You're the Flight Surgeon

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Tuesday morning sick call is busy after a holiday weekend. Your clinic is overrun with upper respiratory infections and injuries acquired over the last 3 d. Your technician is concerned about your next patient. She reports that he looks uncomfortable sitting in the exam room. He is a 25-yr-old African-American man with abdominal pain. He is a pilot stationed at another base who came to the area over the weekend to climb a popular peak. Although he made it to the 12,000-ft summit, it was not easy going. Over the last 24 h he has had unremitting left upper quadrant abdominal pain. He also has nausea, pain with inspiration, and pain radiating to the left shoulder. Vital signs include a heart rate of 95 bpm, blood pressure of 135/85 mmHg, respiratory rate of 22, and temperature of 98°F. Physical exam reveals left upper quadrant tenderness with guarding.

1. What item in your differential diagnosis is most likely?

A. Splenic infarction.
B. Myocardial infarction.
C. Infectious gastroenteritis.
D. Splenic rupture.

ANSWER/DISCUSSION

1. A. Splenic infarction is most likely given his recent altitude exposure. He has no history of trauma to the abdomen, which decreases the likelihood of splenic rupture. Although atraumatic splenic rupture is possible, it is rare and more likely to occur with malignancy, infection, or inflammatory processes. Pain due to infectious gastroenteritis or myocardial infarction does not typically localize to the left upper quadrant. Kehr's sign (i.e., referred shoulder pain) and pleuritic chest pain are due to diaphragmatic irritation.

2. All initial military flying class physicals undergo laboratory evaluation. Which blood disorder that he has previously been tested for most likely increased his risk for this event?

A. ABO blood group.
B. G6PD enzyme activity.
C. Sickle cell trait.
D. Human immunodeficiency virus screening.

ANSWER/DISCUSSION

2. C. Sickle cell trait (SCT). Screening evaluation previously revealed that the patient had SCT. In contrast to persons with sickle cell disease, who carry two copies of the autosomal recessive sickling gene (HbSS) and are likely to experience painful vaso-occlusive events beginning early in life,[1] individuals with just one HbS gene and one normal HbA gene usually live a normal life. In rare cases, however, persons with SCT may also experience red blood cell sickling, leading to conditions such as exertional rhabdomyolysis, thromboembolic disease, acute chest syndrome, renal papillary necrosis, splenic infarct, and even exertional death. SCT is much more common in individuals of West African and Mediterranean descent, where the HbS gene conferred a survival advantage against falciparum malaria.[8] Although splenic infarction is a possible complication of human immunodeficiency virus infection, the vaso-occlusive event is more likely due to SCT given his race and altitude exposure.

3. What imaging would you order to confirm your suspected diagnosis?

A. Ultrasound.
B. Magnetic resonance imaging.
C. Computed tomography (CT) with contrast.
D. Send him to the operating room; imaging is not required.

ANSWER/DISCUSSION

3. C. CT with contrast. CT scan is the gold standard for evaluation of splenic injury. Ultrasound may also be adequate for diagnosis and is often used in emergency departments in the workup of abdominal trauma. Magnetic resonance imaging may also visualize the lesion, but it is less likely to be accessible in an acute setting.[5] Since the patient's

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vital signs are stable, he should not be rushed to the operating room without imaging.

As suspected, the imaging reveals a splenic infarct. He is admitted for pain control and observation. After several days, he is feeling better. He is ready to head back to his home base, but this requires a commercial flight.

4. Should you allow him to fly home?

A. Sure.
B. No way.
C. Yes, but only with an altitude restriction.

ANSWER/DISCUSSION

4. A. Commercial flights are generally pressurized to 6000–8000 ft and he will not be dehydrated or exerting himself. SCT patients with splenic injuries have flown commercially without any additional injury.[6] Before leaving the hospital, he should be warned about the risks of overwhelming postsplenectomy sepsis and vaccinated against influenza and encapsulated bacteria (*Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Haemophilus influenzae* type B).[7]

5. After he returned to his home base and fully recovered, he reports to his local flight surgeon for return to flying status. Should the patient be returned to flying status?

A. Yes. This was a rare event and there is no need for any duty restrictions.
B. Yes, but he will need a waiver first.
C. No. Symptomatic SCT is disqualifying from flying duties.

ANSWER/DISCUSSION

5. C. While persons with SCT typically have a normal life expectancy, conditions common in military aviation—including altitude exposure, hypoxemia, and dehydration—may precipitate vaso-occlusive events. Asymptomatic SCT is acceptable for all U.S. Air Force flying classes provided the HbS is $\leq$ 45% on electrophoresis (it is extremely rare for someone with SCT to have HbS > 45%). Symptomatic SCT, however, is disqualifying for Flying Class I, II, and III. SCT, with or without a history of symptoms, is not disqualifying for ground-based positions such as air traffic controllers or remotely piloted aircraft pilots.[3] U.S. Navy aviators with SCT are disqualified if they require treatment,[4] whereas U.S. Army aviators with SCT are disqualified if they experience a vaso-occlusive event on exposure to altitude during flight or in the decompression chamber.[9] Federal Aviation Administration regulations make no specific mention of SCT, but "other disease of the blood or blood-forming tissues that could adversely affect performance of airman duties," which presumably includes SCT, requires a Federal Aviation Administration decision.[2]

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