



Welcome to the third edition of the *North Memorial Trauma Update*. This peer reviewed educational newsletter, written by the trauma surgeons at North Memorial, is published on a quarterly basis. One of the goals of a Level I Trauma Center is to provide quality trauma education to providers caring for injured patients. The first two volumes covered initial resuscitation of the trauma patient and key components of the secondary and tertiary survey. In this edition, discussion will be centered on the role of radiographs and laboratory studies.

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X-rays and Lab studies in the Trauma Patient

OBJECTIVES:

1. To describe appropriate initial x-ray and lab studies in the trauma patient
2. To describe appropriate studies in a patient that requires transfer to a higher level of care
3. To review recent literature as it relates to trauma imaging studies

The previous editions of *Trauma Update* have reviewed the primary and secondary surveys. In this edition, appropriate use of x-ray and lab studies will be reviewed. The Advanced Trauma Life Support course emphasizes that all seriously injured patients should have chest, pelvis and c-spine radiographs as part of their work-up. The information from these studies can be used to guide the care of the injured patient. The following article will reinforce these recommendations and adds a few possible enhancements.

A 35-year-old man presents to a small hospital after a severe motor vehicle crash. He has an altered level of consciousness (GCS=10) and an obvious femur fracture. His vital signs are stable.

QUESTION #1:

What x-ray studies should you obtain in your evaluation of this patient?

- | | |
|---------------------------|---------------|
| A. Chest and pelvis x-ray | D. A and C |
| B. Head CT | E. A, B and C |
| C. Femur x-ray | |

One of the biggest challenges in treating trauma patients in a small hospital is selecting the appropriate x-ray studies for a wide range of injured patients. One can usually divide patients into three groups during the primary survey and resuscitation phase. The first group are patients that clearly are going to require more resources than are available at your institution. The second group are patients that clearly have injuries that you will be able to manage. The last group are patients who require more complex diagnostic studies to determine if they have more serious injuries.

In the group of patients that will be transferring to a higher level of care, the goal should be to find life-threatening injuries that need immediate treatment before transfer. In these time-sensitive

continued on page 2

patients, chest and pelvis x-rays help to identify many of these injuries. Other studies, such as CTs and spine films use up valuable minutes of the “golden hour” and should not be done. The two other groups of patients should have appropriate studies ordered based on their physical findings and mechanism of injury. Obtaining radiographic studies should never delay a patient’s transfer.

QUESTION #2:
In a patient that needs a head CT, what is the best way to clear the cervical spine?

- A. Clinical exam
- B. 3 view cervical x-rays
- C. C-spine CT
- D. A and B
- E. A and C

In a patient that is awake, alert and has no distracting injuries, the cervical spine can be cleared clinically. In all other patients, the clinical exam must be supplemented with an x-ray exam. That exam has consisted of a three-view c-spine x-ray. Many times these plain films are incomplete or inadequate to safely rule out cervical spine injuries and CT scans are done to completely evaluate the c-spine. Recent literature suggests plain cervical spine images lack the sensitivity to reliably exclude c-spine fractures. Additionally, nearly 75% of patients required additional CT images to complete their radiologic evaluation. In several studies, plain cervical spine series missed between 40 and 60% of the fractures seen on CT. The authors recommend that blunt trauma patients, with

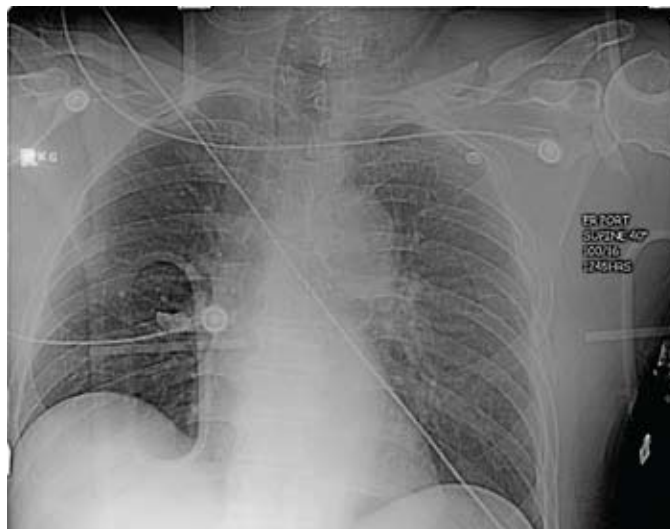


significant mechanism, whose c-spine can't be cleared by clinical exam, have CT scans.

A 20-year-old man presents to your ED after being ejected from a rollover MVC. He is unresponsive and requires intubation. His BP is 85 and his pulse is 80.

QUESTION #3:
A lateral c-spine x-ray would be of benefit in your initial treatment of this patient?

- A. True
- B. False



This patient has many possible reasons why he is hypotensive. It would be very important to obtain chest and pelvis x-rays early in the work-up as they could give valuable information for the etiology of the hypotension. This could include a complex pelvic fracture, tension pneumothorax or a large hemothorax. A lateral c-spine x-ray may show a cervical spine fracture and add neurogenic shock to your differential.

QUESTION #4:
The same patient has a complex pelvic fracture with a widened pubic symphysis. What imaging study would be important early in his work-up?

- A. Inlet/outlet views of pelvis
- B. Judet views of pelvis
- C. Urethrogram
- D. All of the above
- E. None of the above

Complex pelvis fractures can have several associated injuries. One of these injuries if missed can have disastrous outcomes. Urethral injuries can be seen with open book and lateral compression pelvic fractures. They may present with blood at the meatus or a high riding prostate. In such a patient, prior to placing a foley catheter,

a urethrogram must be done to evaluate for an injury. Failure to do so can convert a partial urethral injury into a complete transection. Remember, specialized tests should only be performed after the patient's hemodynamic status has been normalized.



QUESTION #5:
What would be appropriate laboratory studies in the multiply injured patient?

- A. CBC
- B. Type and Cross
- C. ABG
- D. ETOH
- E. All of the above

Appropriate lab studies are similar to x-rays, in that patients transferring to a higher level of care need very little bloodwork. Initial lab work is primarily used as a baseline for future labs. Even a patient with significant blood loss, the hemoglobin will have minimal change prior to resuscitation. There is one lab test that does provide rapid and valuable information in the trauma patient. If readily available, an arterial or venous blood gas may identify patients with unrecognized serious injuries. The base deficit may be a useful marker of a severe acute perfusion deficit seen in significant hemorrhage. An alcohol level may clarify a patient's unexplained decreased level of consciousness.

In summary, patients that need transfer for definitive care need limited radiologic and lab studies to evaluate for life-threatening injuries prior to their transfer. Other patients may require more specialized studies to identify their injuries. In certain situations, CT scans have replaced conventional imaging in the evaluation of injuries.

References:

American College of Surgeons Committee on Trauma, "Initial Assessment and Management", *ATLS: Student Course Manual, 7th edition* ACLS; (Chicago); 2004

Gale SC, Gracias VH, Reilly PM, Schwab CW. The Inefficiency of Plain Radiography to Evaluate the Cervical Spine After Blunt Trauma. *J Trauma* 2005;59:1121-1125

Answers: 1-D; 2-E; 3-A; 4-C; 5-E

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2009 CME Opportunity

ATLS (Advanced Trauma Life Support)

Feb. 26-27, June 11-12, Oct. 22-23, Dec. 3-4, 2009

This program was developed by the American College of Surgeons Committee on Trauma and is designed to assist physicians in providing the first hour of emergency care to trauma patients. Training combines didactic lectures and practical skills stations, allowing time to perfect skills in the initial assessment; and management and stabilization phases of trauma patients.

For more information and to register online for classes, please go to cmetracker.net/NM/catalog.

For questions please call (763) 520-7274.

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2009 Trauma Nursing Education

Trauma 101

April 20, 2009

Designed to cover the basics of traumatic injuries and the care of the injured patient.

Trauma 201

October 26, 2009

Designed to build on the basics presented in Trauma 101. Discussions and case presentations on the critical care needs of the injured patient. Trauma 101 is strongly recommended as a prerequisite to this class.

For registration and/or questions, please call (763) 520-5940 or email, ce@northmemorial.com

Long Hot Summer

March 6-7, 2009

For more information and to register, ce@northmemorial.com

Watch this link for updates

<http://www.northmemorial.com/professionaledu.cfm>

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