You're the Flight Surgeon

This article was prepared by Timothy A. Netters, Jr., M.D., M.P.H.

It is midsummer and you have been assigned to a midsized Air Force base in the Southwest, and it is your first tour as a flight surgeon. You were lucky during the assignment process and were given a squadron medical element position and assigned to be the medical backbone of an esteemed heavy squadron. As the new flight surgeon, you do your due diligence and earn the trust and respect of your new squadron and make it a point to make it known that they can come to you with anything medical or otherwise.

While in clinic on a Friday afternoon, one of your pilots books an acute appointment asking to be seen by you specifically. The staff grants the member's request and the patient's vital signs are as follows: heart rate 83; temperature 100.9°F, respiratory rate 13, blood pressure 123/78. The patient is a 31-yr-old white man who presents with a dry cough, fever, sore throat, and a runny/stuffy nose for the past 3 d. He has no significant past medical history and his social history is as follows: nonsmoker, consumes one to two alcoholic beverages per week on the weekend. The patient states that his 2-yr-old child, who attends daycare on base, has similar symptoms at home and is being taken to the pediatrician. He reports associated generalized muscle pain that is better with Motrin and generalized fatigue. On physical exam you find the following: boggy nasal turbinates bilaterally with clear drainage, erythematous oropharynx with no tonsillar enlargement or purulence, clear chest to auscultation bilaterally, mild generalized tenderness to palpation in the upper/lower extremities bilaterally. You place the pilot on duties not including flying (DNIF) and treat him conservatively. The following Friday, the patient, appearing to be on the mend, catches you at your squadron office to update you on the status and treatment of his son and himself.

1. Given this patient's presentation, review of system, and physical exam findings, what diagnoses would you consider to be the most likely cause of his illness at this point?

A. Viral upper respiratory infection (URI).
B. Influenza.
C. Atypical pneumonia (walking pneumonia).
D. Seasonal allergies.

ANSWER/DISCUSSION

1. A. The most likely diagnosis based on the patient's presentation is a viral URI. Viral URIs typically last from 6–10 d and resolve on their own. Often, supportive treatment is given to alleviate the associated symptoms. Depending on the virus, most commonly rhinoviruses, symptoms can vary and closely mimic influenza.[1] Influenza would be a strong consideration given the cold-like symptoms in conjunction with the generalized muscle aches; however, given the patient most likely contracted the illness from his son and the requirement of child-care workers on base to obtain their yearly flu vaccination make influenza slightly less likely. Additionally, this time period is outside of the traditional influenza season, making it even more less likely. Atypical pneumonia would have been a strong consideration had the patient's symptoms taken a more protracted course. Traditionally, atypical pneumonia will usually resolve within a few weeks without the need for antibiotics and, given the relatively quick resolution of the patient's symptoms, this is not likely to be the correct diagnosis. It is unlikely that the patient's symptoms are due to seasonal allergies, as it would be an atypical presentation with the low grade fever and body aches, so of the above choices it would be near the bottom of the list of potential differential diagnoses.

The member informs you that on presentation to the pediatrician, his son had a rash with what appeared to be small blisters on his hands and feet, fever, and was more irritable than usual. Since being seen, he relays that his child's condition has improved greatly with over-the-counter medications and without the need for antibiotics.

2. Given the member's description of his son's symptoms and treatment, what was the child's most likely diagnosis?

A. Respiratory syncytial virus infection.
B. Measles.
C. Allergic reaction.
D. Hand, foot, and mouth disease (HFMD).

ANSWER/DISCUSSION

2. D. The most likely diagnosis for the member's child is HFMD, which is typically caused by the coxsackie (the B variant in particular) family of viruses. The diagnosis is all but assured given the characteristic blistering rash that was described by the member that covered the child's

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hands and feet with the associated fever.[5] Respiratory syncytial virus is unlikely given the blistering rash and the lack of described upper respiratory symptoms. Measles, like HFMD, has a characteristic exanthem as well. However, the exanthem does not usually involve blistering of the skin and will usually be associated with a high fever and characteristic koplic spots in the oral cavity. An allergic reaction could be a possibility; however, the typical skin reaction to an allergen is hives and localized pruritus. Hives is typically a nonblistering rash that tends to become generalized with prolonged exposure to the irritant.

The rest of the week is otherwise uneventful and, during subsequent interactions with the member, he appears to have fully recovered from his illness. Approximately a week and a half passes and the member again tracks you down while you are at the squadron because he has been noticing some new symptoms that concern him. The member relays to you that he seems to tire more easily now, has difficulty breathing at times when he exerts himself or even when he is laying down, has a faster heart rate than what is normal for him, and has a near constant dull generalized chest pain. Being the good squadron medical element that you are, you offer to accompany the member to the clinic so that you can formally evaluate him. Upon arriving at the clinic, you ask one of the techs to perform an electrocardiogram (EKG) on the member prior to you evaluating him. The tech presents the EKG to you and, pulling from your cardiology knowledge from your previous training, you recognize that the member has sinus tachycardia and generalized ST segment elevations. Additionally, you order a chest X-ray due to the report of shortness of breath, which is reported as normal. The remainder of the patient's physical exam is unremarkable, and as an extra measure of safety you arrange for the member to be further evaluated by an off-base cardiologist.

3. Given the patient's presenting symptoms and EKG changes, what is the most likely diagnosis at this point?

A. Costochondritis.
B. Myocardial infarction.
C. Myocarditis.
D. Pneumothorax.

ANSWER/DISCUSSION

3. C. Given the complete picture of shortness of breath while laying down, chest discomfort, and diffuse generalized EKG changes 1–2 wk after a viral illness, myocarditis is the most likely diagnosis.[6] Myocarditis is relatively common; however, a previous viral infection (in this case most likely coxsackie virus) is an important cause of myocarditis and its subsequent sequelae,[8] and should be taken into account given this patient's presentation and ancillary test results. Additionally, costochondritis typically presents as point tenderness of the chest wall that worsens with deep breaths and is often sharp in nature, originating near the outer border of the sternum typically. Myocardial infarction typically presents as a pressure sensation in the chest in conjunction with crushing chest pain that often radiates to the left neck and arm. Also, the nonspecific findings on the EKG make this diagnosis less likely. The presentation for a pneumothorax is typically marked shortness of breath with decreased or absent breath sounds on the affected side on physical exam.

The member is seen by a cardiologist, who performs another EKG showing a similar pattern and opts to first order a transthoracic echocardiogram (TTE), which essentially shows no abnormalities. Understanding that a TTE will not target areas of inflammation specifically, the cardiologist opts to perform contrast-enhanced cardiovascular magnetic resonance imaging (CE-MRI). The CE-MRI impression details midwall contrast enhancement in the inferoseptal wall, indicating a potential area of inflammation or other myocardial changes, but is otherwise normal in function and structure. The cardiologist gives the member a formal diagnosis of myocarditis based on his presenting symptoms and cardiac MRI results. Understanding that mild cases of myocarditis typically resolve on their own, the cardiologist decides not to treat the patient and advises the patient to abstain from strenuous activity for 3–6 mo and to return if there are any changes in his status.

A couple of months pass, and the patient relays to you that his chest pain has nearly resolved and that his shortness of breath has gotten significantly better. With his new-found energy and physical improvement, the member elects (without your knowledge) to participate in squadron physical training in an effort to ease back into working out again. Approximately a week goes by and the patient presents on your clinic day. During your interview, the member states that his fatigue, shortness of breath, and mild chest discomfort have returned. Additionally, he states that he has also noticed that his flight boots feel tighter on his feet than usual and denies having obtained a new pair. On physical exam, pertinent positives are bilateral crackles and wheezing in the lungs, a new S3 gallop with a displaced point of maximal impulse, and +1 pitting edema in the lower extremities bilaterally. A chest X-ray shows bilateral patchy infiltrates in the lungs. Given the progression of the member's symptoms, you again seek consultation from the off-base cardiologist. This time, due to the patient's lower extremity edema, the cardiologist performs a repeat TTE and another CE-MRI. The echocardiogram shows enlargement of the left ventricle with subsequent contractile dysfunction and an estimated ejection fraction of 35%. The CE-MRI verifies the left ventricular enlargement and shows expanded contrast enhancement in the inferoseptal wall.

4. What pathology is the patient most likely to have acquired by engaging in strenuous activity in the face of a myocarditis diagnosis?

A. Cardiac tamponade.
B. Dilated cardiomyopathy.
C. Pericardial effusion.
D. Pulmonary hypertension.

ANSWER/DISCUSSION

4. B. The correct answer in this case, given the patient's history of a coxsackie viral illness progressing to myocarditis, is dilated cardiomyopathy, for which the first imaging step would be to obtain a TTE.[4] The CE-MRI is an important noninvasive test to confirm the diagnosis of myocarditis and give the treating physician potential foresight to areas of the heart wall that could be susceptible to future insults.[9] Approximately 20% of cases of acute myocarditis progress to dilated cardiomyopathy[9] and, per the patient's echocardiogram impression, he meets all of the criteria necessary to diagnose dilated cardiomyopathy (left ventricular enlargement,

diminished contractility, and an ejection fraction less than 40%). The other tipoff is the previous coxsackie virus infection and the fact that 10–34% of diagnosed dilated cardiomyopathies suffer from viral myocarditis as well.[9] Cardiac tamponade is unlikely, as it typically results in a more acute clinical picture that can lead to sudden death if not properly diagnosed and treated. Additionally, the echocardiogram report did not mention the presence of fluid in the pericardial sac**.** A pericardial effusion could cause similar symptoms; however, it is very likely that if there was fluid surrounding the heart, it would have been detected via the echocardiogram, much like cardiac tamponade. Additionally, no jugular venous distention was reported on exam. Pulmonary hypertension is typically a diagnosis of exclusion that can have similar presenting symptoms (fatigue, shortness of breath, edema). Considering there is a visualized abnormality of the heart, one would choose to address that issue as opposed to pursuing a diagnosis of exclusion.

AEROMEDICAL DISPOSITION

Assuming that the patient recovers to an asymptomatic state, what would his potential for future flying be? Per the most recent Air Force waiver guide, dilated cardiomyopathy does not have waiver potential for Flying Classes I and IA. There is a possibility of receiving a waiver for all other flying classes depending on the severity and at the discretion and evaluation of the Aeromedical Consultation Service.[3] The Navy waiver guide does not address dilated cardiomyopathy. Considering this patient has compromised contractility and a severely diminished ejection fraction, it would be unlikely that he would receive a waiver unless these tests returned to baseline.[7] In the Army, dilated cardiomyopathy is one of the listed conditions that does not meet the standards of flying duty.[10] Finally, this patient's condition is not one of the 15 disqualifying conditions detailed by the Federal Aviation Administration.[2] It is not one of the listed conditions that could receive an Aviation Medical Examiner Assisted Special Issuance or a Conditions AMEs Can Issue (CACI). The condition would require an FAA Special Issuance.[2]

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