

# Cardiac conduction system and AV block



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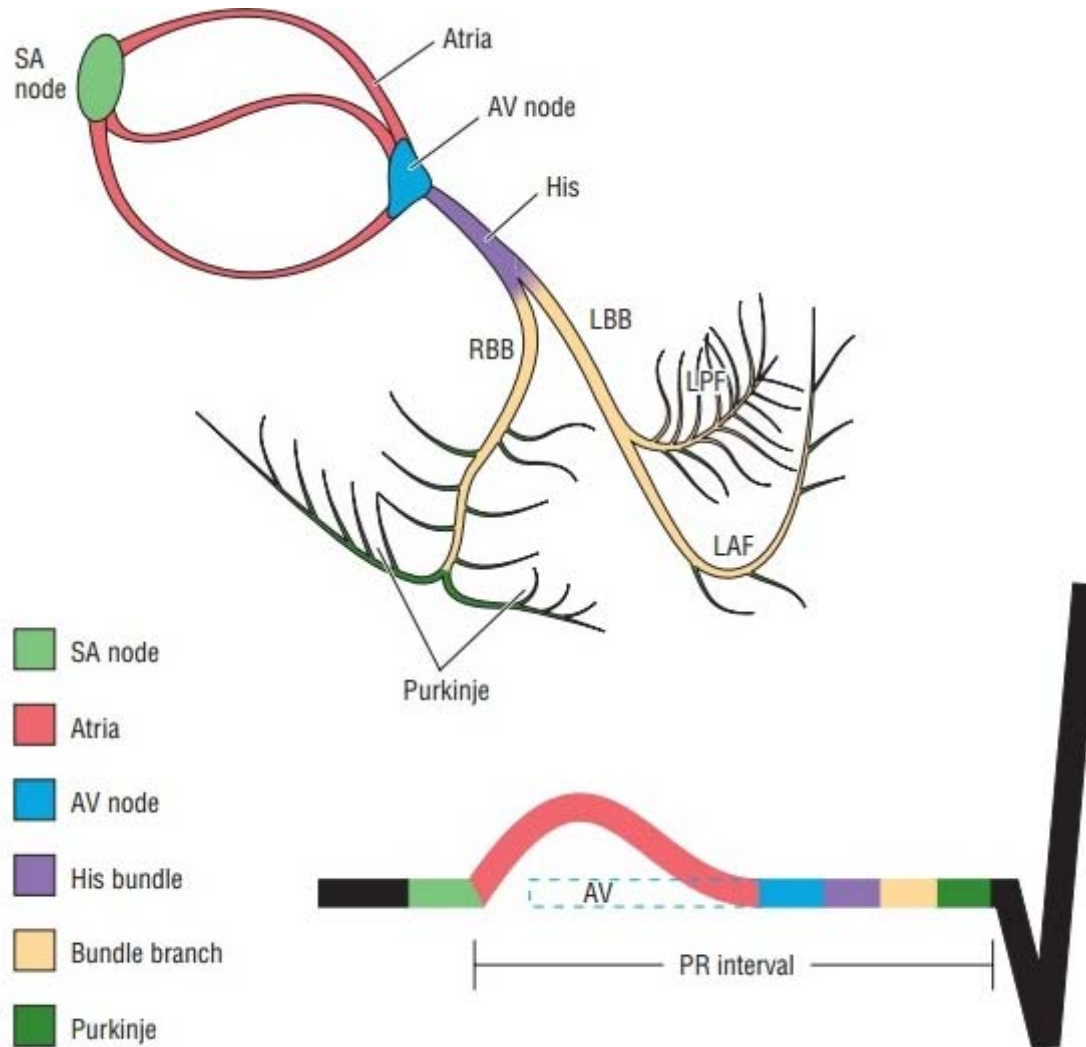
# **Korean Heart Rhythm Society COI Disclosure**

*Choi, Jin Hee:*

The author has no financial conflicts of interest  
to disclose concerning the presentation



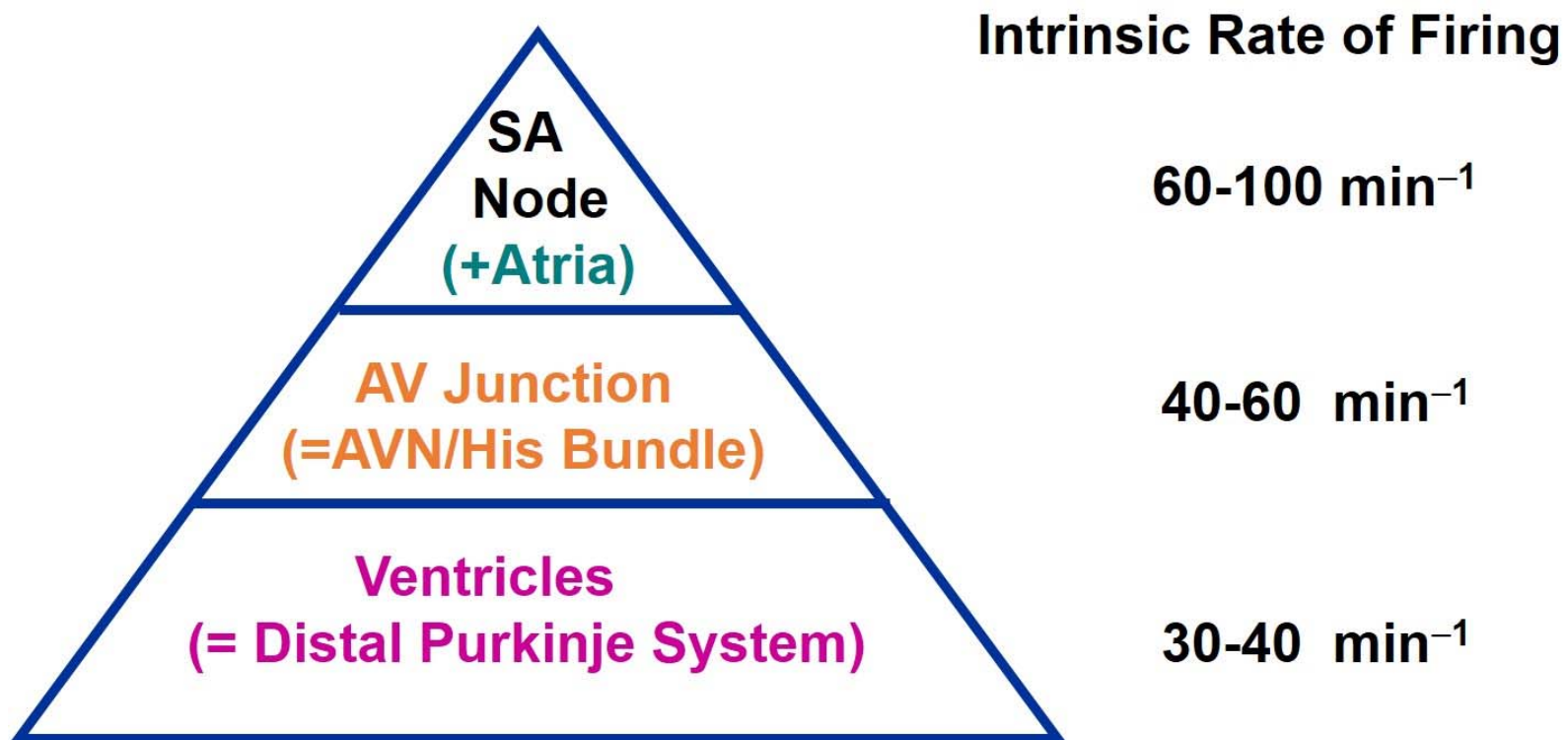
# Cardiac conduction system





# Pacemaker Hierarchy

## (Dominant vs. Subsidiary/Escape Pacemakers)





# Atrioventricular conduction block

- Atrioventricular conduction can be **delayed**, **intermittently** blocked, or **completely** blocked.
- Classification
  - 1) First degree : prolonged conduction time
  - 2) Second degree : intermittent non-conduction
  - 3) Third degree : persistent non-conduction

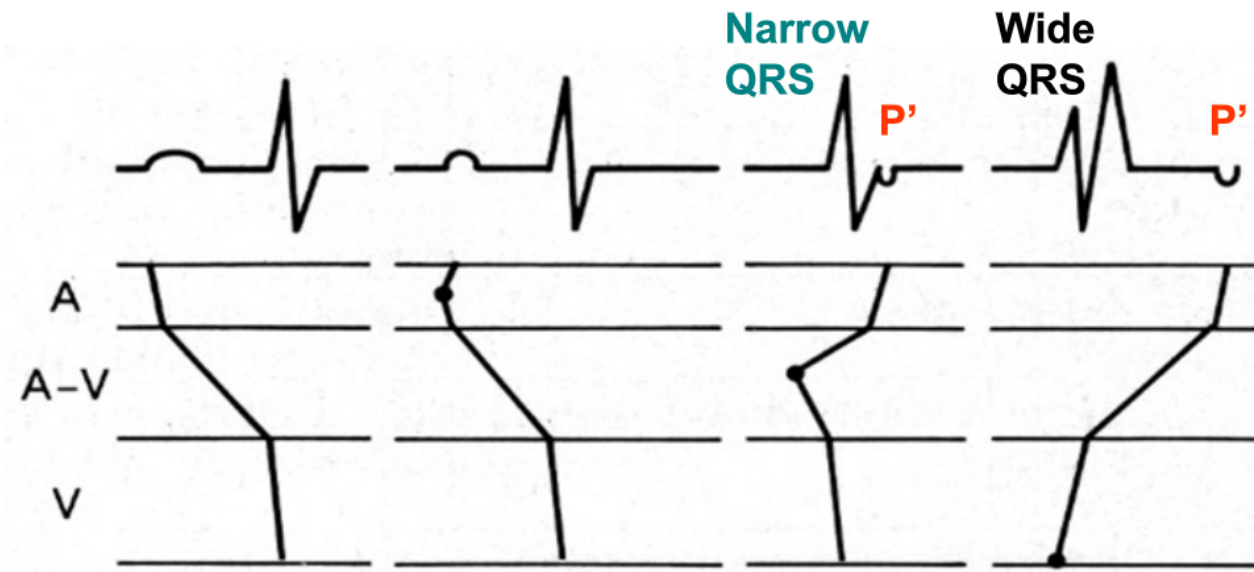


# Approach of AV block diagnosis

## - Questions to help differentiate bradycardia -

- Type of AV block is an ECG diagnosis
- Identification of P wave and QRS complex
- PR interval is consistent?

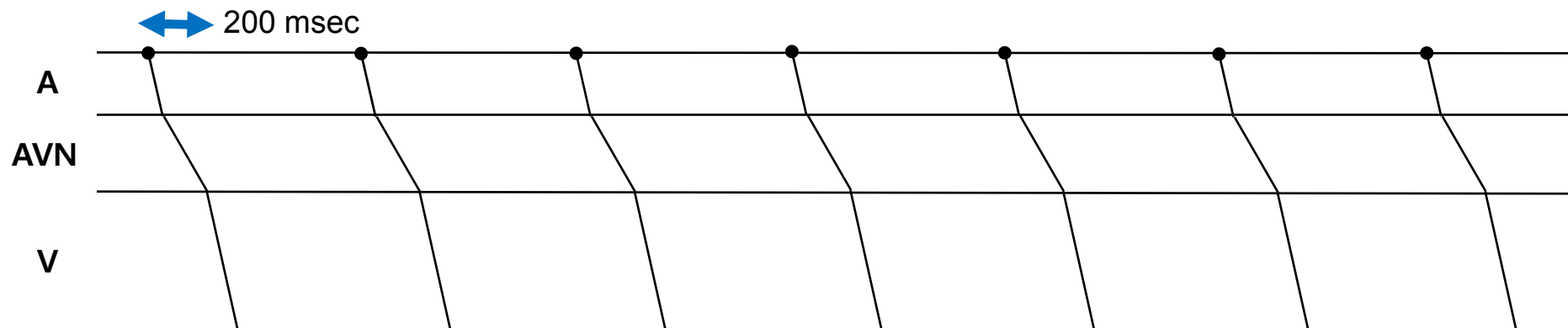
- Laddergram





# First degree AV block = Prolonged PR interval

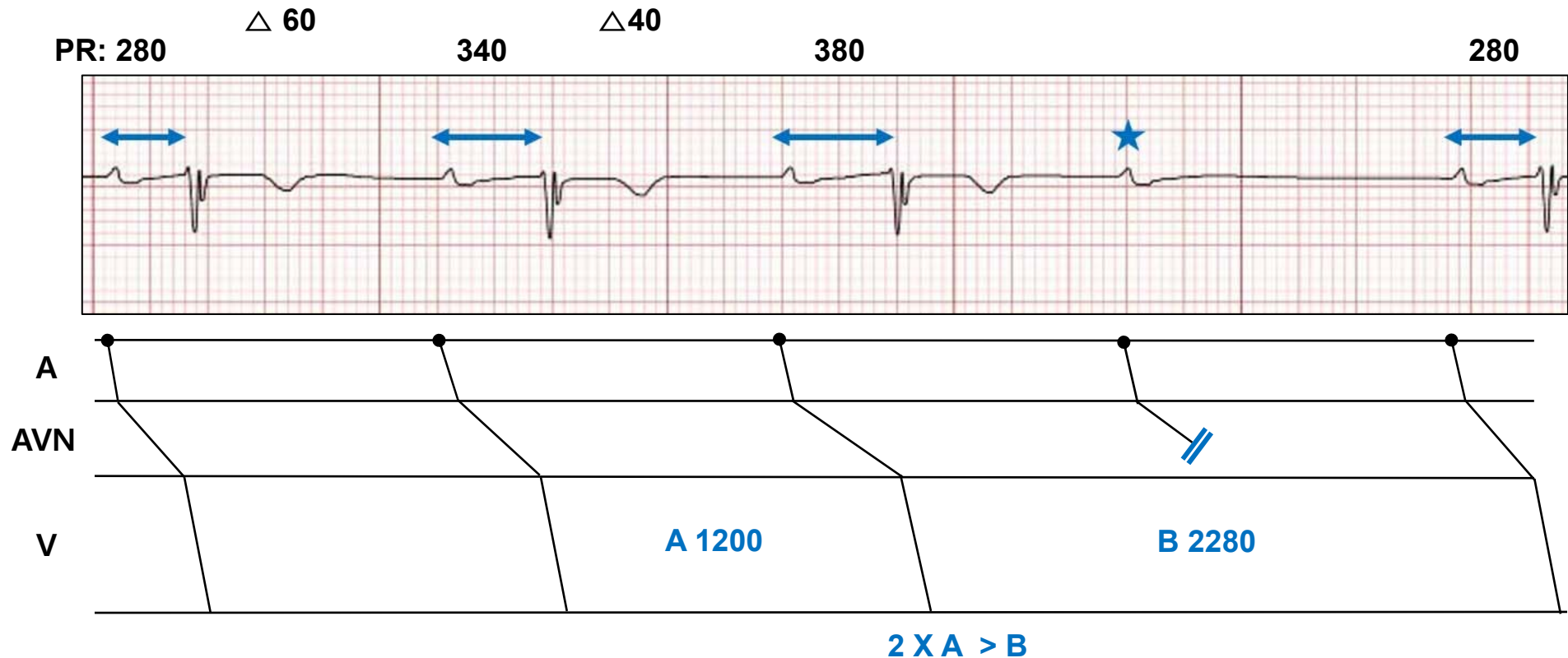
- Slowing of conduction through AV junction
- PR interval  $\geq 0.2$  sec





# Second degree AV block - Mobitz type I, Wenckebach -

- A progressive lengthening of PR interval before the block
- 차단부위: 주로 AV node, proximal His bundle
- Usually reversible and benign







## Second degree AV block - Mobitz type I, Wenckebach -

1. Progressive PR prolongation until blocked P-wave
2. Decremental increment of PR interval
3. Blocked P-wave followed by short PR interval

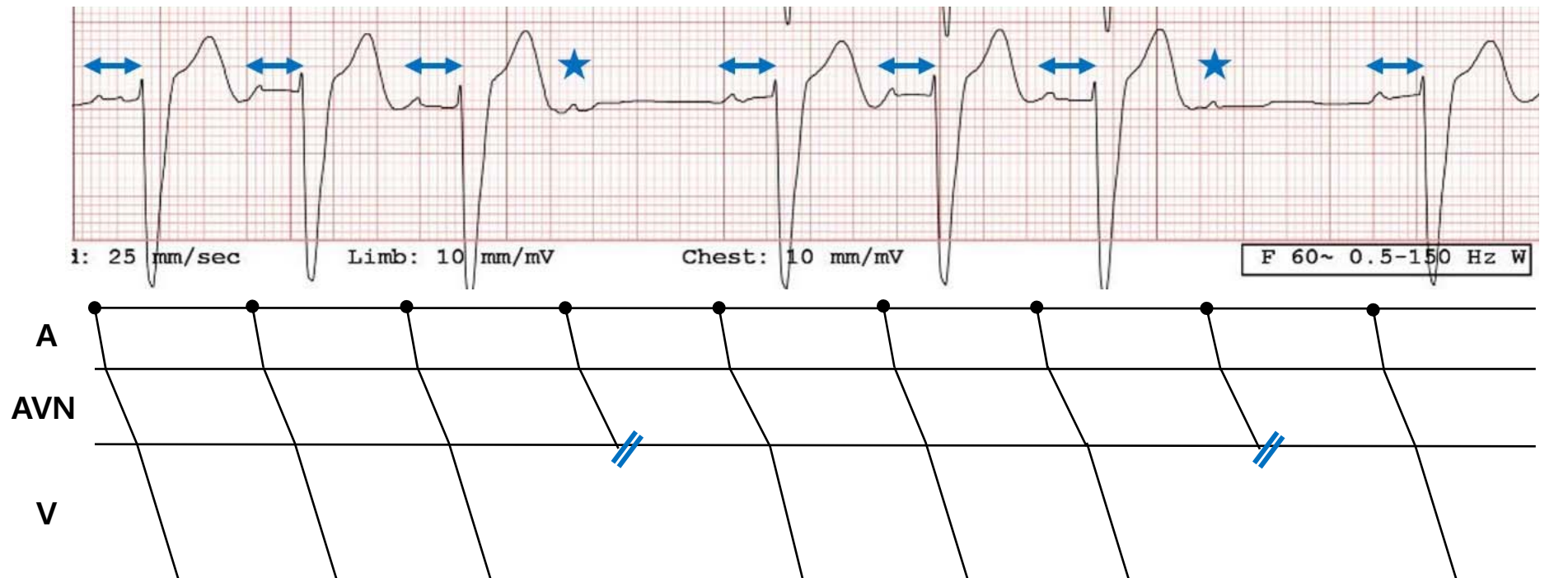
→ Therefore,

1. Progressive shortening of RR interval before blocked P- wave
2. RR interval including blocked P-wave is shorter than 2 X previous RR interval



# Second degree AV block - Mobitz type II -

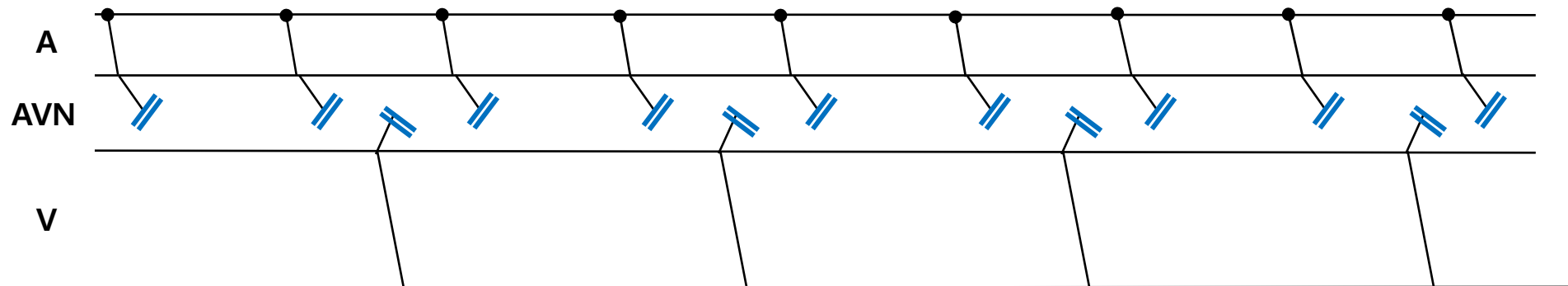
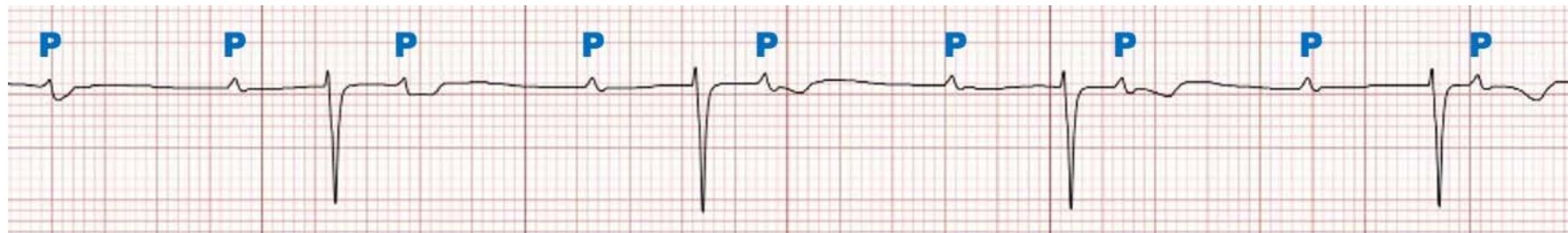
- Constant PR intervals
- 차단부위: His bundle, bundle branches
- 고도 방실 차단으로 진행할 수 있다.



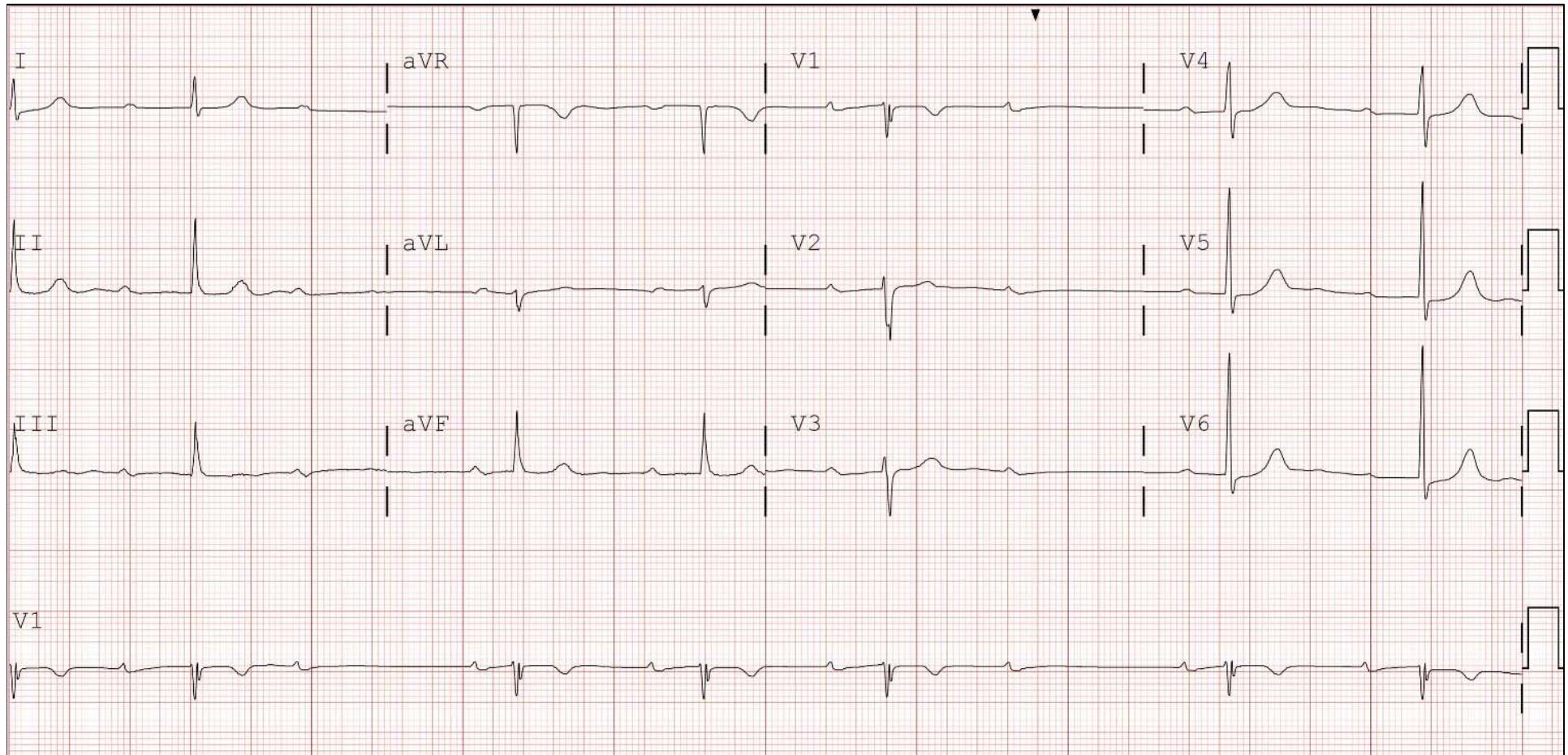


# Third degree AV block = Complete AV block

- Complete failure of conduction from atrium to ventricle
- 차단부위
  - wide QRS 인 경우: distal His bundle
  - narrow QRS 인 경우: AV node, proximal His bundle



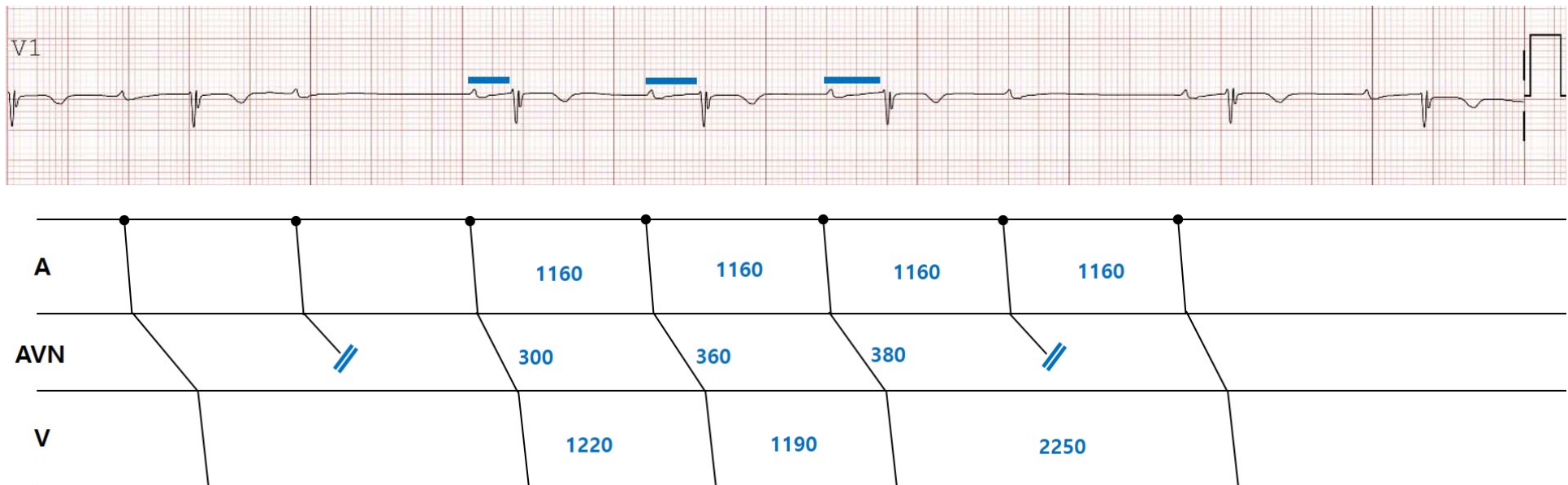
# 55/F, ECG abnormality





## “Typical” 4:3 AV Wenckebach Sequence

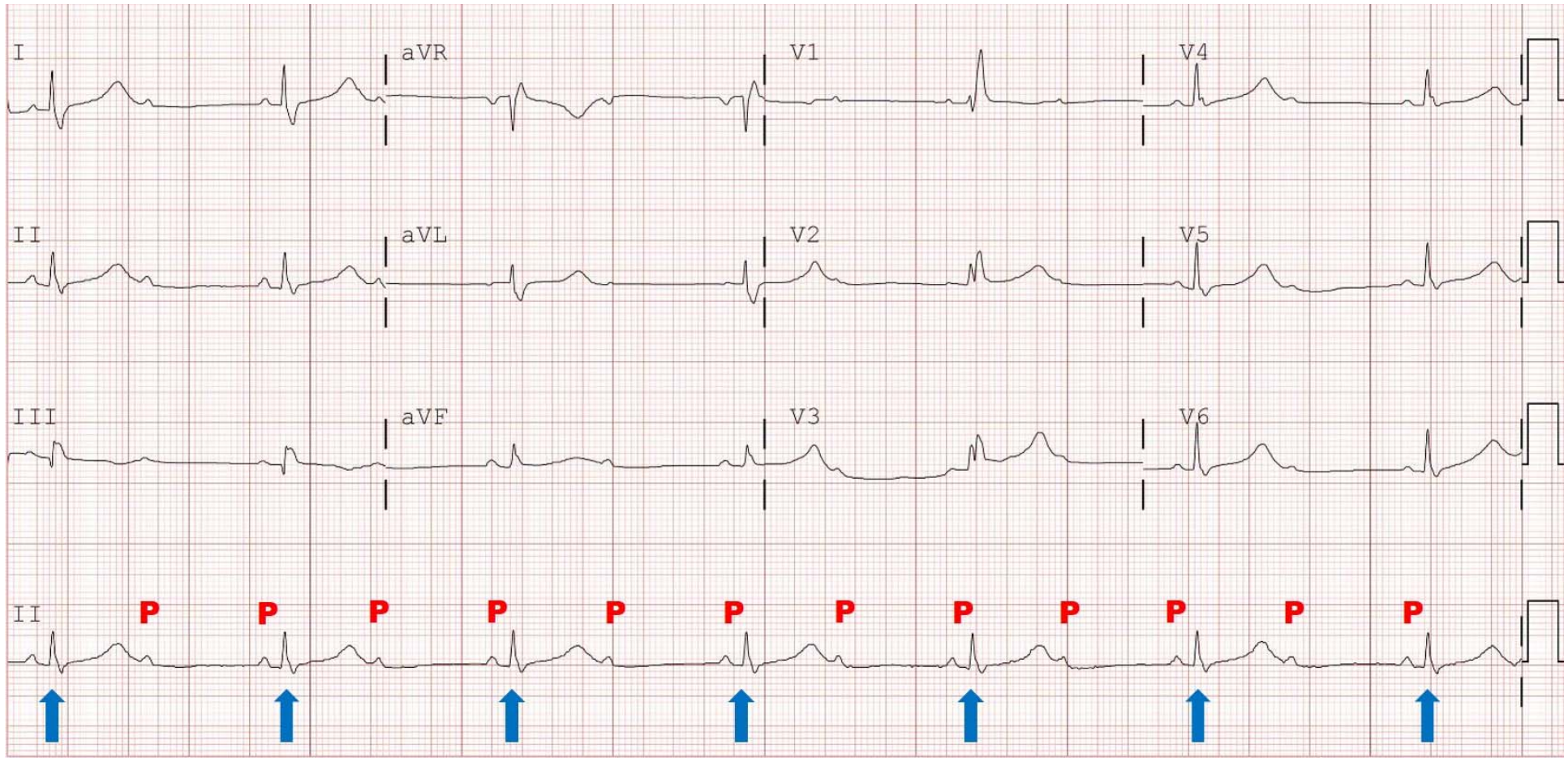
- Progressive PR prolongation and shortening of RR interval before blocked P-wave
- Pause encompassing blocked beat  $< 2 \times$  RR



Case 2

# 47/F, Chest discomfort for 1 day

HT, DM / Telmisartan 40mg, Atorvastatin 10mg, Metformin 500mg



2:1 AV block

## Differentiating mechanism of 2:1 AV block

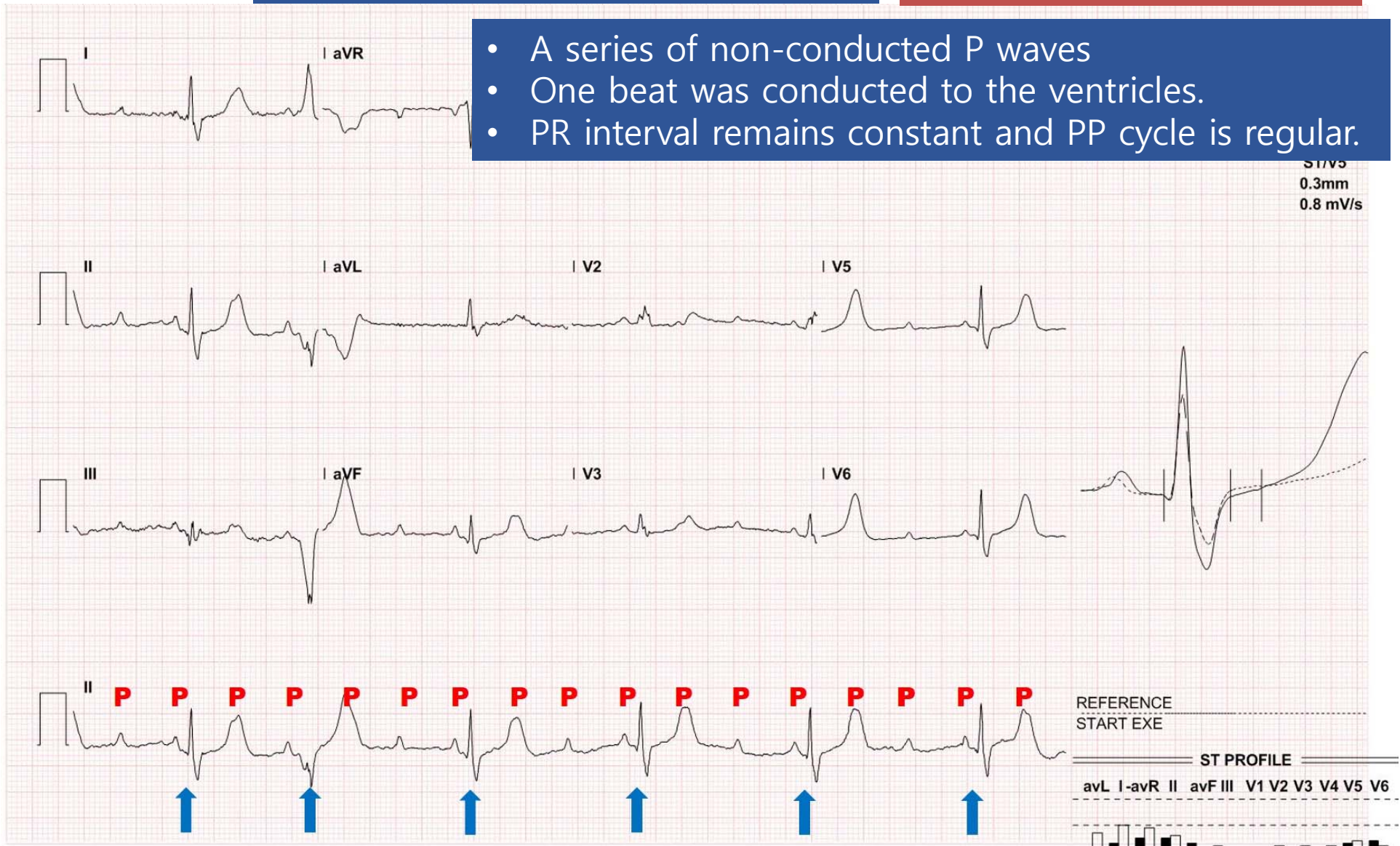
	AV nodal	Infra-nodal
QRS duration	Narrow	Wide
Response to <b>increasing</b> HR & AV conduction ( <b>exercise, atropine</b> )	Improves	Worsens
Response to <b>decreasing</b> HR & AV conduction ( <b>carotid sinus massage</b> )	Worsens	Improves
Acute MI	Inferior	Anterior



# High degree AV block

→ PPM (DDD)

- A series of non-conducted P waves
- One beat was conducted to the ventricles.
- PR interval remains constant and PP cycle is regular.

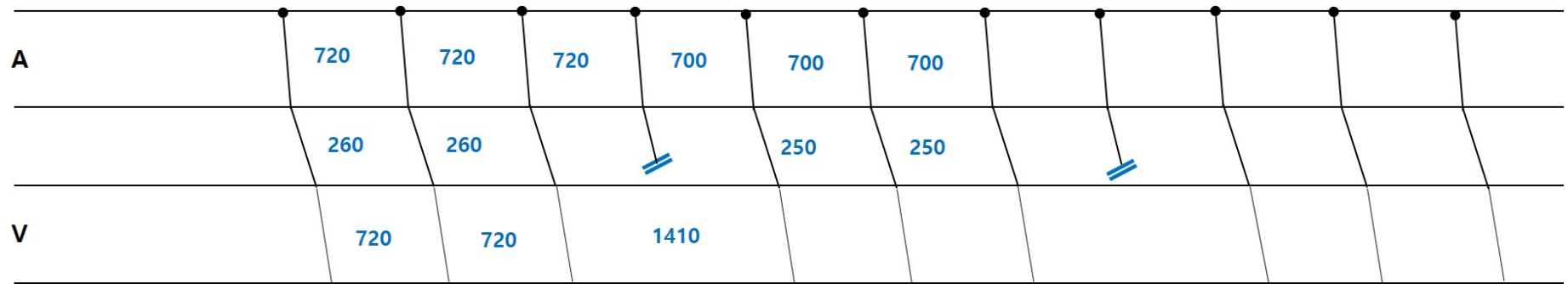
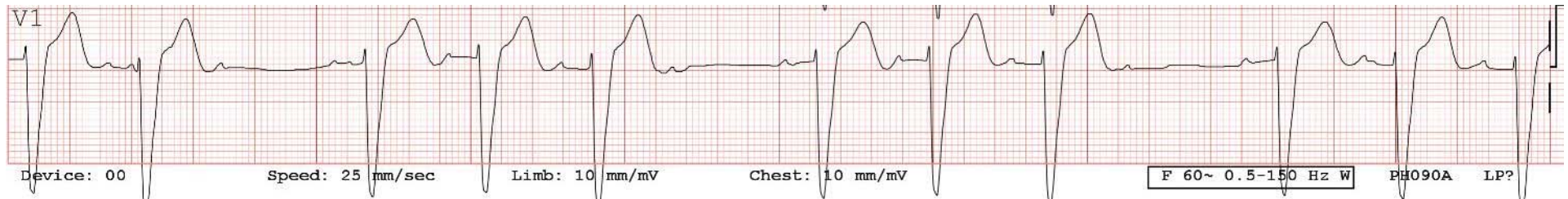




# 65/M, Dyspnea on exertion

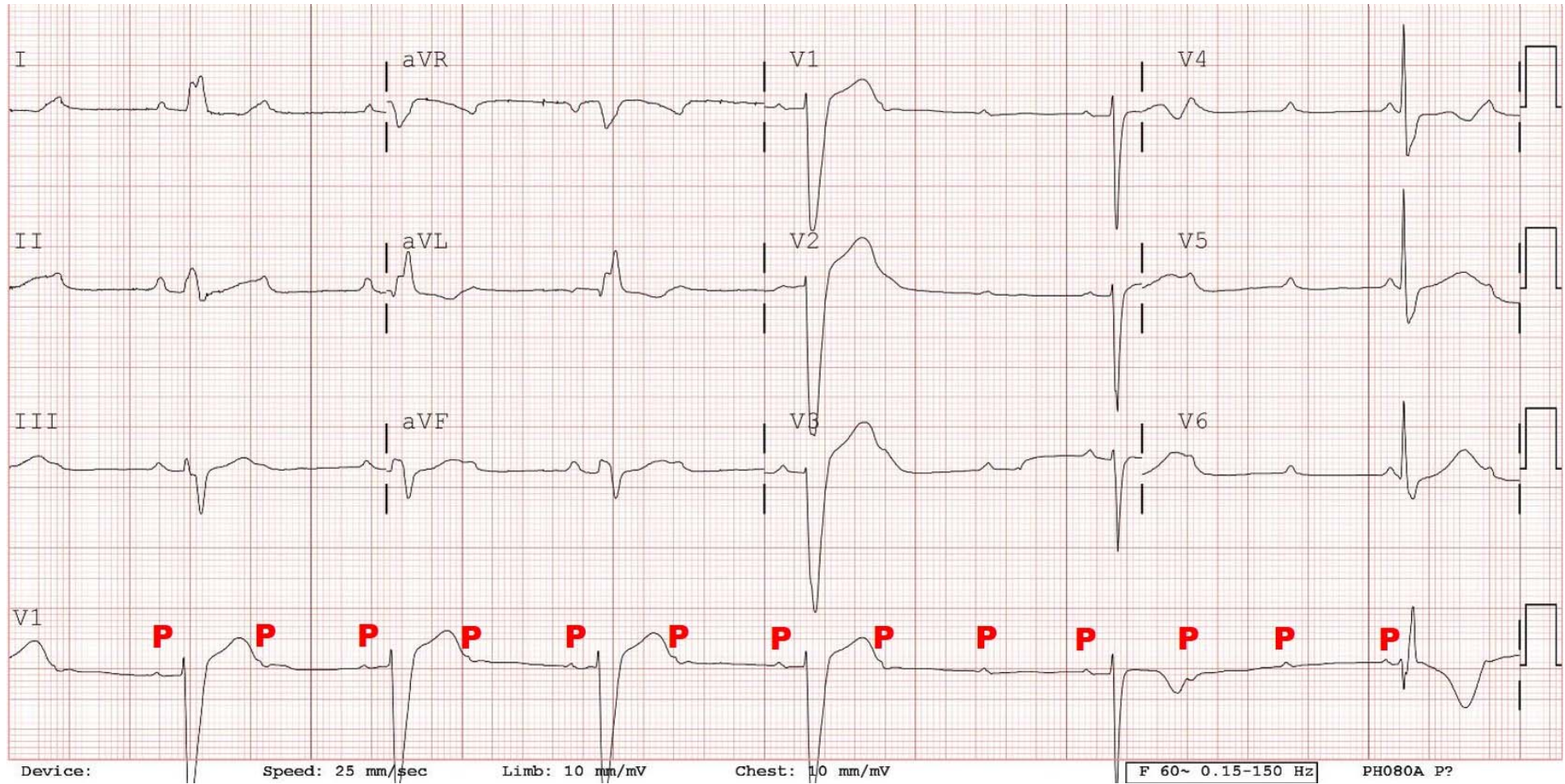


# Second degree AV block, Mobitz type II





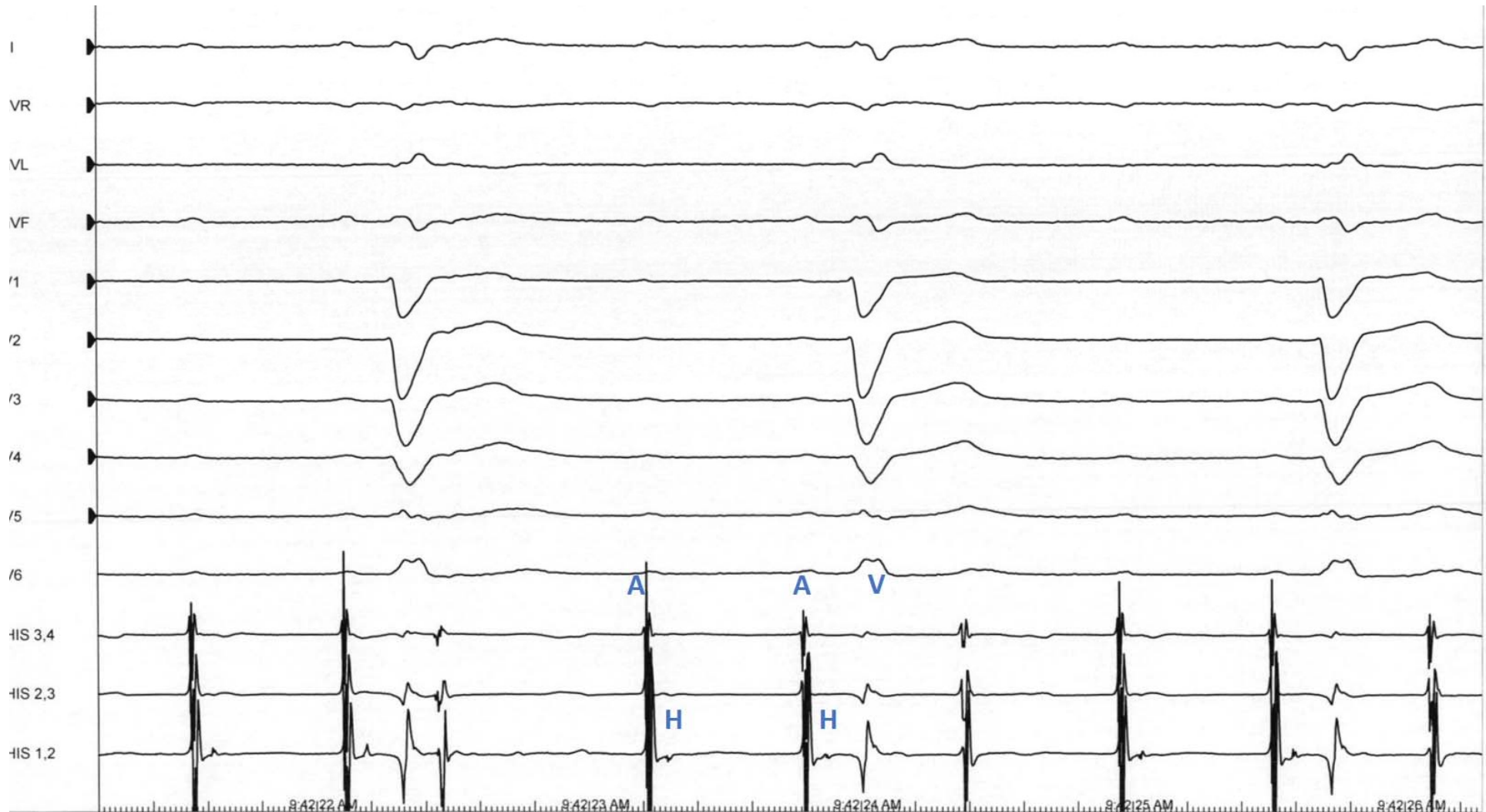
# High degree AV block



Case 3

EPS → HV block

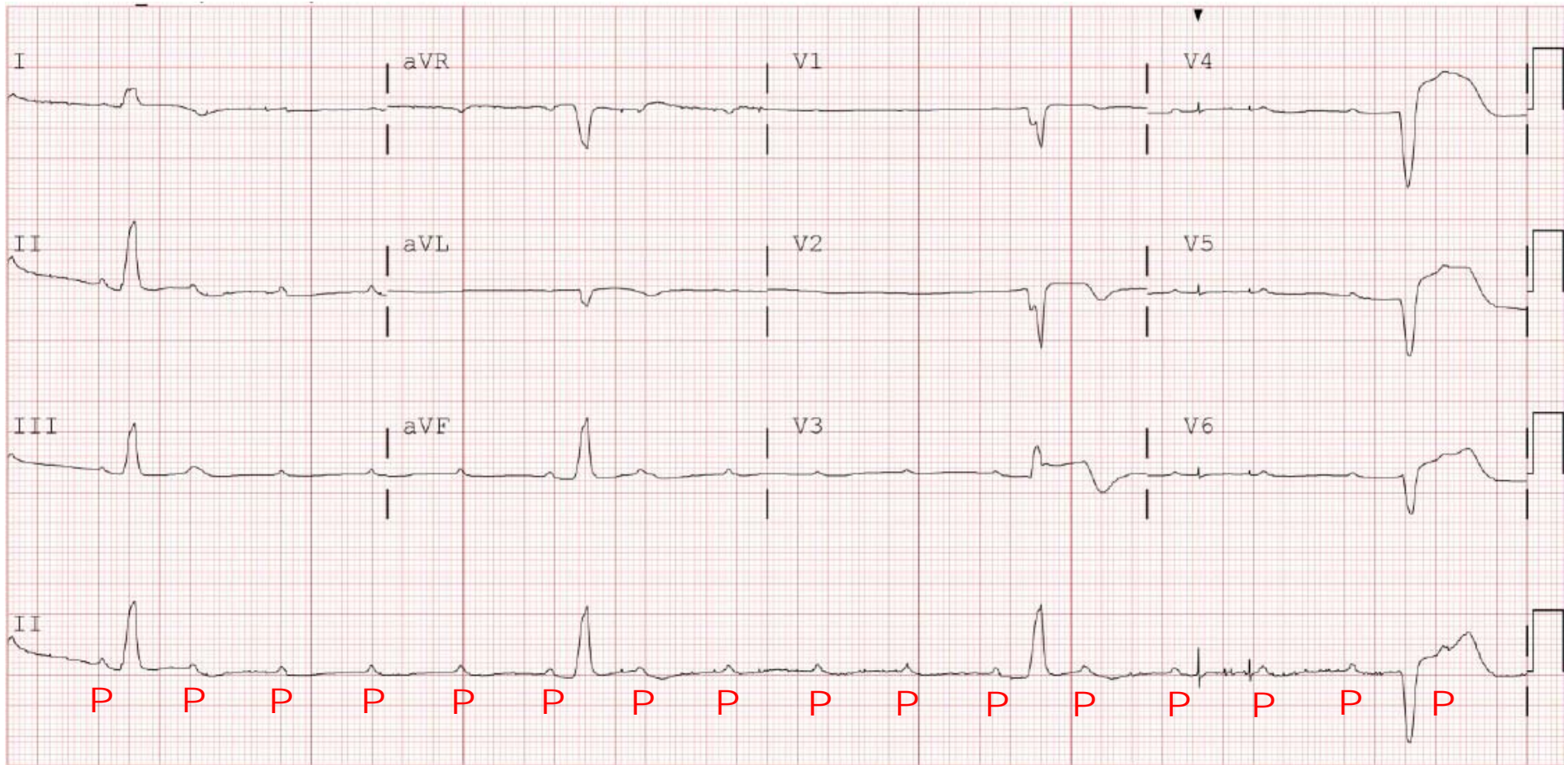
→ PPM (DDD)





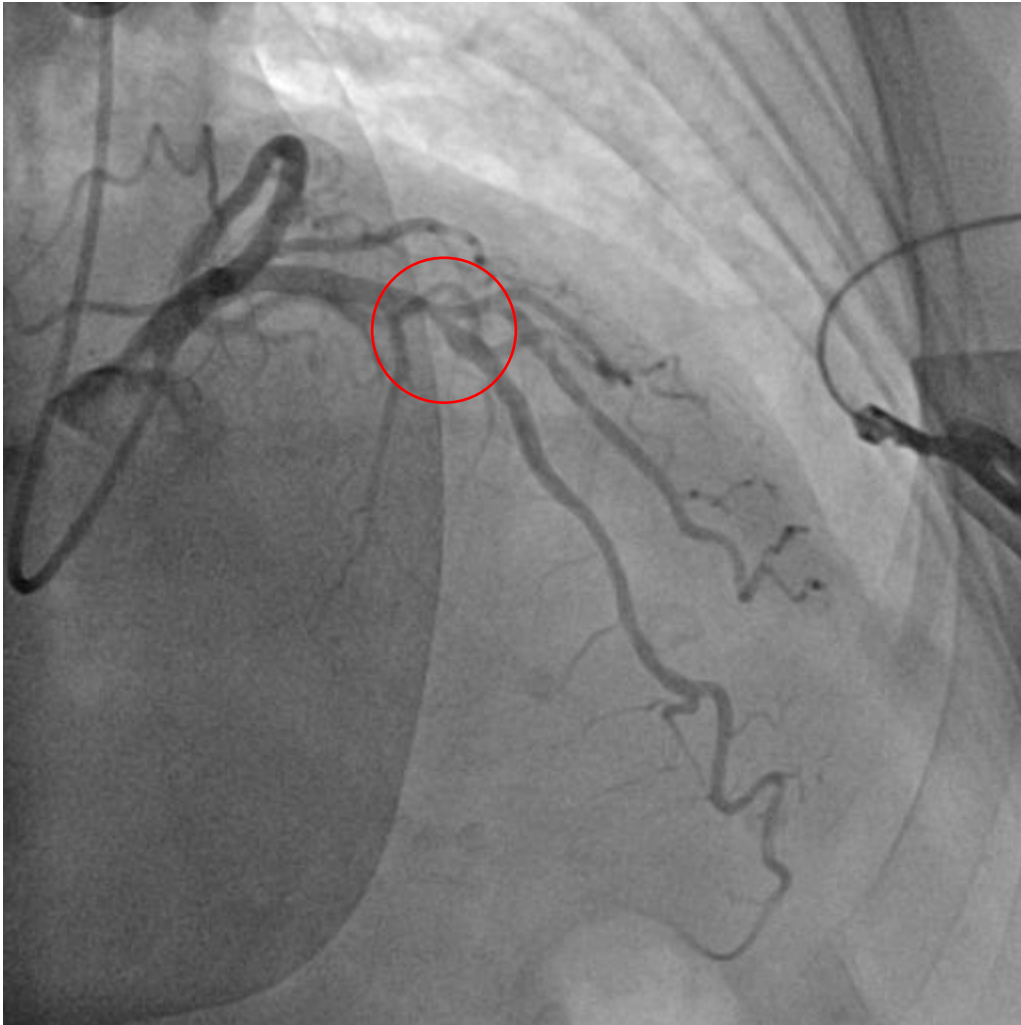
Case 4

70/F, epigastric pain & N/V for 2~3 days



High degree AV block & ST elevation in V2-6

## Case 4



### # Initial cardiac enzyme

CK-MB 89.9 ng/mL (0.5-3.1)

hsTnI 23603.04 pg/mL (0-11.6)

### # TTE, post PCI

: EF 60%

Akinesia of LV apex wall

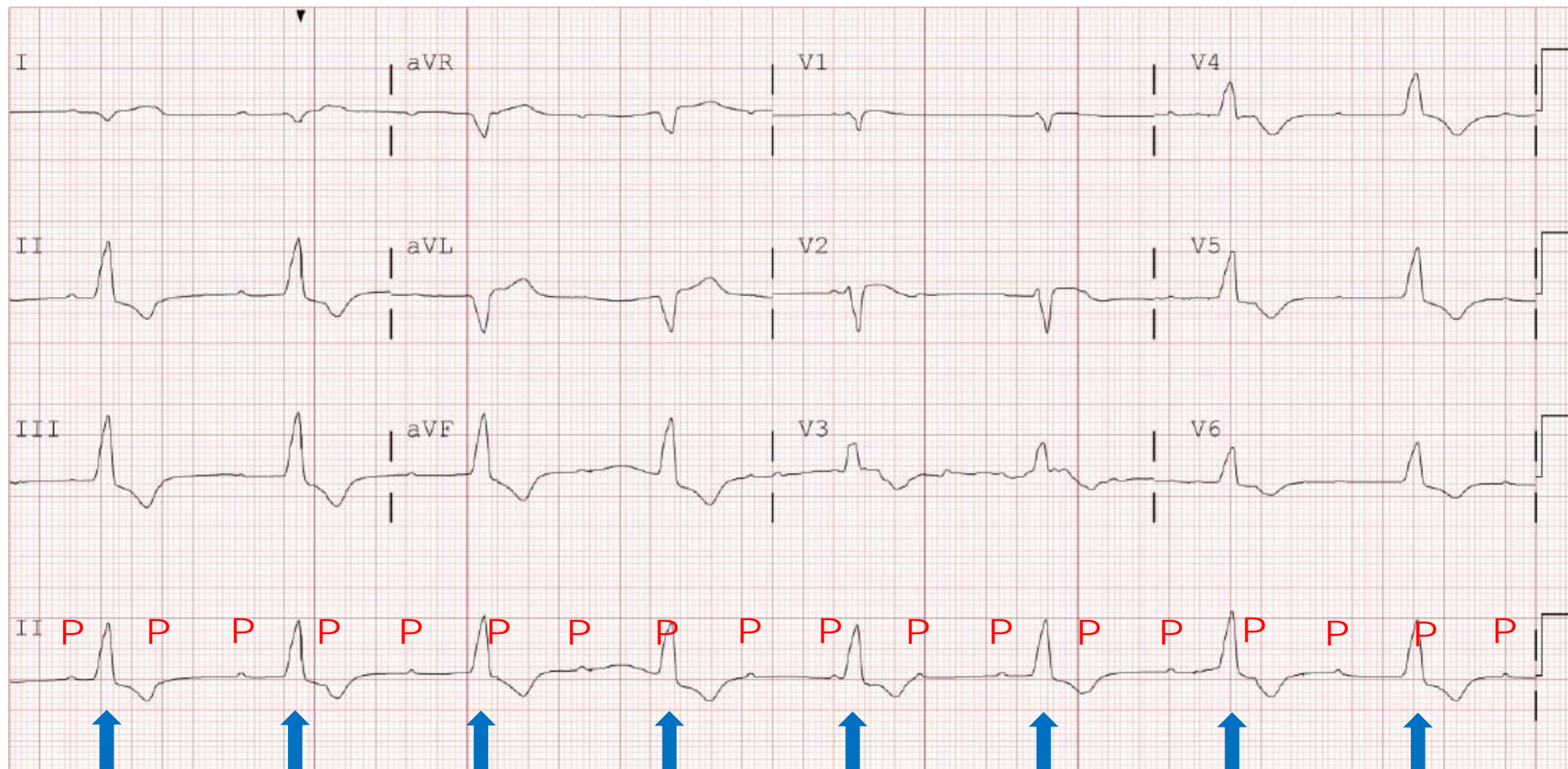
with normal LVEF

: c/w) ischemic insult of LAD territory

High degree AV block due to STEMI, anterior wall



## Case 4

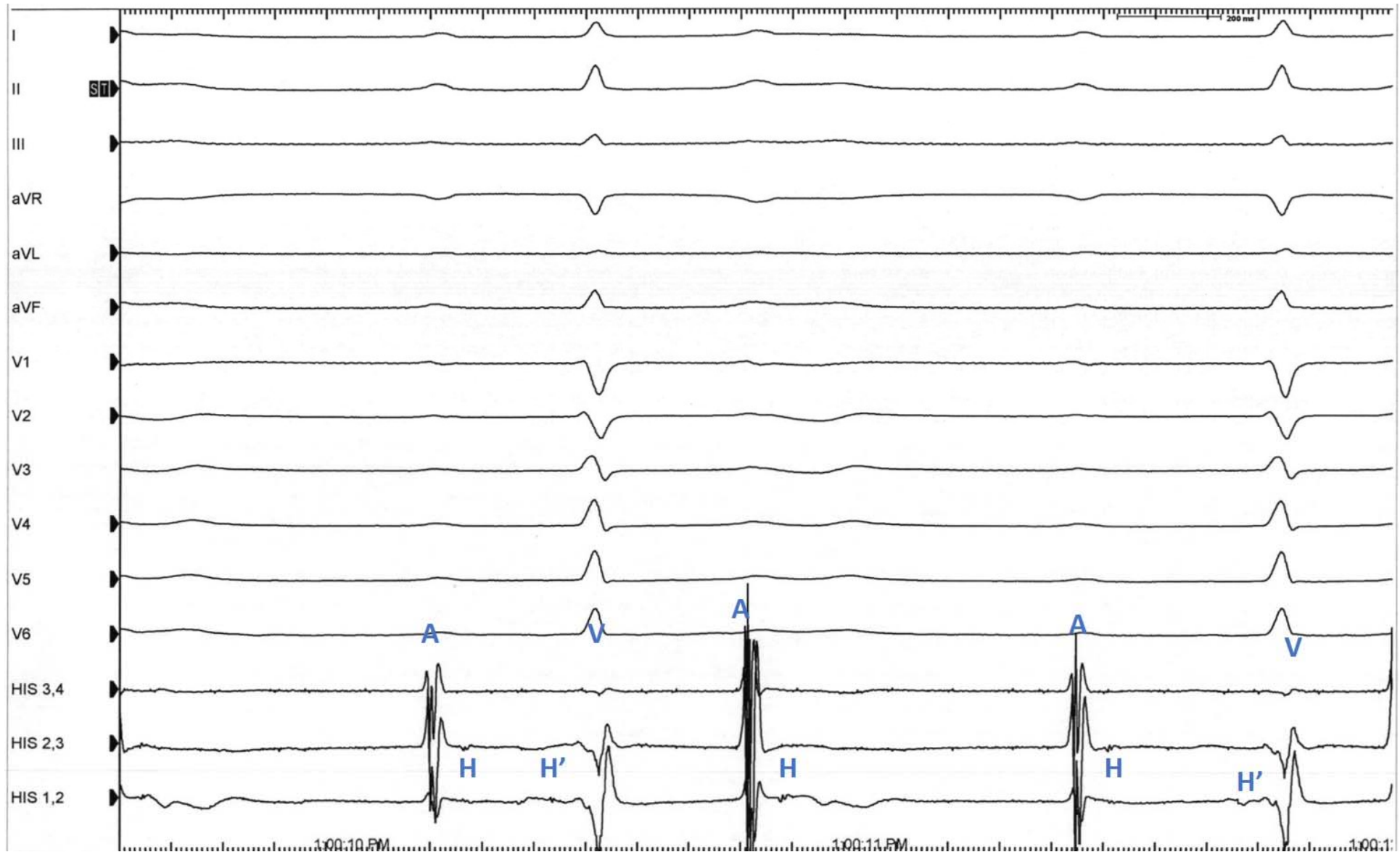


High degree AV block → Complete AV block

Case 4

EPS → Intra-hisian block

→ PPM (DDD)

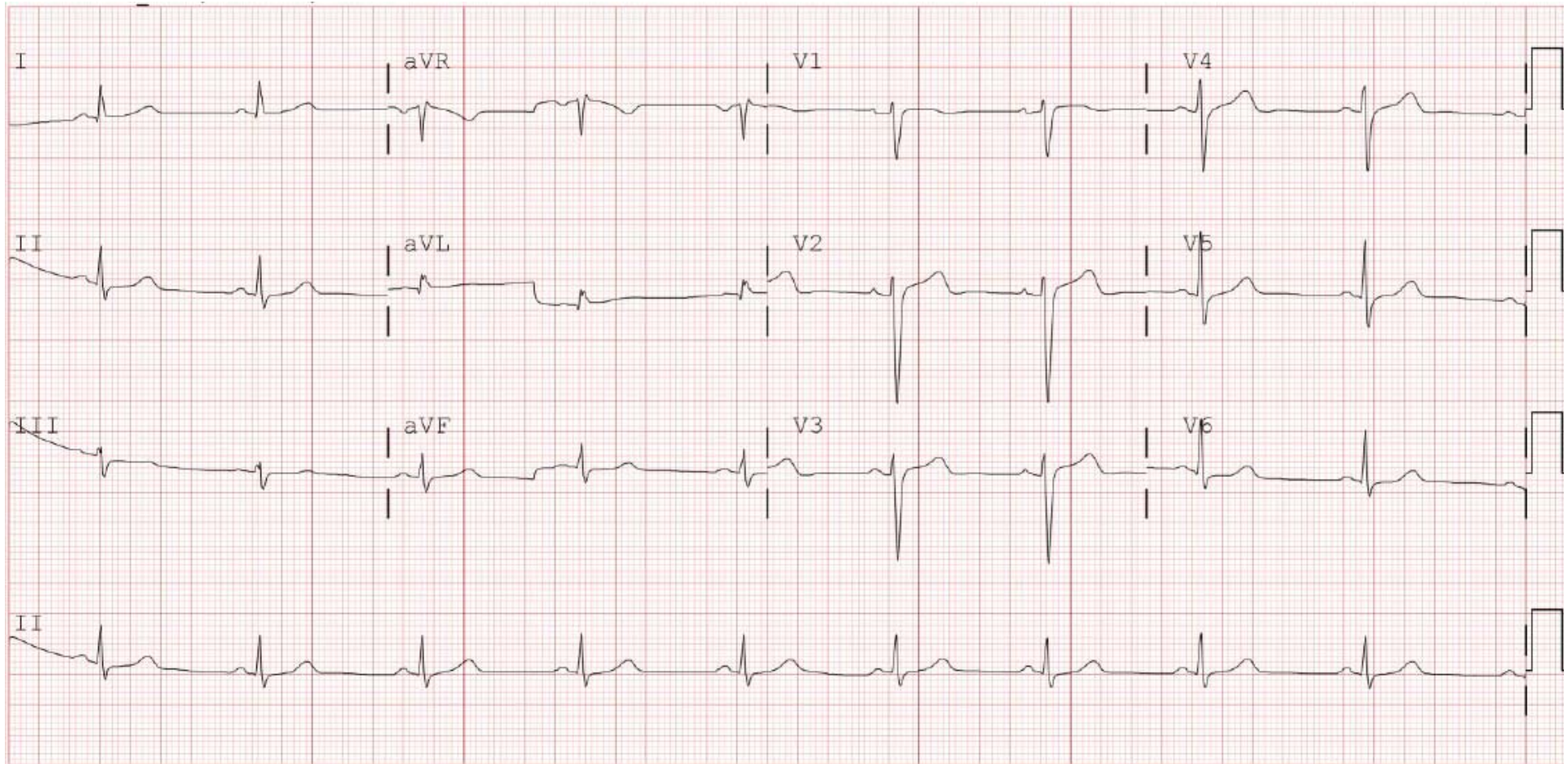




Case 5

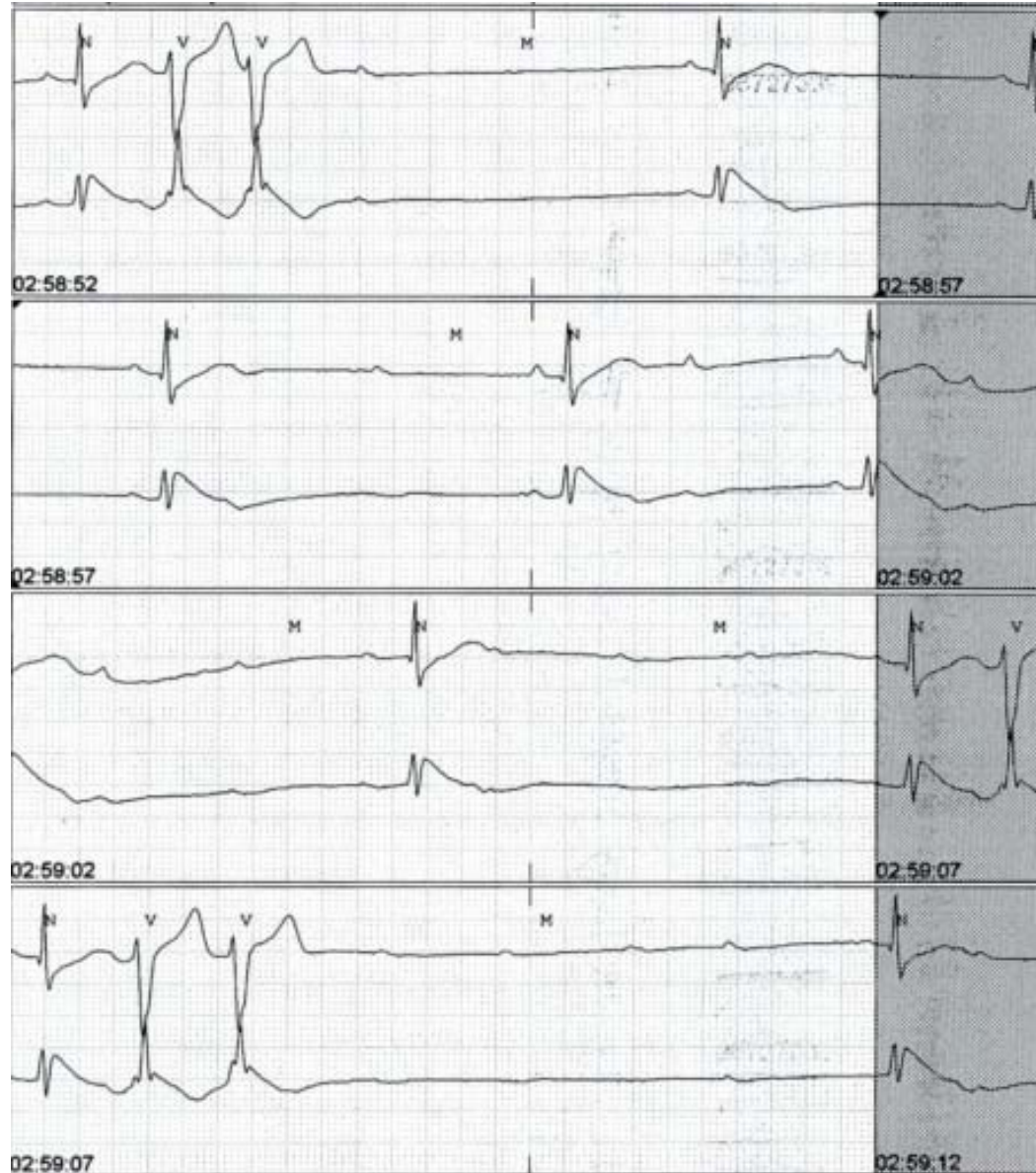
59/F, 오전 9시 설거지 하던 중 syncope  
& chest discomfort

HT, amlodipine 5mg



Case 5

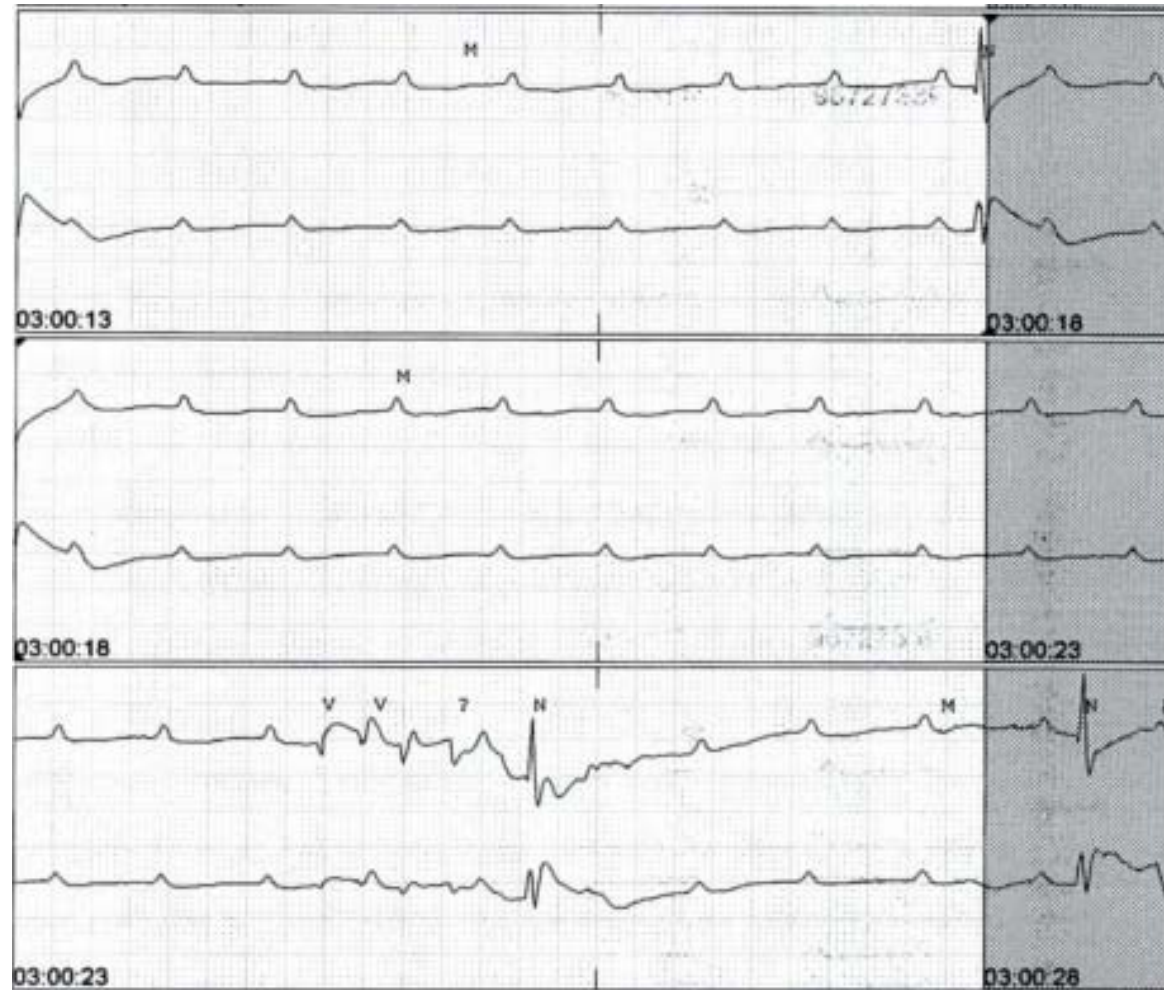
수면 중 가슴 답답한 증상 호소,  
HR 30회 미만 감소 → 당직의 atropine iv





Case 5

Syncope 발생 → external pacing & dobutamine infusion 후 SR 및 mental 회복

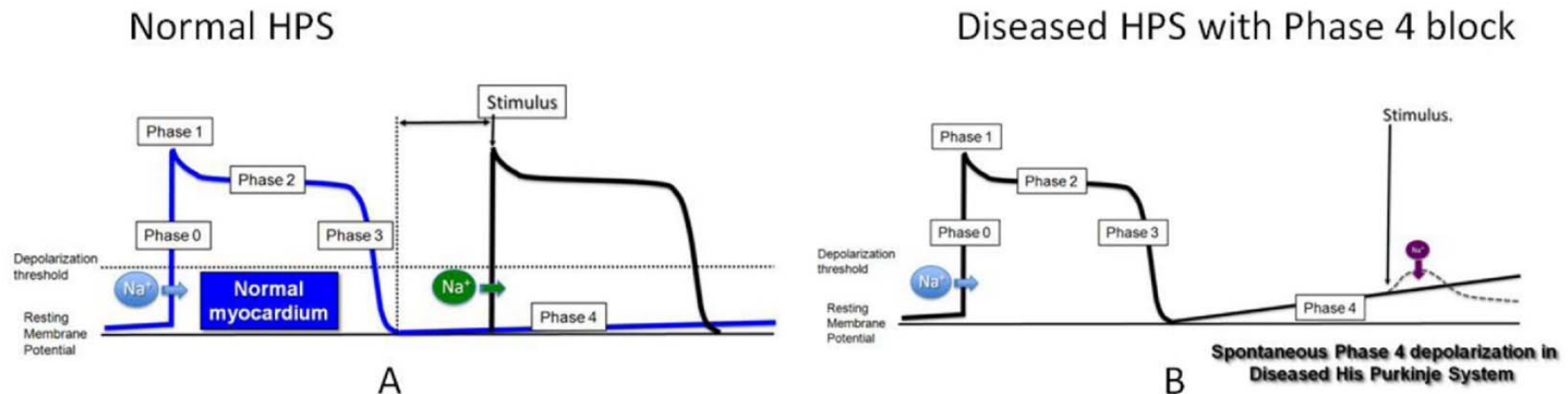


Paroxysmal AV block

→ PPM (DDD)

# Paroxysmal AV block

- a sudden, pause-dependent phase 4 AV block occurring in diseased conduction system



**Figure 3** Action potentials in normal and diseased conduction systems showing phase 4 block. Spontaneous diastolic depolarization during phase 4 in the diseased His-Purkinje system results in reduced availability of sodium channels during the next depolarization, and the resulting action potential cannot propagate the impulse.

Thank you for your attention

