

Temporary pacemaker : Programming & Trouble shooting

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한 두 영

Temporary Pacemaker Overview

- Indication of Temporary Pacemaker
- Programming ; NBG Code , Pacing/Sensing
- Device
- Trouble shooting

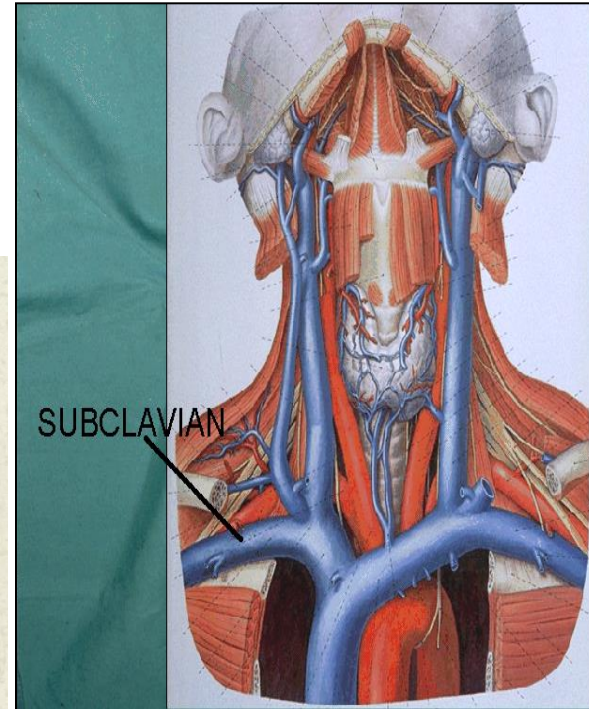
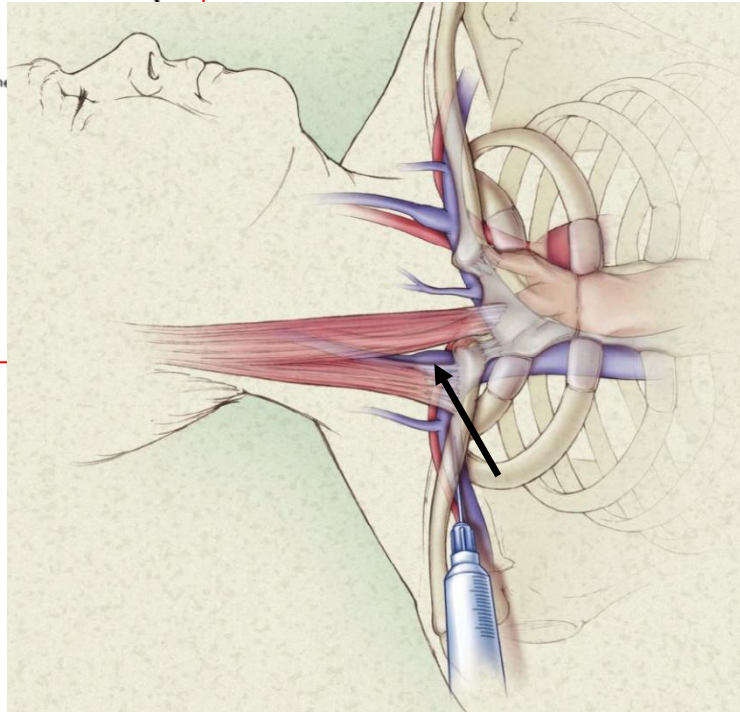
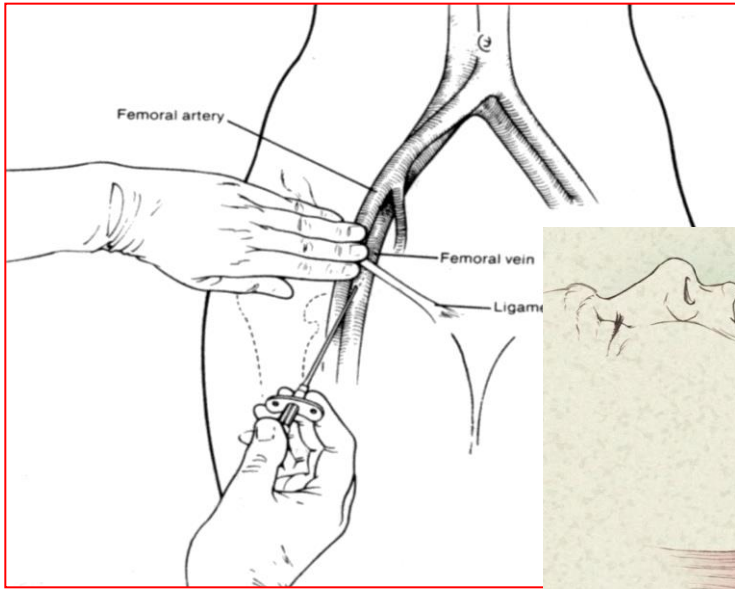
Temporary pacemaker란 ?

일시적으로 전기적 자극을 통하여 서맥이
있는 환자의 심장을 인공적으로 박동하게
만드는 Electronic device

Indication for Temporary pacemaker

- ◆ Symptomatic Heart Block
- ◆ Sick Sinus Syndrome
 - Symptomatic Sinus bradycardia
 - Sinus arrest
- ◆ Pacemaker Replacement
 - Pacemaker dependant patient
- ◆ Support After Heart Surgery
- ◆ Post TAVI (Transcatheter Aortic Valve Implantation)
- ◆ Other
 - Overdrive ventricular pacing (suppress ectopic activity)
 - Overdrive atrial pacing (“break” SVT, atrial flutter)

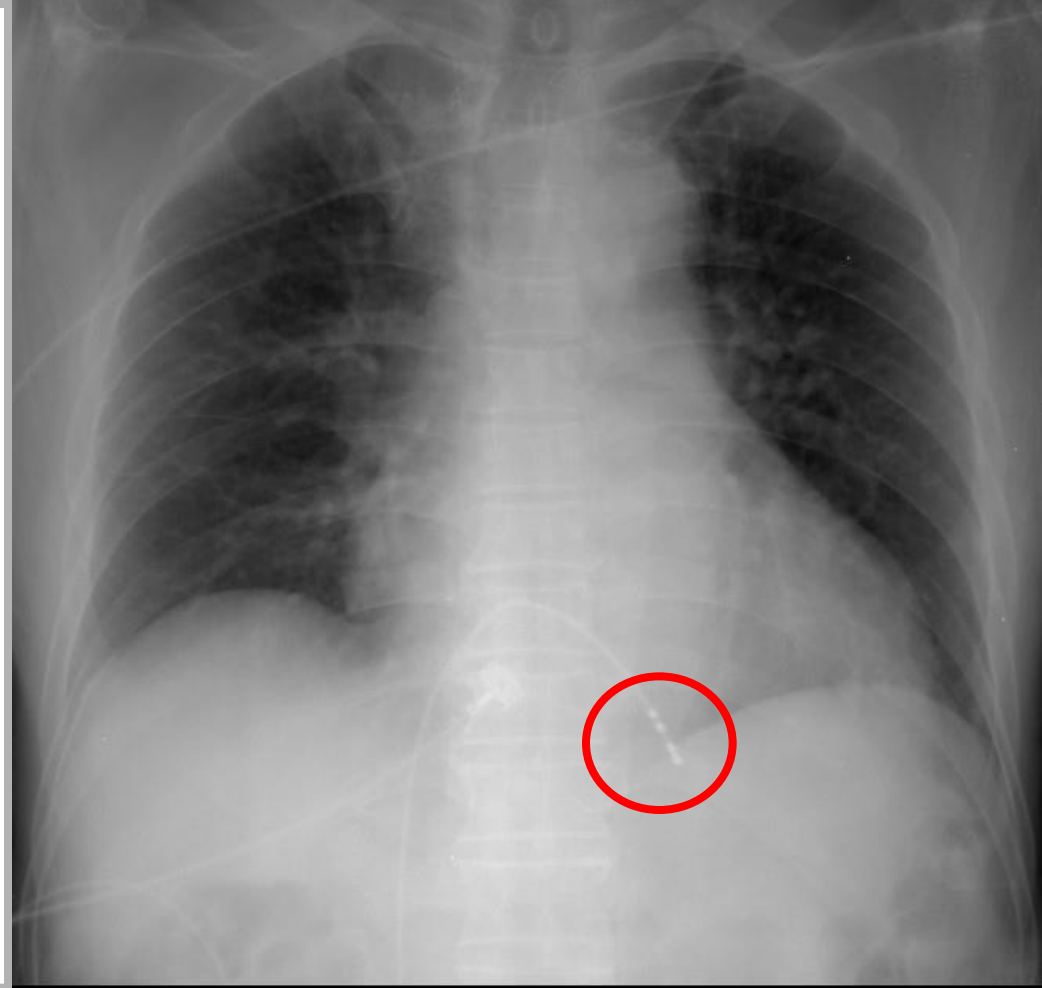
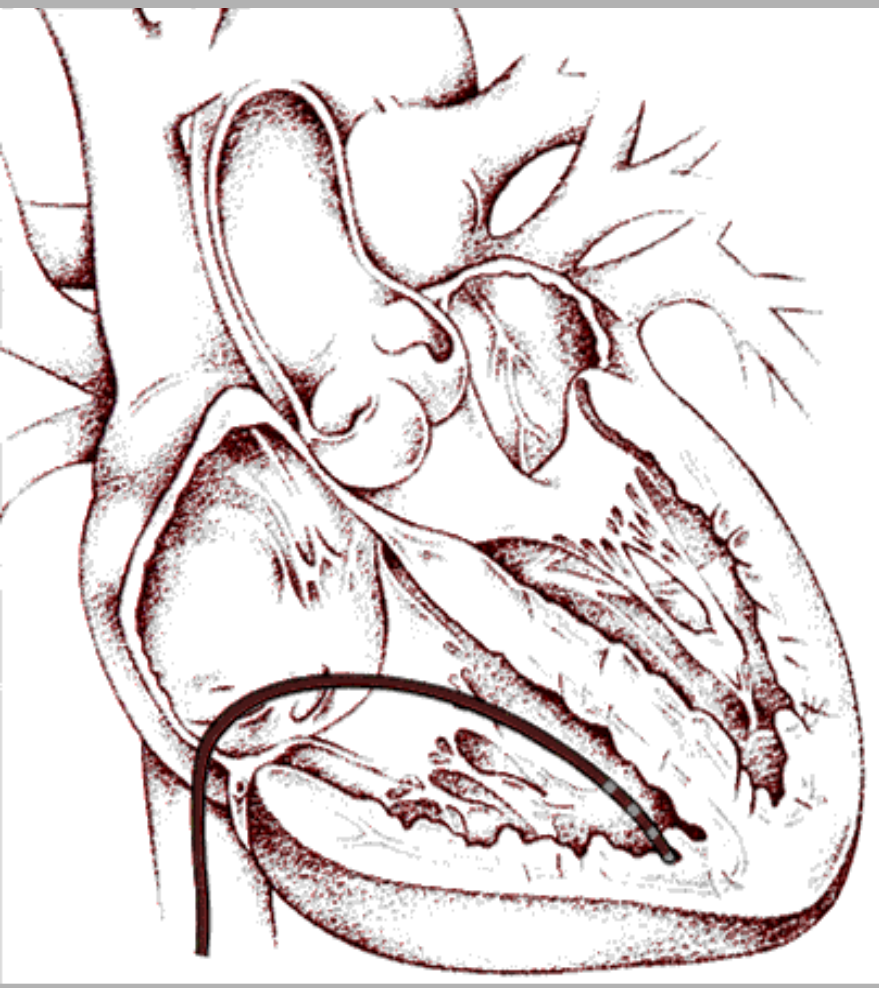
Access Sites

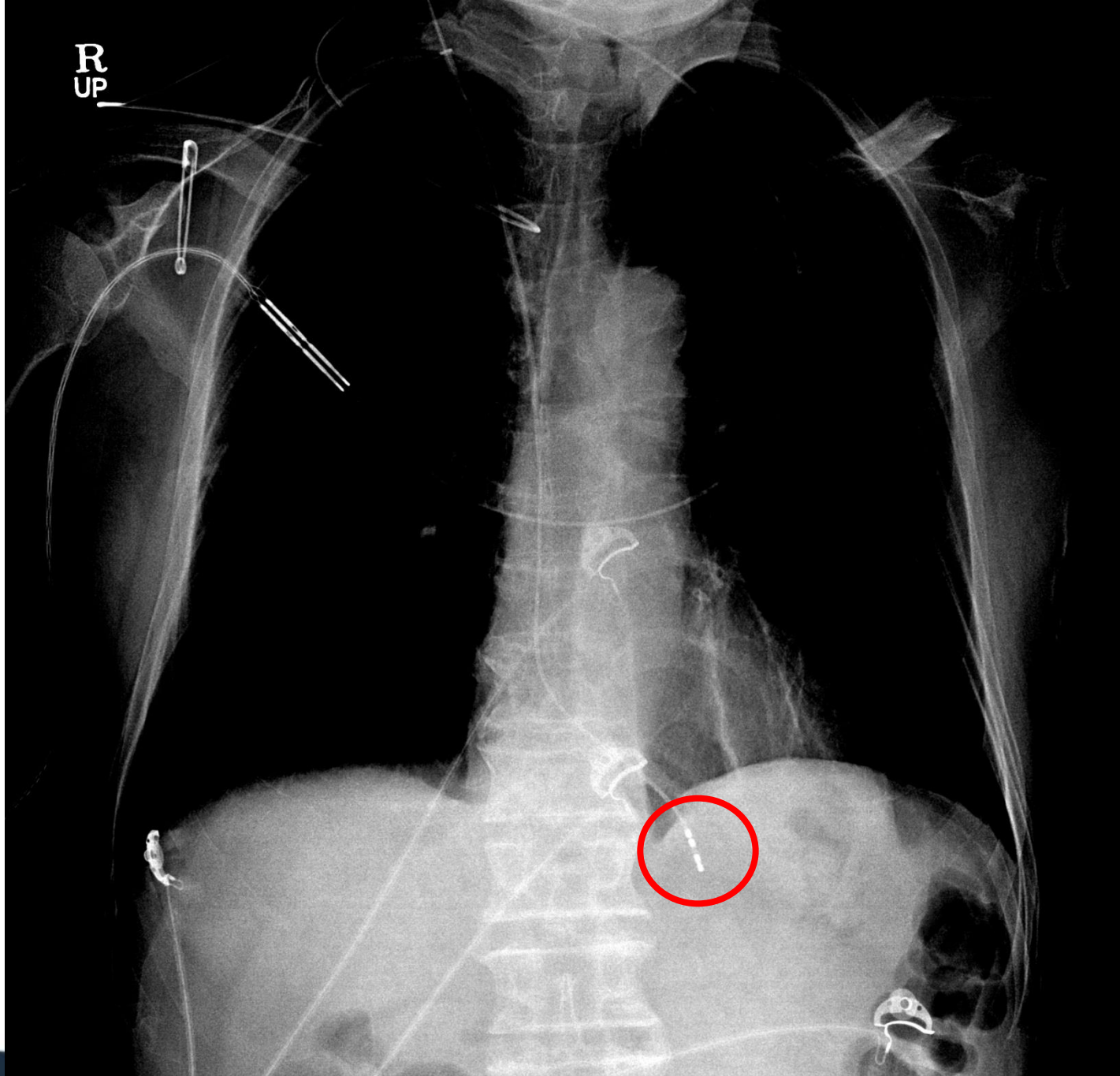


Access Site 비교

	Femoral vein	Internal jugular vein
장 점	<p>Puncture가 비교적 쉬움</p> <p>RV apex로 자연스럽게 위치</p>	<p>환자 거동이 용이 함.</p>
단 점	<p>환자 다리에 Sheath와 Cath가 있기 때문에 거동이 불편함</p>	<p>Puncture가 비교적 어려움</p> <p>RV apex로 위치하기가 부자연스러울 수 있음</p>

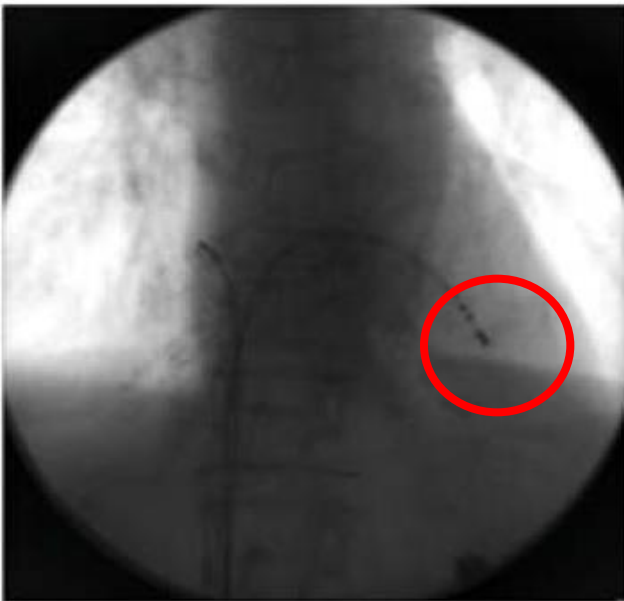
Catheter Placement Strategy



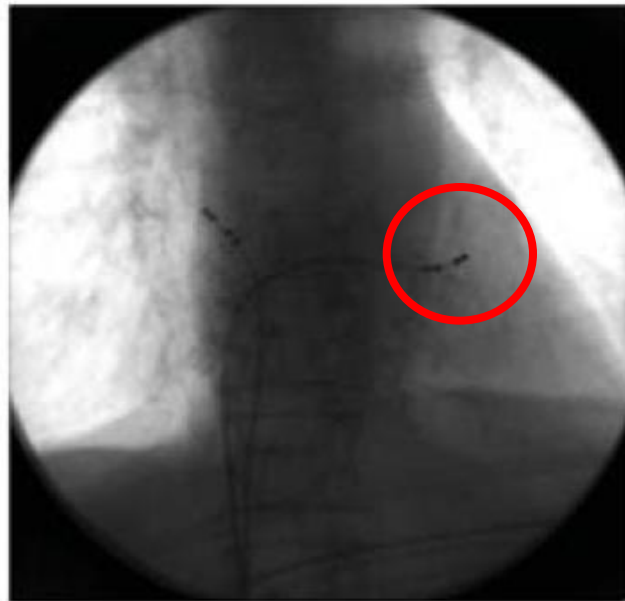


V Pacing 위치에 따른 ECG

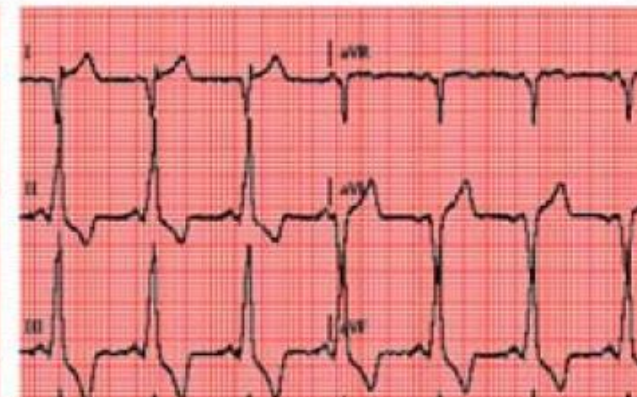
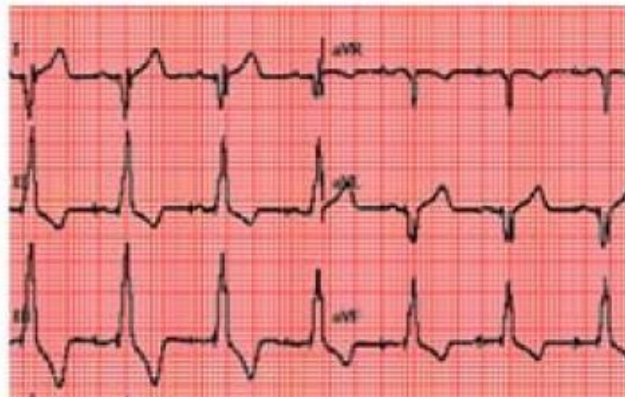
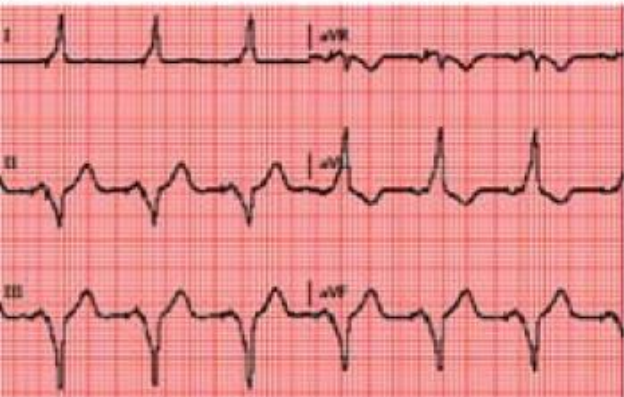
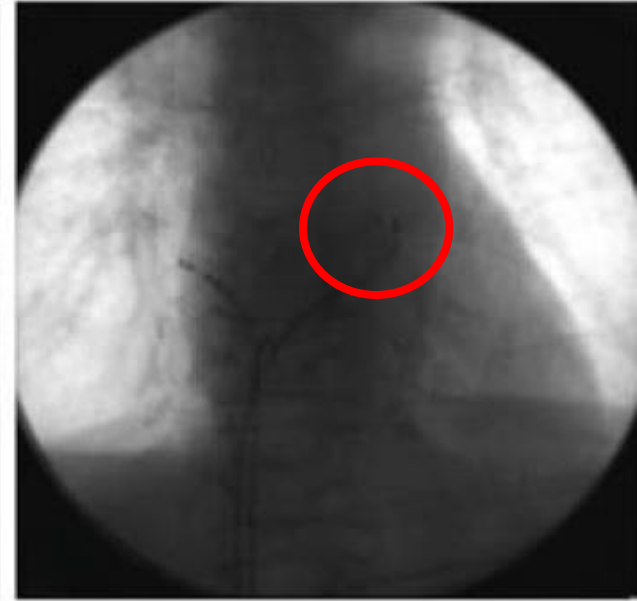
RV apical



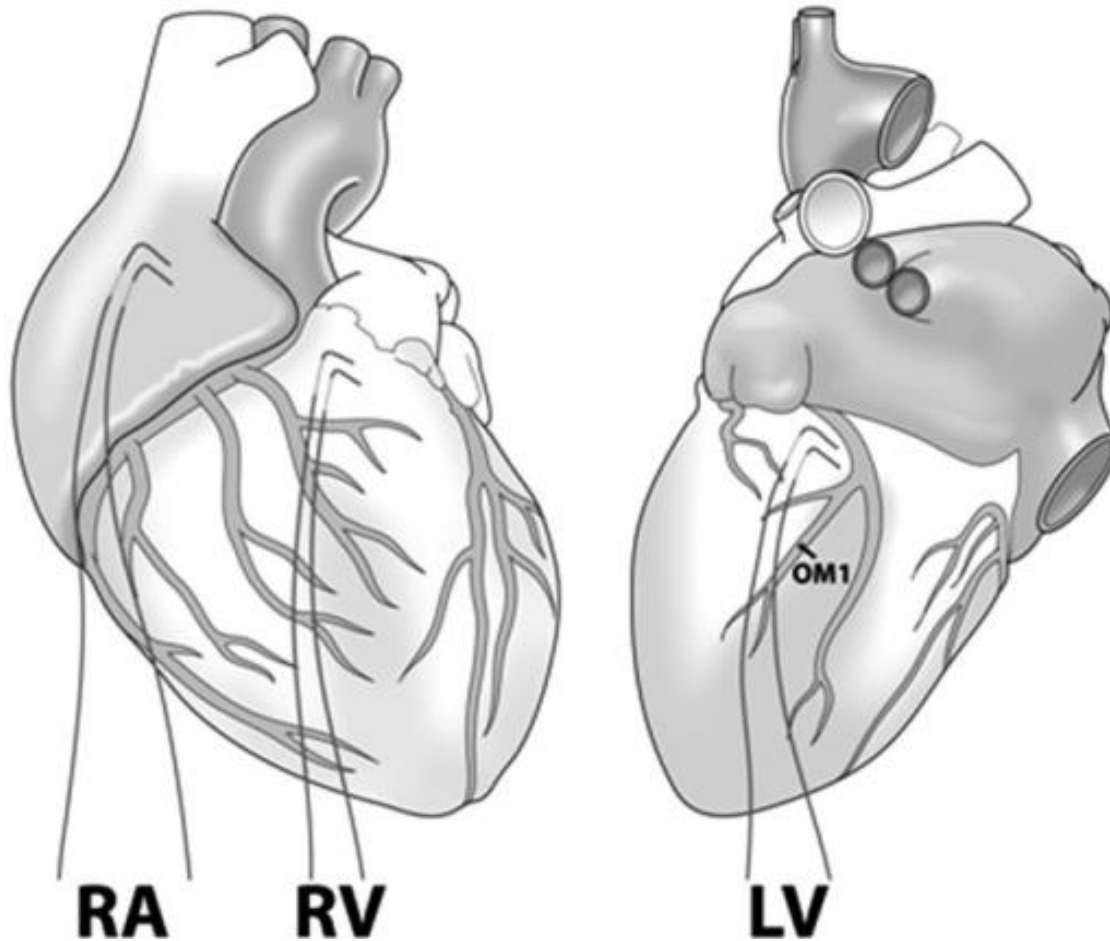
RV mid-septum



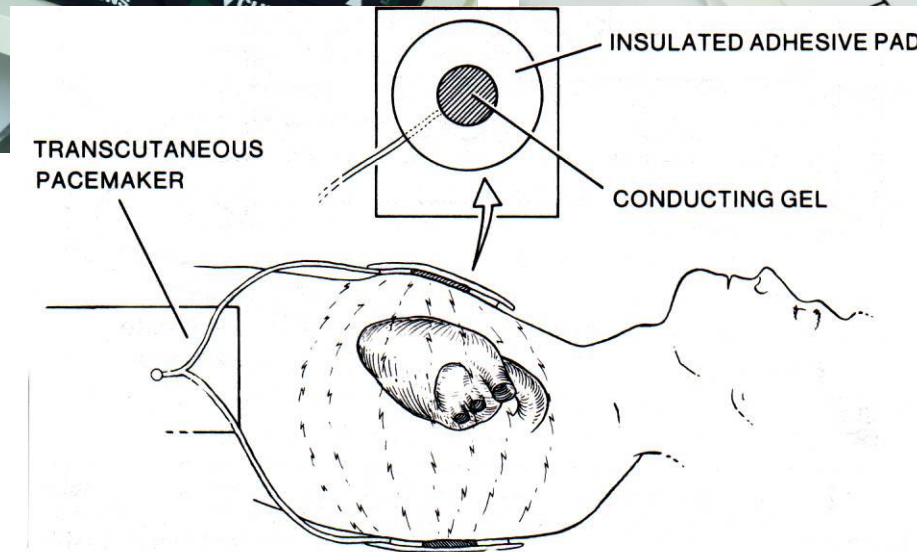
RV outflow-tract



Epicardial pacing



Transcutaneous pacing



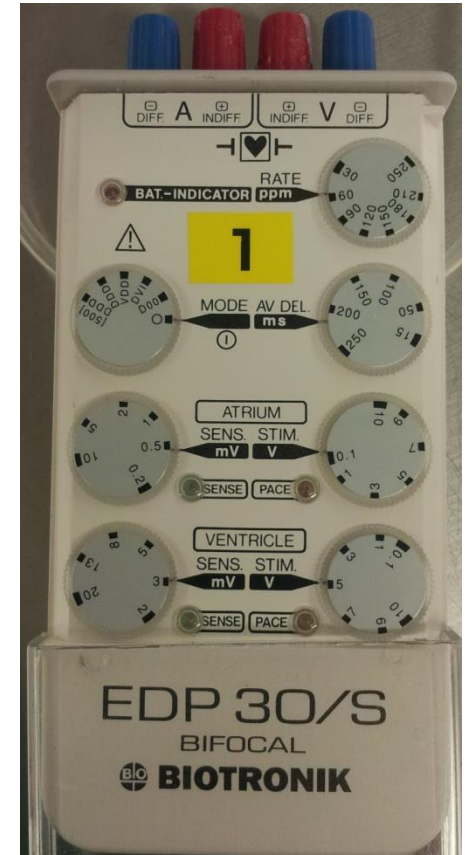
MANUAL
ARR FUL

MANUAL SAVED CCUBEDTZ 25-APR-2002 18:42:47 ALM VIL 70% @25 MM/S
HR X ARR SUSPEND ARR FULL PVC X NBP 55/31 (42)16:34 SPO2 POOR SIGNAL
RR 18



MEDI-GRAF

Devices





Programming

NBG Code

NASPE / BPEG (NBG) Code

- NASPE

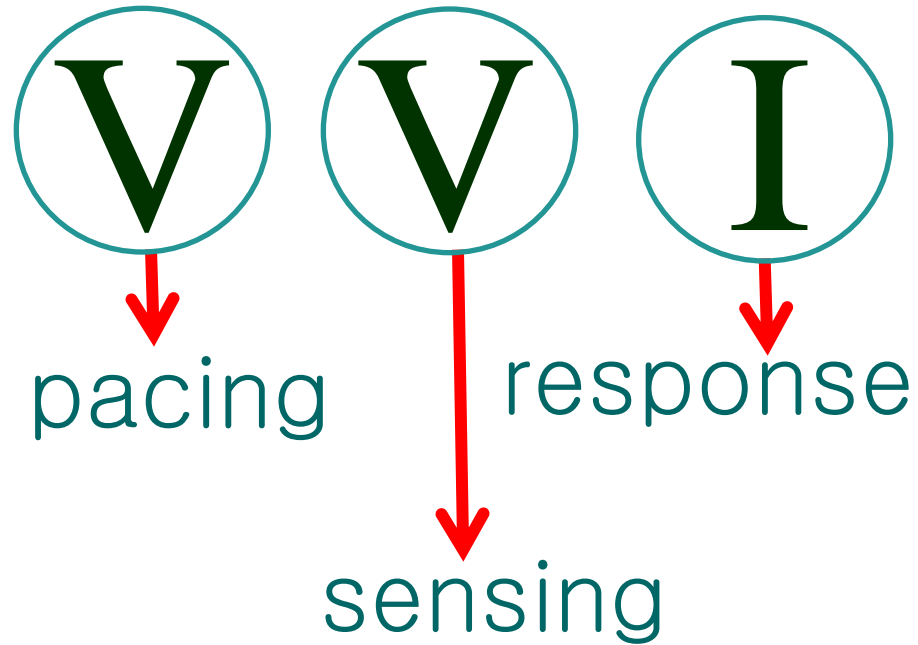
- North American Society of Pacing and Electrophysiology

- BPEG

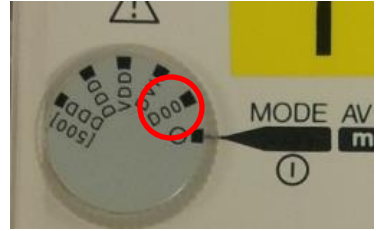
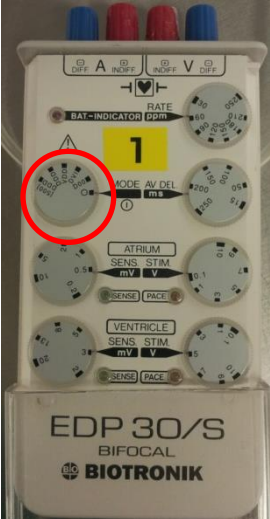
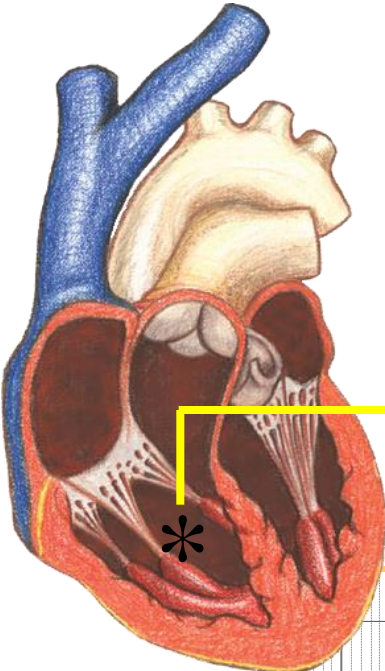
- The British Pacing and Electrophysiology Group

NBG Code

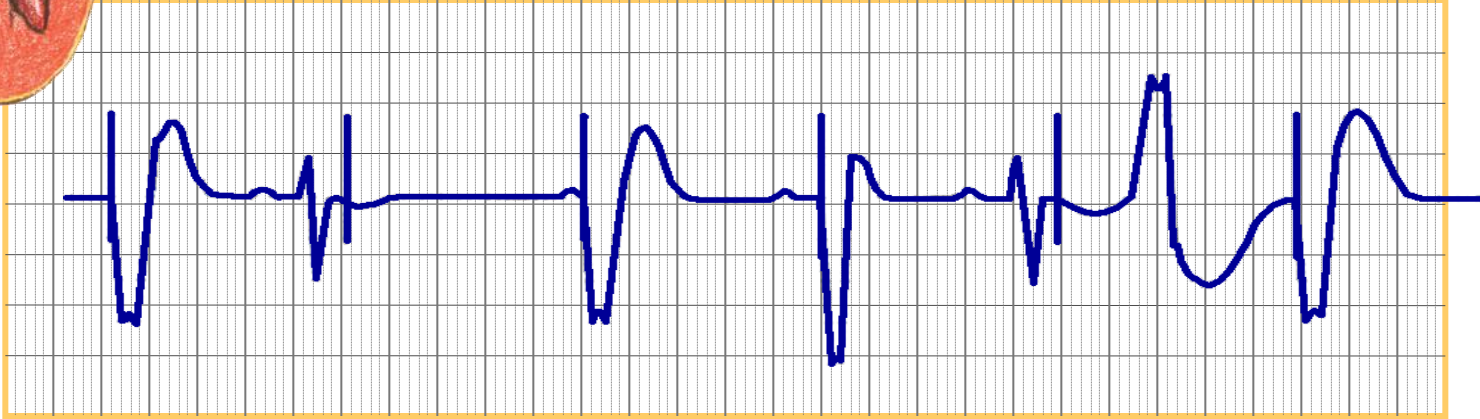
Position	I	II	III	IV	V
Category	Chamber(s) Paced	Chamber(s) Sensed	Response to Sensing	Rate modulation	Multisite Pacing
Letters Used	O-None A-Atrium V-Ventricle D-Dual (A+V)	O-None A-Atrium V-Ventricle D-Dual (A+V)	O-None T-Triggered I-Inhibited D-Dual (T+I)	O-None R-Rate modulation	O-None A-Atrium V-Ventricle D-Dual (A+V)
Manufacturer's Designation Only	S- Single (A or V)	S- Single (A or V)			



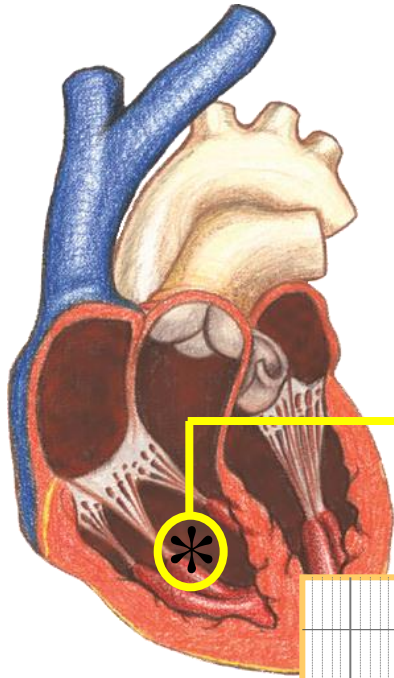
VDD



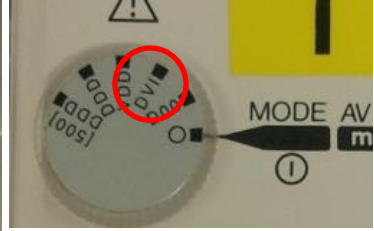
○ = Sense
* = Pace



VVI



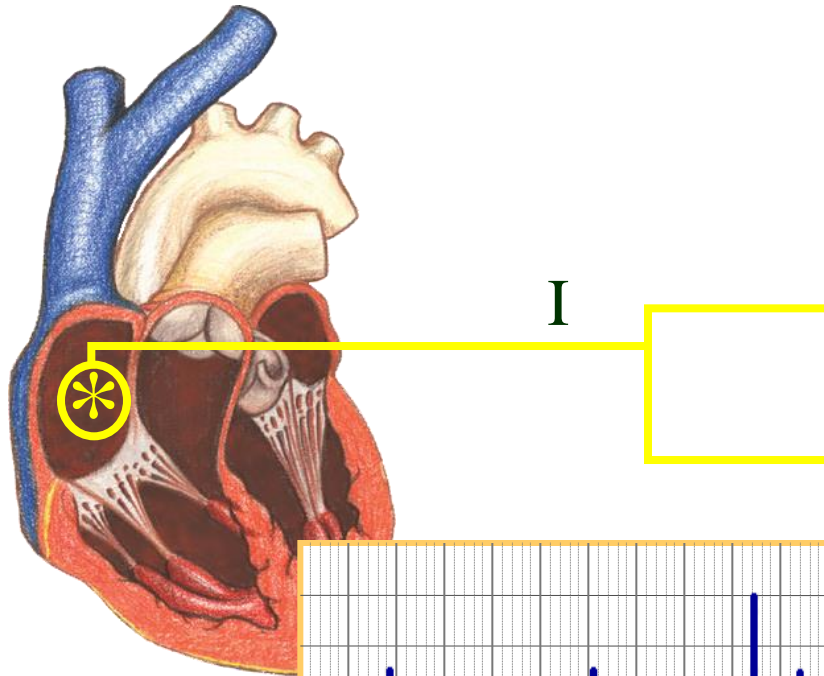
I



- = Sense
- * = Pace



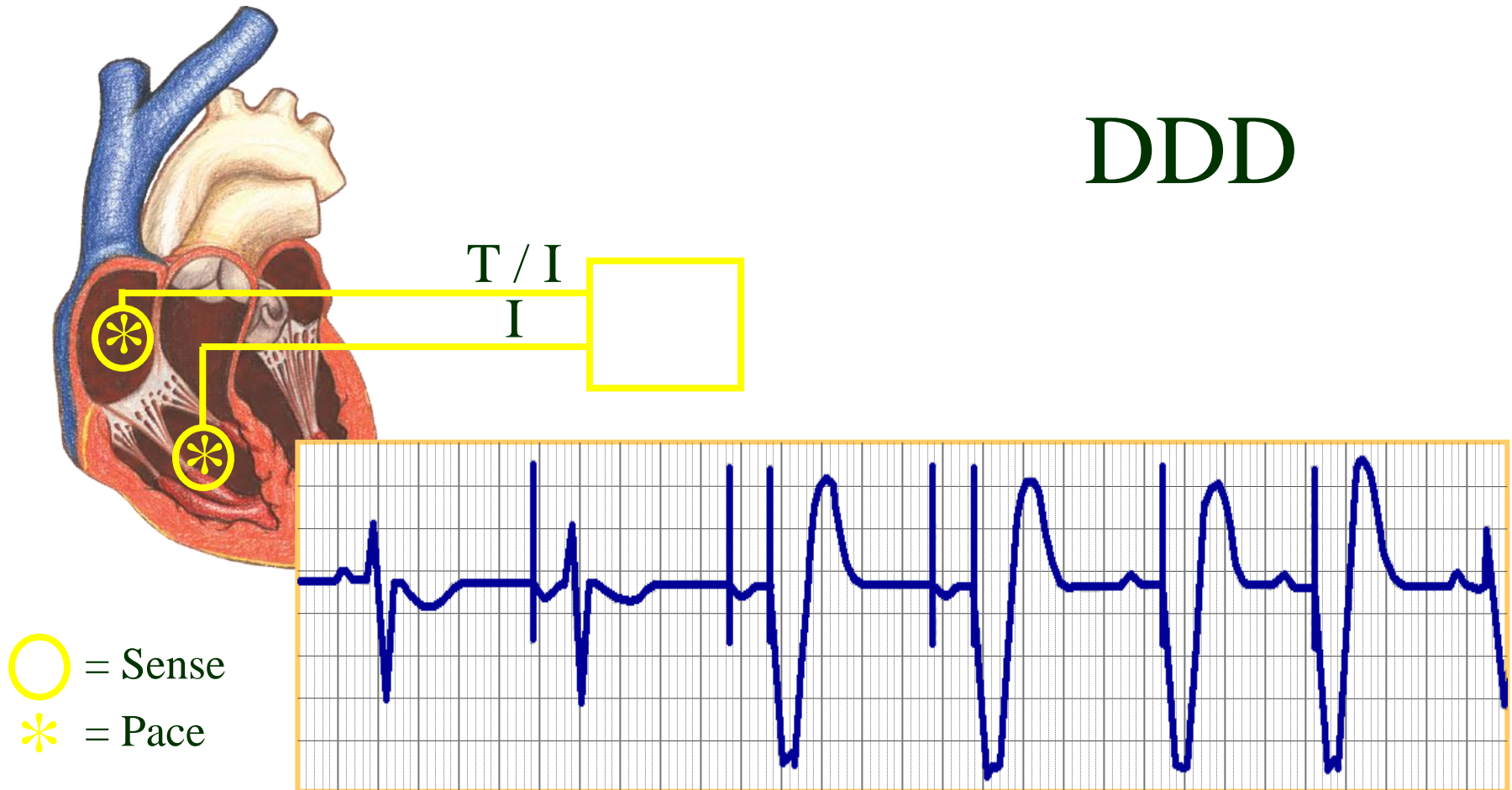
AAI



○ = Sense
* = Pace



DDD



Temporary pacemaker setting

- Base rate
- Sensitivity
- Output

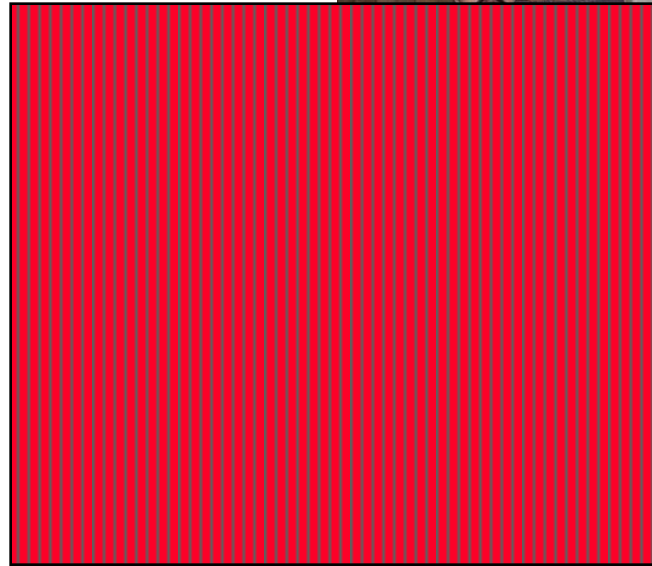


Sensitivity

5 mV

2 mV

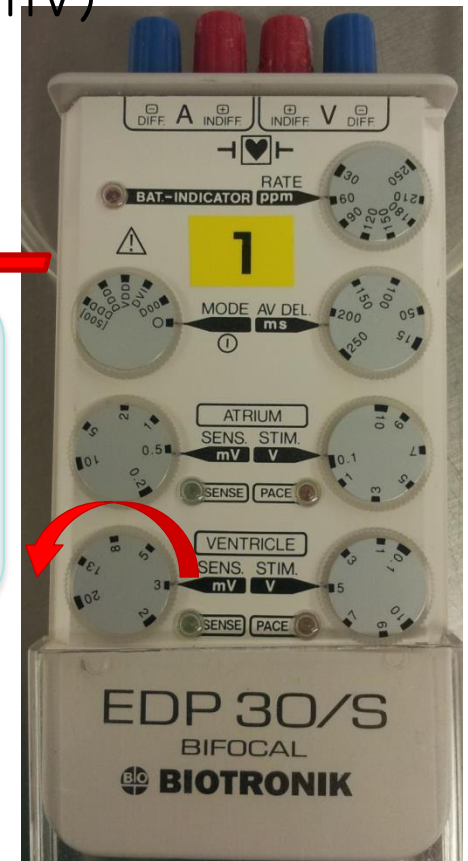
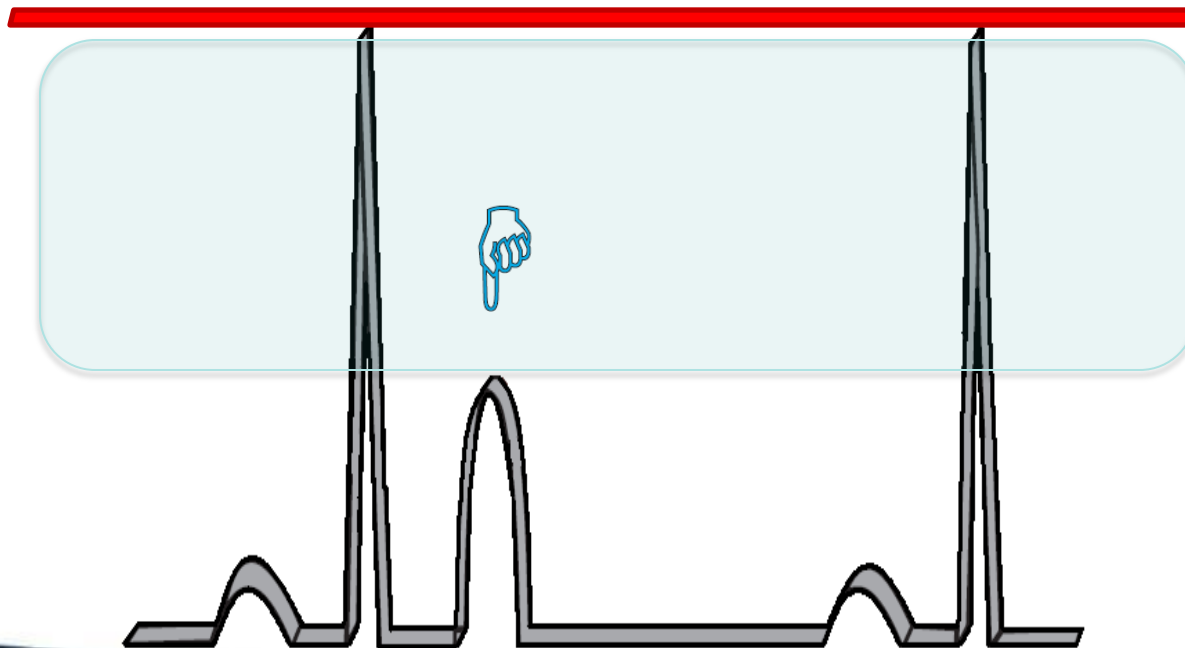
1 mV



Sensing threshold check

- Sensitivity : Signal을 “보는” 정도 (mV)

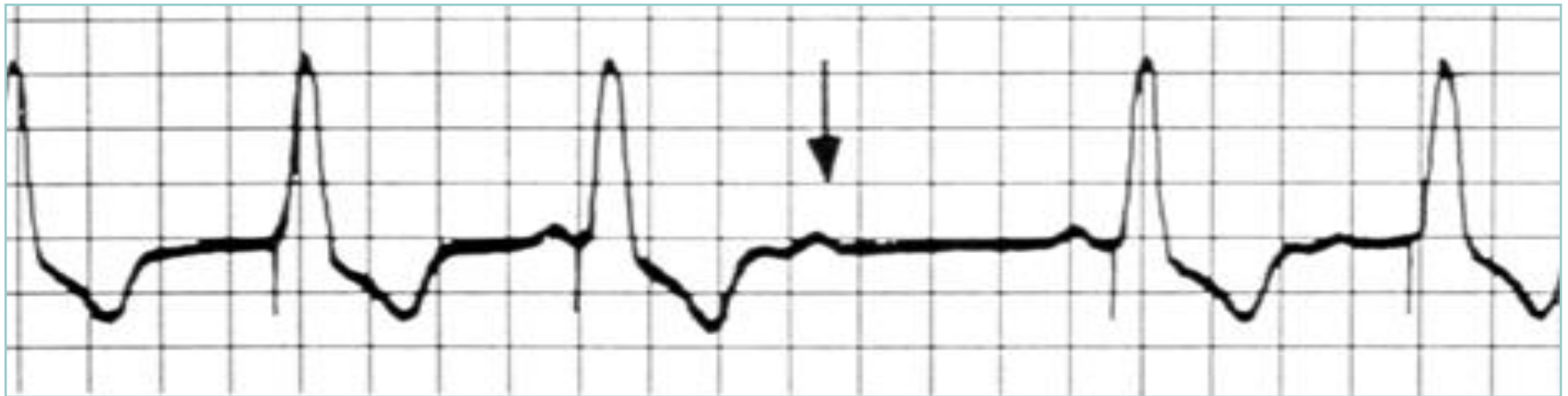
~~Over~~ Sensing
sensing

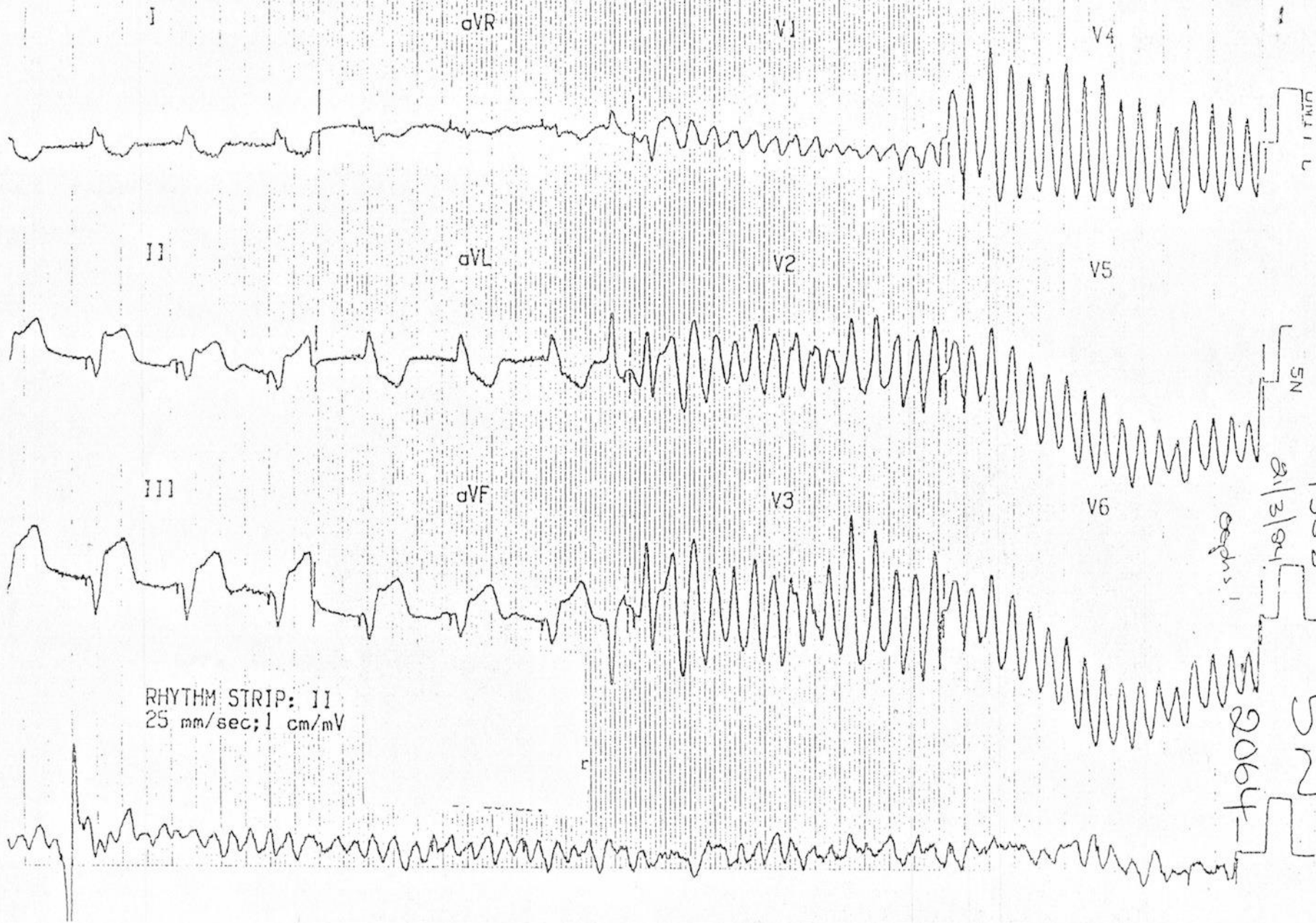


Undersensing



Oversensing

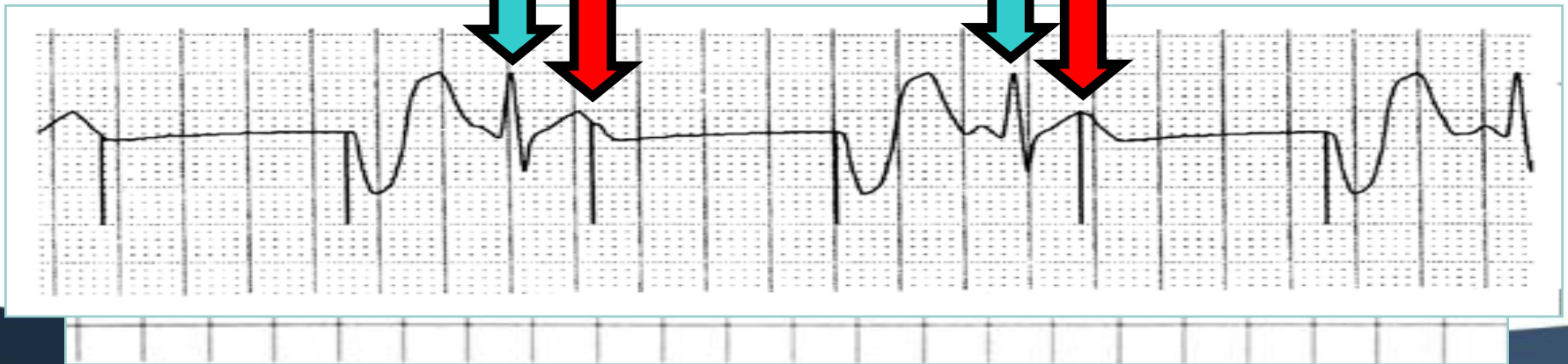




Ventricular Sensing

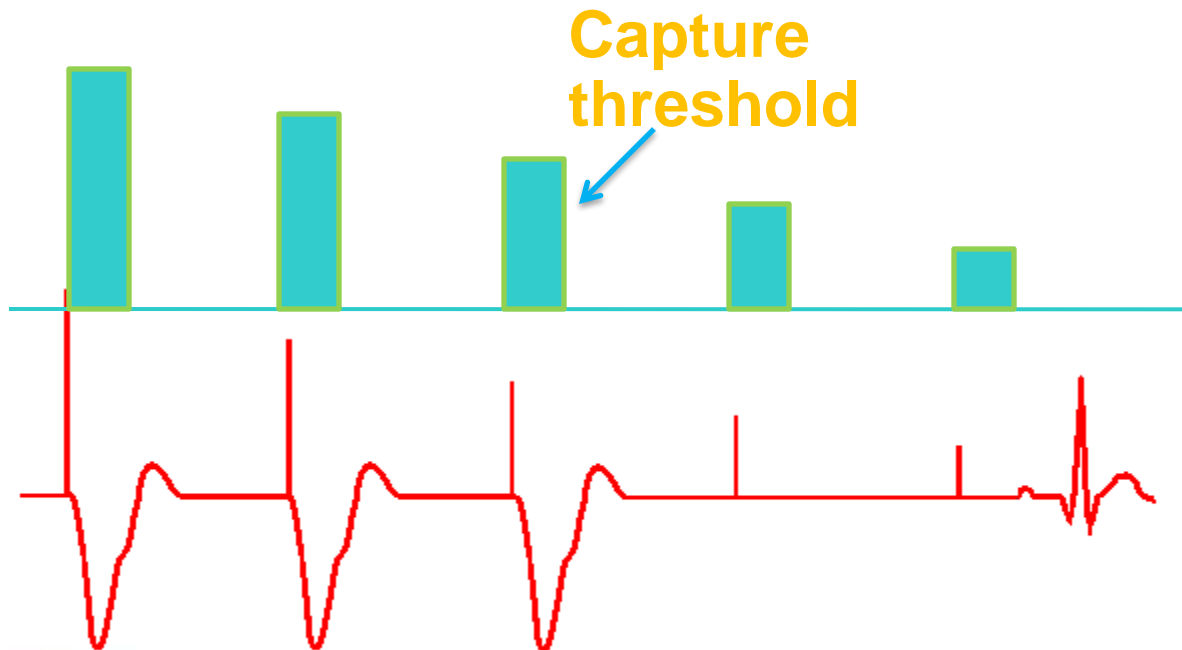


Ventricular Undersensing
Ventricular Oversensing

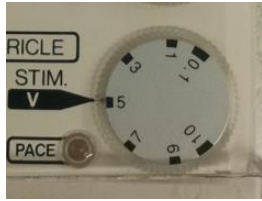


Capture threshold check

- Capture threshold : 실제로 심박동을 할 수 있는 최소한의 Current (mA)
- 환자의 HR보다 10~20회/분 빠르게 하여 check



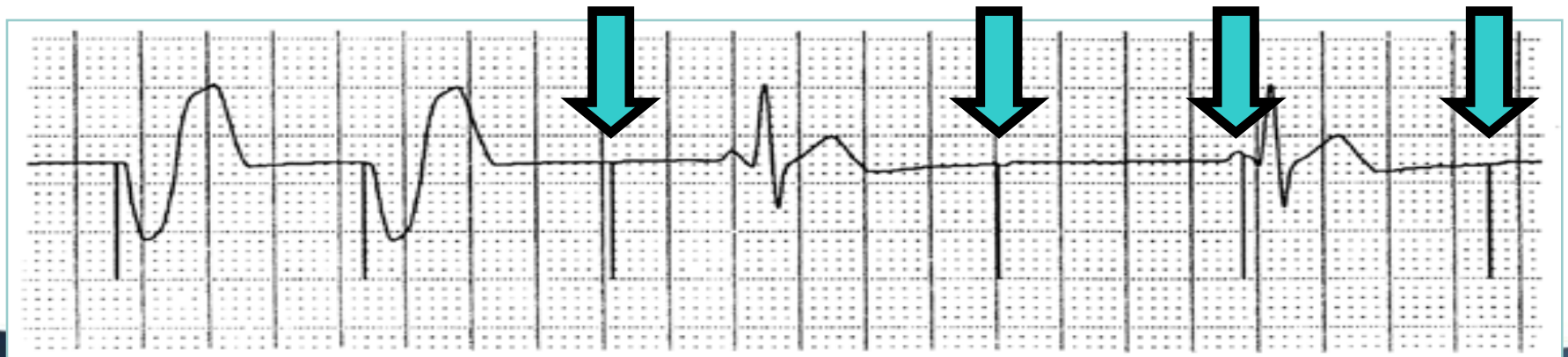
Capture Thresholds



Capture



Loss of Ventricular Capture



Emergency



- Async : Sensing을 하지 않고 VOO로 pacing

Emergency Pacing

- Rate Check Rate
- Output: Turn to MAX
- Sensitivity : Turn to ASYNC

Trouble shooting

1. Loss of output
2. Capture failure
3. Sensing failure
4. Cable disconnect

Case 1.

59y Male

#1.HTN

#2.ESRD on HD (2002.12 - , 월수금)

s/p AVG & thrombi remove

#3.hx. of Rt. scapula fx.(2006.6.28)

#4.parathyroid adenoma (2012)

#5.HBV

#6.Infective Endocarditis(MRSA)

#7.multiple scattered embolic
infarction

#8.Cardiac arrest dt CAVB 15.2.3

s/o Temporary pacemaker insert
(15.2.4)

Male
0cm 0kg
Room:
Loc:131

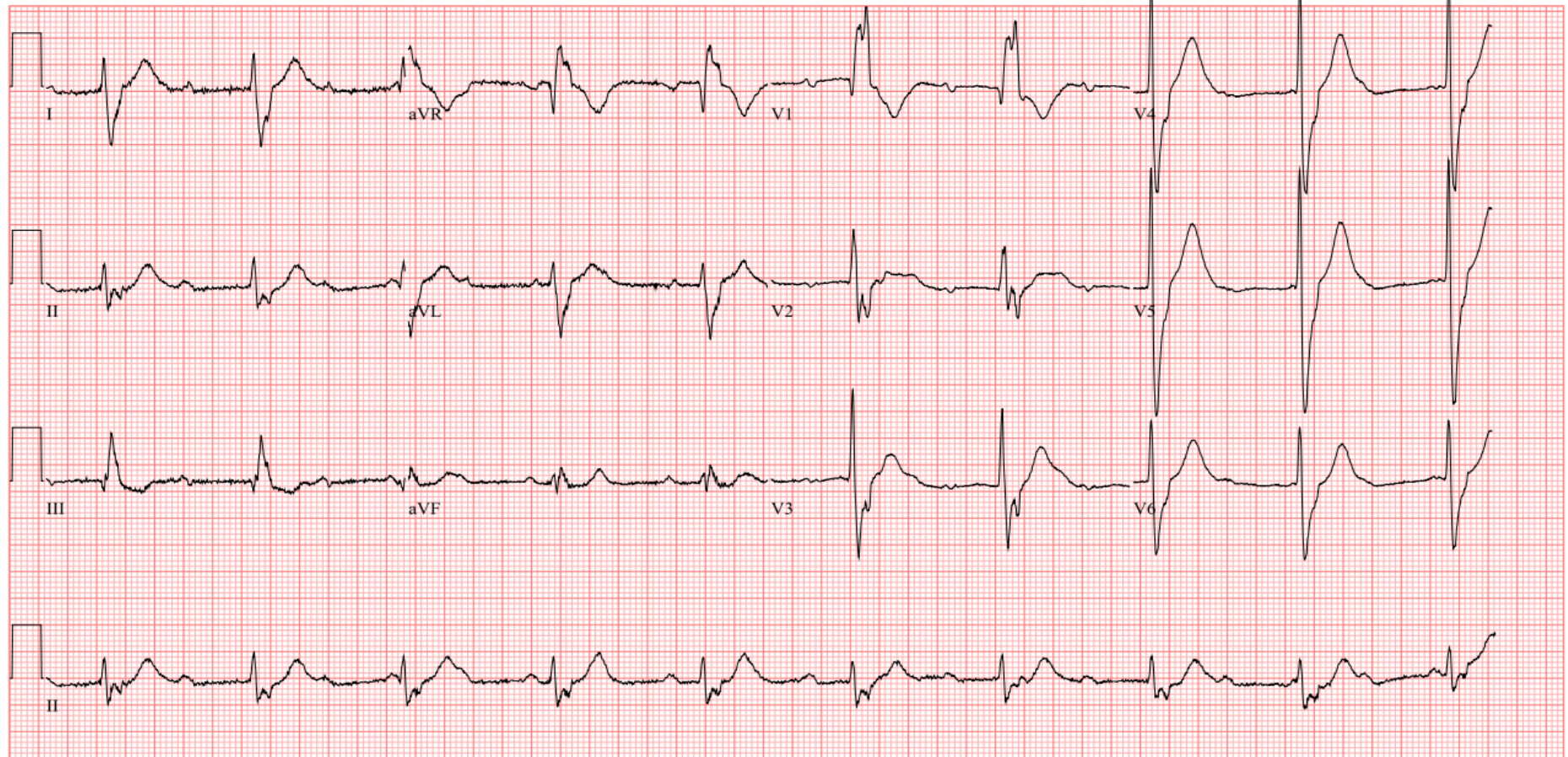
Vent. rate 58 BPM
PR interval * ms
QRS duration 162 ms
QT/QTc 498/488 ms
P-R-T axes 45 139 20

Sinus rhythm with A-V dissociation and Wide QRS rhythm
Right bundle branch block
Abnormal ECG

Technician:
Test ind:

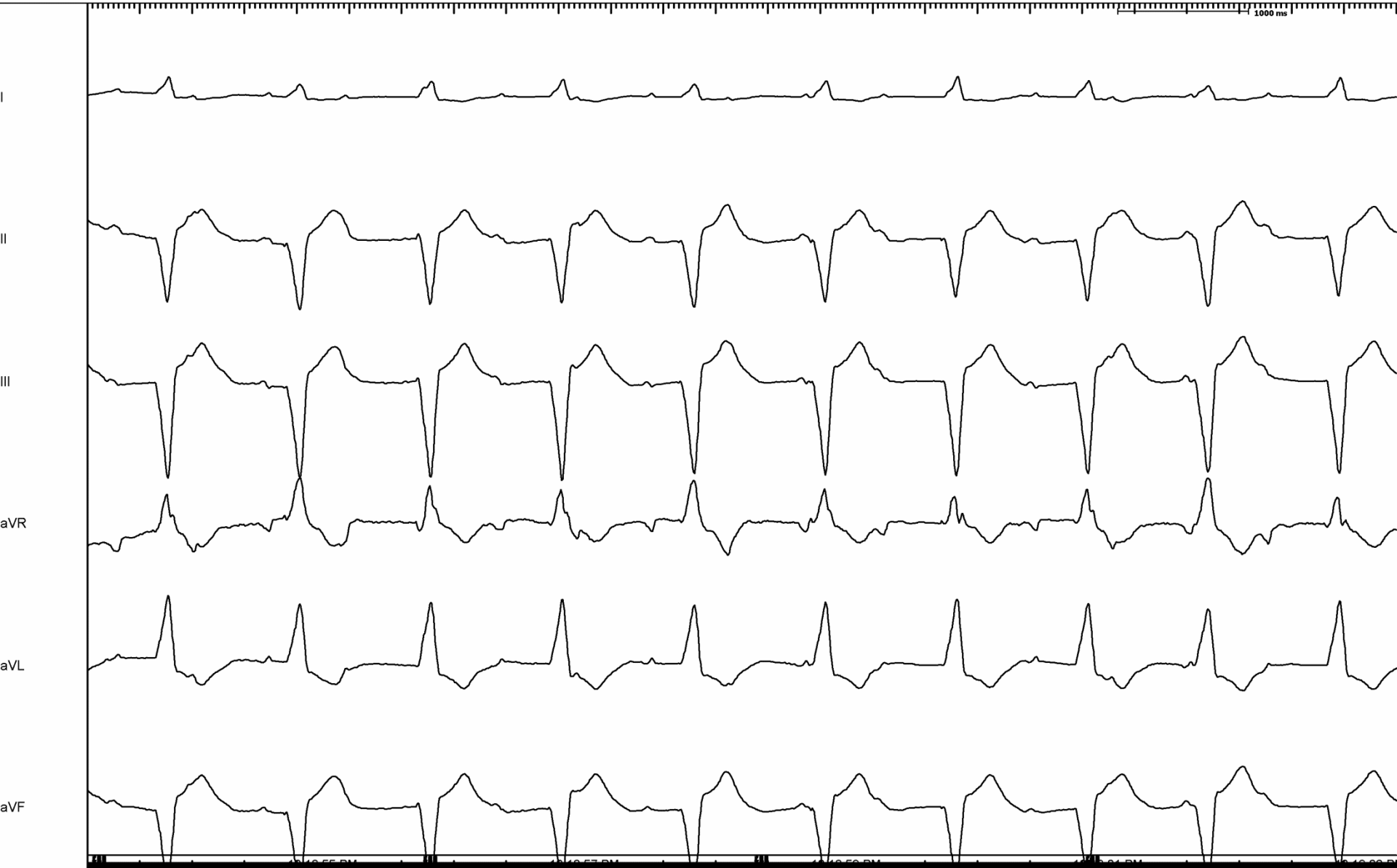
Referred by:

Newly Acquired



25mm/s 10mm/mV 150Hz 7.1.1 12SL 239 CID: 131

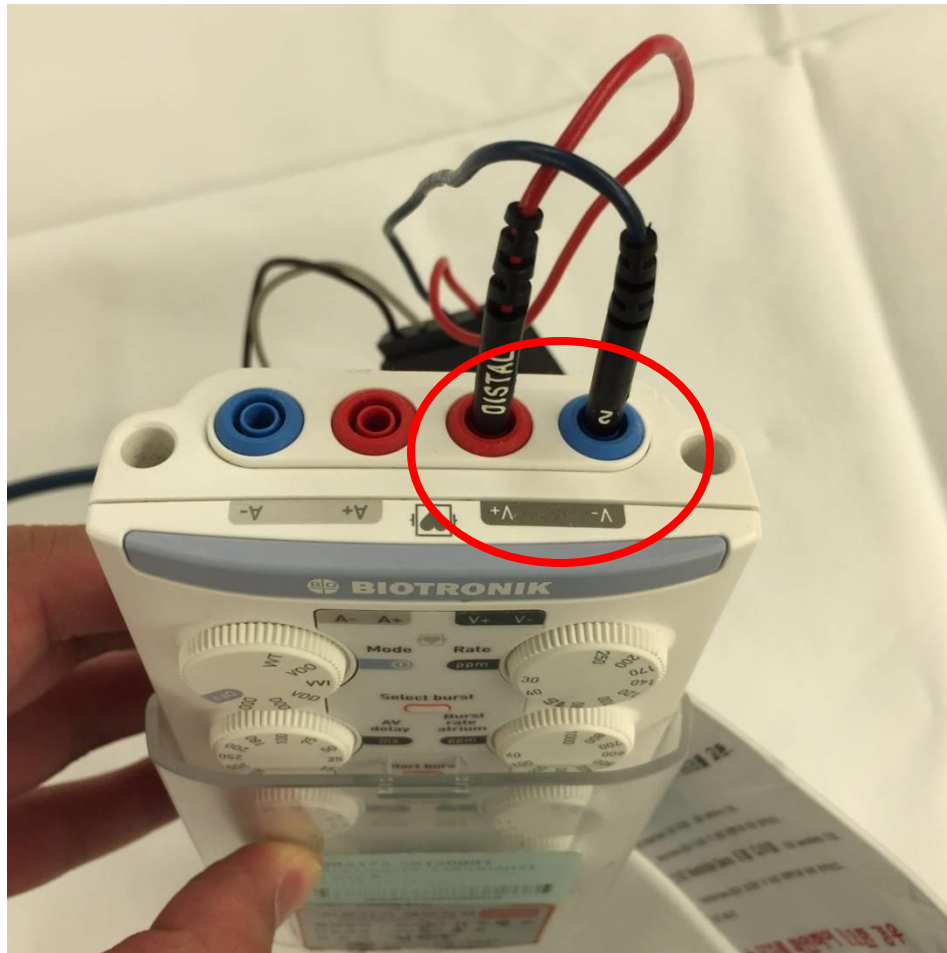
EID:Newly Acquired EDT: ORDER:







Case2.



1.Pacing이 안됨

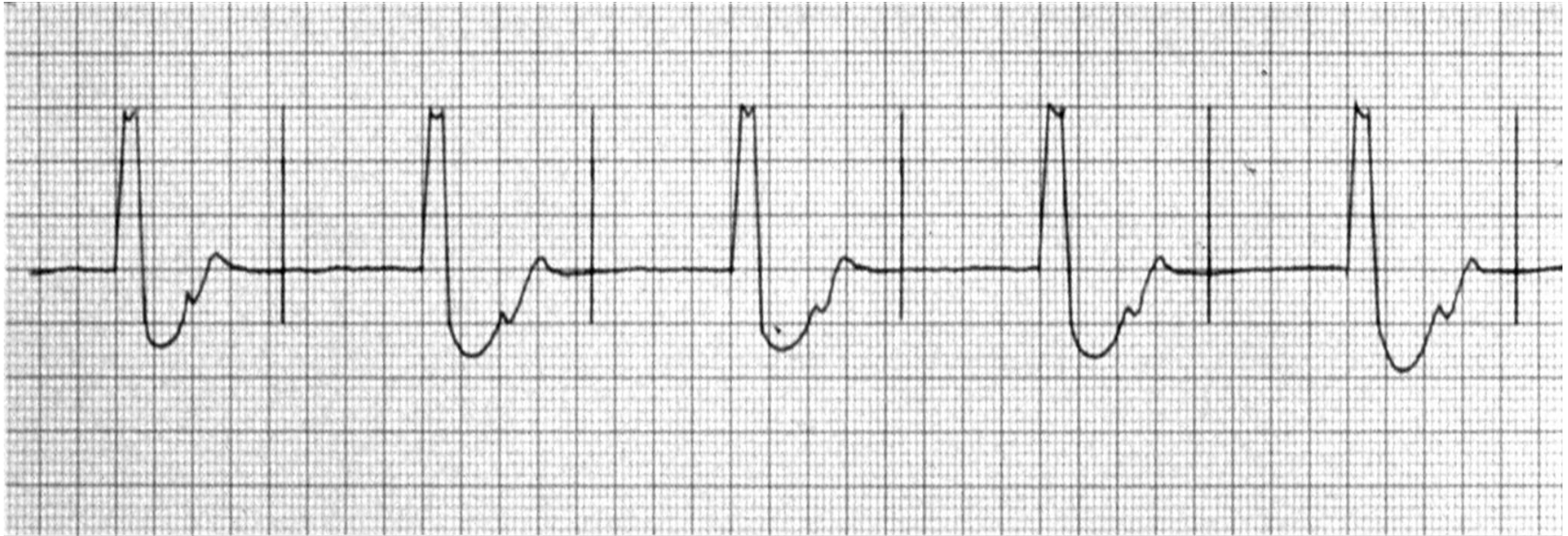
2.Sensing이 안됨

3.둘 다 안됨

④.아무런 문제 없음

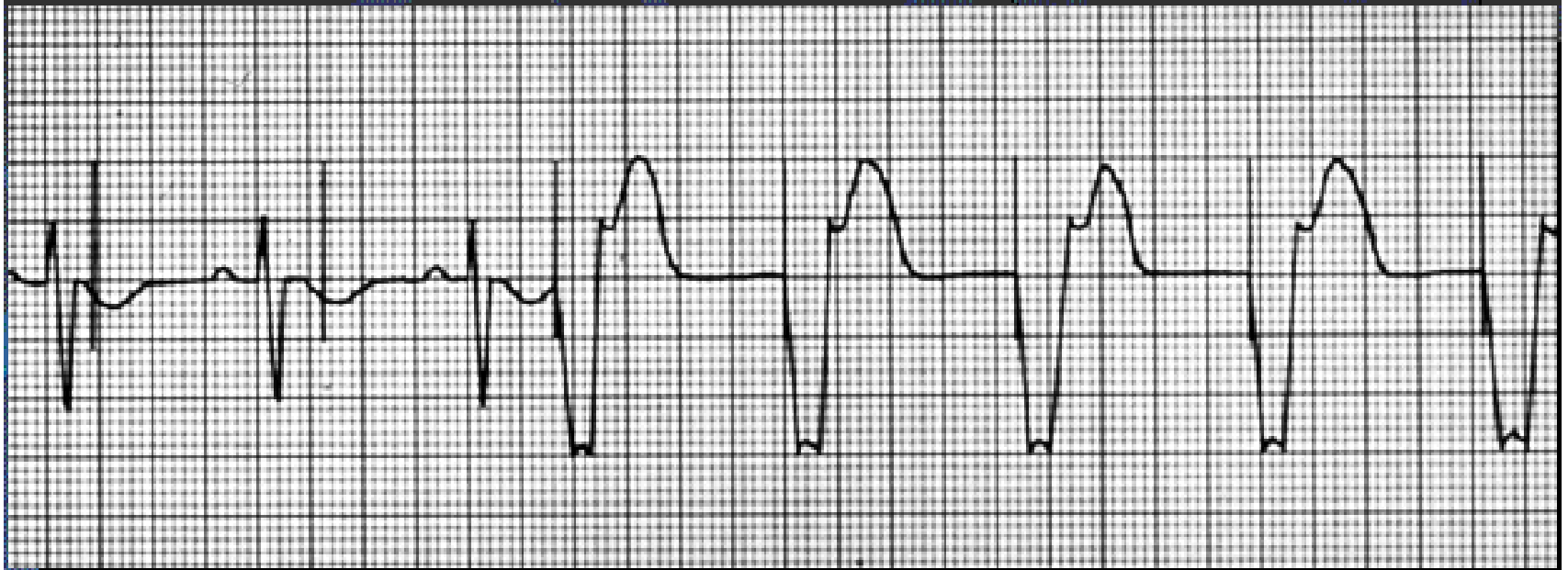


Case3. VVI 75bpm



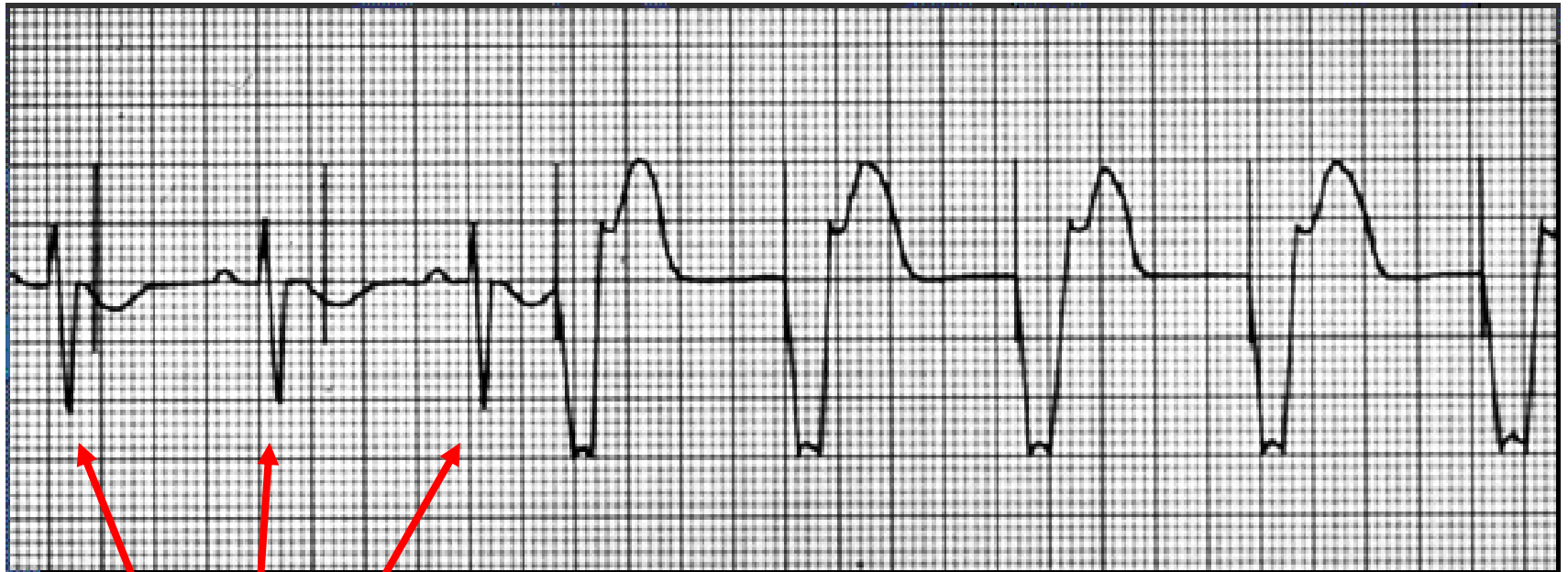
1. Loss of output
2. Capture failure
3. Sensing failure
4. Cable disconnect

Case4. VVI 75bpm



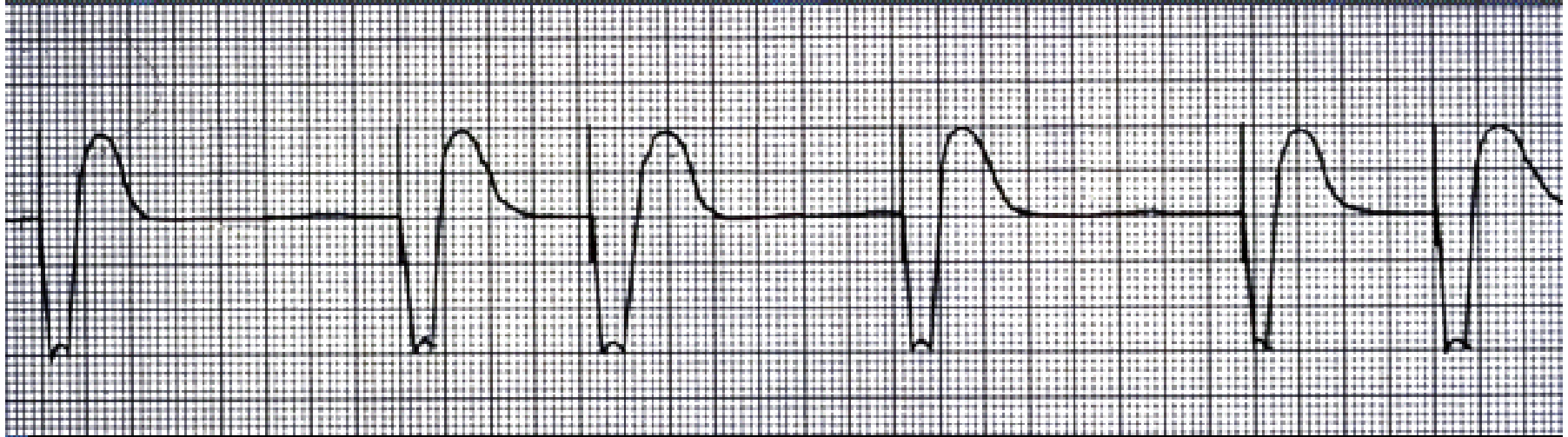
1. Loss of output
2. Capture failure
3. Sensing failure
4. Cable disconnect

Ventricular Undersensing



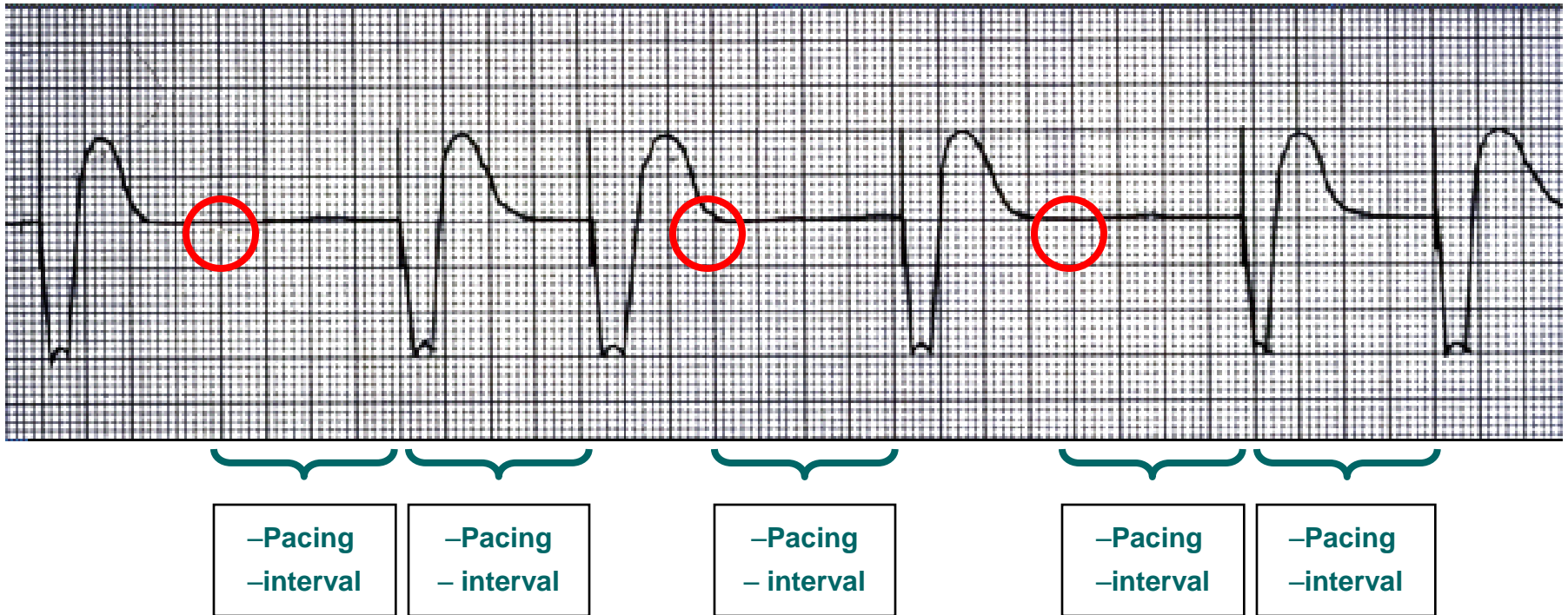
non-sensed R-waves

Case5. VVI 75bpm



1. Loss of output
2. Capture failure
3. Sensing failure
4. Cable disconnect

Ventricular Oversensing



스마트폰을 생각해라!!



1. Battery를 확인해라

2. Output을 높여라

3. Cable 연결을 확인하자

그래도 안되면 서비스 센터로~

경청해 주셔서 감사합니다.

