A 6-Year-Old Boy with Shoulder Pain

Kari Edelson, DO

A 6-year-old male presented to his primary care physician complaining of fever and left shoulder pain. Six weeks before presentation, he had fallen off the monkey bars and was treated for a right distal radius and ulna fracture. His cast was removed and he was otherwise doing well until 2 days before presentation when he developed a high-grade fever with no initial focus. Over the 2 days following the fever, the patient began complaining of pain over the distal end of the left clavicle. He was seen by his pediatrician and a left shoulder X-ray was performed and found to be normal.

On physical exam, the physician felt the patient had otitis media and placed him on clarithromycin. The next day, the shoulder pain worsened and the patient started complaining of additional pain over the anterior left ribcage at T10-11. He again returned to his pediatrician, who stopped the clarithromycin and ordered labs revealing WBC count of 25,200/mcL; platelet count of 418,000/mcL; C-reactive protein (CRP) of 46.5 mg/dL; and an erythrocyte sedimentation rate (ESR) of 50 mm/hour. With the thought of possible osteomyelitis of the shoulder, an MRI was ordered and was also reported as normal. However, because of the extent of...
the pain and significant evidence for an underlying inflammatory process, the patient was admitted to the hospital for further work-up under the supervision of an orthopedist.

The past medical history included a left orchiopexy for an undescended testicle at the age of 8 months. The patient had no history of recurrent infections or recent travel. He lived at home with his mother, father, and brother, who were all well.

On admission to the hospital, 6 days after the initial presentation, the patient appeared tired but was in no acute distress. He remained intermittently febrile, but remaining vitals were stable. There were decreased breath sounds and slight crackles in the left lower lobe without any signs of respiratory distress, normal respiratory rate and oxygen saturation of 100% RA. The patient was refusing to take deep breaths because of pain. He complained of tenderness over the distal end of the left clavicle, but had full active range of motion of the shoulder without crepitus, overlying erythema, warmth, or swelling. He was intermittently sensitive to palpation over the left ribcage at T10-T11 along the mid-axillary line. His abdomen was soft and non-tender without splenomegaly or guarding. Upon hospital admission, repeat labs revealed hemoglobin of 11.2 g/dL, platelets of 458,000 /mcL; ESR was 81 mm/hour; WBC count of 22,300 /mcL with 69% PMNs, 3% bands, 18% lymphocytes, and 8% monocytes. Chest film demonstrated a small left pleural effusion of unknown significance (Figure 1, see page 342). Ceftriaxone was started and azithromycin and metronidazole were also later added.

Because of the perplexing presentation of left pleural effusion and left shoulder pain with a negative MRI but increased ESR, a CT scan of the thorax was performed the next day. The CT of the thorax revealed a small left pleural effusion with left lower lobe volume loss and/or consolidation. Incidentally, the inferior frames revealed what appeared to be a large, complex cystic area just inferior to the effusion (see Figure 2). This was suggested to be old trauma or an inflammatory process. The patient subsequently underwent thoracentesis with drainage of 40 cc of serosanguinous fluid revealing WBC 1,900/UL with 78% PMNs; 7% lymphocytes; glucose 90 mg/dL; amylase <10 U/L; LDH 157 U/L; and protein 3.4 g/dL. The patient tolerated the procedure well; however, fever persisted over the next 2 days, reaching a peak of 104.4°F without any clinical improvement in pain in both the shoulder and ribs. Tobramycin was added at this point and a CXR was repeated, revealing an enlarging left pleural effusion. The patient was taken for a second thoracentesis and thoracostomy tube placement, at which time an additional finding led to the final diagnosis.

**DISCUSSION**

A splenic abscess was identified by the radiologist during the thoracentesis. After drainage, a repeat CT scan showed evidence of an old splenic fracture (see Figure 3, page 344). Final cultures grew *Salmonella* serogroup B.

Isolated splenic abscesses are rare in children and often difficult to diagnose, as is seen with this case. They are typically more common in adults and usually occur via hematogenous spread, especially in the immunocompromised patient. Splenic trauma is a known predisposing factor, along with splenic infarction from disorders such as sickle cell disease, other hemoglo-

**Figure 2. Complex cystic mass seen on CT of thorax. Source: Edelson K. Reprinted with permission.**

**DIAGNOSIS**

**Splenific abscess**
binopathies, and leukemia. Most infectious agents are aerobes, predominantly *Streptococcus*, *Staphylococcus*, *Enterococcus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus*, *Pseudomonas*, and *Salmonella* species.

There have been many recent advances in the management of these abscesses. In the past, a splenectomy was the treatment of choice, leaving patients with compromised host immunity against encapsulated organisms. There have now been numerous case reports of successful management with the use of CT-guided percutaneous drainage, in combination with antibiotics. Percutaneous drainage is indicated for uniloculated or biloculated abscesses or for patients who are unstable for surgery. Percutaneous drainage is minimally invasive, maintains host immunity, and is a successful treatment option in the appropriate patient when combined with antibiotics.

Non-operative management is also the preferred approach in hemodynamically stable pediatric patients with splenic trauma. This approach is successful in more than 90% of cases and allows the conservation of host immunity against encapsulated organisms. There have now been numerous case reports of successful management with the use of CT-guided percutaneous drainage, in combination with antibiotics. Percutaneous drainage is indicated for uniloculated or biloculated abscesses or for patients who are unstable for surgery. Percutaneous drainage is minimally invasive, maintains host immunity, and is a successful treatment option in the appropriate patient when combined with antibiotics.

Since there had been no standardized protocol for treatment of these injuries before the 1980s, Fallat and Casale surveyed 117 pediatric surgeons to determine recommended practice guidelines. These guidelines include grading of splenic injury by computed tomography in initial presentation and admission of all patients for observation. Patients with grade III–V injuries are typically admitted to the PICU and all patients should receive fluid replacement and monitoring for hemodynamic instability. Patients who remain unstable, with blood loss greater than 40mL/kg after repeated replacements, must be managed surgically.

In our patient’s case, several factors contributed to the diagnostic difficulty. The splenic laceration was not appreciated with the initial trauma; the child did not have a predisposing immunodeficiency; the presenting symptom was referred scapular pain that the 6-year-old boy was calling shoulder pain; and he was complaining of rib pain instead of the expected abdominal pain. Once the splenic laceration was identified, it could be presumed that this was sustained during the initial fall off the monkey bars, which led to development of a hematoma and eventual secondary abscesses. After growth of *Salmonella* from the cultured fluid, it was revealed that the family had purchased several pet turtles, known carriers of *Salmonella*, around the time the child had fractured his wrist. Given that the splenic laceration was identified 6 weeks after initial injury, the exact grade could not be determined for purposes of management. However, he was successfully treated non-operatively with percutaneous drainage, antibiotics, and subsequent observation until resolution.

Figure 3 A-B. CT of the abdomen demonstrates large splenic fracture after abscess drainage with pigtail catheter. Source: Edelson K. Reprinted with permission.

CONCLUSION
Splenectomy is a very rare disease in immunocompetent children and is potentially life-threatening, although advances have been made to improve morbidity and mortality. This diagnosis should always be considered in any patient with leukocytosis, fever, and signs suggestive of left upper quadrant pathology, including left shoulder pain, left-sided rib pain and left-sided pleural effusion without respiratory symptoms.

REFERENCES