Atraumatic Splenic Rupture After Weight Lifting in a Patient Presenting With Left Shoulder Pain

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ABSTRACT  We discuss a 23-year-old active duty male who presented to the emergency department with left shoulder pain after deadlifting heavy weights the day prior. His physical examination revealed a nontender and otherwise unremarkable left shoulder with full range of motion and mild tenderness to palpation in the left upper quadrant of the abdomen. A bedside focused assessment with sonography for trauma (FAST) examination showed free fluid in the abdomen and a computed tomography scan showed a splenic laceration and splenomegaly. He later tested positive for infectious mononucleosis. This is the first case report of atraumatic splenic laceration after heavy weight lifting. This case illustrates the importance of a broad differential and high index of suspicion in the patient with undifferentiated abdominal pain in order to diagnose a potentially fatal disease.

INTRODUCTION
Atraumatic splenic rupture is a rare but potentially fatal condition. This may occur in patients with underlying splenic pathology from infections like mononucleosis and malaria, malignancy, metabolic disorders, and hemangiomas.1,2 This is in contrast to the even more rare “spontaneous” splenic rupture that occurs in patients without any underlying process.3 Patients are often unaware of underlying conditions that may make their spleens more susceptible to rupture, and if not considered by physicians, the diagnosis may be missed or delayed.

Infectious mononucleosis (mono), frequently caused by Epstein-Barr virus, is a common infection with about 90% of people being infected by adulthood.4 Splenomegaly occurs in about 50% of infected patients.5 Mono is the most common cause of atraumatic splenic rupture in the western world, reported in up to 0.5% of patients with proven mono and is also the leading cause of death in this patient population.2,4,5 Abdominal pain is even more rare in mono, only present in 1–2% of patients and typically indicative of a ruptured spleen.5

CASE REPORT
A 23-year-old active duty male presented to the emergency department with a chief complaint of left shoulder pain. The patient described aching left shoulder pain that began the night prior while deadlifting heavy weights. The patient denied fevers, lightheadedness, sore throat, chest pain, dyspepsia, or back pain. On examination, he was afebrile and hemodynamically stable. Focused examination of the left shoulder showed no anatomic abnormalities, no bruising or skin changes, no focal tenderness to palpation, full and painless range of motion, and a normal neurological examination. Because the patient’s reported symptoms and physical examination did not correlate, we expanded our evaluation. Abdominal examination revealed mild tenderness to palpation in the left upper quadrant without guarding or rebound. Given the unexpected abdominal tenderness with unexplained shoulder pain, laboratory studies, including a hemoglobin level, were obtained and were within normal limits. A bedside focused assessment with sonography for trauma (FAST) examination showed free fluid in the left greater than right upper quadrants and an enlarged spleen. General surgery was consulted for early involvement given the potential for decompensation. The patient was diagnosed with a grade 3 splenic laceration and splenomegaly without active bleeding on computed tomography scan (Figs. 1 and 2). His mono-spot test was positive. The patient was admitted for monitoring and serial abdominal examinations. The next morning, he remained hemodynamically stable with a stable hemoglobin. His symptoms were improving and he was tolerating a diet so he was discharged home that day with activity restrictions. At follow-up in the general surgery clinic two weeks later, the patient’s symptoms were improving. At the time of publication, the patient had not suffered any complications from this splenic laceration.

DISCUSSION
This case illustrates several important points regarding the emergency medicine clinician’s evaluation and management of cases that lack straightforward presentations. This case is
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First, this patient presented atypically. Splenic rupture usually presents as left upper quadrant abdominal pain with associated tenderness. Referred left shoulder pain with palpation of the left upper quadrant, known as Kehr’s sign, may be present from hemoperitoneum irritating the diaphragm. In severe cases, there may be associated hemodynamic instability, pallor, diaphoresis, or other signs of shock. Our patient’s primary chief complaint was shoulder pain. He was hemodynamically stable and the event was not directly preceded by trauma. Given the history of weight lifting with upper extremity pain, the initial evaluation focused on a musculoskeletal etiology. On examination, he had abdominal tenderness which was out of proportion to the presentation and prompted further testing. There are other case reports of atraumatic splenic laceration in which the patient presents with a chief complaint other than abdominal pain. For example, a teenage male with primarily neck and shoulder pain and an elderly male presenting with epigastric and left sided chest pain, both ultimately diagnosed with atraumatic splenic laceration.\textsuperscript{4,6} Anchoring on the initial chief complaint could lead to a missed diagnosis. Broadening a differential when the history and physical examination do not correlate is essential to guide the clinician to the correct diagnosis.

Second, our patient’s history of weight lifting is not typically associated with intra-abdominal solid organ rupture, and he denied any history of blunt abdominal trauma which is more commonly associated with splenic lacerations. In atraumatic splenic ruptures, the diseased spleen is presumed to be more susceptible to minor injury. Debnath et al. compare a diseased spleen to that of a “pathologic bone fracture” to describe the fragility of the spleen to minor, often undetectable insults.\textsuperscript{3} A proposed mechanism of rupture is that infection, malignant infiltration, and engorgement result in micro-tears and weakening of the spleen which is susceptible to increased portal venous pressure from valsalva maneuver and external compression from diaphragmatic or abdominal wall contraction.\textsuperscript{1,3,5} Though there are documented cases of splenic laceration from sneezing, a snowball fight, and a fall from height in a pediatric patient, at the time of this publication, there were no case reports of splenic laceration from weight lifting.\textsuperscript{3,7,8}

Further complicating our patient’s presentation, he denied constitutional symptoms to suggest infectious mononucleosis, nor was he practicing activity avoidance as his remarkable splenomegaly was as of yet undiagnosed. There are case reports of cardiac arrest after atraumatic splenic laceration, including in a young child with known infectious mononucleosis.\textsuperscript{3,5} Although traumatic and atraumatic splenic lacerations can be fatal, our patient fortunately had a good outcome. Appropriate activity restrictions and return precautions for the development of abdominal pain in patients with splenomegaly are necessary and could be lifesaving.

CONCLUSION
This patient is not unlike thousands of other healthy, active duty patients who present to clinics and emergency departments with complaints of shoulder or abdominal pain. Splenic pathology must be considered on the list of differential diagnoses. A broad differential diagnosis and thorough physical examination are crucial in the assessment of undifferentiated abdominal pain to prevent missing potentially fatal diagnoses.

especially applicable to military medicine where the patient population is typically young, healthy, and active adults.
in the emergency department. All patients with splenomegaly, especially those with infectious mononucleosis, should be counseled on activity restrictions as part of their discharge precautions.

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**REFERENCES**

1. Agarwal AA, Sonkar A, Kushwaha J, Gaurav K: Spontaneous splenic rupture presenting as haemoperitoneum: coinfection of *Plasmodium vivax* and *Plasmodium falciparum*. BMJ Case Rep 2013; 2013: bcr2013008851.

2. Debnath D, Valerio D: Atraumatic rupture of the spleen in adults. J R Coll Surg Edinb 2002; 47(1): 437-45.

3. Reinhold G, Melonakos T, Lyman D: A near fatal sneeze spontaneous splenic rupture: a case report and review of the literature. Clin Prac Cases Emerg Med 2017; 1(3): 190-3.

4. Sergent SR, Johnson SM, Ashurst J, Johnston G: Epstein-Barr virus-associated atraumatic spleen laceration presenting with neck and shoulder pain. Am J Case Rep 2015; 16: 774-7.

5. Rinderknecht AS, Pomerantz WJ: Spontaneous splenic rupture in infectious mononucleosis: case report and review of the literature. Pediatr Emerg Care 2012; 28(12): 1377-9.

6. MacKenzie KA, Soiza RL: Spontaneous splenic rupture mimicking pneumonia: a case report. Cases J 2008; 1(1): 35.

7. Bušková J, Poláčková MJ, Pavlovský Z: Snowball fight – an unusual cause of spleen injury. Soud Lek 2017; 62(1): 6-7.

8. Briassoulis G, Fitrolaki D-M, Tavladaki T, Voloudaki A, Ilia S: At the beach to jump or not to jump? Pediatr Emerg Care 2016; 32(1): 34-5.