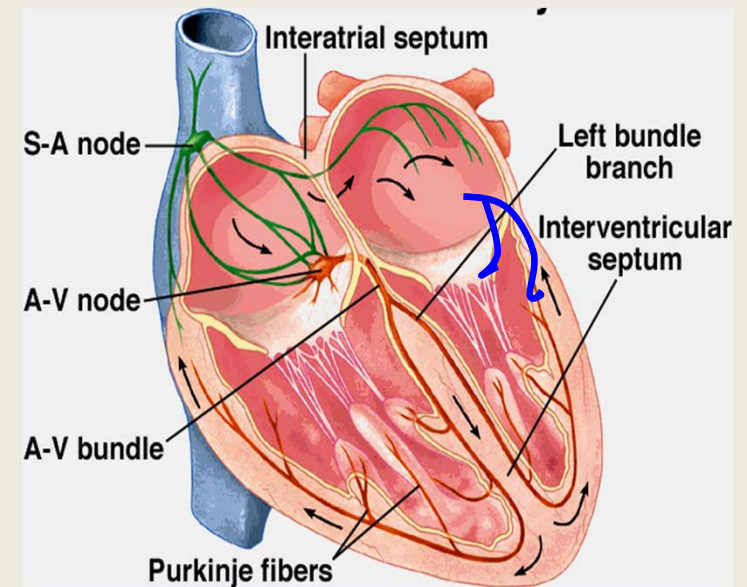
Variable	Univariable			Multivariable		
	Hazard Ratio	95% CI	P	Hazard Ratio	95% CI	P
AVRT-AF	102.51	30.33–346.39	<0.001	27.16	5.29–139.40	<0.001
AP-AERP	0.90	0.87–0.92	<0.001	0.86	0.82–0.91	<0.001
Multiple APs	6.05	1.93–19.02	0.002	...		
Age at enrollment	0.92	0.87–0.98	0.01	0.91	0.81–1.02	0.09
Sex	4.33	0.98–19.18	0.05	...		
Symptoms	0.18	0.04–0.78	0.02	...		

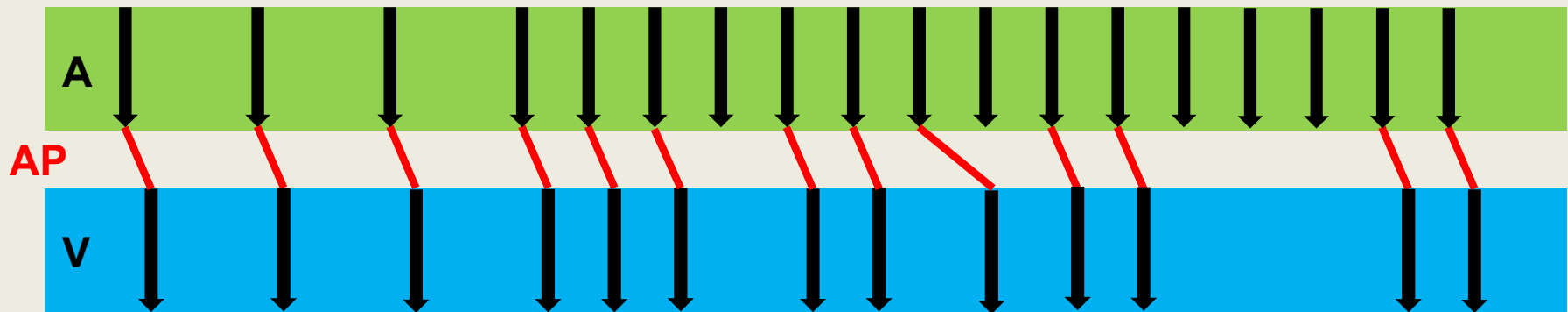
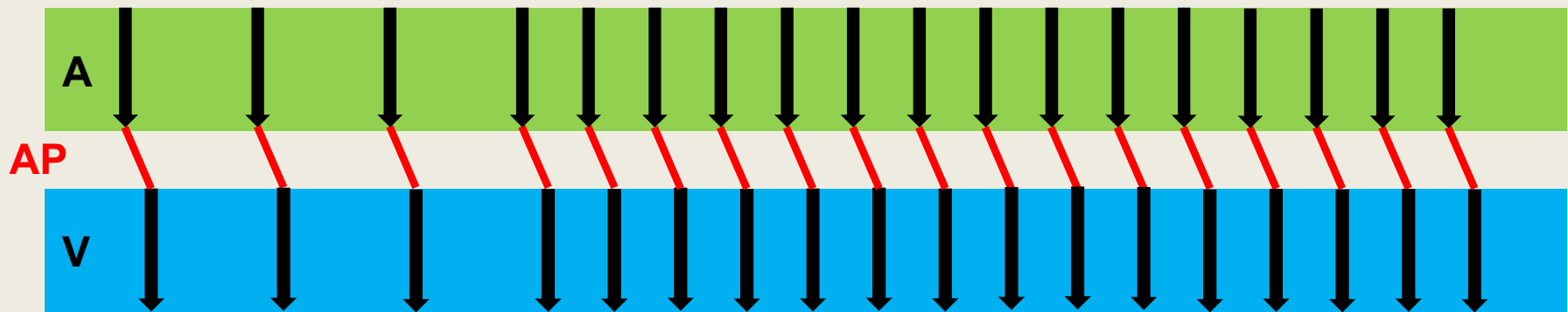
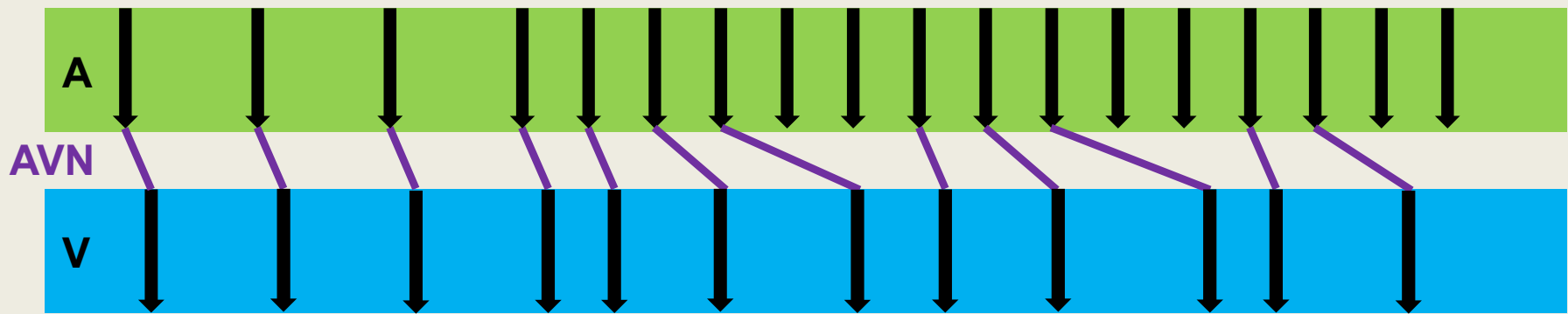
All but 1 patient showed an AP-AERP \leq 230 msec

Depends on intrinsic EP properties of AP rather than on symptoms

Sudden cardiac death risk

- **Mainly in children or young adults**
- **Depends on Accessory pathway properties**





Accessory pathway(AP)

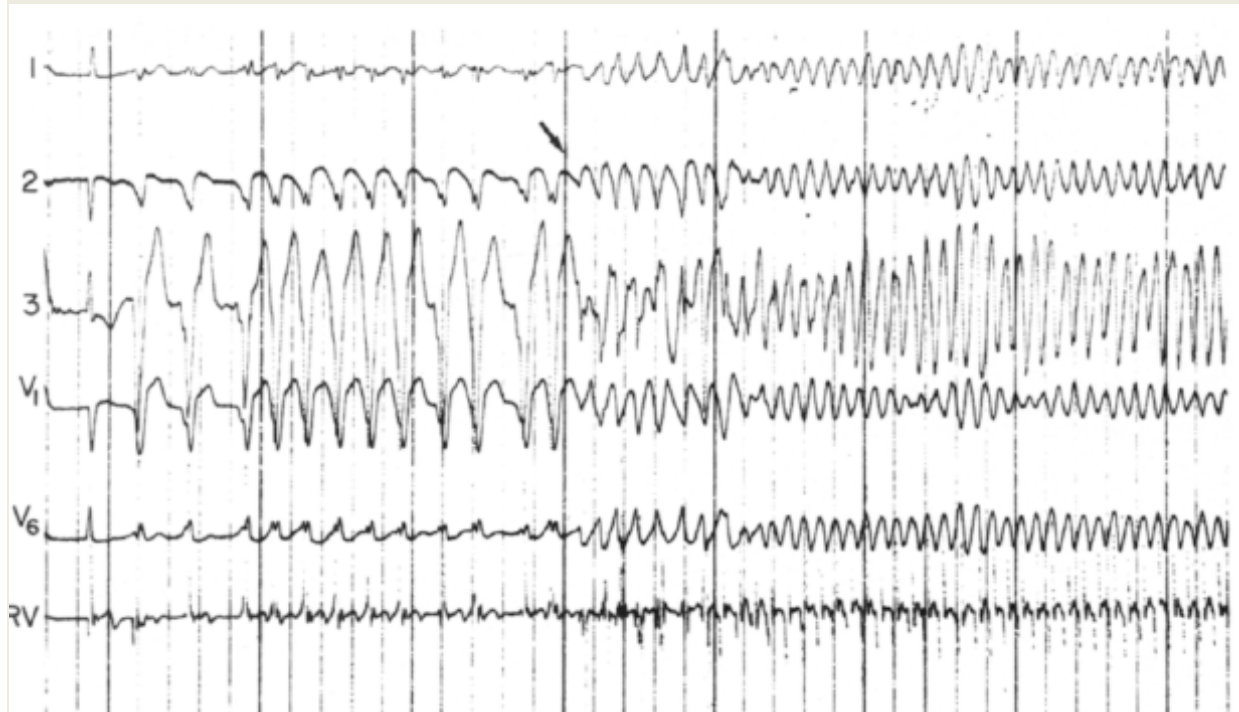
: It's not all the same AP!

How to access accessory pathway properties

→ **EP study**

Non-invasive test

AP exam: EP study



* Prediction of SCD risk:

Rapid atrial pacing

**AP conduction: < 250 msec (240beats
/min)**

Table 2. Prediction of Sudden Death by Invasive and Noninvasive Testing

	Sensitivity (%)	Specificity (%)	Predictive Accuracy (%)
Electrophysiologic testing (shortest RR interval RR \leq 250 ms)*	77.8	48.3	18.9
Disopyramide (continuous pre-excitation)*	71.4	26.1	12.8
Exercise testing (continuous pre-excitation)*	80.0	28.6	11.8

*Definition of positive test result.

AP exam: EP study

* Prediction of malignant arrhythmias:

Rapid atrial pacing, AP conduction: < 250 msec (240beats/min)

Accessory pathway refractory period < 240 msec

The ability to induce sustained AVRT

Multiple accessory pathways

Guideline

COR	LOE	Recommendations
IIa	B-NR	An EP study is reasonable in asymptomatic patients with pre-excitation to risk-stratify for arrhythmic events.
IIa	B-NR	Catheter ablation of the accessory pathway is reasonable in asymptomatic patients with pre-excitation if an EP study identifies a high risk of arrhythmic events, including rapidly conducting pre-excited AF.

AP exam: Non-invasive test

Pre-excitation syndrome, n=135

EPS vs Non-invasive test (EKG, Holter, Exercise test)

Low risk: Loss of pre-excitation during non-invasive test

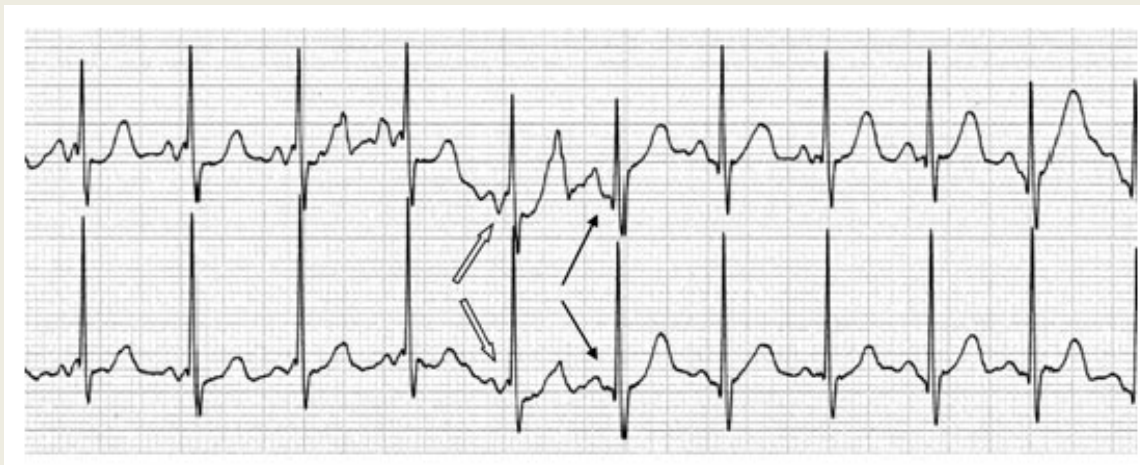


Table IV.

Correlation of Any Noninvasive Test with Invasive Testing at Baseline

Noninvasive Risk Assessment	Invasive EP Study Results at Baseline		
	Nonrapid	Rapid	Total
Low-risk	22	2	24
Indeterminate	77	34	111
Total	99	36	135

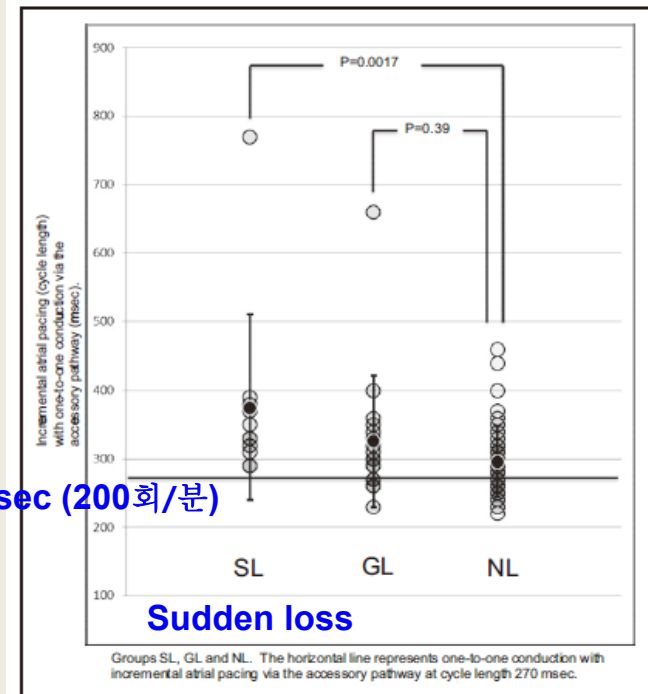
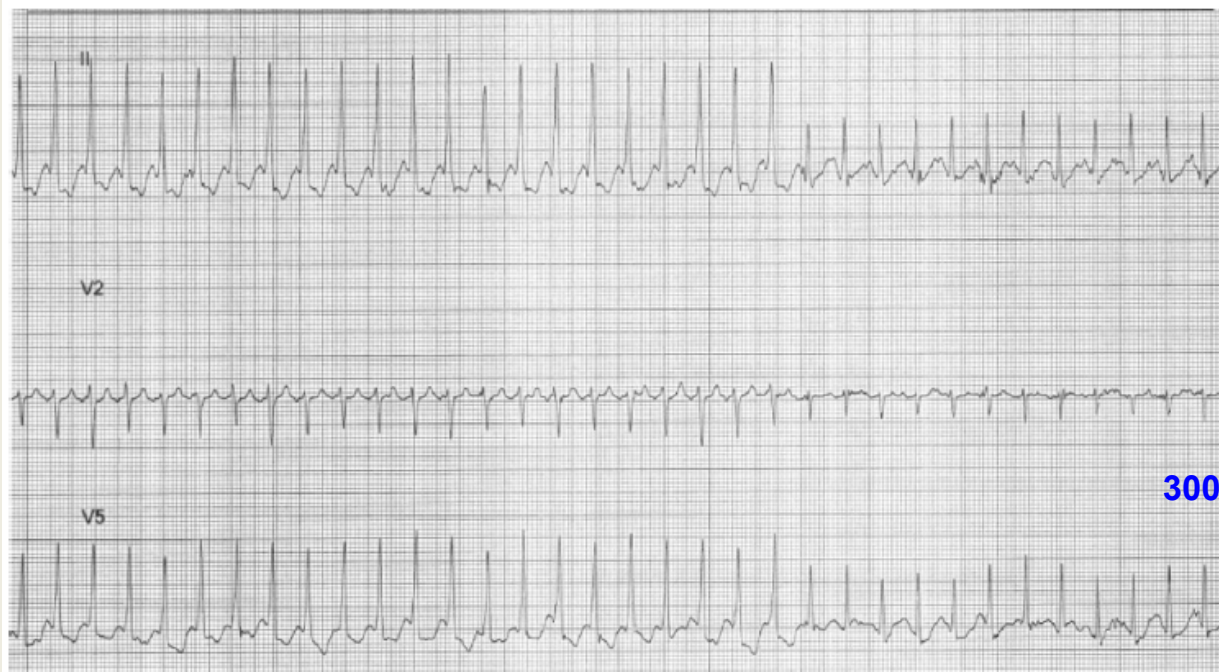
Specificity: 94%, PPV: 92%

Non-invasive test

Pre-excitation syndrome pediatric pts, n=76

EPS vs Exercise test

Low risk: Loss of pre-excitation during non-invasive test



Guideline

COR	LOE	Recommendations
I	B-NR C-LD	In asymptomatic patients with pre-excitation, the findings of abrupt loss of conduction over a manifest pathway during exercise testing in sinus rhythm. or intermittent loss of pre-excitation during ECG or ambulatory monitoring are useful to identify patients at low risk of rapid conduction over the pathway.

All asymptomatic pre-excitation patients need to be examined?

Guideline

COR	LOE	Recommendations
Ia	B-NR	Observation, without further evaluation or treatment, is reasonable in asymptomatic patients with pre-excitation.

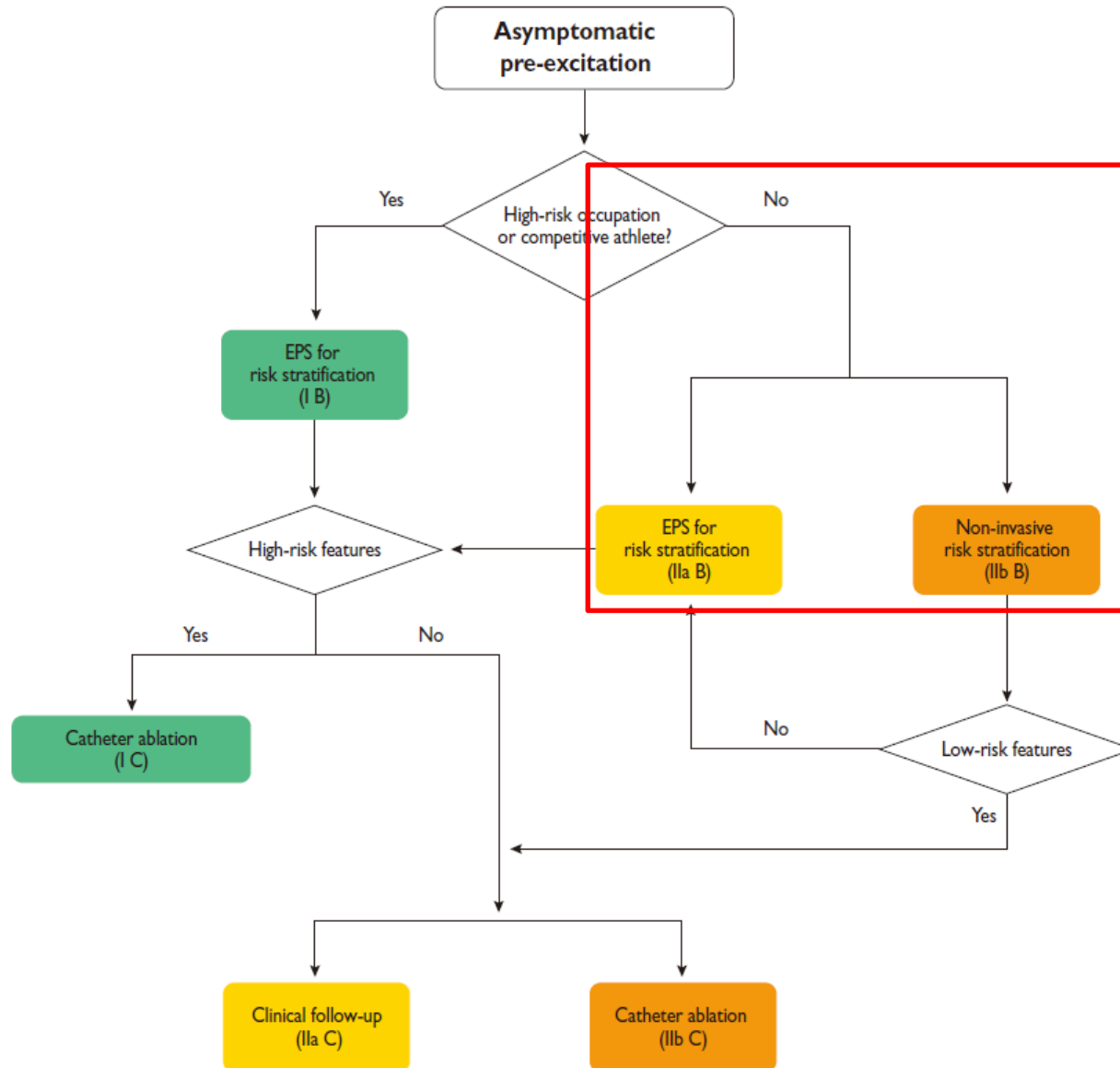
2015 AHA/ACC/HRS SVT guideline

↑
Gap in recommendation
↓

COR	LOE	Recommendations
Ia	B	Performance of an EPS to risk stratify individuals with asymptomatic pre-excitation should be considered.

2019 ESC SVT guideline

2019 ESC guideline



2019 ESC guideline

2015 ACC/AHA/HRS Guideline for the Management of Adult Patients With Supraventricular Tachycardia

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society

2019 ESC Guidelines for the management of patients with supraventricular tachycardia

The Task Force for the management of patients with supraventricular tachycardia of the European Society of Cardiology (ESC)

Developed in collaboration with the Association for European Paediatric and Congenital Cardiology (AEPC)

Fatal arrhythmias and SCD

Risk factors for SCD in patients with asymptomatic preexcitation

Clinical Risk Factor

Male^{38,51,52}

Age <30 years⁵³

Structural heart disease^{33,51}

Septal localisation^{38,55}

Intermittent preexcitation

Pre-excitation syndrome **pediatric pts**, n=328

Persistent WPW vs intermittent WPW

Table II.

High-Risk Pathways **AP ERP \leq 250ms**

	Persistent Preexcitation (n = 287)	Intermittent Preexcitation (n = 41)	Loss of Preexcitation on Exercise Stress Test (n = 24)	P Value
At baseline	30	2	2	0.60
Became high risk on isoproterenol	12 (n = 41)	2 (n = 17)	1 (n = 7)	0.38
Total	42 (14.6%)	4 (9.8%)	3 (12.5%)	0.72

Incidence of AP ERP \leq 250 ms was not significantly different

급여기준 (변경 전)

전기 생리학 검사 (EPS) 급여기준

- WPW syndrome

고주파 전기 소작술(RFCA) 급여기준

- 증상이 있는 Accessory pathway에 의한 빈맥 (AVRT, AF/AT c WPW)

급여기준 (변경 후)

전기 생리학 검사 (EPS) 급여기준

- WPW syndrome

고주파 전기 소작술(RFCA) 급여기준

- 증상이 있는 Accessory pathway에 의한 빈맥 (AVRT, AF/AT c WPW)
- 증상이 없는 pre-excitation 환자에서
 1. AP conduction: ≤ 250 msec
 2. Accessory pathway refractory period < 240 msec
 3. Multiple accessory pathways
 4. 타인의 생명을 책임지는 직업 (조종사, 운전자등), 운동선수

Procedure related complications

Type of complications	Percent (%)
Venous thrombosis	1%
Pulmonary embolism	0.3 - 1.6%
Thrombophlebitis	0.6%
Infection	0.8%
Complete AV block	0.1%
Venous complication in children*	2%

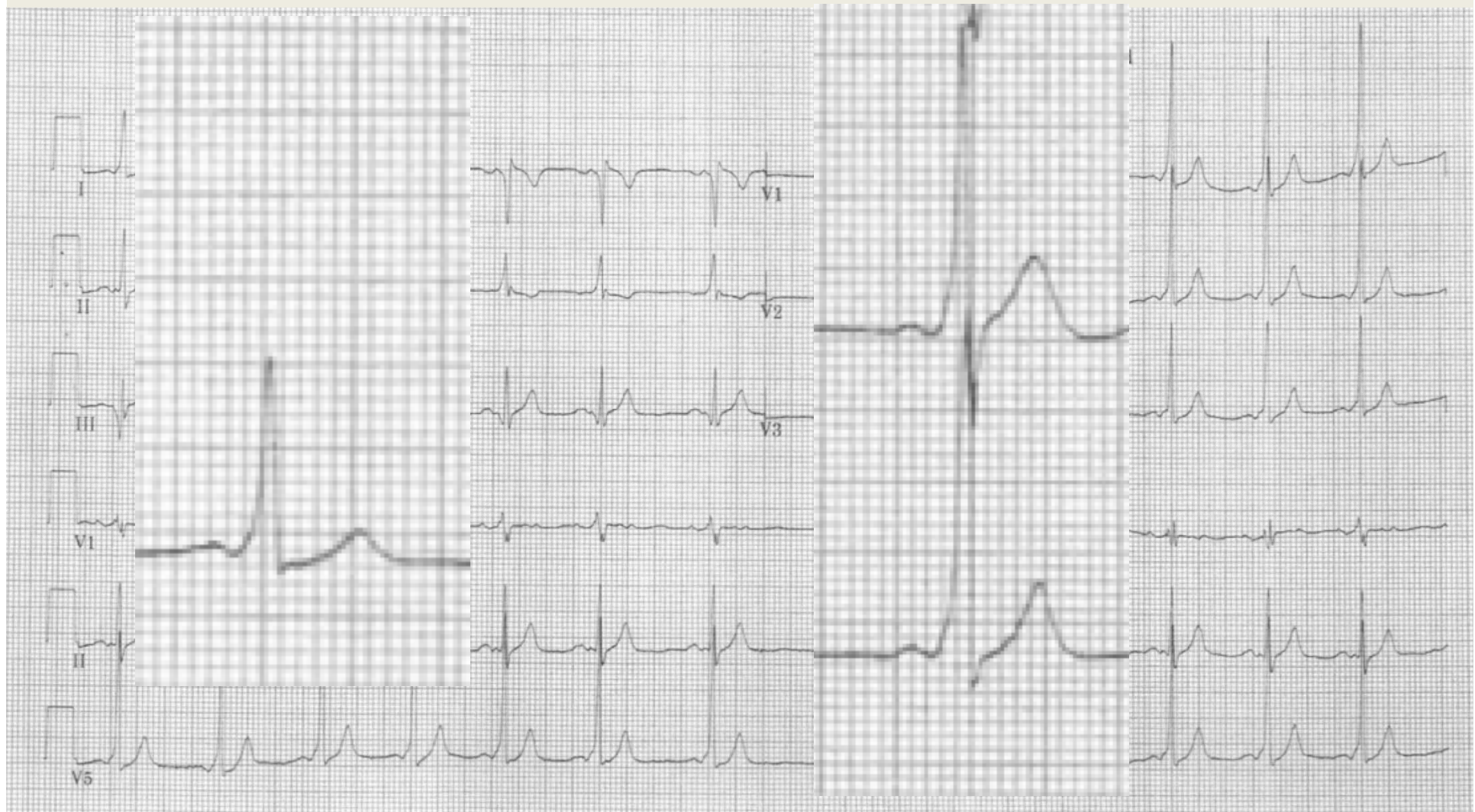
J Am Coll Cardiol 1987;9:1261–1268.

Ann Intern Med 1982;97:490–493.

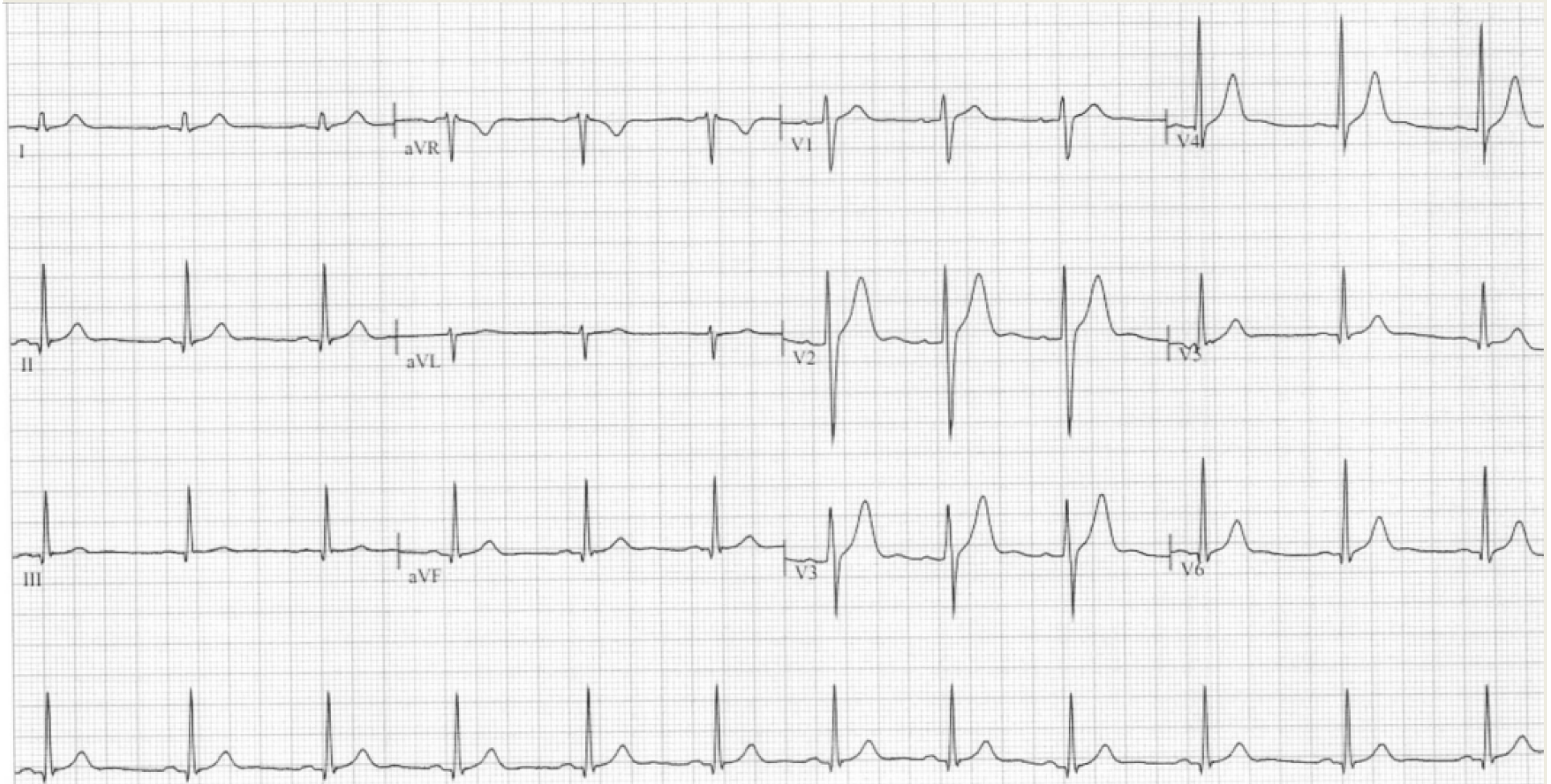
* *Catheter Cardiovasc Interv* 2006;68:450–455.

Case 2

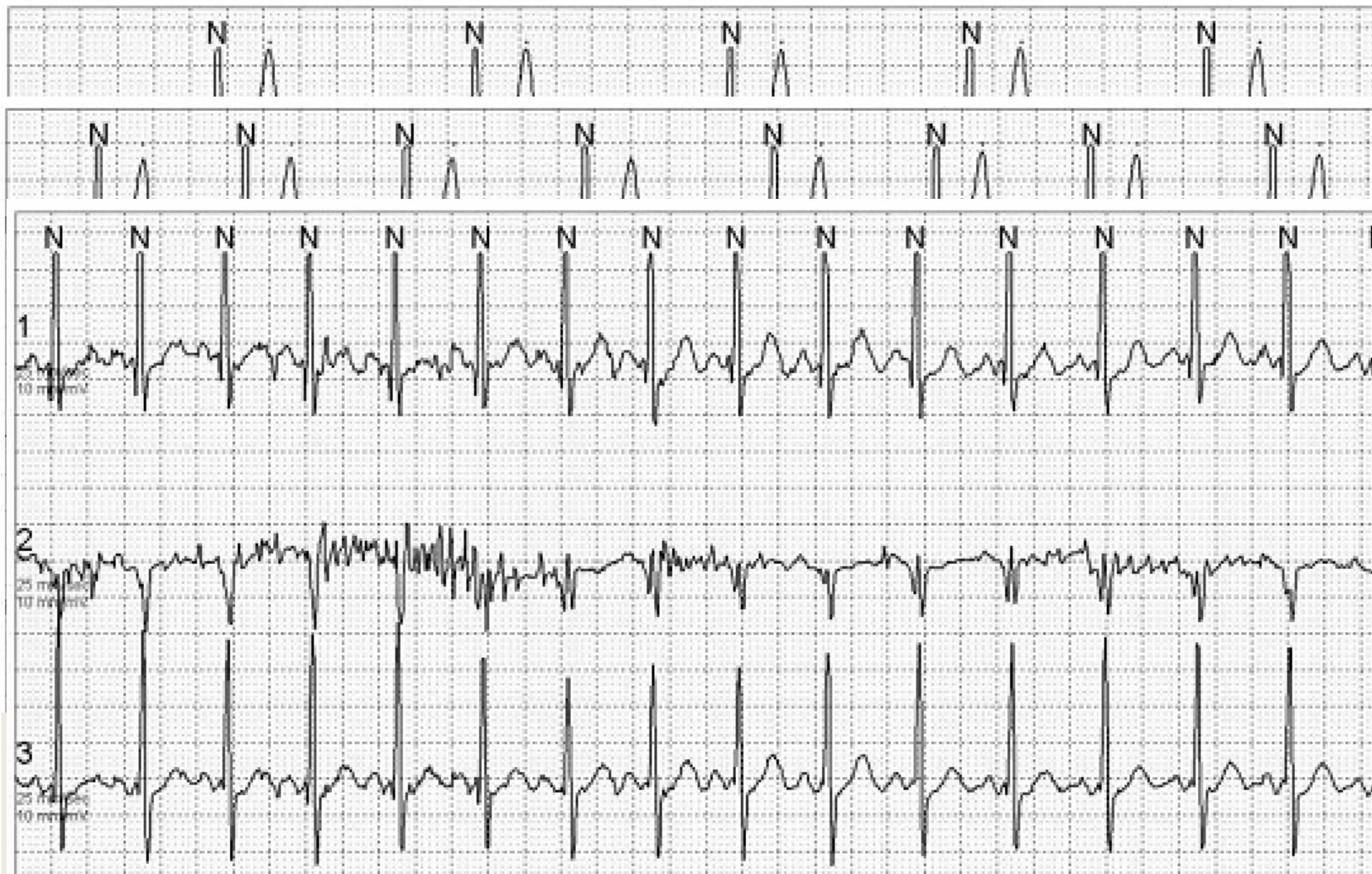
56 years old, female. Health check-up. Asymptomatic



12 lead EKG (at our hospital): delta wave (-)

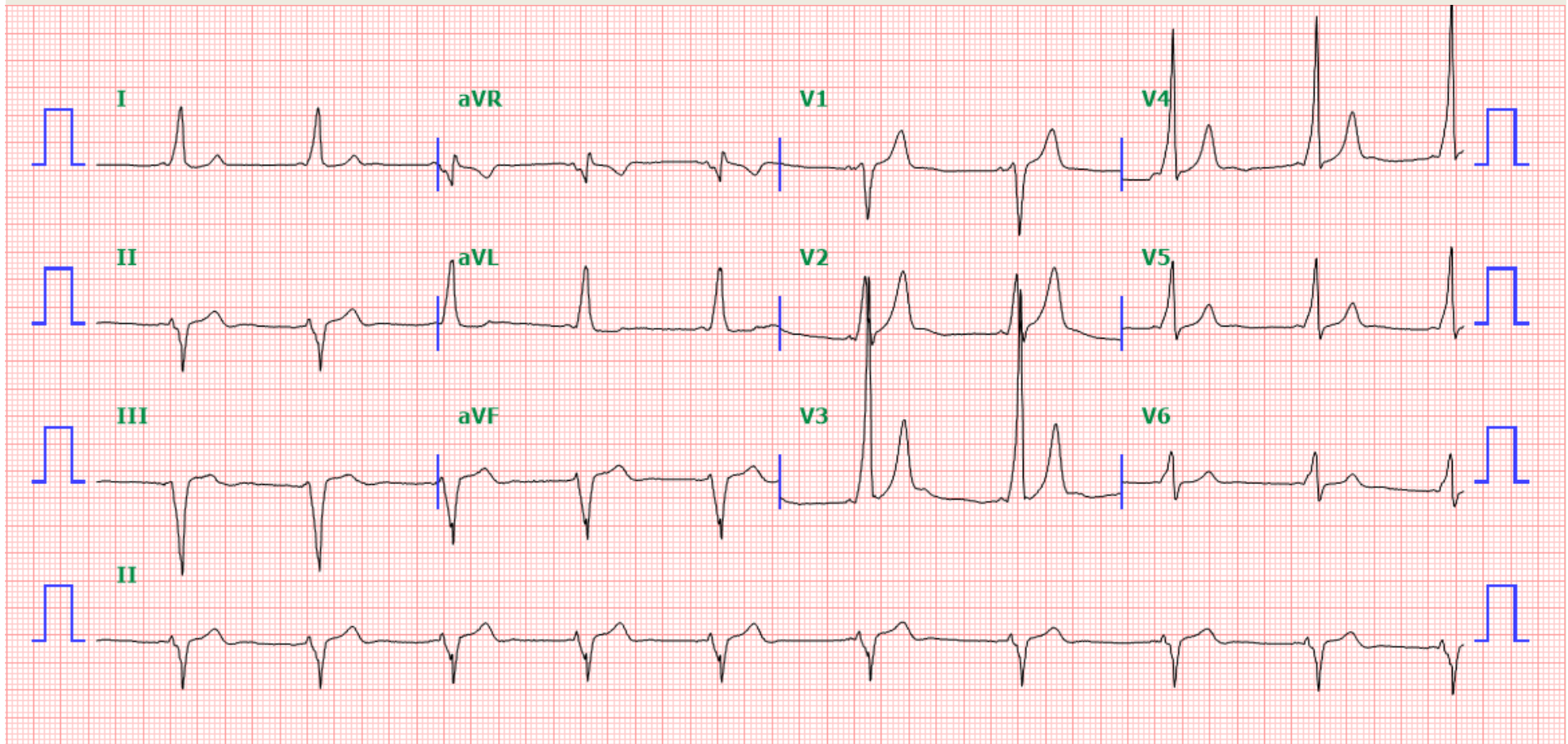


Holter: Intermittent abrupt delta loss

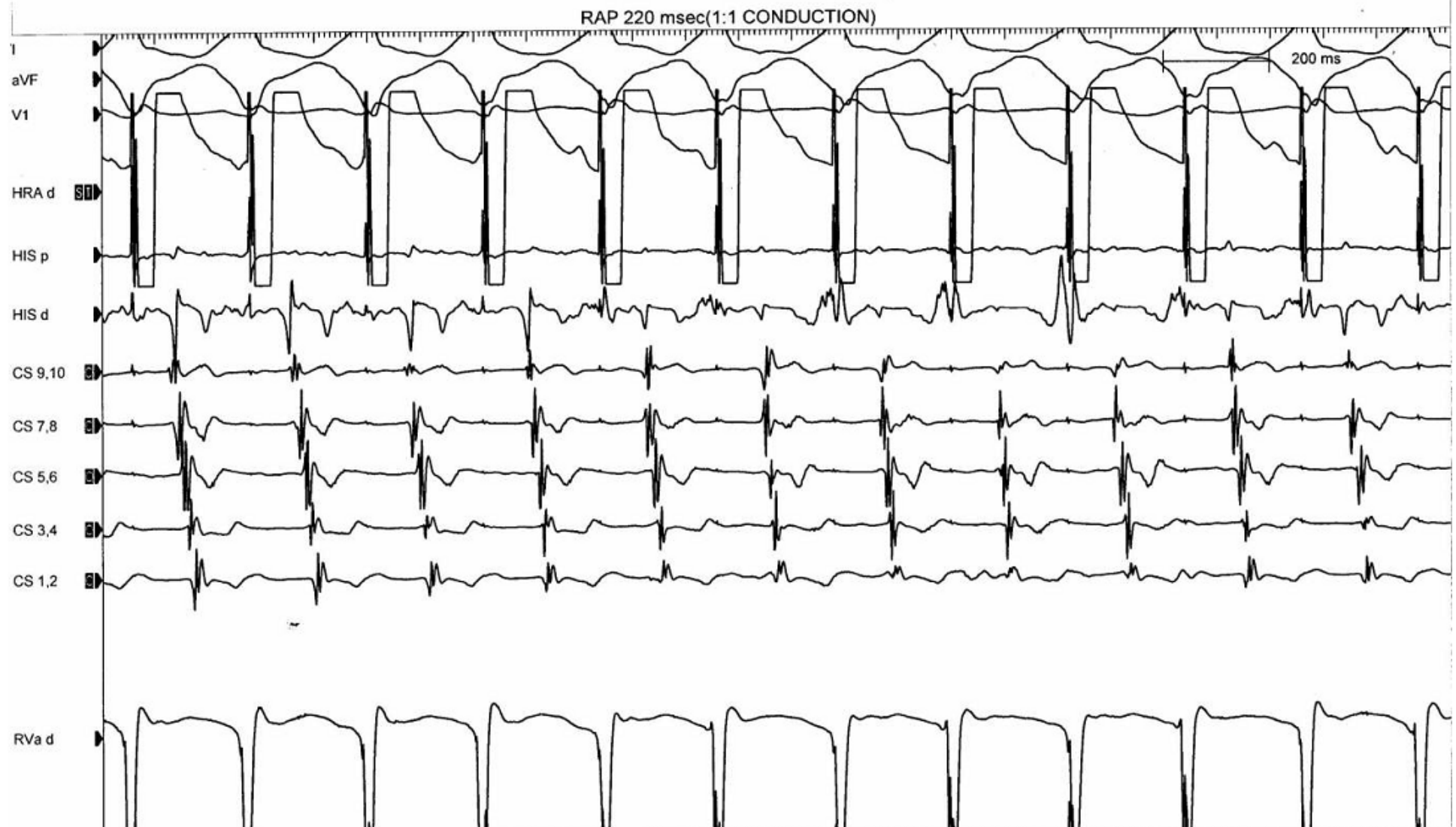


Case 3

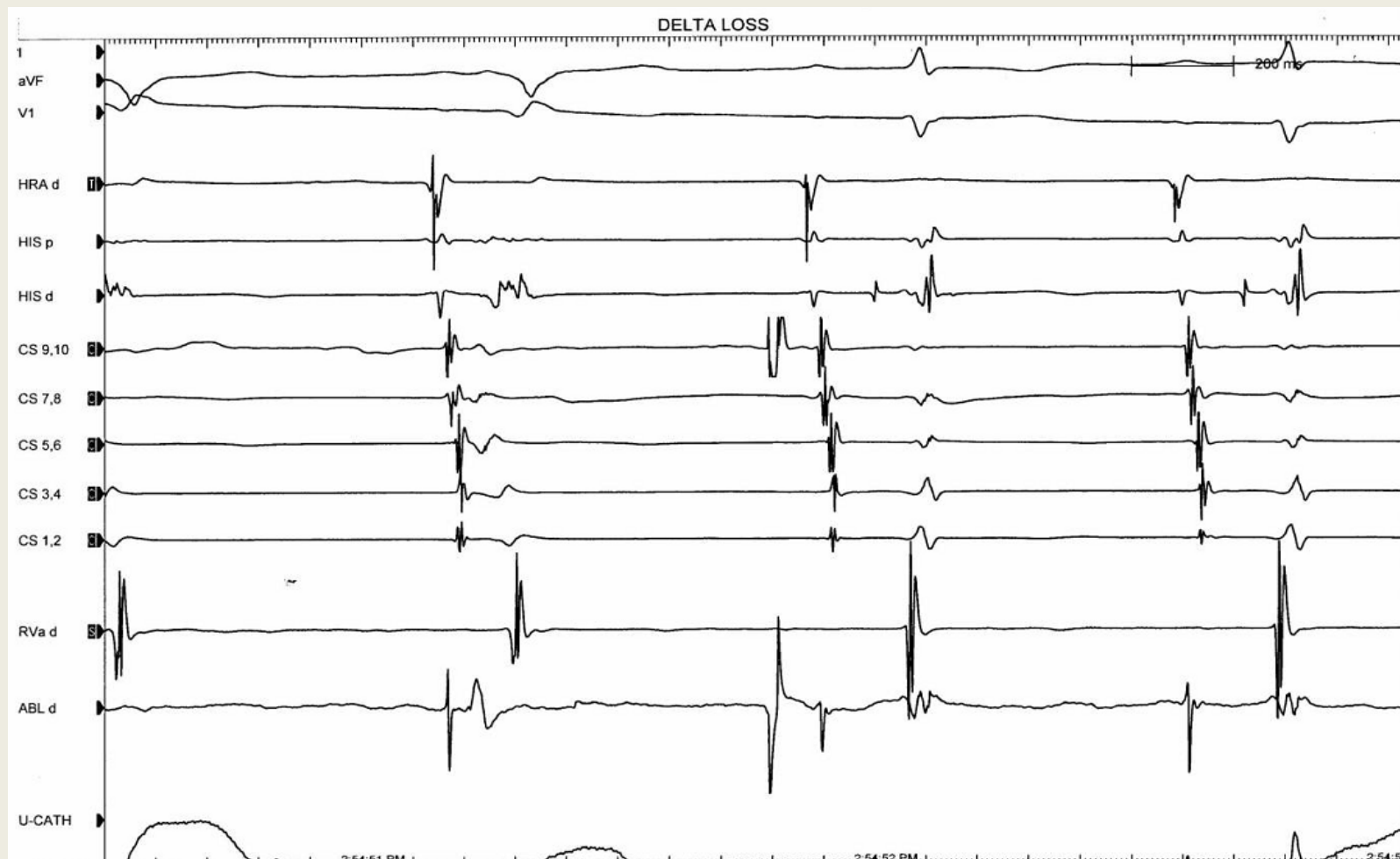
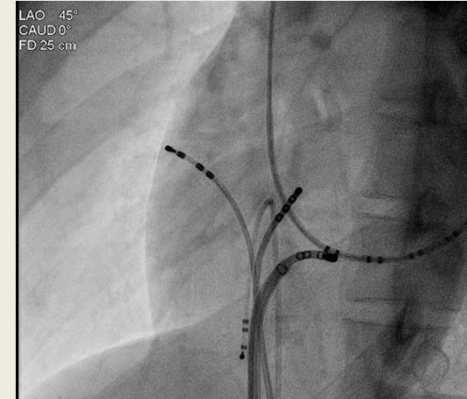
17/M, Referred for EKG abnormality. Asymptomatic



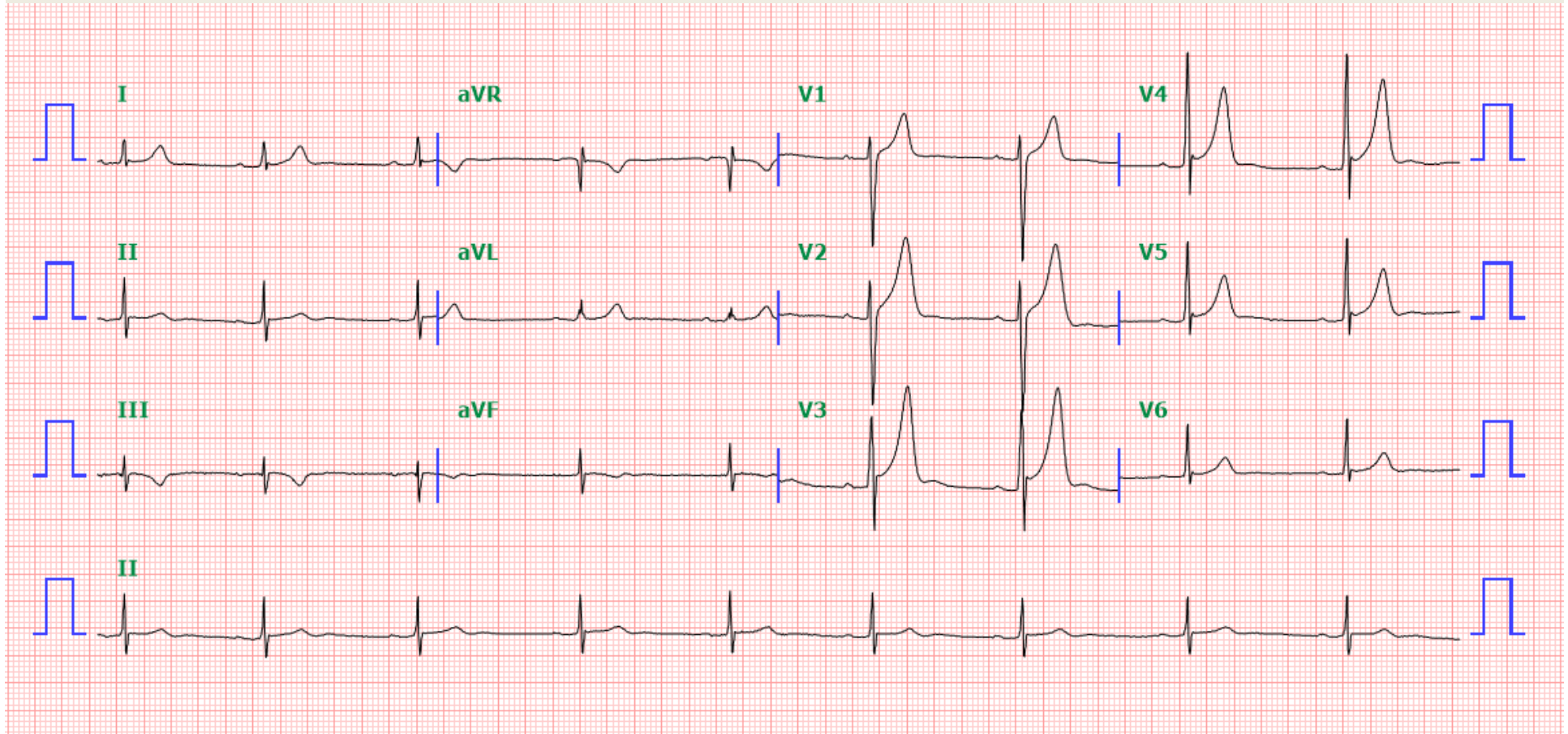
EP study



RFCA



Post RFCA



Summary for pre-excitation

- **Asymptomatic pre-excitation can be related with fatal arrhythmias very rarely.**
- **In asymptomatic patients, further evaluations are determined in consideration of age or occupation.**
- **EPS or Non-invasive test (EKG, Treadmill test, Holter) for risk stratification**
 - **Low risk in EPS or Non invasive test: observation**
 - **High risk in EPS: RFCA**

Thank you for attention