A Case of Paroxysmal Atrial Fibrillation/Flutter in a Mission-Assigned Astronaut

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Peter A. Bauer, MD, MPH
Medical Operations
NASA Johnson Space Center

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Overview

- Patient History
- Case History
  - Initial Presentation
  - Evaluation and Treatment
  - Medical Certification
- Case Follow-up
- What if…?

Patient History

- Gender: Male
- Age range: 40-50
- Ethnicity: Caucasian
- Habits: Nonsmoker, minimal intake of caffeine, moderate social drinker, some effort toward AHA type diet
- Assigned and in training to be a long duration crewmember aboard ISS

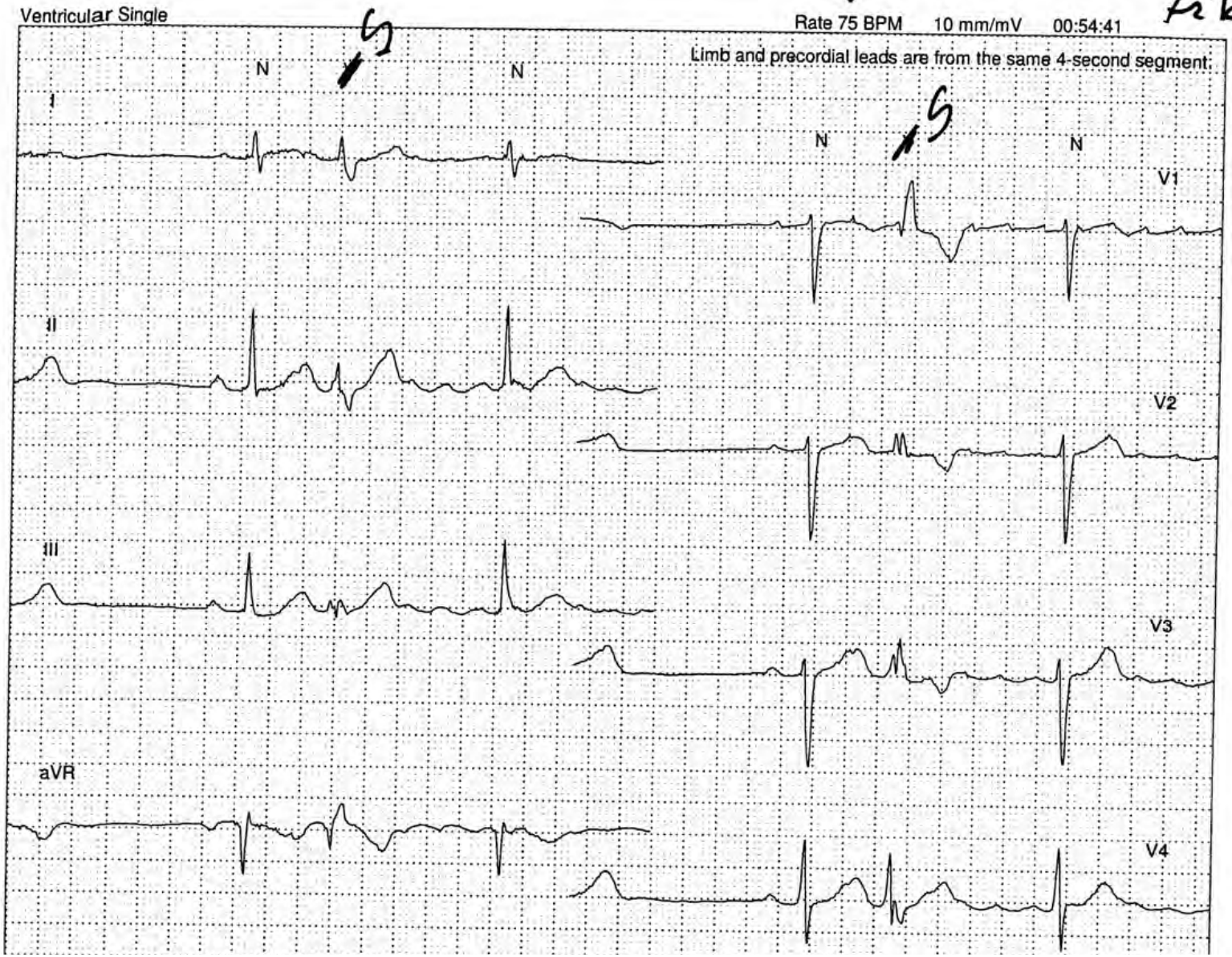
Initial Presentation

- Pertinent Medical History
  - Hypertension treated with Lisinopril (waived)
  - Hyperlipidemia controlled with Lipitor (waived)
  - NKMA
- Nearly daily intense aerobic activities as well as regular resistance training

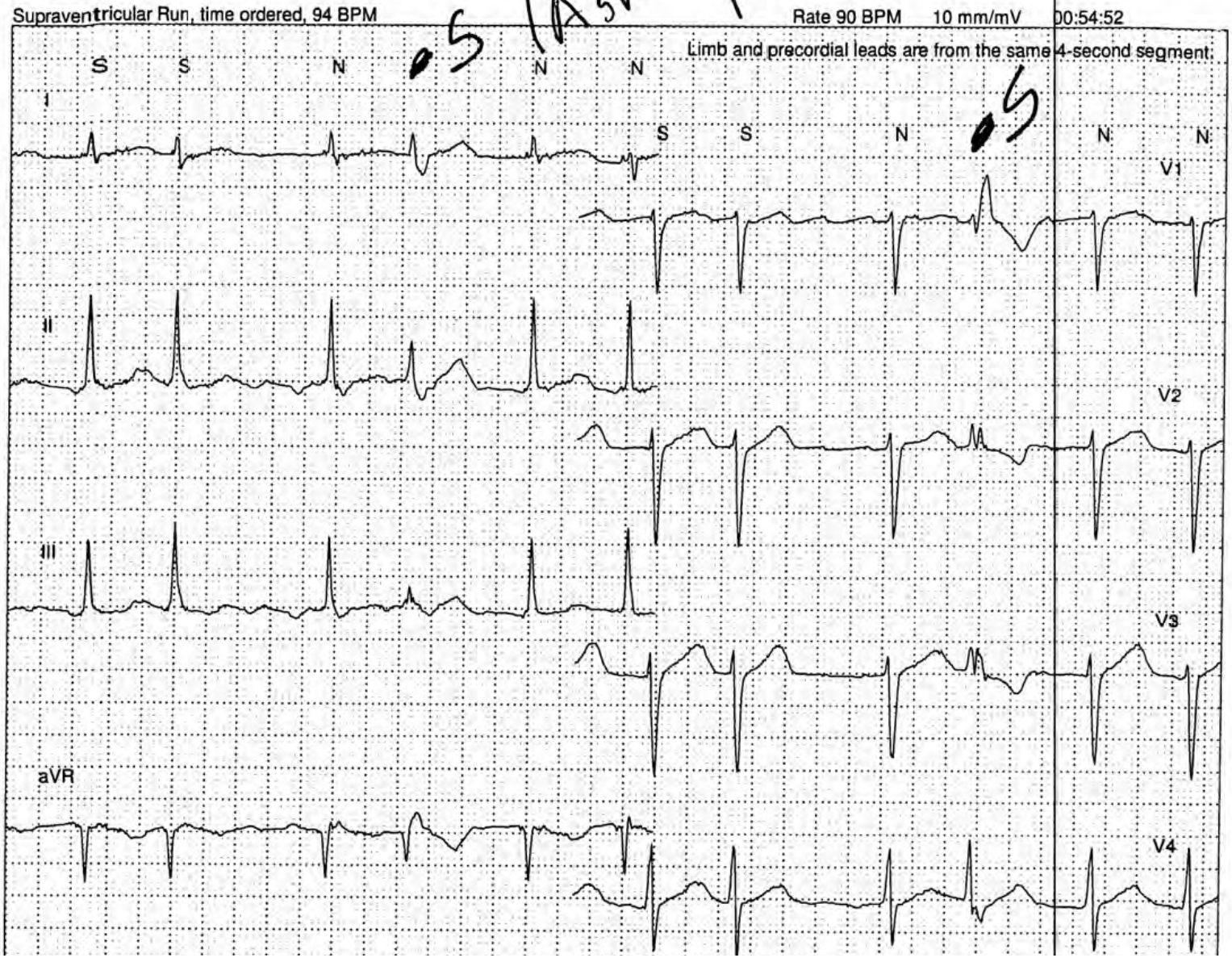
Initial Presentation

- At L-6.5 months ("Day 0" in timeline)
  - Routine scheduled ambulatory ECG recording (Holter monitor) showed several paroxysms of AF/Flutter lasting minutes during sleep
  - Upon retrospection, may have had other recent previous episodes
- AF captured on follow-up ECG; spontaneously converted to NSR within minutes
  - Ventricular Rate generally 70-90 bpm
  - Normotensive and essentially asymptomatic
  - Patient was able to feel difference in heartbeat once aware of the issue, otherwise asymptomatic

#1 Onset of Atrial flutter / fib.



A fib continued C72



[redacted] [redacted] [redacted] 06:27:15 NASA

[redacted]
Male Caucasian
[redacted]
Room:
Loc:1

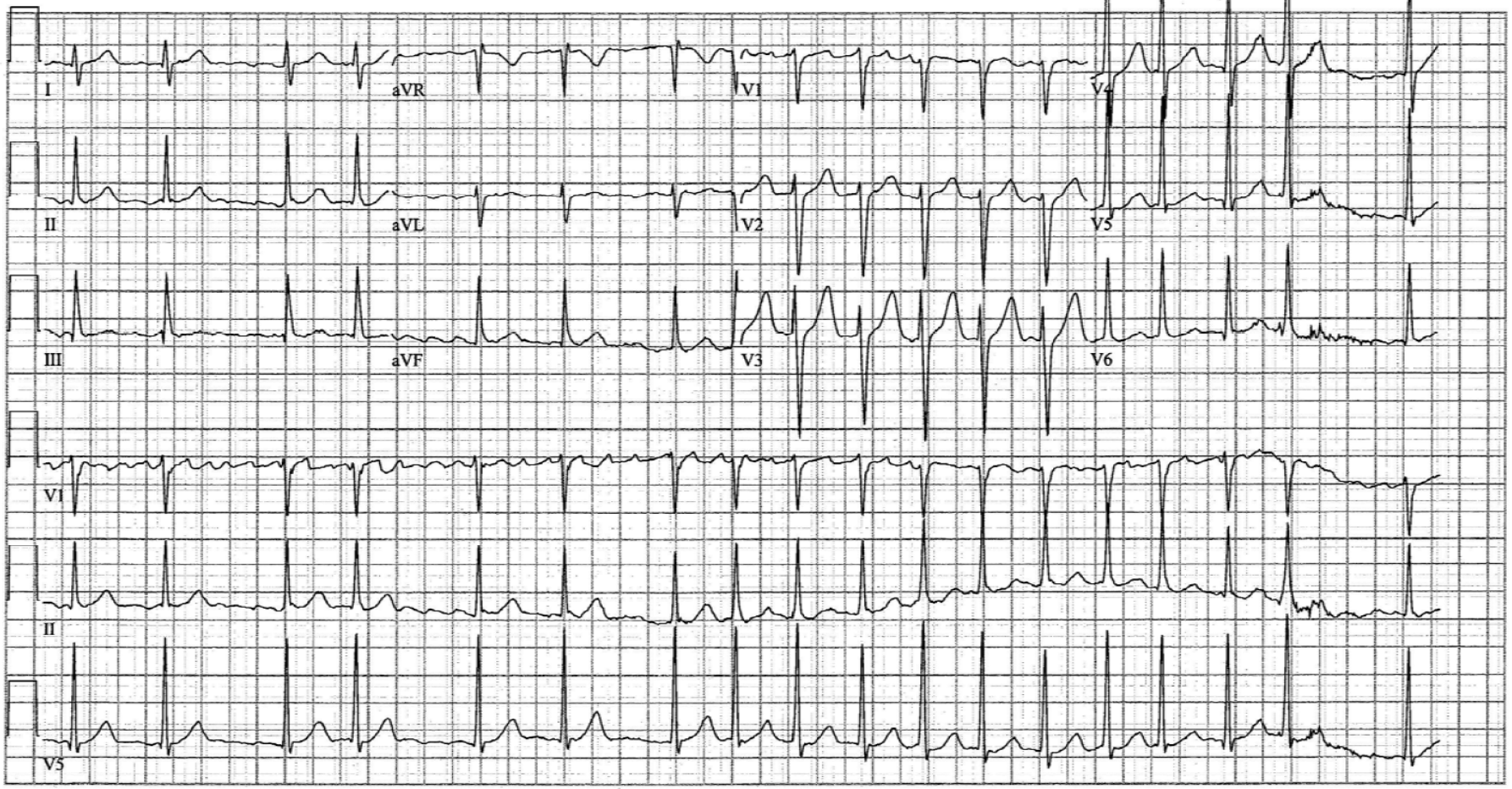
Vent. rate	106	BPM
PR interval	*	ms
QRS duration	92	ms
QT/QTc	356/472	ms
P-R-T axes	* 90	43

Atrial fibrillation with rapid ventricular response with a competing junctional pacemaker
Rightward axis
Abnormal ECG

Technician: 20
Test ind:ASTRONAUT PHYSICAL

Referred by: WX TRAVER

Confirmed By: RX PUTTAPPA



25mm/s 10mm/mV 150Hz 7.1.1 12SL 235 CID: 2

[redacted] ORDER:

[redacted] [redacted] [redacted] 08:45:07 NASA

[redacted]
Male Caucasian
[redacted]
Room:
Loc:1

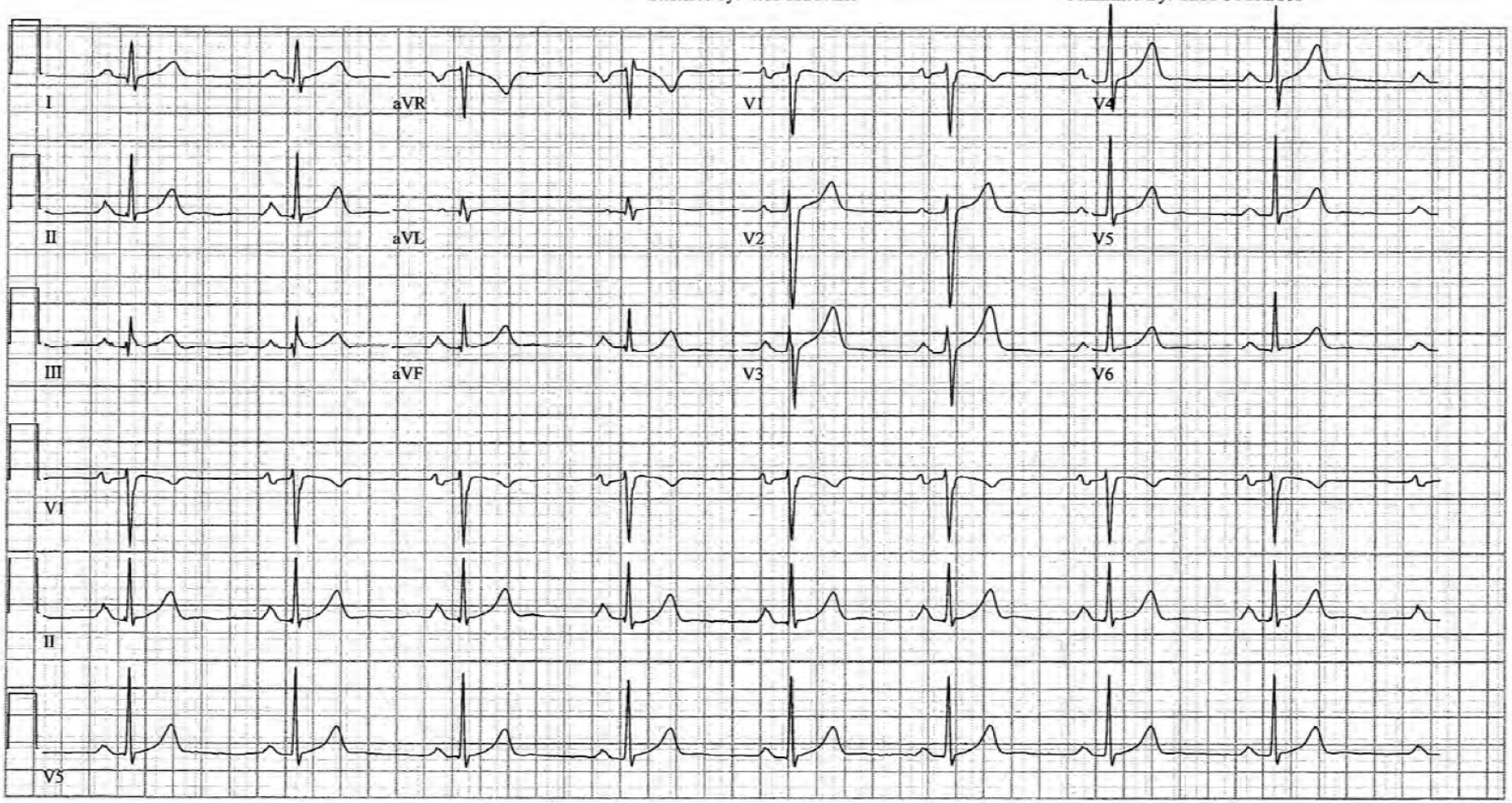
Vent. rate	51	BPM
PR interval	198	ms
QRS duration	88	ms
QT/QTc	432/398	ms
P-R-T axes	54 57	51

Sinus bradycardia
Right atrial enlargement
Borderline ECG

Technician: 20
Test ind:ASTRONAUT PHYSICAL

Referred by: WX TRAVER

Confirmed By: RX PUTTAPPA



25mm/s 10mm/mV 150Hz 7.1.1 12SL 235 CID: 2

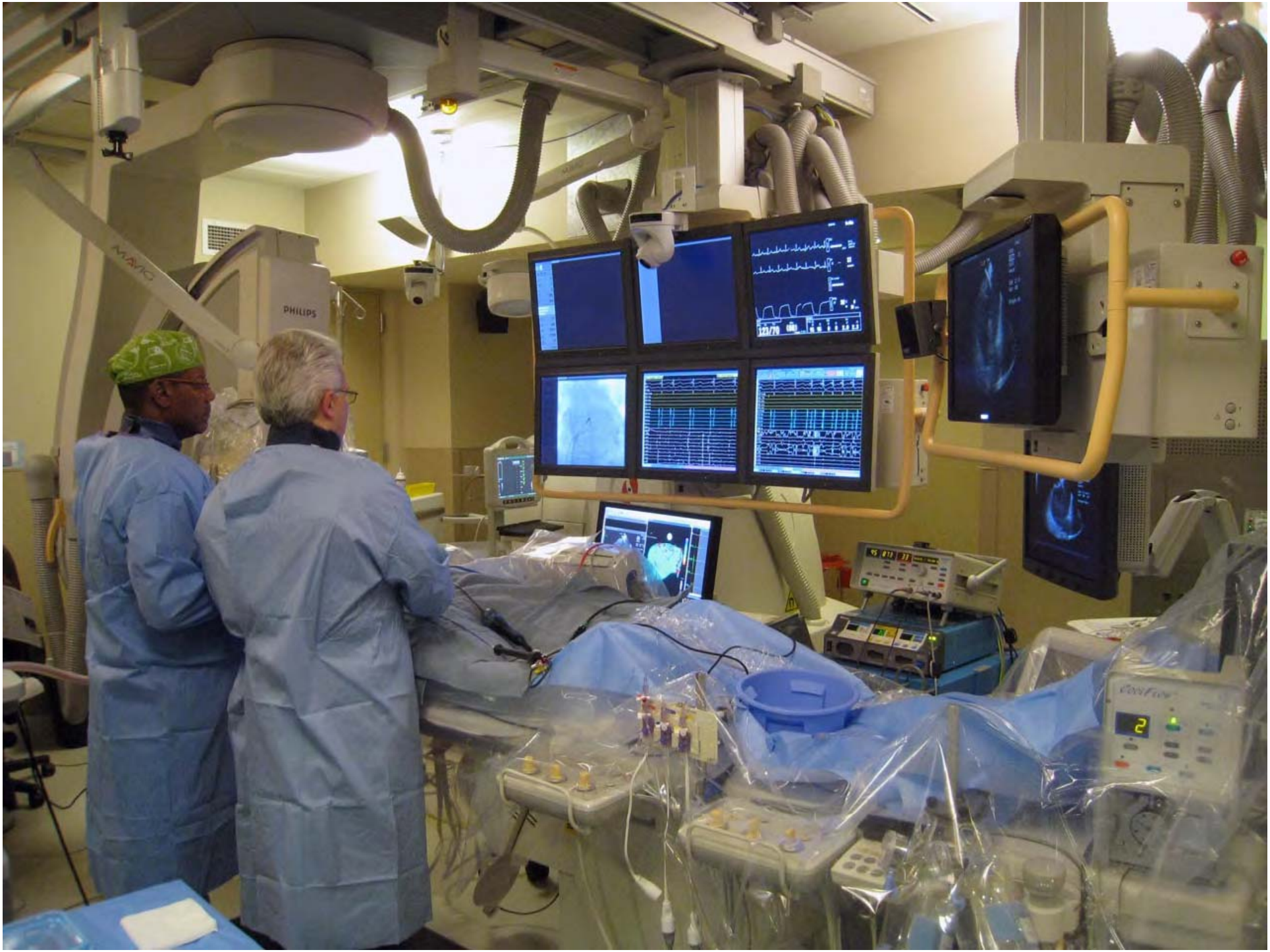
[redacted] ORDER:

Evaluation

- Immediately grounded pending further eval
- Normotensive during paroxysms
- Normal labs including TFTs
- When not in AF, ECG was completely normal
- Echocardiogram showed mild LA enlargement (4.1cm, LA index 35), o/w normal study

Initial Treatment

- Day 0: Placed on Warfarin
- Day 5: Transvenous ablation under general anesthesia
  - Chest soreness for 1-2 days post-procedure
  - Uneventful recovery
  - Return to full physical activities by 1 week
- Continued on Warfarin, $2 < INR < 3$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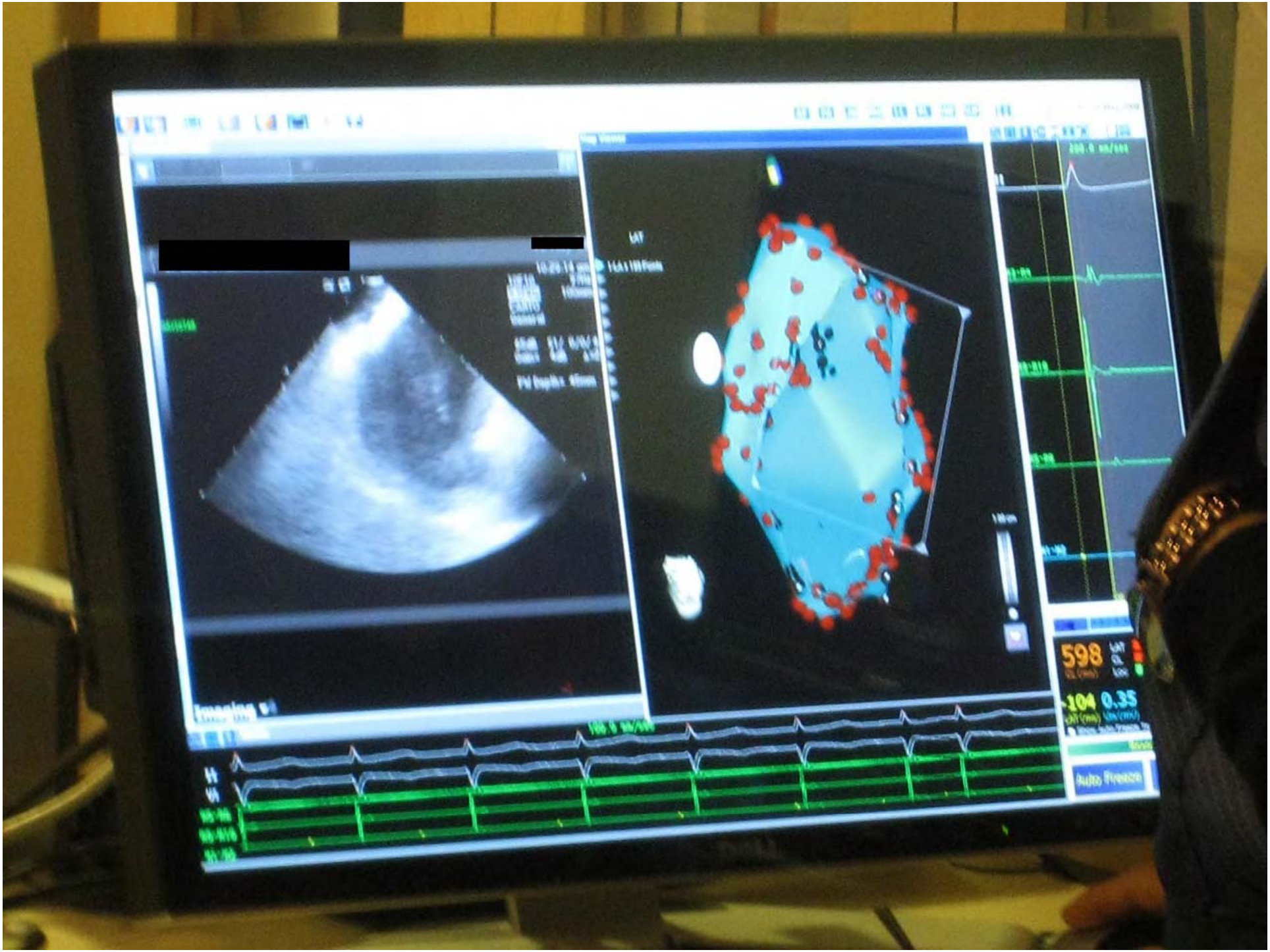
LAT
598
104 0.35
Auto Freeze

Early Post-Ablation Follow Up

- No signs or symptoms of recurrence
- Multiple 30 sec rhythm strips
- Day 25: Peak Cycle Exercise Eval completed
- Days 57-59: Two-day Holter showed rare PACs, rare PVCs, and single 4-beat run of Atrial Tachycardia, rate 126 bpm
- Day 63: Discontinued Warfarin; started 81mg Aspirin

Early Post-Ablation Follow Up (Continued)

- Day 90: Passed a Low +Gx centrifuge run
  - Max 4.5 sustained “eyeballs in” force
  - Multiple PVCs at rest prior to centrifuge but no dysrhythmia of any kind during or post-run
- Day 109: Completed essentially normal 7-day Holter Protocol
- Day 109: Normal chest MRA to r/o Pulm Vein stenosis

Return to Ground-based Training

Day 112

- Echo showed EF 55-60%, mild LA enlargement (4.3cm and LA Index of 35)
- Treatment considered complete by interventional cardiologist
- Discontinued Aspirin
- Granted NASA waiver for all training activities including Neutral Buoyancy Lab

Return to Flight Status

- Day 126: Second Peak Cycle Exercise Eval completed
- Day 134: Periodic Flight Physical
- Day 147: NASA waiver for all space flight
- Day 168: Multi-lateral Space Medicine Board waiver for all space flight

Case Follow Up

- Day 220: Astronaut launched to space for 5-6 month mission aboard ISS
  - No evidence of any cardiac dysrhythmia during space flight
    - Holter monitor not conducted
  - Crewmember self-monitored for irregular pulse and symptoms of AF. NONE.
  - Several normal rhythm strips were obtained
- Follow-up through 11 months post-flight
  - Normal ECGs, Holter monitor
  - Exercise returned to pre-flight levels after reconditioning

What if…?

- Options in case of recurrence on orbit
  - Convert or control rhythm
    - Medications
      - Amiodarone 400mg (USOS) and Verapamil (RS) on ISS;
      - Anti-coagulate (flew 5mg and 10mg Coumadin)
    - Cardioversion
  - De-orbit

Questions?