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

9 May 2011

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AsMA 2011
Annual Scientific Meeting
Anchorage, AK
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
Onset of atrial flutter
A fibrillation (fibrillation phenomenon) 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

VENT. RATE: 106 BPM
PR INTERVAL: * ms
QRS DURATION: 92 ms
QT/QTc: 350/472 ms
P-R-T AXES: * 90 43

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Male Caucasian
Vent. rate 51 BPM Sinus bradycardia
PR interval 198 ms Right atrial enlargement
QRS duration 88 ms Borderline ECG
OT/QTc 432/398 ms
P-R-T axes 54 57 51

Technician: 20
Test ind: ASTRONAUT PHYSICAL

Referred by: WX TRAVER
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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?