

You're the Flight Surgeon

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While serving as a flight surgeon for a Naval rotor-wing community on the East Coast, you get a call that one of your pilots, who is currently out of state, is having heart palpitations. He states that the sensation came on suddenly after having a large drink of a smoothie. He denies any chest pain, shortness of breath, or lightheadedness. You know this pilot is on a waiver for an episode of holiday heart a couple years before, but otherwise has no significant medical history. You believe he is most likely experiencing a recurrence of atrial fibrillation and send him to the nearest emergency room (ER). In the ER, they quickly confirm the diagnosis of atrial fibrillation.

1. What are some causes of atrial fibrillation in someone with no structural heart disease?

- A. Hyperthyroidism.
- B. Alcohol consumption.
- C. Large caffeine intake.
- D. Tobacco.
- E. All of the above.

ANSWER/DISCUSSION

1. E. You know from his previous cardiac workup that underlying structural heart disease is unlikely to be a cause of atrial fibrillation in this patient. There are several known provocateurs of atrial fibrillation in someone with no structural heart disease, including cold stimulation along with hyperthyroidism,⁸ alcohol consumption,¹⁰ large caffeine intake,⁹ and tobacco. You believe the pilot likely triggered the arrhythmia from taking in a large bolus of smoothie. The pilot remains in atrial fibrillation in the ER. You become concerned that he hasn't spontaneously converted to normal sinus rhythm and begin to contemplate the potential complications of atrial fibrillation. Knowing that the complications of atrial fibrillation can be deadly, you wonder what should be done for your aviator.

2. What are some indications for cardioversion?

- A. Hemodynamic instability.
- B. You just can't stand to see an electrocardiogram (EKG) tracing with such irregularity.

- C. First recognized (symptomatic) episode.
- D. A and C.
- E. Long-standing atrial fibrillation.

ANSWER/DISCUSSION

2. D. While the aviator is young and hemodynamically stable, you recognize that he has palpitations, which could be distracting from flight or just about any other activity that requires concentration. You also know from previous workup that he has no structural heart disease and, therefore, would be a good candidate for direct current cardioversion. Although this episode is not his first, it has been relatively short in duration. With his normal heart structure, short duration of abnormal rhythm, and only second occurrence, you know that his chances for long-term success with direct current cardioversion should be excellent.⁵ Now that you have considered the potential for cardioversion, you wonder whether you need to consider anticoagulation.

3. What are some considerations for anticoagulation in patients with atrial fibrillation?

- A. Duration of atrial fibrillation.
- B. Structural heart disease.
- C. Comorbid medical conditions.
- D. Associated bleeding risks.
- E. All of the above.

ANSWER/DISCUSSION

3. E. These considerations and more cross your mind with respect to this patient in particular. Your aviator does not seem to fit the research profile of most patients with atrial fibrillation and he certainly has no comorbid medical conditions. In this patient, bleeding risk is certainly an impactful consideration given his profession as an aviator. In your reading, some experts argue that in patients with even a short duration of atrial fibrillation (less than 48 h), there should still be a period of at least 4 wk of anticoagulation following conversion.¹

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4. Now that you have decided that this patient may likely need some form of anticoagulation, how else would you follow and treat this condition long term?

- A. Leave it alone. Atrial fibrillation will go away with time.
- B. Talk to an electrophysiologist about radiofrequency ablation.
- C. Check the patient's rhythm and rate with ambulatory monitoring every 6 mo.
- D. B and C.
- E. None of the above.

ANSWER/DISCUSSION

4. D. Radiofrequency ablation with ambulatory monitoring is an appropriate treatment plan in an aviator. One study published in the *New England Journal of Medicine* compared the use of ablation versus medical management in 264 patients and found no significant difference between the efficacy of treatment in either group.² That being said, ablation is a single event when successful; in comparison, the rhythm and rate control medications used have side effects, and the need for long-term use is typically not approved in the aviation community. If a patient is treated with antiarrhythmics or rate control medications, he or she must be off those medications and symptom free for at least 6 mo before an ambulatory monitoring period can be done.

5. What is the rate of conversion from paroxysmal to persistent atrial fibrillation?

- A. 100%. All those with paroxysmal atrial fibrillation end up in constant arrhythmia after 1 yr.
- B. 50%. Approximately half of patients progress to persistent atrial fibrillation.
- C. 6%. Those with few comorbidities seldom convert to consistent rhythm disorder.
- D. 0%. There is no risk of conversion.

ANSWER/DISCUSSION

5. C. Conversion to persistent atrial fibrillation is certainly a worry in our patient and all patient populations. The HATCH score can be used to calculate the risk of transformation. This scoring, similar to the use of CHA₂DS₂-VASc for anticoagulation purposes, gives points to comorbidities to assess risk. Hypertension, age greater than 75 yr, and chronic obstructive pulmonary disease are all given one point, while congestive heart failure and stroke or transient ischemic attack are given two points. A score of 0 with the HATCH calculations has a risk of progression to sustained atrial fibrillation of 6% over a 1-yr period. Conversely, a score of 5 increases that threat to 50%.⁴ An interesting and concerning statistic was discovered in a study published in *Circulation* stating that one in five patients with a history of symptomatic atrial fibrillation was reported to show atrial fibrillation on EKG while asymptomatic at the time of the EKG recording.¹² While asymptomatic patients typically had better left ventricular function and lower maximal heart rates with atrial fibrillation, their prognosis for further heart disease and stroke was no less severe than symptomatic patients.⁷

The pilot is now in a nonflying status since his second recurrence of atrial fibrillation. He is interested to know when or if he could return to flying.

6. What do you tell this pilot?

- A. His case will have to be evaluated by the respective waiver authority.
- B. He can return to flying once he has a documented normal, 24-h Holter monitor.
- C. He can resume flying now, since he feels back to normal.
- D. He can return to flying when he can drink a frozen beverage without recurrence.

ANSWER/DISCUSSION

6. A. Due to the risks associated with radiofrequency catheter ablation and chance of recurrence despite treatment, the pilot elects to not proceed with radiofrequency catheter ablation. The Air Force Waiver Guide, U.S. Navy's Aeromedical Reference and Waiver Guide, and the U.S. Army Aeromedical Policy Letters state that a waiver will not be recommended in recurrent cases in the absence of treatment with radiofrequency ablation.^{3,11,13} After consulting the Naval Aerospace Medical Institute in Pensacola, FL, you are advised to submit a waiver for special consideration with a cardiology consult, exercise treadmill testing, echocardiogram, and ambulatory EKG monitor obtained 3–6 mo after the event. According to the Guide for Aviation Medical Examiners, for a civilian aviator with recurrent atrial fibrillation, all pertinent information and a current status report needs to be submitted for review by the Federal Aviation Administration.⁶ The pilot is currently awaiting a decision by the Naval Aerospace Medical Institute and has not had another recurrence of atrial fibrillation.

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You are a flight surgeon at a Marine Corps base in an overseas location. You are asked by a physician assistant (PA) for assistance on a dermatological case. Prior to seeing the patient, you ask the PA for more information. He states the patient is a 20-yr-old man who recently returned to base after 8 d in the field and complains of a rash developing on his right arm. On exam, the PA noticed a tattoo on his right arm and firm, granulomatous 2- to 3-mm papules within the tattoo. The patient said he received the tattoo 4 wk ago. The initial diagnosis was folliculitis and the patient completed a course of Keflex 250 mg four times a day for 10 d. Complete blood count, comprehensive metabolic panel, and hepatitis C panel were obtained and unremarkable. When the lesions did not resolve, he was given triamcinolone 0.5% twice a day with no improvement. On exam today, the PA states there are erythematous pustules within the tattoo.

1. What should you do next?

- A. Send the patient home on Septra DS.
- B. Tell him to continue with the triamcinolone.
- C. Obtain more history on the tattoo.
- D. Perform a biopsy.
- E. Both C and D.

ANSWER/DISCUSSION

1. E. Tattoos have become increasingly popular in society, with one in five U.S. adults reporting at least one tattoo (21%).⁴ Potential complications of tattooing include hepatitis B, hepatitis C, bacterial endocarditis, squamous cell carcinoma, and basal cell carcinoma, as well as skin and soft tissue infections due to methicillin-resistant *Staphylococcus aureus* and nontuberculous mycobacteria (NTM).¹² The presentation

of these cutaneous infections is quite variable, leading to frequently missed diagnoses. Lesions with characteristic inflammatory changes should be biopsied, especially in a case such as this, which has been refractory to medication.¹⁰

You ask the patient about his tattoo and he states he obtained it about a month ago and developed a rash in the area 2 wk later. He has noticed an increase in the size and number of lesions and describes them as pruritic. He says he received the tattoo with a friend who has also developed a similar rash. Upon further inspection you notice the affected areas are those within the gray shading. The patient states the black ink was diluted with tap water to create gray ink for the shading. You perform a punch biopsy.

2. While you wait for the results of the biopsy, what should you do?

- A. Treat empirically for a suspected *Mycobacterium* species.
- B. Contact the public health officer so the case can be reported.
- C. Wait until the biopsy results come back before treating the patient.
- D. Both A and B.

ANSWER/DISCUSSION

2. D. Nontuberculous mycobacteria infections associated with tattoo placement have been reported worldwide.^{7,11} The majority of these infections are caused by three types of rapid-growing nontuberculous mycobacteria (RGM): *Mycobacterium chelonae*, *M. abscessus*, and *M. fortuitum*.^{14,19} RGM contamination has been found to occur

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