Arrhythmia Case Studies

Content Courtesy of:

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CASE #1

History

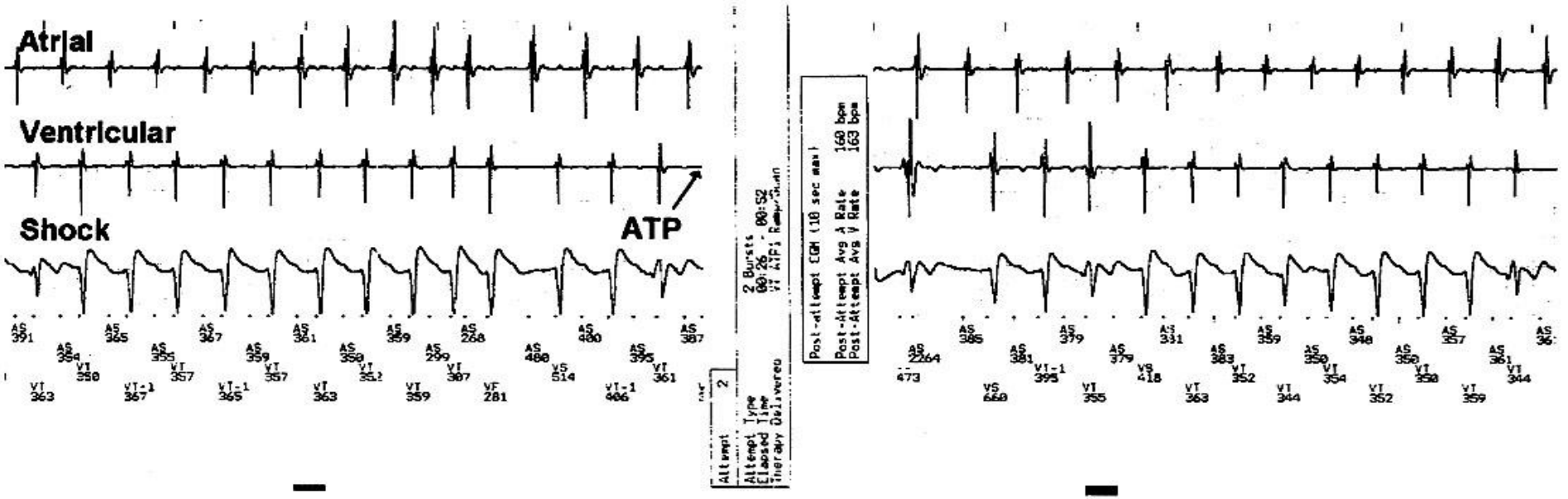
- A 62 year old male with a prior MI, ejection fraction of 25% and prior CABG had had a dual chamber defibrillator placed for inducible sustained monomorphic ventricular tachycardia after repetitive nonsustained episodes of VT were discovered on Holter monitor.
- At electrophysiology study he had inducible sustained VT with a cycle length of 340 msec

Presentation

- He returns for routine follow up and after receiving an ICD shock and the following tracing is recorded. The following tracings represent sequential stored electrograms during a single tachycardia episode.

Device Settings

- The device has been configured to a VT zone of 165 to 210 bpm with two bursts of ATP followed by low energy conversion shock at 1.1 joule.
- VF zone was configured with 33 joule shock for rates greater than 210 bpm.
- Rate sensing atrial and ventricular electrograms are shown with the shock electrograms recorded from the shock coil.



Case study 1- Question 1

The tracing above shows which of the following:

A. Ventricular tachycardia with AV dissociation with appropriate ATP

B. Ventricular tachycardia with 1:1 VA conduction with appropriate ATP

C. Sinus tachycardia

D. Atrial fibrillation with a rapid ventricular response

Case #1- Question 1 Answer

The tracing above shows which of the following:

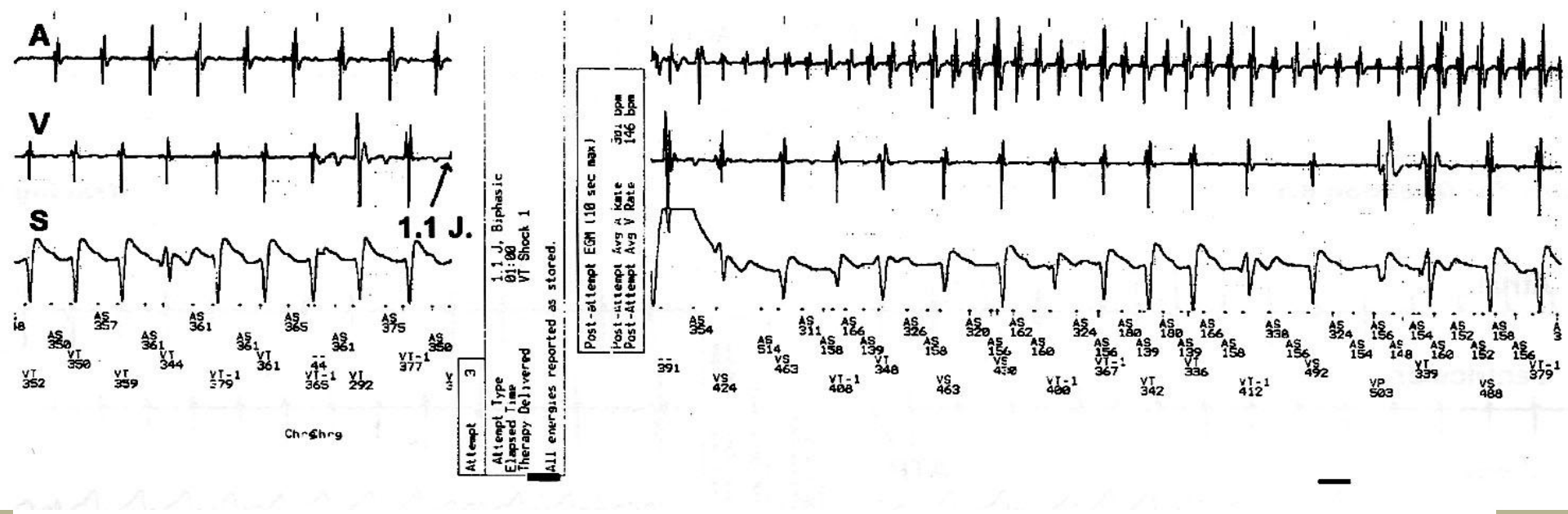
A. Ventricular tachycardia with AV dissociation with appropriate ATP

B. Ventricular tachycardia with 1:1 VA conduction with appropriate ATP

C. Sinus tachycardia

D. Atrial fibrillation with a rapid ventricular response

The tracing shows sinus tachycardia with two atrial premature contractions prior to the 2 bursts of antitachycardia pacing. Ventricular tachycardia with AV dissociation is excluded by the 1:1 AV relationship. Ventricular tachycardia with 1:1 conduction is excluded by the change in A-A intervals preceding the change in V-V intervals. Atrial fibrillation is excluded by the discrete atrial electrograms with cycle lengths of approximately 360 msec. The atrial and ventricular electrograms in tracing 1A are morphologically identical to those in1C after shock therapy. The rate of the sinus tachycardia exceeds the rate cut off with a ventricular tachycardia zone of 165 bpm.



Case 1- Question 2

The tracing above shows which of the following:

A. Ventricular tachycardia shocked to ventricular fibrillation

B. Ventricular tachycardia shocked to atrial fibrillation

C. Sinus tachycardia shocked to atrial fibrillation

D. Sinus tachycardia shocked to NSR

Case #1- Question 2 Answer

The tracing above shows which of the following:

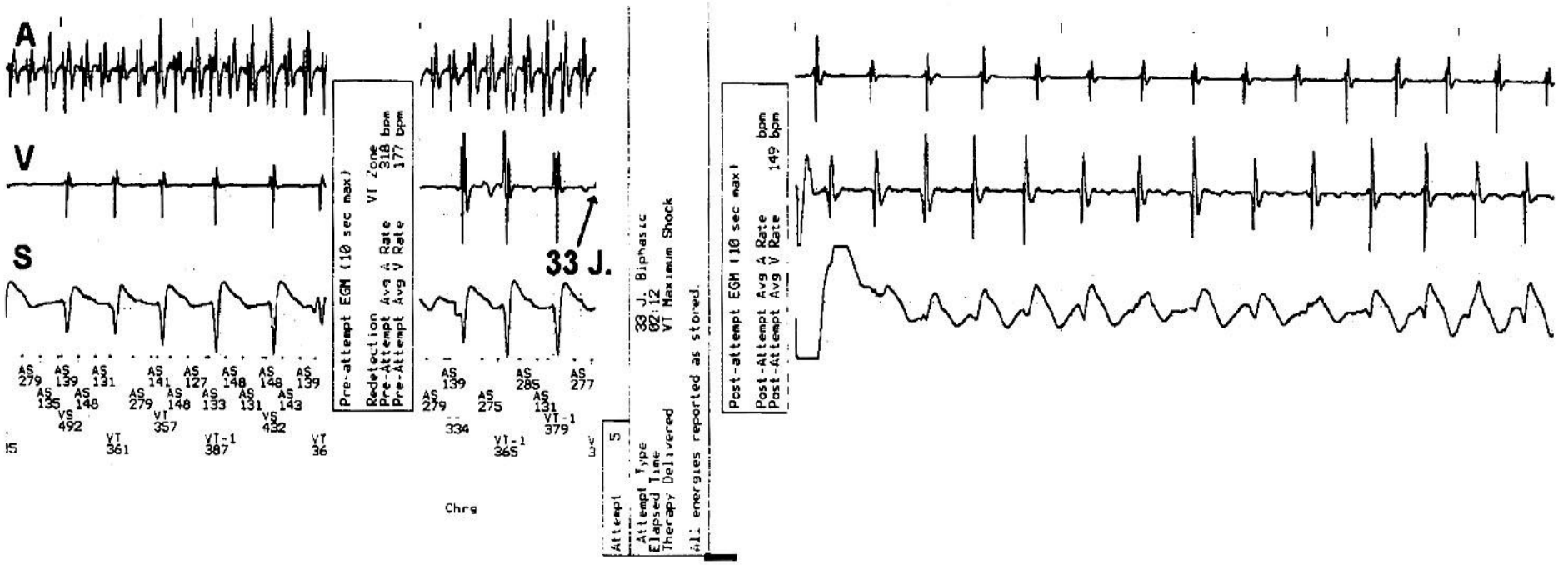
A. Ventricular tachycardia shocked to ventricular fibrillation

B. Ventricular tachycardia shocked to atrial fibrillation

C. **Sinus tachycardia shocked to atrial fibrillation**

D. Sinus tachycardia shocked to NSR

In the tracing, sinus tachycardia persists at greater than 165 bpm and a 1.1 joule shock indicated by the arrow induces atrial fibrillation. The post shock ventricular electrograms are similar to those before the shock with one paced beat (VP). The irregular rapid atrial electrograms indicate atrial fibrillation is present and the marker channel indicates appropriate atrial sensing. Because the atrial fibrillation results in a ventricular response at rates greater than 165 beats/minute it is detected as ventricular tachycardia with average rate of 177 bpm.



Case 1- Question 3

The tracing above shows which of the following:

A. Ventricular fibrillation shocked to sinus rhythm

B. Ventricular tachycardia shocked to normal sinus rhythm

C. Atrial fibrillation shocked to ventricular tachycardia

D. Atrial fibrillation shocked to sinus rhythm

Case #1- Question 3 Answer

The tracing above shows which of the following:

A. Ventricular fibrillation shocked to sinus rhythm

B. Ventricular tachycardia shocked to normal sinus rhythm

C. Atrial fibrillation shocked to ventricular tachycardia

D. **Atrial fibrillation shocked to sinus rhythm**

The tracing shows atrial fibrillation with a rapid ventricular response of approximately 190 bpm is present. The device subsequently delivers a 33 joule shock re-establishing sinus rhythm after multiple premature ventricular contractions. The shock electrogram widening is commonly seen immediately after shocks from polarization artifact and typically returns to normal within several seconds.

Case #1 – Question 4

The most appropriate therapy based on the available clinical information above would be which of the following:

A. Start amiodarone

B. Institute beta blocker therapy to prevent sinus tachycardia

C. Program stability criteria to prevent therapy for atrial fibrillation

D. Increase the rate cut off for detection in the VT zone to 190 bpm

E. A and C

Case #1 – Question 4 Answer

The most appropriate therapy based on the available clinical information above would be which of the following:

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B. **Institute beta blocker therapy to prevent sinus tachycardia**

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E. A and C

CASE #2

History

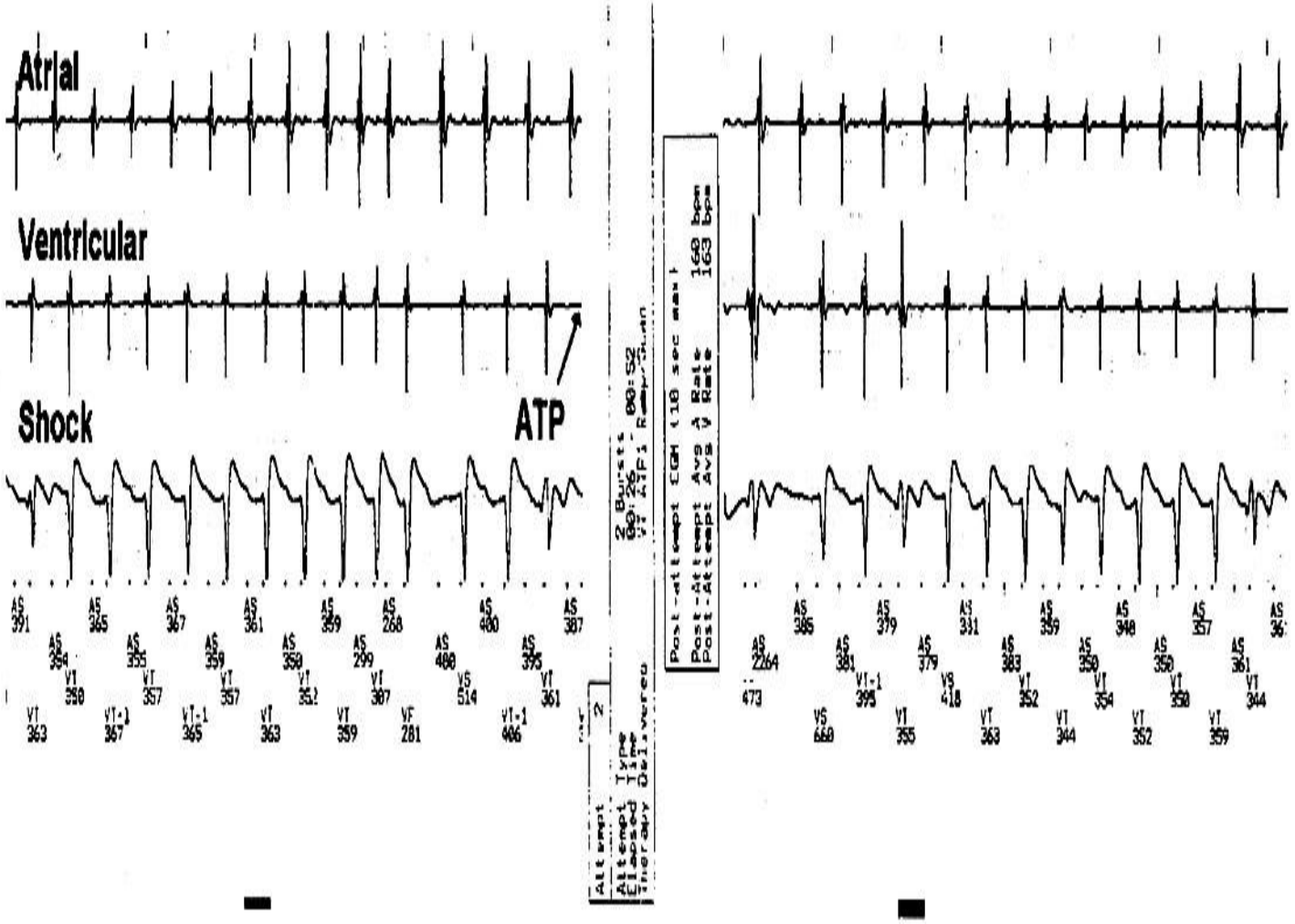
A 62 year old male with a prior MI, ejection fraction of 25% and prior CABG had had a dual chamber defibrillator placed for inducible sustained monomorphic ventricular tachycardia after repetitive nonsustained episodes of VT were discovered on Holter monitor. At electrophysiology study he had inducible sustained VT with a cycle length of 340 msec.

Device Settings

- VT zone of 165 to 210 bpm with two bursts of ATP followed by low energy conversion shock at 1.1 joule.
- VF zone was configured with 33 joule shock for rates greater than 210 bpm.

Presentation

He returns for routine follow up and after receiving an ICD shock and the following tracing is recorded. Rate sensing atrial and ventricular electrograms are shown with the shock electrograms recorded from the shock coil.


Atrial
Ventricular
Shock
ATP

Case #2- Question 1

Initial rhythm in this tracing shows which of the following:

A. Ventricular tachycardia with AV dissociation with appropriate ATP

B. Ventricular tachycardia with 1:1 VA conduction with appropriate ATP

C. Sinus tachycardia

D. Atrial fibrillation with a rapid ventricular response

Case #2- Question 1 Answer

Initial rhythm in this tracing shows which of the following:

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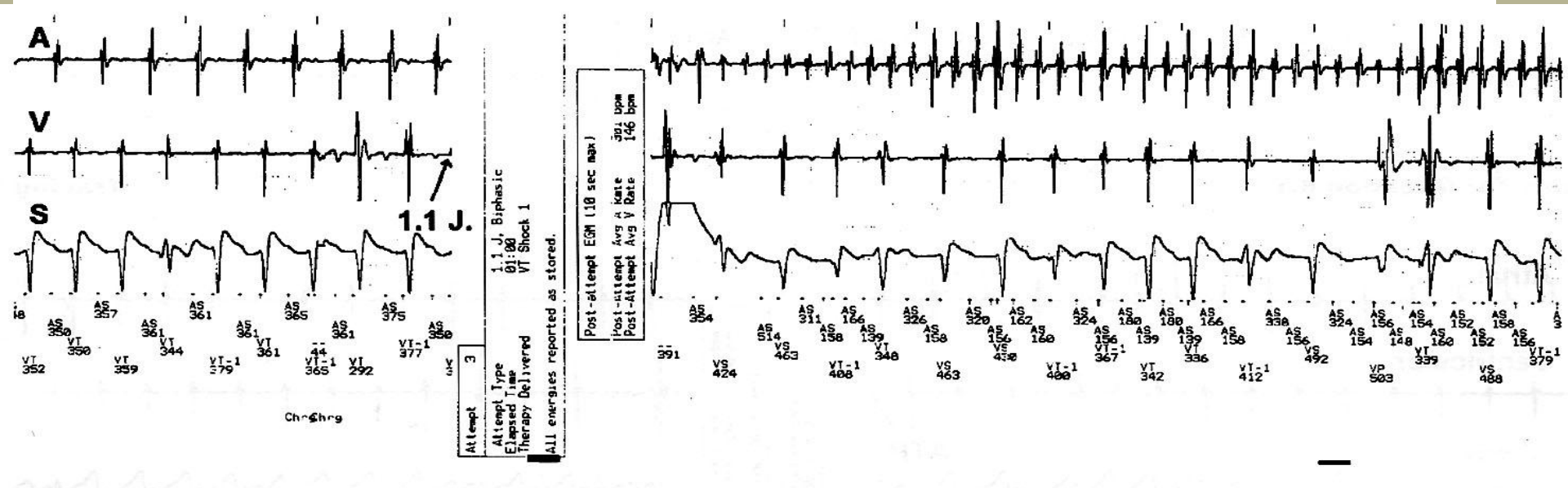

Case #2- Question 2 Answer

The tracing below shows which of the following:

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Case #2- Question 3

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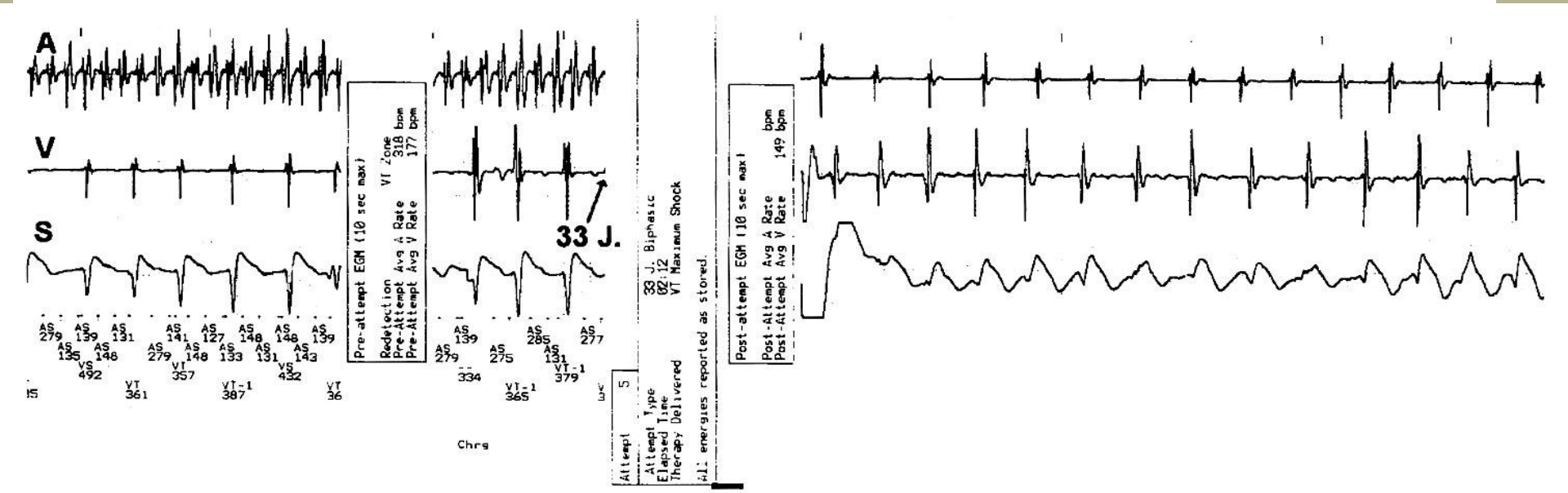

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D. Increase the rate cut off for detection in the VT zone to 190 bpm

E. A and C

CASE #3

History

A 65-year-old male had prior 3 vessel disease and CABG with congestive heart failure and ejection fraction of 15%. He had documented sustained ventricular tachycardia with syncope and based on this a dual chamber ICD was placed.

Device Settings

- VT Zone with anti-tachycardia pacing (ATP) for rate of 130 to 200 bpm followed by low energy cardioversion.
- For rates greater than 200 bpm maximum shock was programmed.

Presentation

- The tracing represents the stored electrograms.
- The electrograms are shown from the right atrial and ventricular leads and the shock coil.

Case #3- Question 1

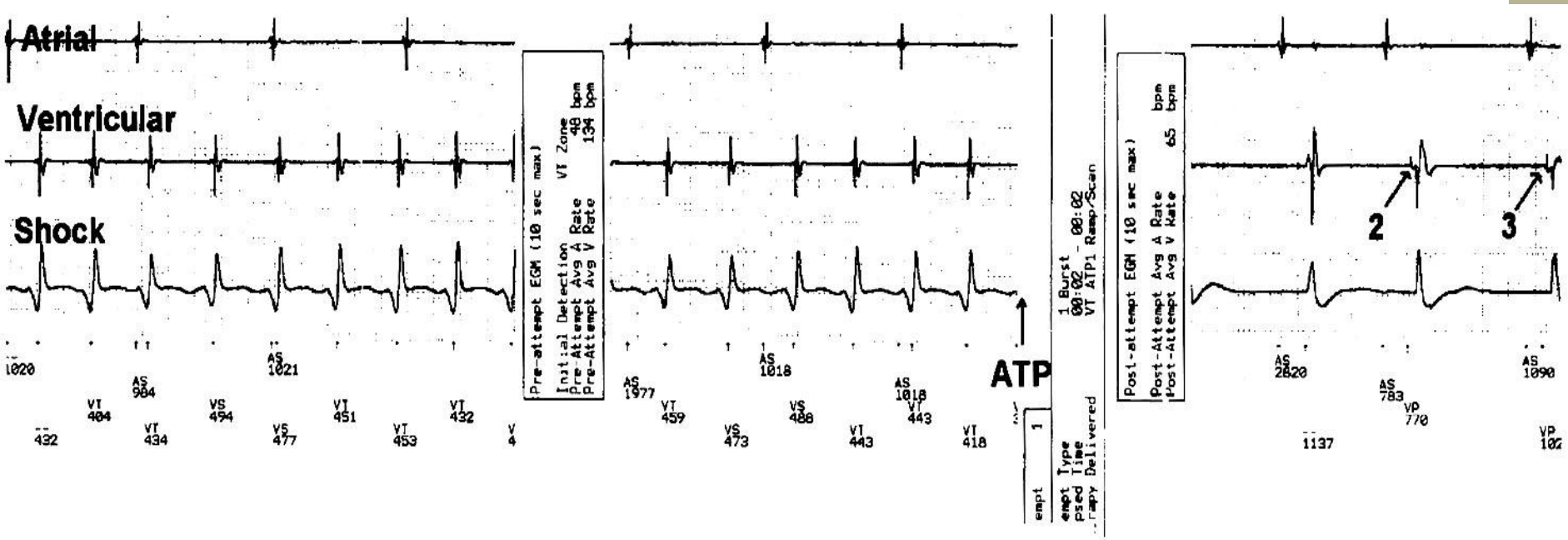
The tracing shows which of the following:

A. Atrial fibrillation with a rapid ventricular response

B. Sinus tachycardia

C. Ventricular tachycardia with atrioventricular dissociation

D. Ventricular tachycardia with VA association



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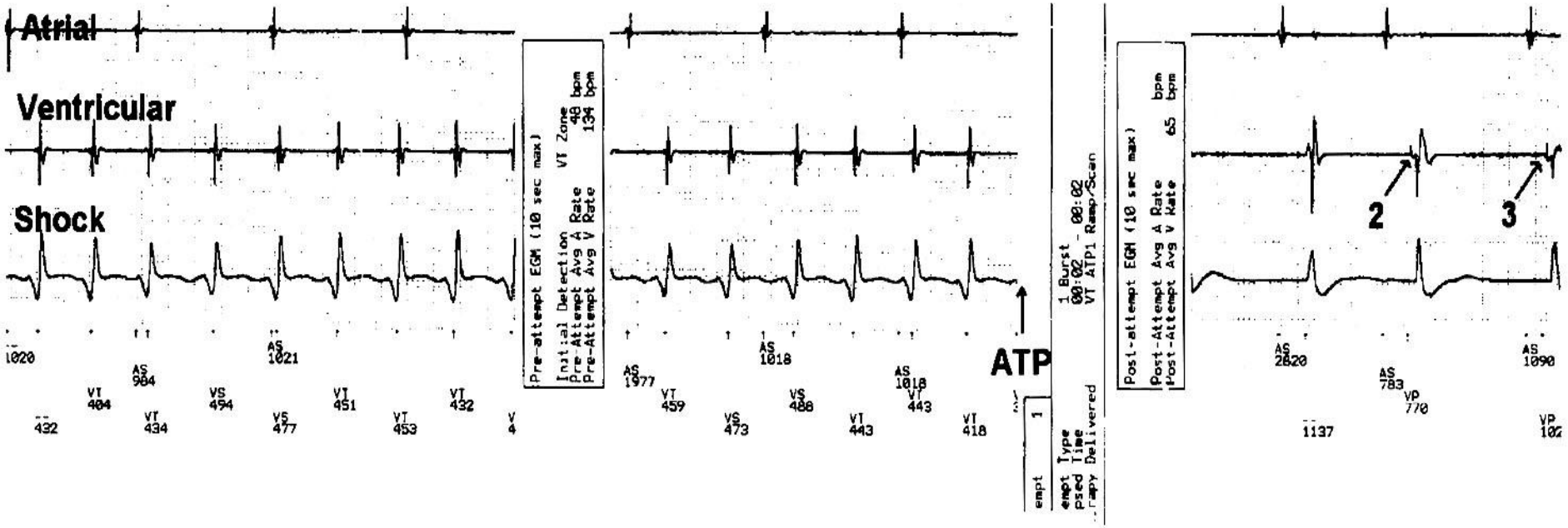
Case #3- Question 2

Which of the following is true for the beats labeled 2 and 3 after antitachycardia pacing:

A. Normal sinus rhythm results with conduction through the AV node
B. Ventricular tachycardia persists but at a lower rate
C. Ventricular tachycardia is terminated and the patient shows PV pacing
D. Atrial fibrillation is present



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D. Atrial fibrillation is present

CASE #4

History

A 55 year old women with a history of prior myocardial infarction and ejection fraction of 20% and known anterior apical aneurysm had previously had a dual chamber pacemaker laced with bipolar leads because of sinus bradycardia. She subsequently developed sustained monomorphic ventricular tachycardia which was inducible in the EP Lab and treated with a single chamber ICD. At the time of implantation, interaction testing between the pacemaker and ICD indicated clinically significant interaction. However, at routine follow up the patient 20 months later, it was noticed that there was sensing of the pacemaker stimulus outputs by the ICD. The capture threshold for the ventricular pacemaker was 3.0 volts at 0.6 msec and the output had been programmed to 5.0 volts at 0.6 msec. The tracing shown represents interaction testing which was done at that time.

Case #4- Question 1

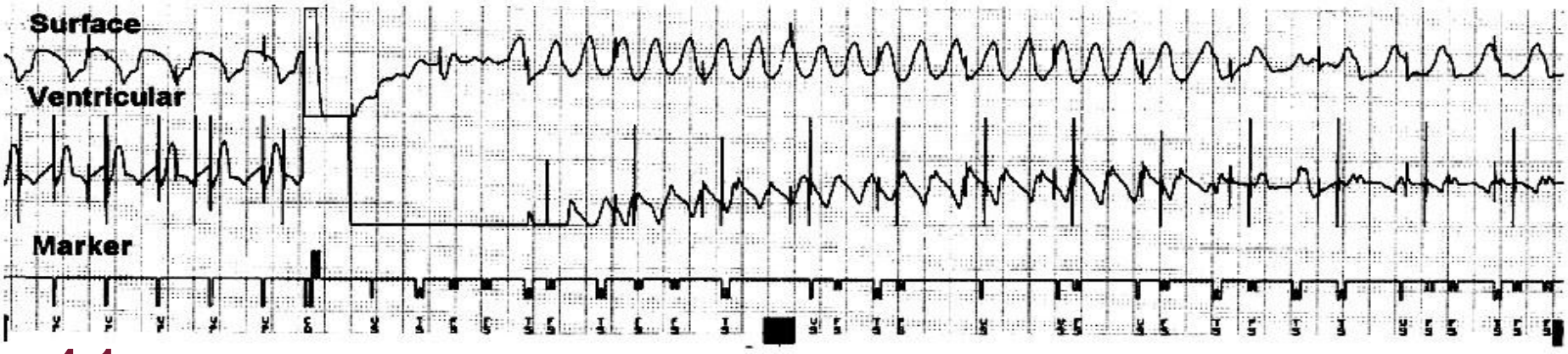
Ventricular fibrillation was induced with shock on T. Which of the following statements is true regarding the subsequent arrhythmia?

A. There is oversensing of the atrial stimulus output by the ICD

B. There is oversensing of the ventricular stimulus output by the ICD

C. There is undersensing of the ventricular fibrillation

D. All of the above are true



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Case #4- Question 1 Answer

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B. There is oversensing of the ventricular stimulus output by the ICD

C. There is undersensing of the ventricular fibrillation

D. All of the above are true

Case #4- Question 2

The most appropriate response to this would be which of the following?

A. Make the ICD ventricular sensitivity less sensitive

B. Decrease the output of the ventricular pacemaker to 2.5 volts and re-test for interaction

C. Place a new rate sensing lead for the ICD

D. Place a dual chamber ICD and remove the pacemaker

Case #4- Question 2 Answer

The most appropriate response to this would be which of the following?

A. Make the ICD ventricular sensitivity less sensitive

B. Decrease the output of the ventricular pacemaker to 2.5 volts and re-test for interaction

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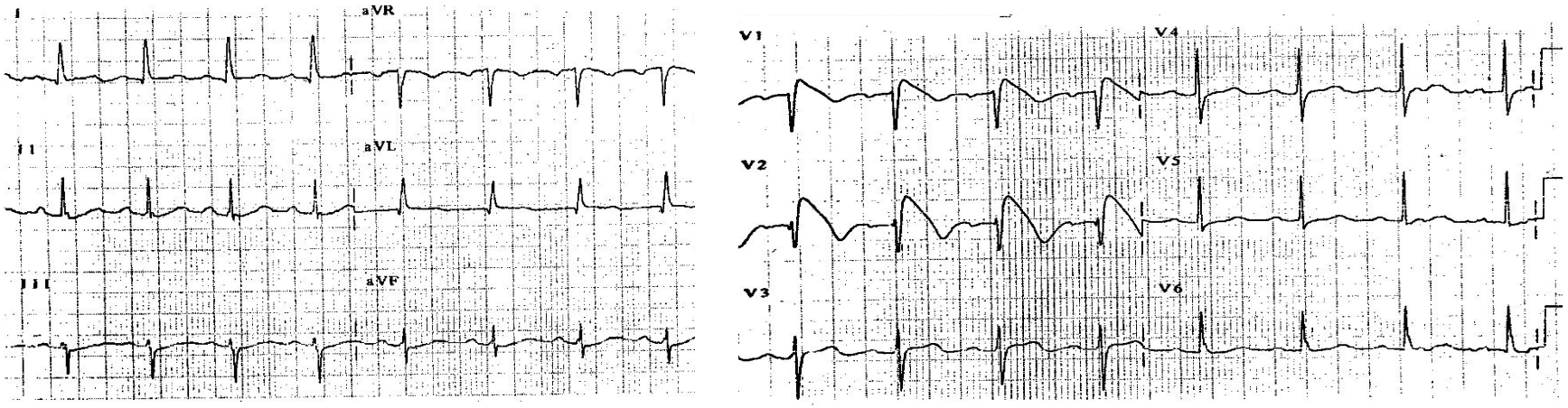
CASE #5



40 year old man with single episode of dizziness. 12 lead ECG at time of evaluation

CASE #5- Question 1

Which of the following is not true related to the patient's arrhythmia syndrome?

A. The patient arrhythmias will be effectively suppressed with beta blockers.

B. The arrhythmia syndrome has been linked to a mutation in the cardiac potassium channel gene SCN5A located on chromosome 3

C. The ECG abnormality can usually be provoked or potentiated by quinidine.

D. All of the above

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C. The ECG abnormality can usually be provoked or potentiated by quinidine.

D. All of the above

Case #5- Question 2

Which of the following has been reported as being associated with the patient's arrhythmia syndrome?

A. Mutations on chromosome 3 have been described for both LQT3 and the patient's syndrome

B. The syndrome typically presents as rapid uniform sustained VT

C. The syndrome is most common in European males

D. The relative prominent transient outward current and resultant transmural inhomogeneity in ventricular repolarization associated with this syndrome is primarily confined to the LV epicardium

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D. The relative prominent transient outward current and resultant transmural inhomogeneity in ventricular repolarization associated with this syndrome is primarily confined to the LV epicardium

Case 5- Question 3

Which of the following is true concerning catheter ablation in this patient?

A. The risk of catheter ablation and cardiac perforation exceeds 20 % and should not be attempted

B. The patients VT is likely to originate from the mid RV free wall

C. Pacemapping alone is typically used to map VT in this setting

D. None of the above

Case 5- Question 3 Answer

Which of the following is true concerning catheter ablation in this patient?

A. The risk of catheter ablation and cardiac perforation exceeds 20 % and should not be attempted

B. The patients VT is likely to originate from the mid RV free wall

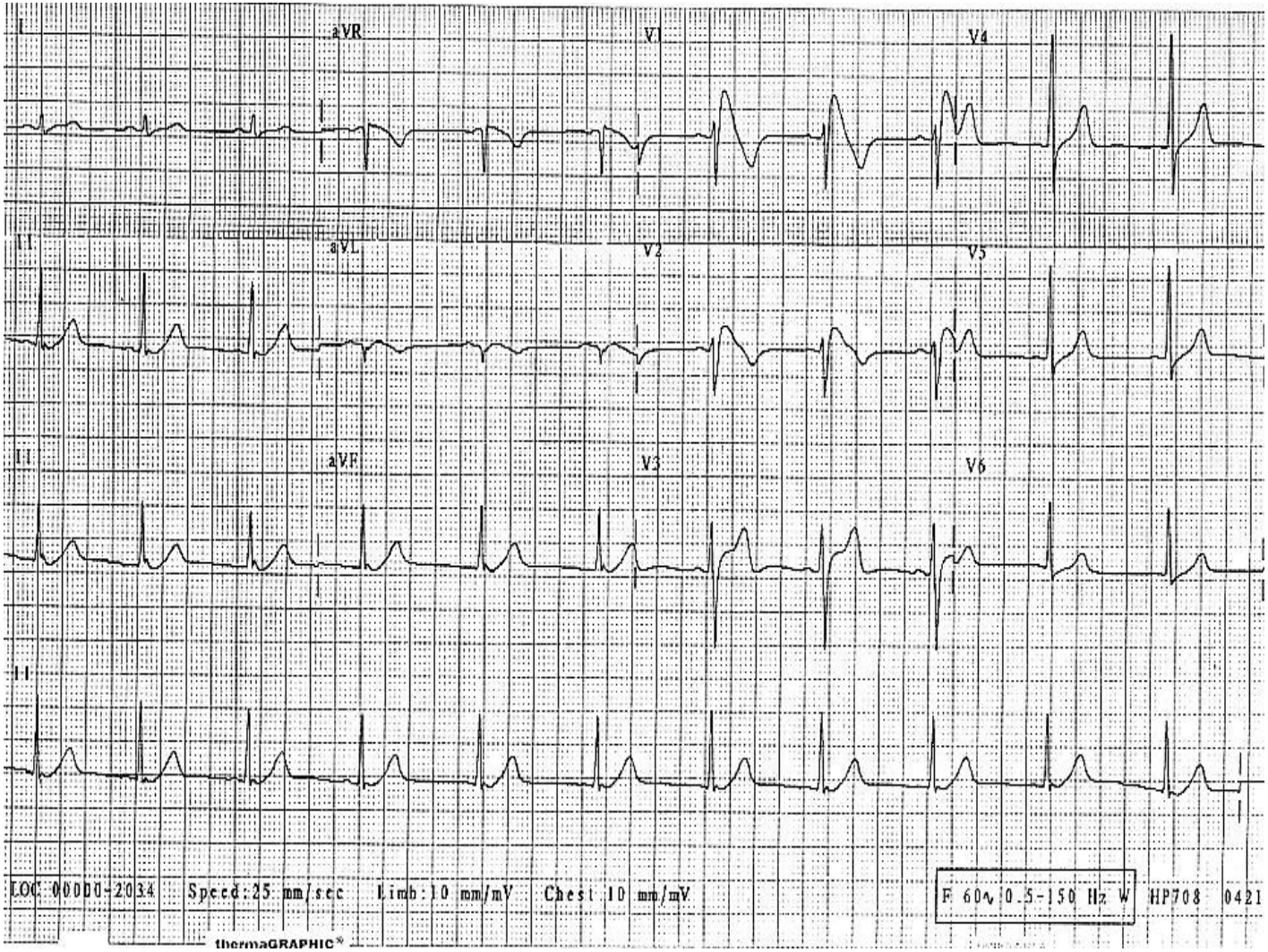
C. Pacemapping alone is typically used to map VT in this setting

D. None of the above

CASE #6- Question 1

A 30 year old Spanish man is referred because of syncope and an abnormal ECG as shown. His younger brother who is symptom free accompanies him and has a normal ECG.

CASE #6


I
aVR
V1
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II
aVL
V2
V5
III
aVF
V3
V6
II
LOC 00000-2034 Speed:25 mm/sec Limb:10 mm/mV Chest 10 mm/mV
F 60∿ 0.5-150 Hz W HP708 0421
thermaGRAPHIC®

Case 6: Question 1

Administration of which of the following drugs would be helpful in the brother's evaluation?

A. Sotalol

B. Isoproterenol

C. Flecainide

D. Adenosine

E. Verapamil

Case #6- Question 1 Answer

Administration of which of the following drugs would be helpful in the brother's evaluation?

A. Sotalol

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