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

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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
Ventricular Single

Limb and precordial leads are from the same 4-second segment.

Onset of atrial flutter

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A fib continued

Supraventricular Run, time ordered, 94 BPM

Rate 90 BPM 10 mm/mV 00:54.52

Limb and precordial leads are from the same 4-second segment.
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
**Patient Information:**

- **Gender:** Male
- **Race:** Caucasian
- **Vent. rate:** 51 BPM
- **PR interval:** 198 ms
- **QRS duration:** 88 ms
- **QT/QTc:** 432/398 ms
- **P-R-T axes:** 54
- **08:45:07**

**Diagnosis:**
- Sinus bradycardia
- Right atrial enlargement
- Borderline ECG

**Test Information:**

- **Technician:** 20
- **Test Ind:** ASTRONAUT PHYSICAL

**ECG Details:**

- **Referred by:** WX TRAVER
- **Confirmed by:** RX PUTTAPPA

**Scale:**

- 25 mm/s
- 10 mm/mV
- 150 Hz
- 7.11
- 12SL 235
- CID: 2

**ORDER:**

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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**
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?