"...Take truce with the unruly spleen..."

—Shakespeare, "Romeo and Juliet"

Bijon Das, MD, CCFP(EM); and Sam G. Campbell, MB BCh, CCFP(EM)

A 16-year-old presents with pain in his left shoulder. He had collided with another player during a hockey game the previous evening. He also complains of pain in the left upper quadrant of his abdomen, which gets worse when he lies down or takes a deep breath (Table 1).

Questions:

1. **What clinical clues suggest occult abdominal injury?**
2. **What is the initial management?**
3. **What complications should I anticipate?**
4. **When else should I consider splenic rupture?**

Table 1
Vital signs and examination results

Vital signs

- Pulse: 62 beats/minute
- Blood pressure: 110/60 mmHg
- Temperature: 36.3 C
- Respiratory rate: 22 breaths/minute
- Oxygen saturation: 99% on room air

Examinations

- Left upper quadrant: Moderate tenderness with slight voluntary guarding
- Percussion and rebound tenderness: Absent
- Lung auscultation: Good breath sounds bilaterally, although full inspiration is restricted by pain

The rest of the exam is unremarkable.

Answers:

1. What clinical clues suggest occult abdominal injury?

The shoulder pain and abdominal findings suggest an intraperitoneal injury. In this case, it is most likely a ruptured spleen. His notably unremarkable hemodynamic vital signs and clinical examination are not atypical. Young patients can compensate for blood loss before showing clinical evidence of shock, and acute hemoperitoneum in the early stages may not cause signs of peritonitis.

The most common internal organ injured in blunt abdominal trauma is the spleen. Splenic injuries can coexist with rib fractures; liver laceration/rupture; or damage to the left kidney, diaphragm, or tail of the pancreas. History and physical exam continue to form the basis for the diagnosis. Although common in severe, generalized abdominal trauma, splenic injuries may follow less significant trauma localized to the right upper quadrant. Hypotension and tachycardia should raise suspicion of significant hemorrhage into the abdominal cavity, but may be absent initially. Signs of peritoneal irritation are typically present, although a large amount of intra-abdominal free blood may exist in the peritoneal cavity, with few physical findings. Other signs include percussion tenderness or bruising in the left upper quadrant, left upper quadrant pain, and pain referred to the left shoulder strap due to diaphragmatic irritation.

Children are more likely to be hemodynamically stable than adults with splenic injuries of similar severity. The ability to compensate for hypovolemia is also better in children and young adults. In this group, the risk of delayed or missed diagnosis is even greater.

2. What is the initial management?

All patients should have large bore venous access obtained at two sites. Crystalloid fluid boluses should be used liberally. The patient should be prepared for blood transfusion, which is indicated in cases where low blood pressure is refractory to initial fluid bolus.

Persistent hemodynamic instability demands immediate referral or transfer for exploratory laparotomy. If available, focused abdominal ultrasonography in the emergency department (ED) may identify free fluid and assist in the diagnosis of hypovolemic shock. Ultrasound should not be used alone to rule out splenic injuries. Stable patients should undergo a computed tomography (CT) scan.

Splenectomy is still the procedure of choice in many cases, so surgical consultation is indicated whenever splenic rupture is suspected. Criteria for non-operative management include hemodynamic stability, negative abdominal examination, absence of contrast extravasation, other associated injuries requiring laparotomy, or bleeding tendency.

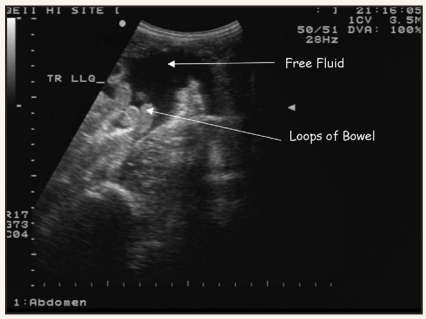

Figure 1. Ultrasound showing significant free intraperitoneal fluid.

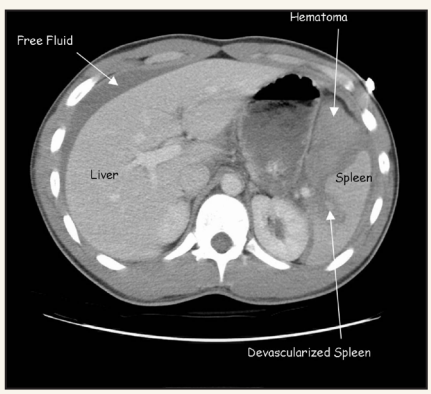

Figure 2. Enhanced CT scan of the abdomen showing laceration of the spleen and a large amount of perisplenic and free abdominal fluid compatible with hemorrhage.

3. What complications should I anticipate?

Complications of non-operative management include continuing or delayed bleeding, necrosis of the spleen, and abscess. Patients should be advised to avoid contact sports for three months following the injury.

Complications of splenectomy include overwhelming postsplenectomy infection, bleeding, transient thrombocytosis, pancreatitis, and intra-abdominal abscess. Splenectomized patients should receive pneumococcal, meningococcal, and hemophilus influenzae vaccine, and be counselled regarding their increased risk of severe infection before discharge from hospital.

4. When else should I consider splenic rupture?

Delayed splenic rupture occurs in 1% to 2% of cases of abdominal trauma and may present at a time remote from the initial trauma. Splenic rupture may occur as a result of most illnesses associated with splenomegaly, the most common of which is infectious mononucleosis. Although a history of recent viral infection is typical, splenic rupture may occur in the absence of other symptoms.

More on our patient

Two large bore intravenous drips were started. The patient was given a large fluid bolus and appropriate analgesics.

His initial hemoglobin was 120g/L. Platelets were $177x10^9$/L. Electrolytes and renal function were normal. Ultrasound showed significant amounts of free intraperitoneal fluid, and a heterogeneous appearance of the spleen (Figure 1). Enhanced CT scan of the abdomen and pelvis confirmed splenic laceration, with a large amount of free intraperitoneal fluid consistent with hemorrhage (Figure 2).

The patient was admitted to a surgical unit under close observation. Blood work the following morning, after appropriate fluid resuscitation, demonstrated a drop in his hemoglobin level to 89 g/L. He responded well to conservative therapy and was discharged three days later. Dx

This department covers selected points to avoid pitfalls and improve patient care by family physicians in the ED. Submissions and feedback can be sent to diagnosis@sta.ca.

Dr. Das is an emergency medicine resident, Dalhousie University, Halifax, Nova Scotia.

Dr. Campbell is an assistant professor of emergency medicine, Dalhousie University, and an ED physician, Queen Elizabeth II Health Sciences Centre, Halifax, Nova Scotia.