Frequent Asymptomatic PVCs in a Young Competitive Athlete

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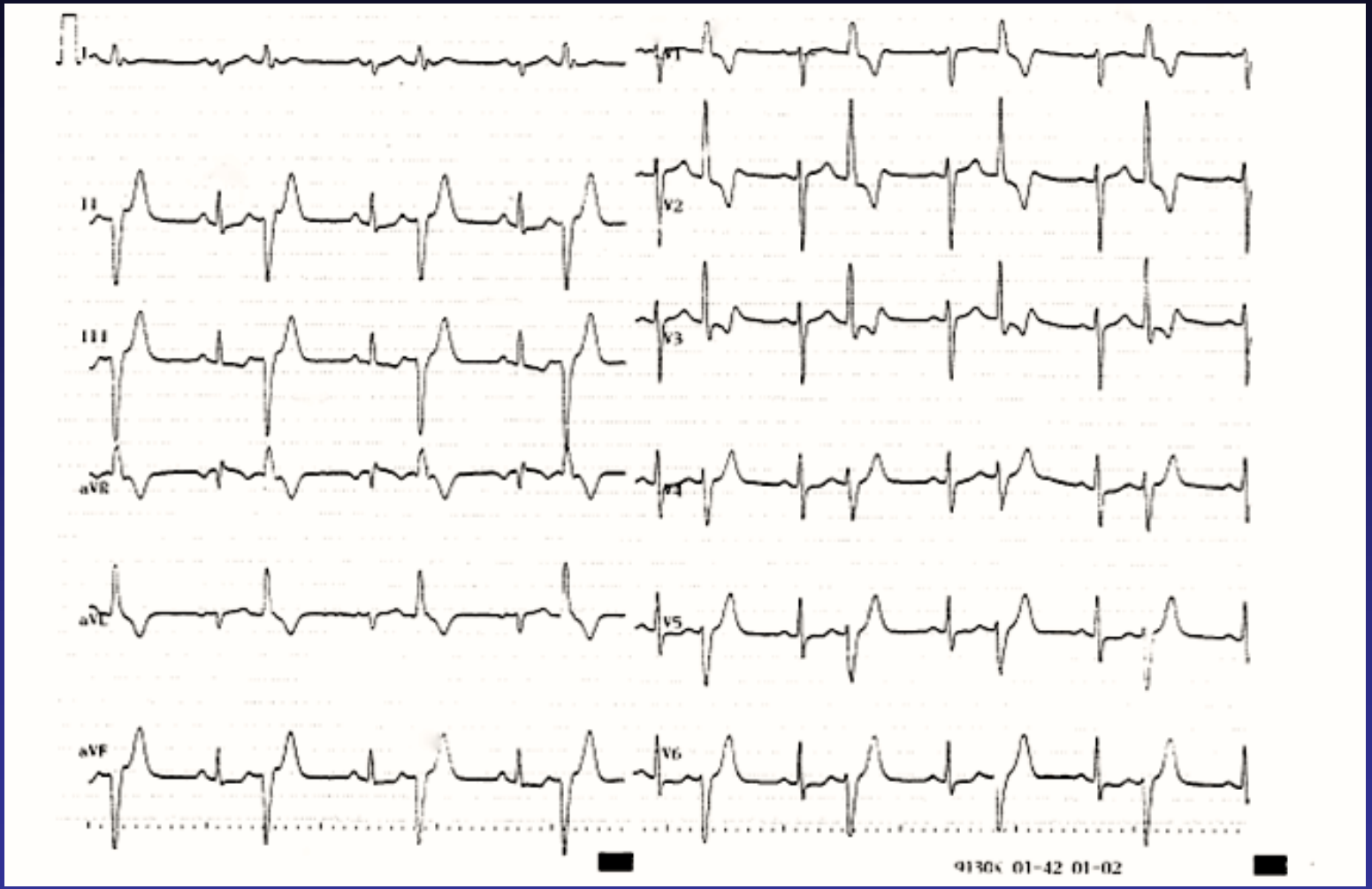
Medical History

- 15 y/o female with normal past medical history
- Competitive basketball player
- Found to have multiple PVCs during a regular checkup
- Asymptomatic

Initial Evaluation

- **PE:** Within NL
- **ECG:** Ventricular bigeminy, PVCs – RB, sup. axis morphology
- **Echo:** No evidence of structural or valvular abnormalities
- **Holter:** 35% of her daily heart beats were in fact unifocal PVCs
- **ET:** No increase in number of PVCs

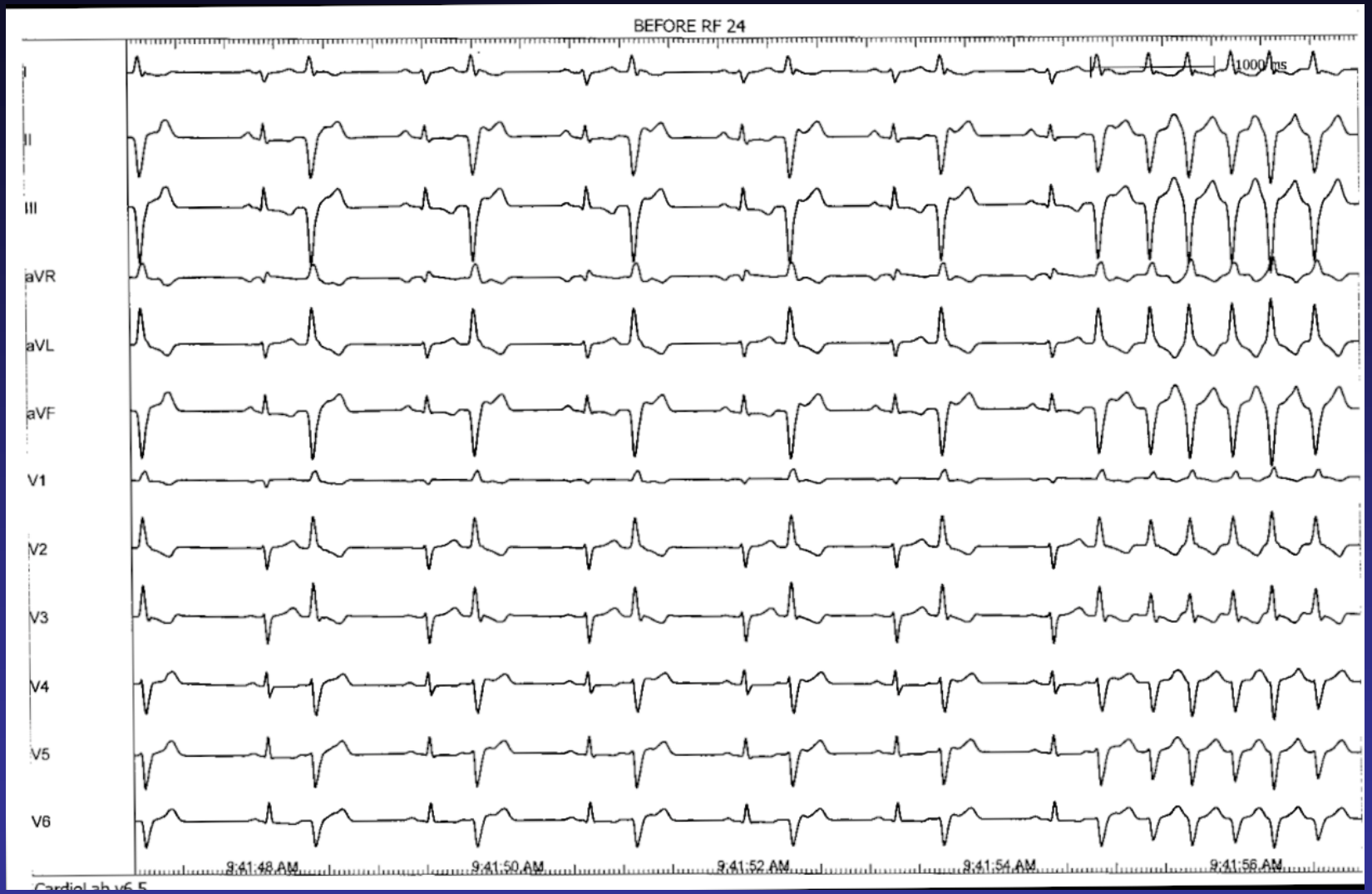
Baseline ECG



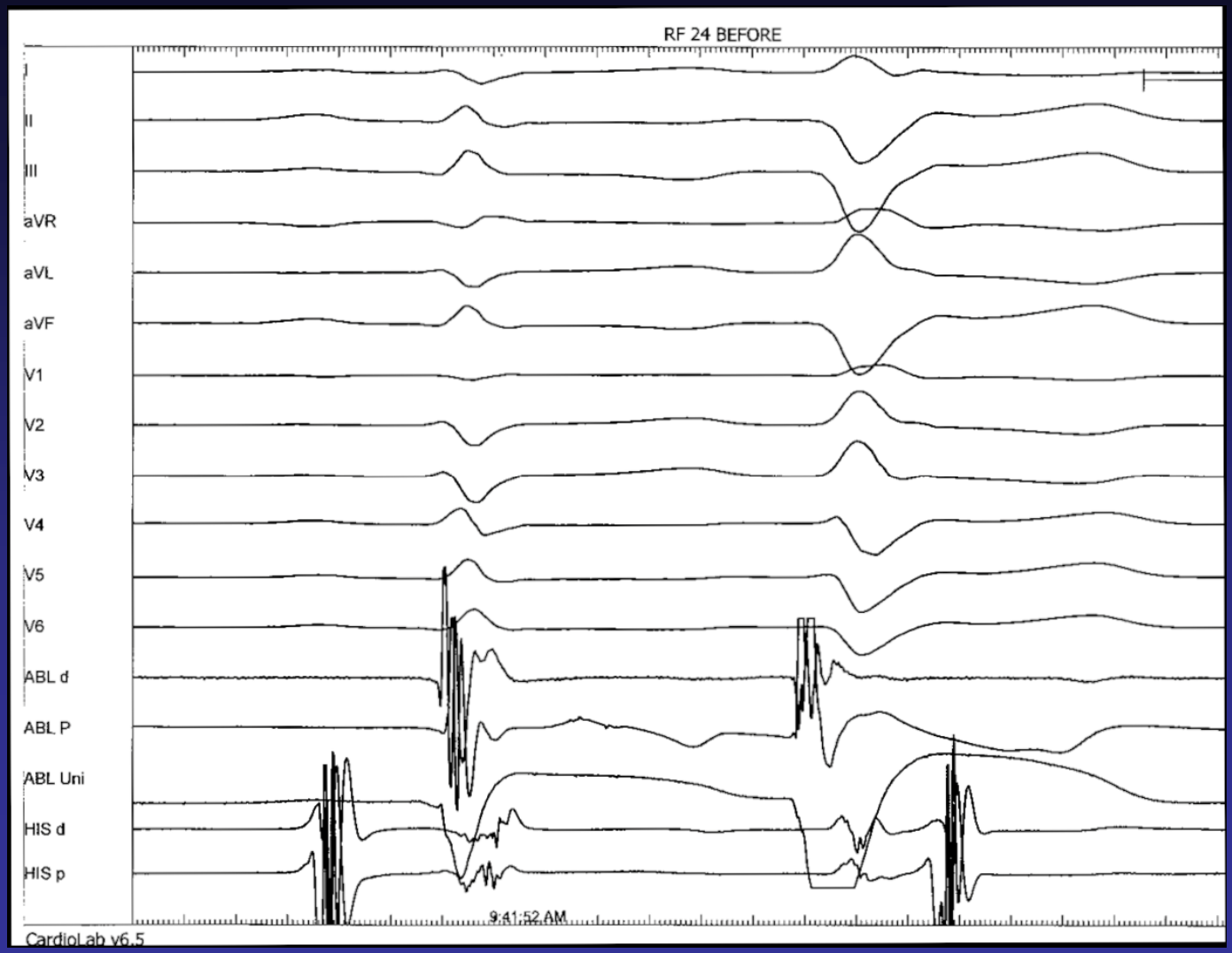
Discussion

- **What is the differential diagnosis?**
- **How would you proceed?**

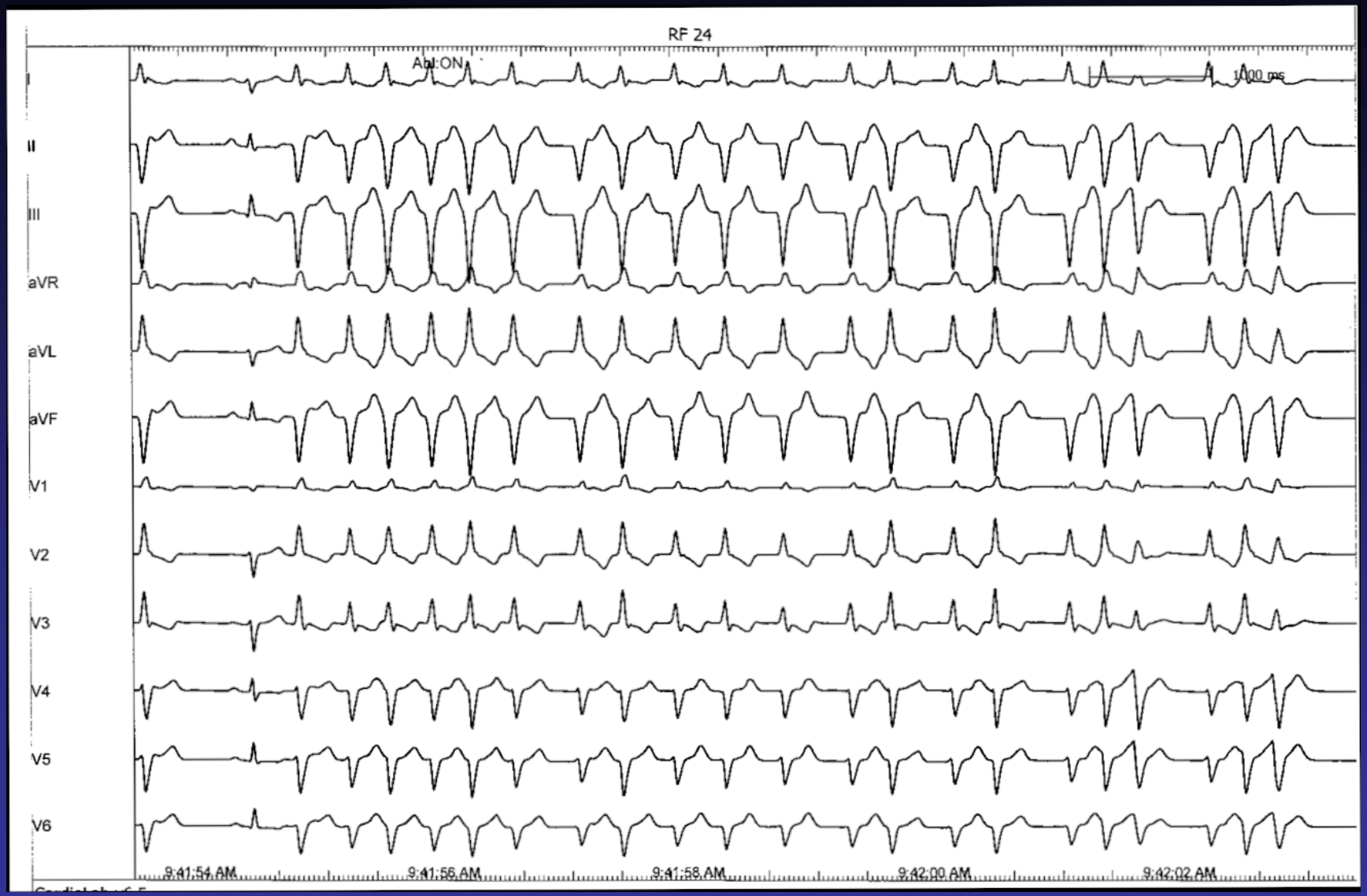
Due to the PVC morphology, a fascicular origin was suspected and she was taken to the EP lab at another hospital…



Ablation catheter located on Lt. post fascicle preceded PVC by 20 msec. and with identical 12/12 pace map



Ablation


RF 24
Abl:ON
1000 ms
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
9:41:54 AM
9:41:56 AM
9:41:58 AM
9:42:00 AM
9:42:02 AM

Clinical Course

- Ablation failed and she was started on CCB (Verapamil 40mg x3/d)
- Holter on CCB: 450 PVCs/ day
- Banned from any competitive sports activity
- The patient was referred to our center

Clinical Course

Verapamil dosage was increased to 240 mg/day

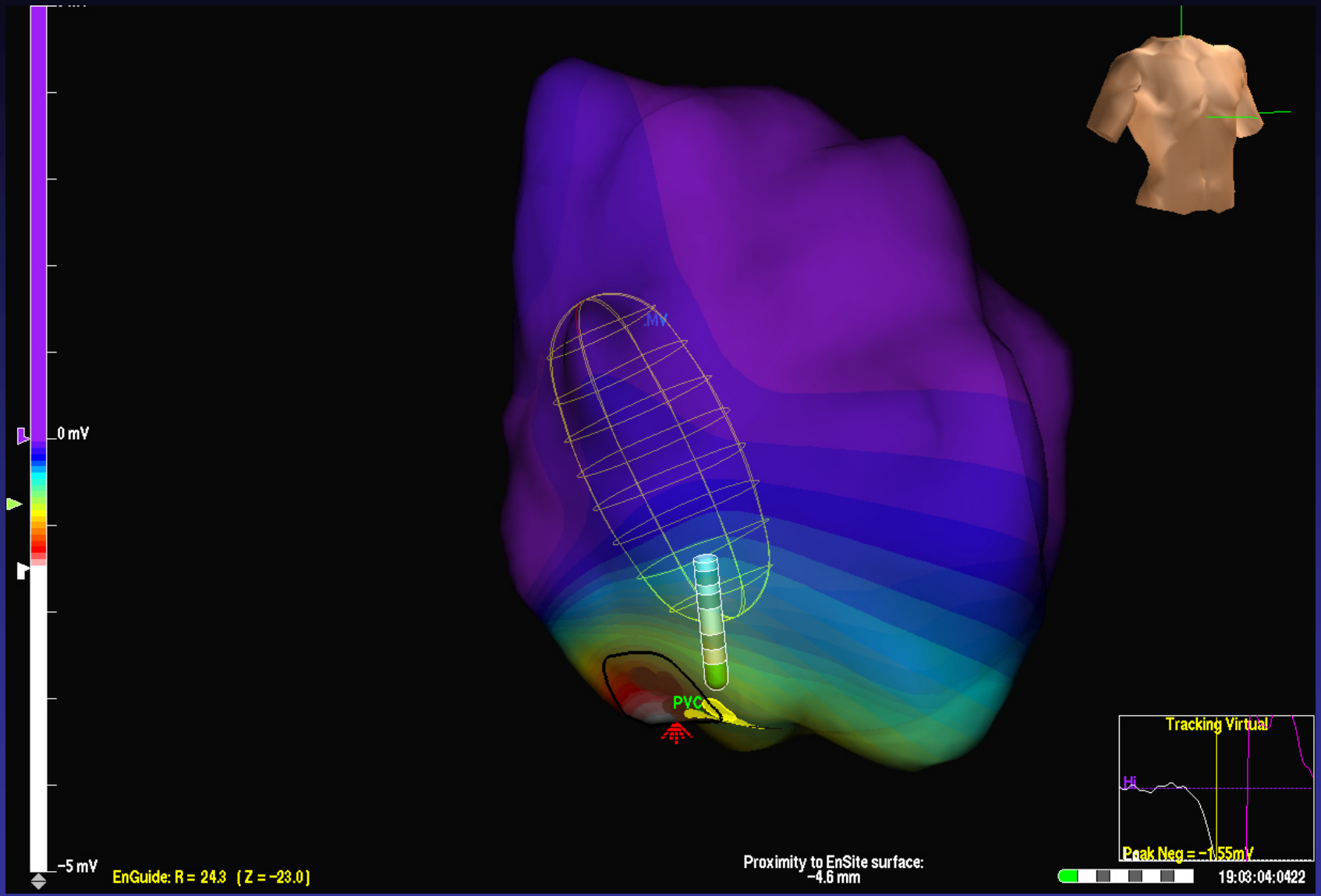
- Holter: 3% PVCs
- ET: No PVCs at baseline but bigeminy rhythm at maximal HR
- Cardiac MRI: very mild decrease in LVEF (52%); LVEDV: 152 ml ; LVESV 73 ml (mildly increased)

Discussion

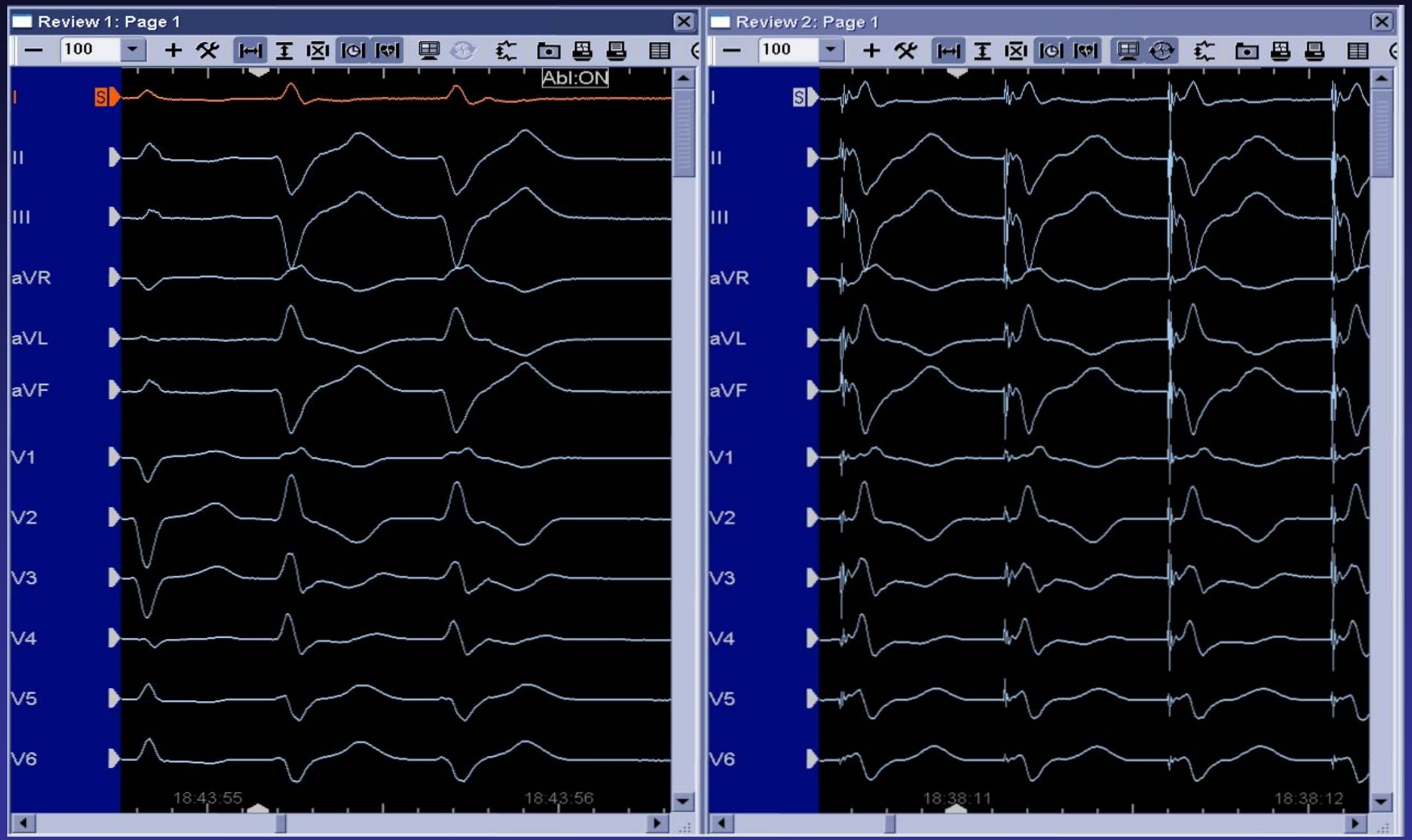
What to do now?

1. Nothing
2. BB/AAD
3. Another ablation
4. AICD

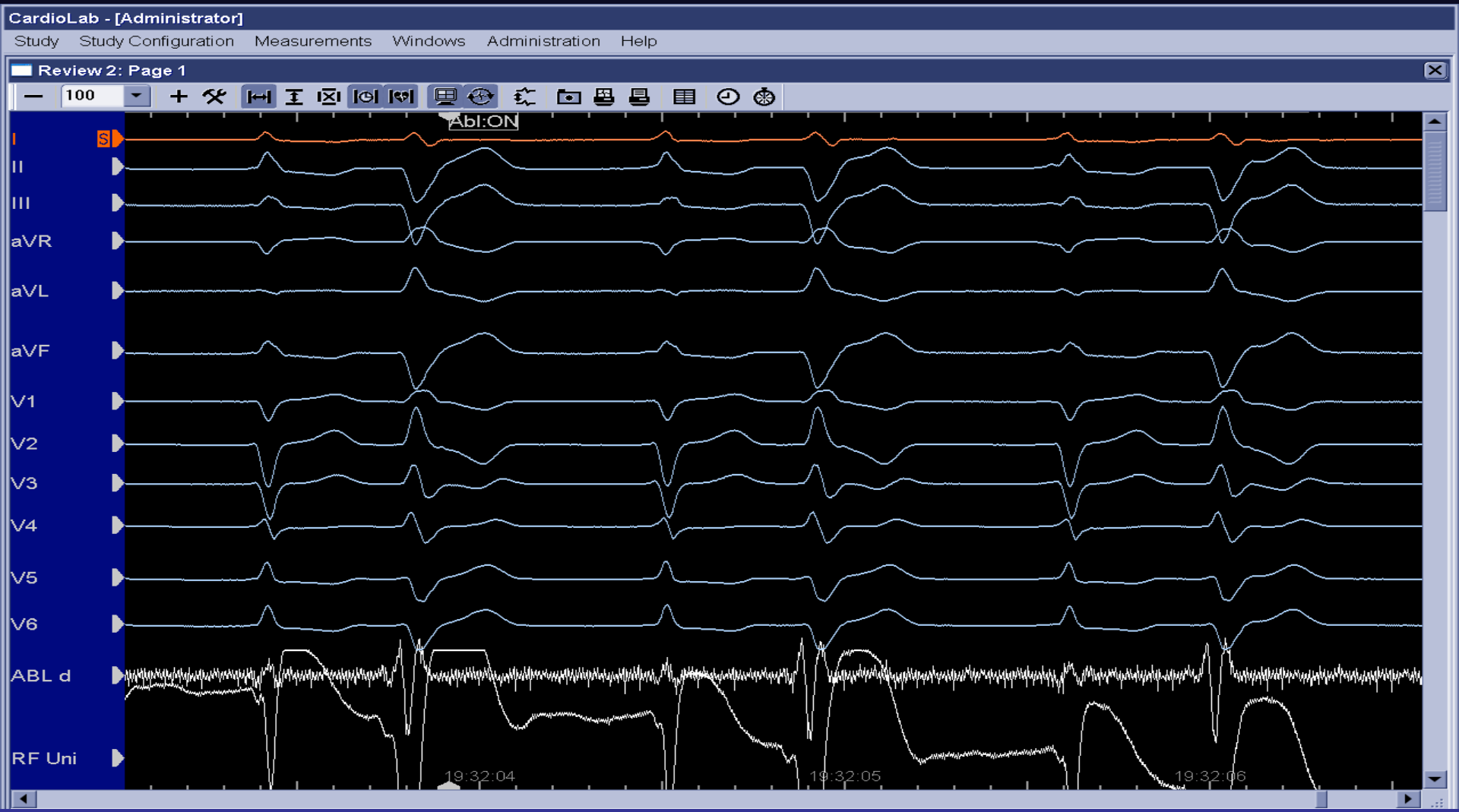
Ablation using ESI 3D mapping system: focal origin



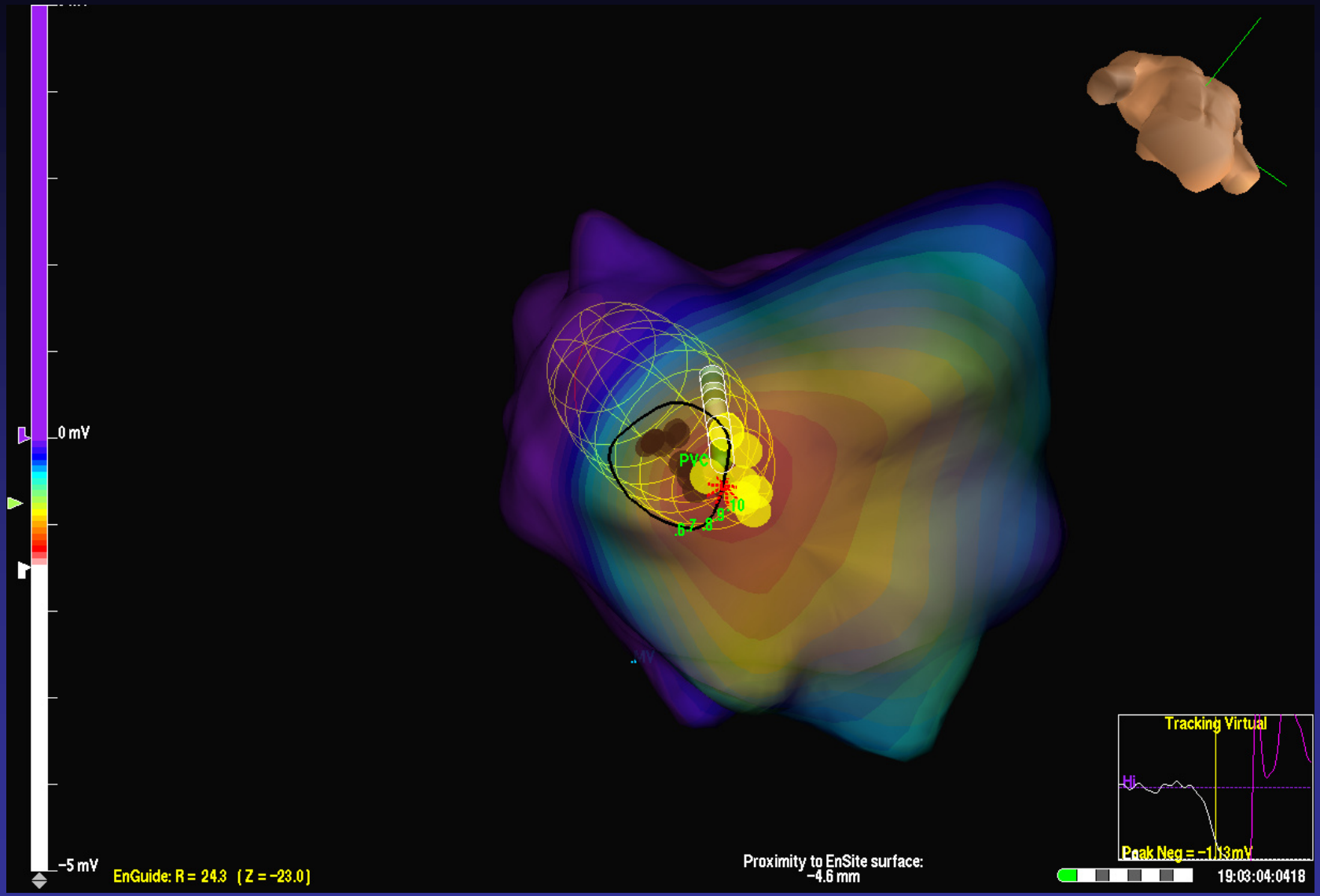
- At this site a perfect pace map was observed (no pre-potential at this site):



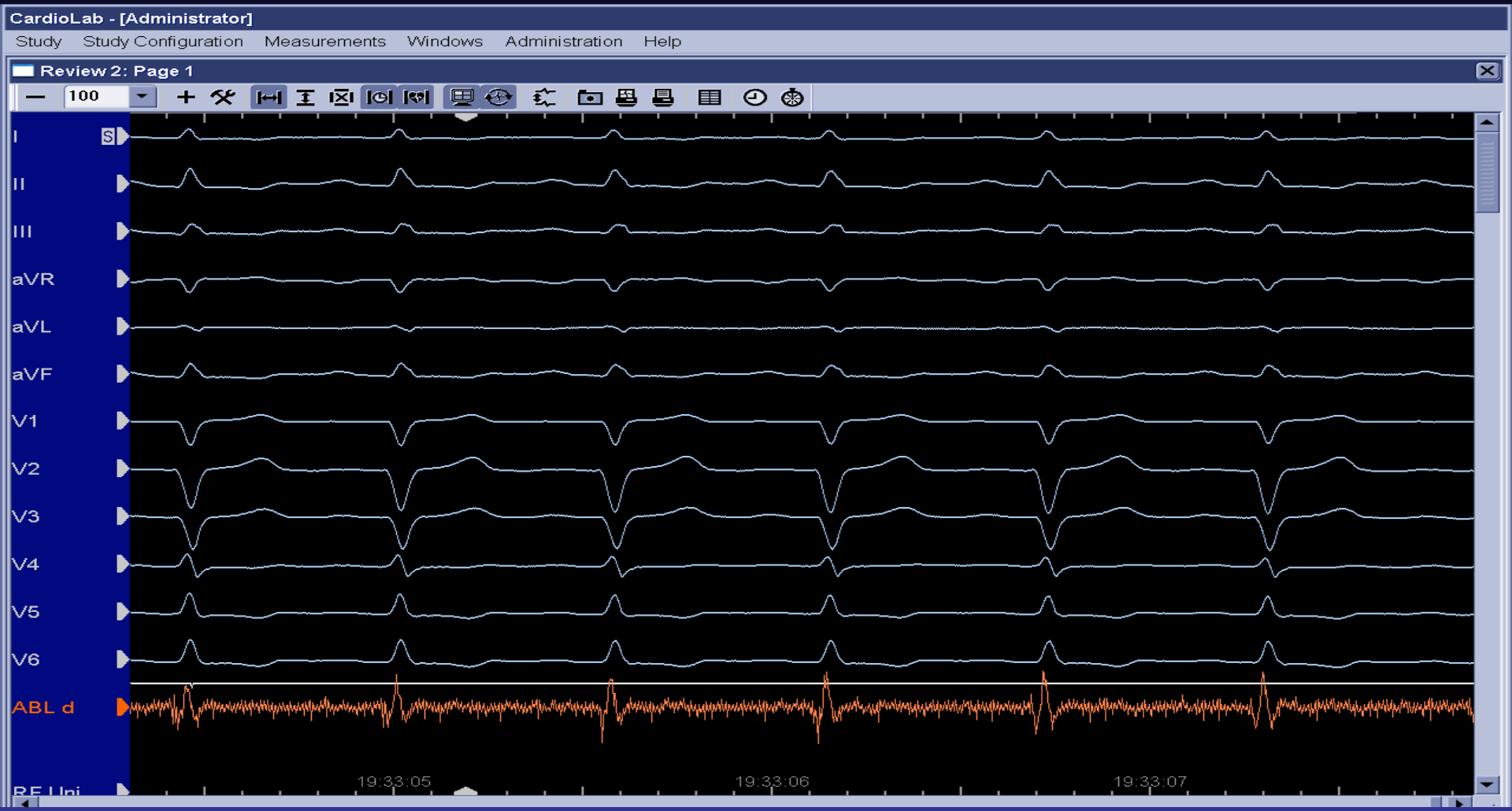
Ablation ON (irrigated catheter):



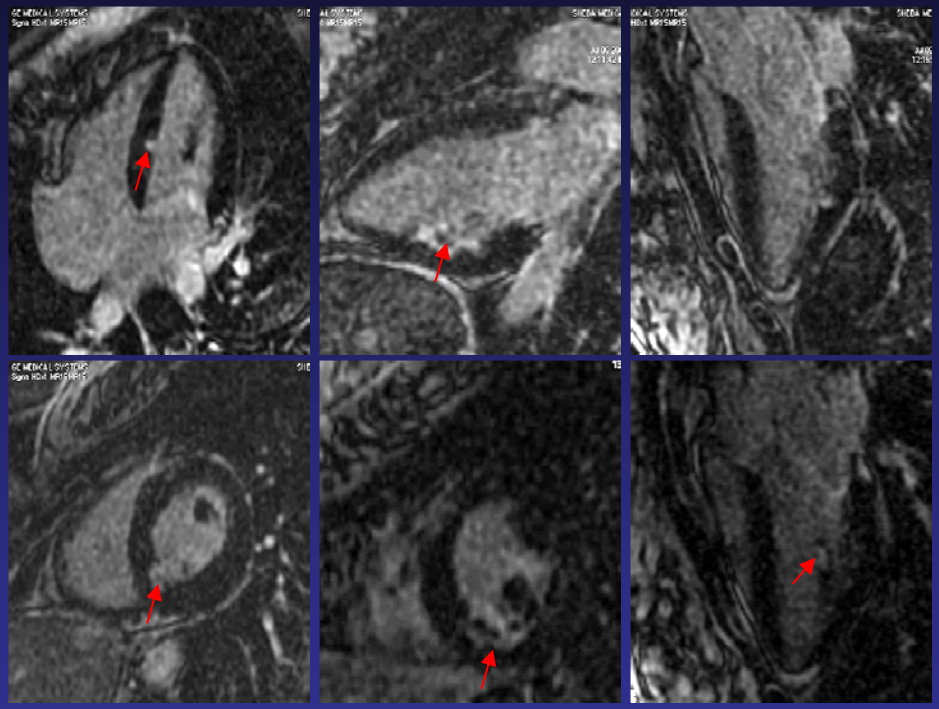
Catheter ablation at earliest site by ESI activation map:

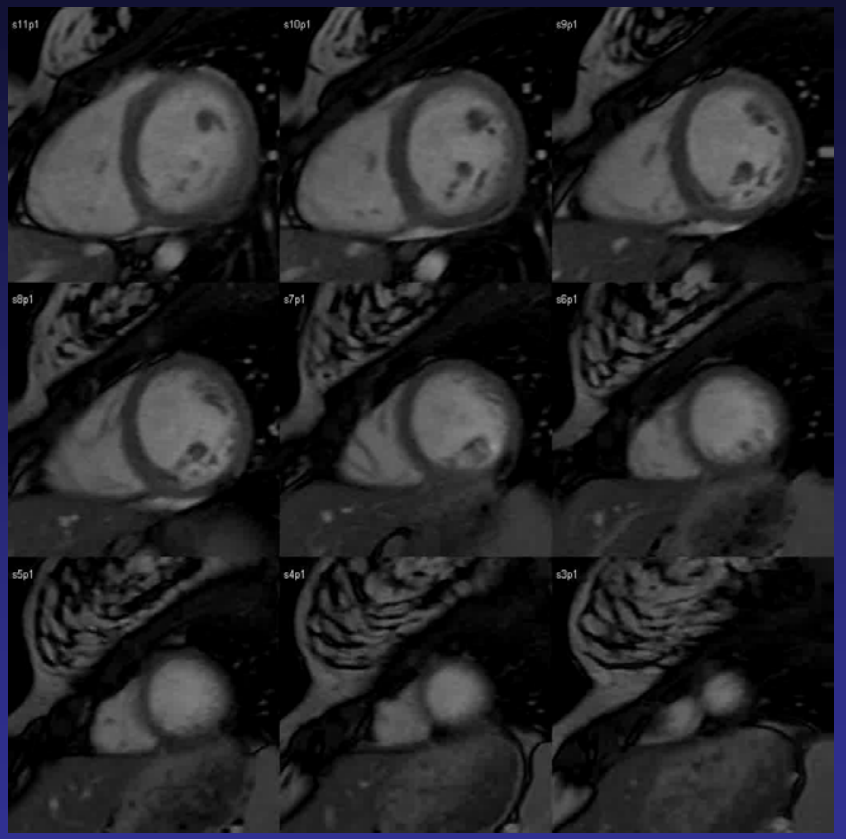


Post ablation: PVCs not inducible



MRI: delayed enhancement at site of ablation located on LV posterior papillary muscle

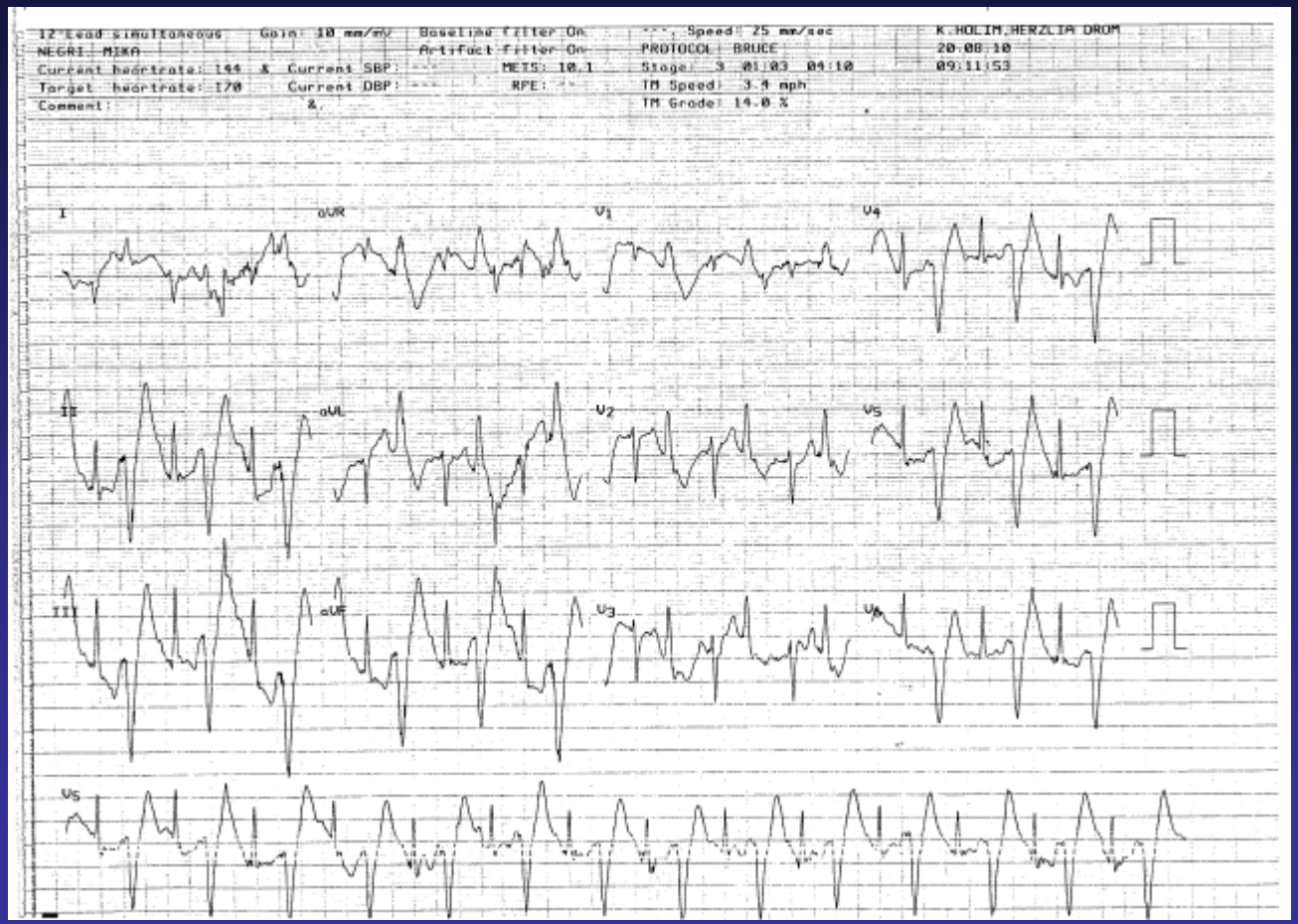




Final Diagnosis: Papillary Muscle VT!

Follow up

- A few weeks later: No PVCs on Holter or ET.
- But another month later she performed ET demonstrating…

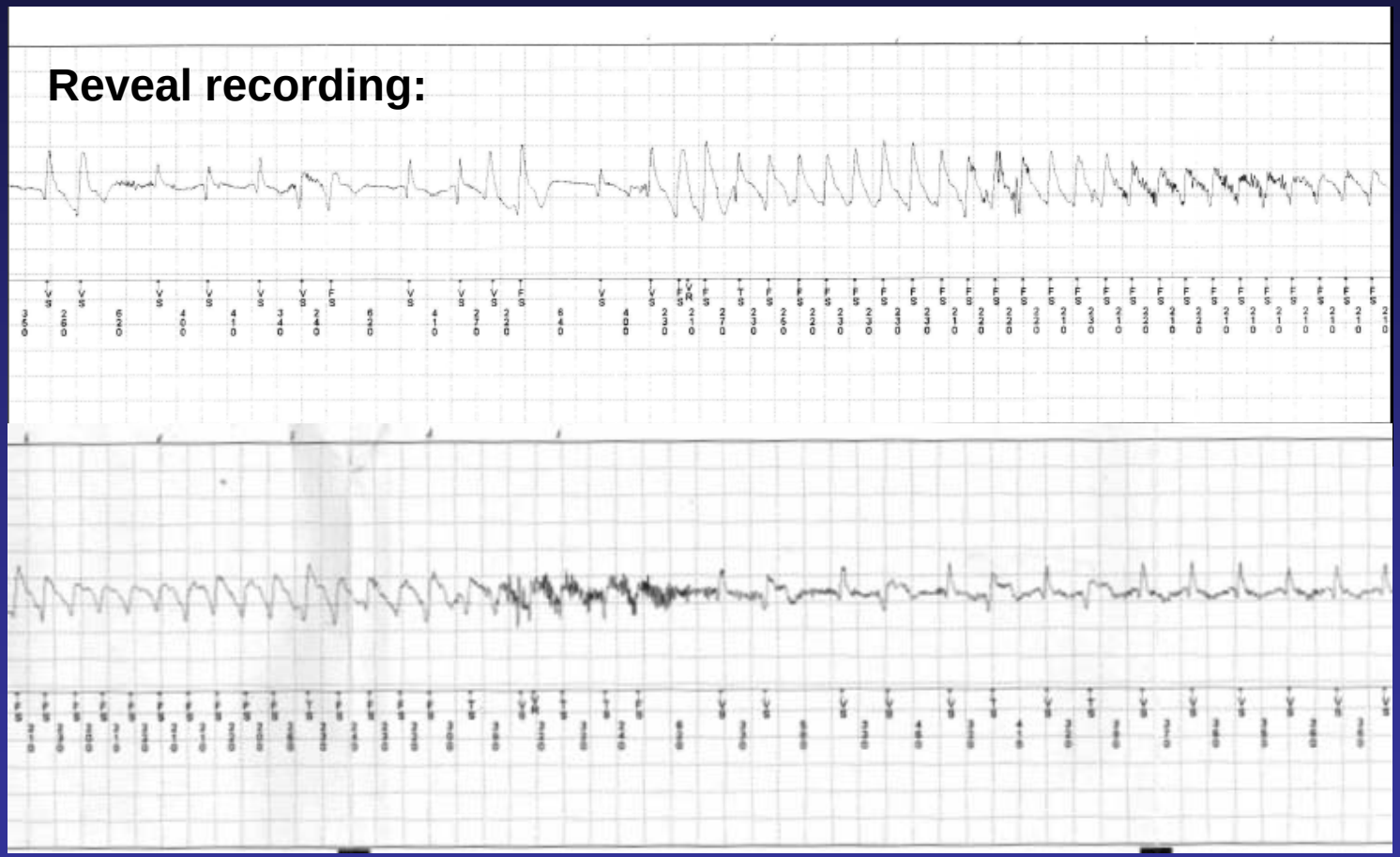


A few weeks later, she presented with true syncope during physical exertion

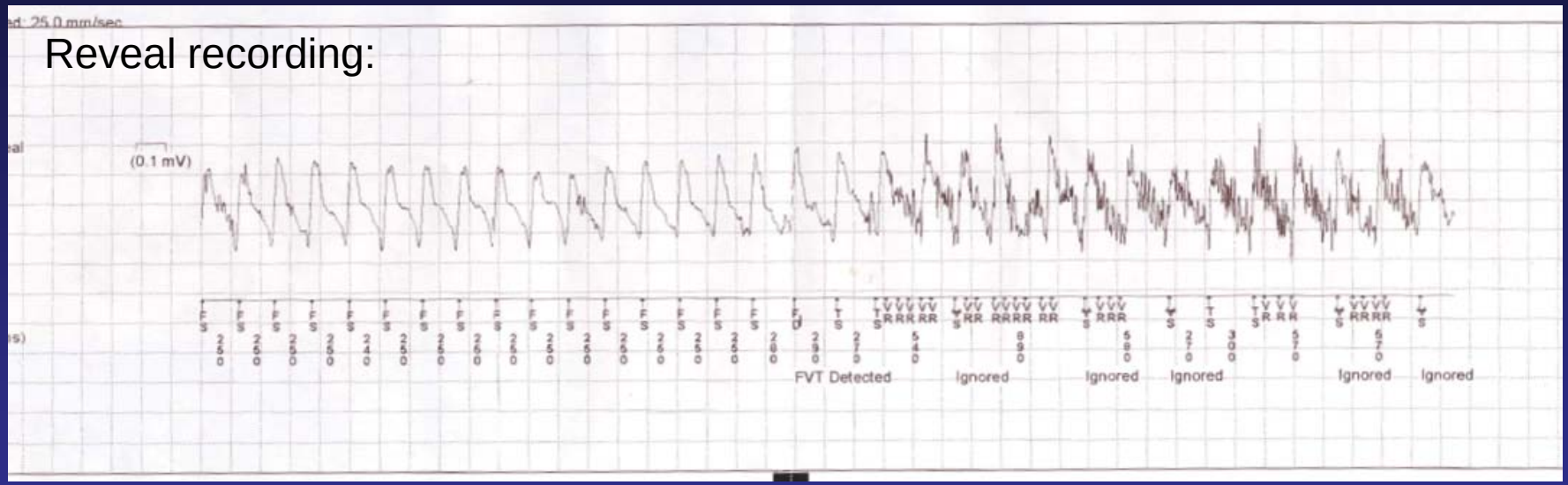
4 weeks later…

Dizziness during a basketball game.

She was not on her beta-blockers at the time.



And later on again...
Recorded at rest on 10mg of Bisoprolol

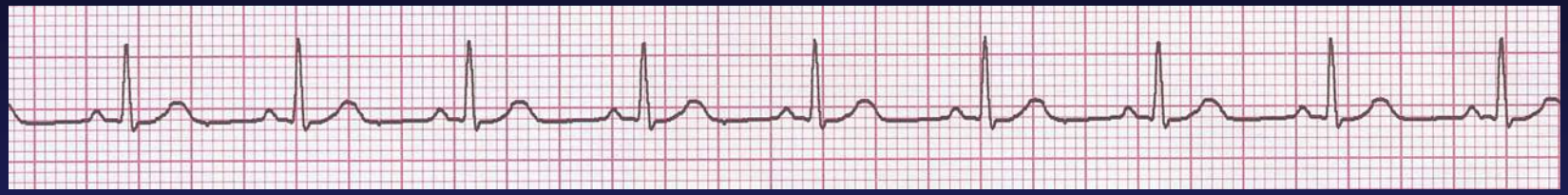


Discussion

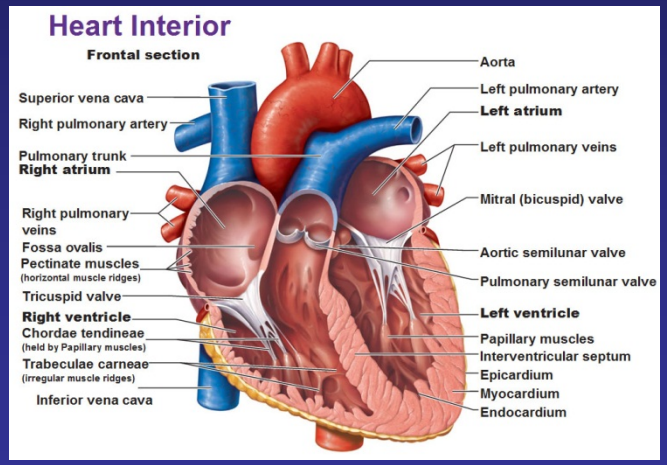
What to do now?

1. Redo?
2. BB/AAD?
3. Refrain from any sports activity?
4. AICD?

After additional ablation at Bordeaux, France



Open discussion



Discussion – Papillary muscle VT

<u>Described as a distinct clinical entity by Doppalapudi et al.</u>

(Circulation: Arrhythmia & Electrophysiol. 2008;1:23-29.):

1. All patients had normal LVEF per echo
2. More frequently located in the left posterior than left anterior papillary muscle
3. Non of them experienced syncope or SCD

Papillary muscle origin of arrhythmia

(Doppalapudi et al. Circ Arrhythmia Electrophysiol. 2008;1:23-29.)

4. PAP arrhythmias were not inducible by programmed atrial or ventricular stimulation

5. Sustained VT, if inducible, was provoked by isoproterenol or burst pacing, suggesting that the underlying mechanism is triggered activity

Comparison Papillary VPCs vs. Fascicular VPCs

(Good et al. Heart Rhythm 2008;5:1530 –1537)

1. Might have similar surface ECG (specifically post. medial PAP), although…
2. 2/7 pts. with PAPs showed focal, delayed enhancement on MRI compared to non in the fascicular VT patient group.
3. EPS: Presystolic Purkinje potentials were identified at all effective ablation sites for fascicular arrhythmias, but in arrhythmias originating from PAPs, no or more distal Purkinje potentials were recorded

Papillary muscle origin of arrhythmia

- Activation map is the most reliable method
- Ablation at site with excellent pace maps failed to terminate the tachycardia
- Several further RFA were usually needed
- 80% RFA at both sides of the PAP were required.

The above suggests that the origin is located in the subendocardial or deep regions of the PAM (Yamada et al. Circ: A&E Aug 2010)

Conclusions

- Papillary muscle VT is a new clinical entity with distinct electro-cardiographic and electro-physiological features
- Advanced mapping tools such as ESI/Carto or ICE are very helpful
- Several RFAs are usually needed in order to eliminate the arrhythmia
- Some pts. exhibit focal areas of delayed enhancement suggesting some degree of predisposing jeopardized myocardium

Thank you...

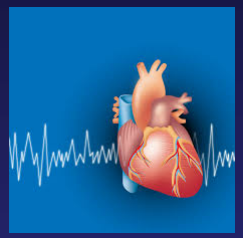
Sheba Medical Center
Tel Hashomer

The Leviev Heart Center

Discussion

- **DD:**

1. Fascicular (Belhassen) VT
2. Papillary muscle VT
3. Other focal? CMP?



- **How to proceed?**

1. No further investigation or Tx.
2. BB/CCB
3. Anti-arrhythmic drugs
4. EPS/Ablation