



Welcome to the seventh edition of the *North Memorial Trauma Update*. In this edition discussion will center on blunt splenic injuries.

Remember *Trauma Update* is GOING GREEN in 2010! Starting with our next edition in the first quarter issue in 2010, *Trauma Update* will only be distributed by email. For providers receiving *Trauma Update* in the mail, please send your email address to: traumaupdate@northmemorial.com so you can be added to the list. If you are already receiving *Trauma Update* by email either directly or as a forward you don't need to do a thing.

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North Memorial Trauma Update
North Memorial Health Care
3300 Oakdale Ave N
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Blunt Splenic Injury

Splenic injuries are the most common abdominal solid organ injury seen after blunt trauma. Though most splenic injuries are now treated non-operatively, complications, including death, can occur if injuries are not identified and appropriately treated. The purpose of this issue of *Trauma Update* is to share some of the keys to diagnosis and treatment of blunt splenic injuries.

Case Study

An 18 year-old healthy male athlete was the restrained driver involved in a car crash. His car was struck on the driver's side. He did lose consciousness. His complaints on arrival at your ED were left lateral chest, left shoulder and left hip pain.

Exam showed a young, awake, alert, well-developed male. Vitals: BP 100/60; Pulse 100; RR: 24; SaO₂: 98% on mask O₂. There was tenderness over the left lateral chest wall and left upper abdomen. Breath sounds and bowel sounds were normal. Otherwise, nothing is found on exam.

A Focused Assessment Sonography of Trauma (FAST) showed fluid in Morrison's pouch and in the pelvis. (See Fig 1)

The patient has shoulder pain but no tenderness. Subphrenic blood from a splenic or liver injury can cause referred pain to the shoulder. A patient should not be sent to the radiology department unless hemodynamically stable. Though recent literature suggests early use of blood products in an unstable patient, this patient appears well-perfused after modest IV fluid. Blood transfusion is not needed at this time. Drawing at least a hemoglobin and type and crossmatch in this patient with a hemoperitoneum seen on FAST is advisable.

Your hospital has CT capabilities and a tech is in the hospital.

Figure 1



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QUESTION #1:

Would you send this patient for CT scans at this time?

- A. Yes. Order a CT of abdomen and pelvis with his positive FAST exam. This should be done without IV or oral contrast to avoid possible adverse renal effects.
- B. No. With the positive FAST exam and a stable patient, this patient likely has a splenic or liver injury that will be treated non-operatively.
- C. Yes. A CT scan of chest with IV contrast should be adequate to assess both for intrathoracic and most intraabdominal injuries.
- D. No. If you do not have readily-available surgical coverage that is comfortable with the care of trauma patients and can surgically treat blunt abdominal injuries, CT evaluation can be done at a trauma center after the patient is transferred.
- E. Yes. Since the patient is hemodynamically stable and if CT findings will solidify a treatment plan, and will not delay transfer, CT of the head and cervical spine without IV contrast and scans of chest/abdomen/pelvis with IV contrast should be performed.

If a surgeon who is comfortable with blunt trauma is available, then obtaining further CT scans in this hemodynamically stable patient is reasonable. Loss of consciousness, significant chest wall pain, and fluid on FAST should lead to at least a CT of the head and neck without contrast, followed by CT of chest, abdomen, and pelvis with IV contrast. The risks of IV contrast on renal function are small in a hemodynamically stable patient when compared to the benefits of developing a comprehensive plan of care for this patient with a hemoperitoneum. Treatment may change if other injuries are found. Imaging studies should not be done if they delay transfer of a patient to a higher level of care.

The patient's BP and pulse normalize with 750 ml of isotonic fluid. X-rays show no pneumothorax or pelvic fractures. He is sent for the CT scans described above. A high-grade injury involving the splenic hilum (Grade 4) and a hyperdense "blush" of contrast is seen within the splenic parenchyma.

QUESTION #2:

The next step in this patient's care would be:

- A. MRI with contrast of abdomen to obtain more detail about the splenic injury.
- B. Urgent evaluation by a surgeon who is comfortable and experienced with the care and management of blunt splenic injuries.
- C. Admission to a regular med/surg unit and follow serial hemoglobins.

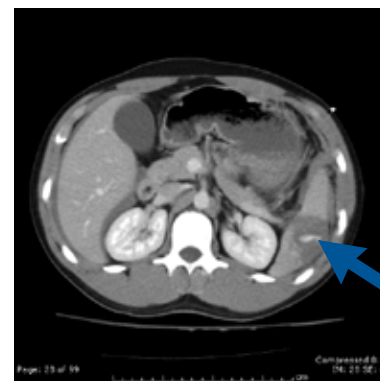
- D. Urgent evaluation by interventional radiology for consideration of angiography and possible embolization of any splenic bleeding points.
- E. Diagnostic peritoneal lavage to further assess the fluid in the pelvis.

Splenic injuries should be evaluated by a surgeon who is comfortable caring for blunt abdominal injuries. Hemodynamic status is the key to evaluation. Emergent surgical intervention is indicated if the patient is hemodynamically unstable. The most common time for recurrent bleeding is within 24 hours of the injury. This risk gradually decreases over 3 to 7 days. A vascular "blush" is a bright, hyperdense area within the spleen (See Fig 2). This finding represents either active bleeding or a marker for a high risk of recurrent bleeding. At North Memorial and other major trauma centers, the presence of such a "blush" in a stable patient will lead to an emergent consult from interventional radiology. Splenic angiography and embolization of any vascular abnormalities is then attempted. Successful embolization improves the outcome of non-operative treatment of blunt splenic injuries. Most blunt splenic injuries are watched in an ICU for at least 12 to 24 hours. The current generation of CT scanners can accurately tell if abdominal fluid is blood. A DPL would rarely be needed to answer this question.

The patient is transferred to a trauma center for further management.

He remains hemodynamically stable. The interventional radiology team performs angiography and discovers a vascular abnormality, which is successfully embolized. (See Fig 3) The patient is then admitted to the ICU.

Figure 2



QUESTION #3:

Important points in his ongoing care should include all of the following, EXCEPT:

- A. Transfuse for Hgb <8 gm%
- B. Frequent vital signs and exams
- C. Bedrest
- D. Cough and incentive spirometry
- E. Serial hemoglobins

Answers: 1. d, 2. b, 3. a, 4. e

Figure 3



Bedrest is usually maintained until hemodynamics and hemoglobin are stable for 24 hours. Abdominal exams are important, especially in the awake/alert patient.

A hemoperitoneum

can cause pain, but there is usually mild tenderness that is confined to the upper abdomen. Because of the frequent blunt chest injuries associated with splenic injuries, analgesia, frequent re-positioning, coughing, and use of incentive spirometry are helpful in preventing atelectasis. Hemoglobin levels will often drop from the injury and from the fluid resuscitation. A falling hemoglobin does not necessarily mean there is active bleeding. Standing orders for transfusion based on a specific hemoglobin level in a healthy, stable patient is not supported in the literature.

QUESTION #4:

The patient is concerned about his athletic career and asks about returning to football full-time. What do you tell the patient?

- A. Limit activity to walking for the first 7-10 days after his injury.
- B. No driving until off narcotics.
- C. No contact sports for at least 6-8 weeks.

- D. No contact sports until the spleen appears to be healed by follow-up CT.
- E. All of the above.

Discussion:

Depending on the severity of injury, the length of hospitalization after non-operative treatment of a splenic injury will usually be 2 to 7 days. Return to work activities will depend on the amount of physical activity involved. Most patients will also have a blunt chest injury and will require analgesics for variable lengths of time. Patients should not drive while taking narcotics. Based on the natural history of splenic injuries, lower grade injuries will usually take 4 to 6 weeks to heal adequately. The more severe injuries, will usually take up to 12 weeks. It is rare nowadays to obtain follow-up abdominal CT scans after blunt splenic injuries, except in cases where the patient wants to return to risky activities such as contact sports or a highly physical job. The CT scan may then be helpful in recommending a time frame for return to all activities.

References:

1. Harbrecht, BG, "Is anything new in adult blunt splenic trauma?" *Am J Surg* 190:273, 2005
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4. Peitzman, AB, et al, "Blunt splenic injury in adults: Multi-institutional study of EAST," *J Trauma* 49: 177, 2000.

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