

# EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER  
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

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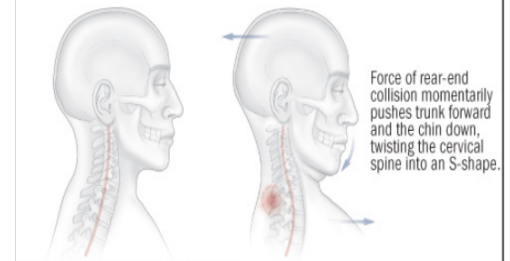
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## Traumatic Cervical Spinal Column Injury

A 30-year-old female with no past medical history presents to the ED after a rear end collision 1 hour ago. Patient states she was stopped at a red light when a Honda civic hit the back end of her car. She states she "feels fine" and only came to the ED as a precaution. She denies any symptoms and wishes to be discharged. Her vitals are within normal limits. On physical exam, patient is alert and oriented and sitting up on the stretcher. She admits to tenderness on palpation of her cervical spine. She is able to rotate her head 45 degrees bilaterally. Sensation is intact bilaterally and she has full active and passive range of motion of her upper and lower extremities bilaterally. Which of the following is true?

- A. Obtain an AP view of the cervical spine only.
- B. This patient meets CCR criteria for imaging, but not NEXUS criteria.
- C. This patient meets NEXUS criteria for imaging, but not CCR criteria.
- D. This patient meets both NEXUS and CCR criteria for imaging.

The S-curve of whiplash



Normal curvature of the cervical spine.

[www.hosmerchiropractic.com](http://www.hosmerchiropractic.com)



<https://mytriagekit.wordpress.com>

Trauma is the most common cause of cervical spinal column injuries. The C-spine should be stabilized in the field prior to hospital arrival using a backboard, rigid cervical collar, and lateral head support.

*EM Case of the Week is a weekly "pop quiz" for ED staff.*

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

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**The correct answer is C.** This patient meets NEXUS criteria for imaging, but not CCR criteria. NEXUS and CCR criteria are further described on page 3. **A.** is incorrect because if radiographs are performed, 3 views is the recommended minimum for a traumatic C spine.

### Introduction

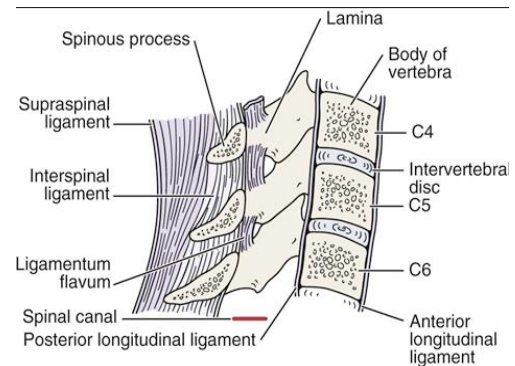
Trauma is the most common cause of spinal column injuries. The cervical spine, especially C2 and the area of C5, C6, and C7, is the most commonly injured region of the spine. Risk factors for traumatic cervical injuries include rheumatoid arthritis, Down syndrome, degenerative joint disease, cancer, being male, engaging in risky behavior, ages between 16-30, and ages greater than 65. Injuries can lead to loss of sensory, motor, or autonomic function. The most fatal injuries occur in the upper cervical spine region.

### Classifications

Acute cervical spine injuries are classified by location (C1-C7), mechanism (flexion, flexion-rotation, extension, extension rotation, lateral flexion, and vertical compression), and stability. To consider the stability, the cervical spine is viewed as 2 columns: anterior and posterior. The anterior column contains the vertebral bodies, anterior spinal ligament, intervertebral disks, and the posterior ligament. The posterior column contains the pedicles, the laminae, the transverse and spinous processes, and the spinal canal. Instability increases if both columns are damaged and therefore the risk of spinal cord injury increases as well.

### ED Initial Evaluation and Management

Advanced Trauma Life Support (ATLS) protocols do not change even when there is a potential spinal column injury. For example, in patients with cardiopulmonary arrest and a possible spinal column injury, oral-tracheal intubation is preferred for airway management. While intubating, in-line stabilization should be used to decrease spinal movement. Video laryngoscopes have helped decrease the difficulties of visualization when performing in-line stabilization intubation.



<https://musculoskeletalkey.com/cervical-spine-5/>

Airway issues should be anticipated in patients with cervical spine injuries. Upper lesions may cause immediate respiratory paralysis, whereas lower lesions can cause delayed phrenic nerve palsy. There may also be obstruction due to hemorrhage and/or edema. Along with hypovolemic shock, neurogenic shock must be considered as the cause of hypotension and bradycardia in a patient with a cervical column injury.

During the secondary survey, spinal column injuries should be evaluated further. Palpation of the column and paraspinal muscles should be performed noting tenderness, step-off deformities, and widened interspinous spaces. A focused neurologic examination should be done to evaluate sensation, and both voluntary and involuntary movements.

### How and When to Image

Generally, in trauma cases where the patient requires immediate surgery, the spine remains immobilized and CT is completed post-operatively. In major trauma, when CT is done to assess internal injuries, CT of the spine is also done. Less severe trauma cases pose a challenge in deciding who needs an image and which kind of image to obtain. Plain radiographs can be helpful, and at minimum, 3 views (AP, lateral, and odontoid) should be obtained. When these images are inadequate, for example obscurity in obese patients or arthritic changes in the elderly, CT may be obtained. Two clinical decision rules have been developed to guide clinicians in determining when it is safe to clear these lower risk patients without using images. These rules are described below.

For a list of educational lectures, grand rounds, workshops, and didactics please visit [BrowardER.com](http://BrowardER.com) and **click** on the **"Conference"** link.

*All are welcome to attend!*

# Warriors

- **National Emergency X-Radiography Utilization Study (NEXUS):** radiography is not necessary if the patient meets **all** five of these low-risk criteria

1. No posterior midline cervical tenderness
2. No evidence of intoxication
3. Normal level of alertness
4. No abnormal neurological findings
5. No painful distracting injuries (ex: long bone fx, large lacerations, crush injuries, etc.)

**Key points:** The study sample size was 34,069 patients. It had 99.6% sensitivity and 12.9% specificity. It is applicable for ages >1 y/o, however caution is recommended in patients >65 y/o. A large retrospective study published in February 2017 supported that the NEXUS criteria were less sensitive for older blunt trauma patients. Using these criteria can help safely reduce imaging by 12-36% in patients presenting with potential C-spine injuries

- **Canadian C-spine rule (CCR):**

1. Perform radiography in any of the following high risk cases:
  - a. Age  $\geq 65$  years
  - b. Dangerous mechanism (ex: fall  $\geq 3$ ft/5 stairs, axial load, high speed MVA >62mph, ejection, bicycle collision with immobile object, motorized recreational vehicle accident)
  - c. Extremity paresthesias
2. If patients don't meet the high risk criteria in 1., see if they meet the following low risk criteria:
  - a. Simple rear end collision (note: pushed into traffic, hit by a large bus/truck, hit at a speed >62mph, and rollovers are not "simple")
  - b. Sitting position in the ED
  - c. Ambulatory at any time
  - d. Delayed neck pain onset
  - e. Absence of midline cervical tenderness
3. Patients not meeting the above criteria in 2., warrant a radiograph. Those meeting **any** of the above can have cervical ROM safely evaluated.
  - a. Active neck rotation  $\geq 45$  degrees bilaterally, even with pain, do not require imaging. Active neck rotation <45 degrees require imaging.

**Key points:** It had 100% sensitivity and 42.5% specificity. It can be used in intoxicated patients as long as they are alert. Exclusion criteria includes non-trauma patients, GCS<15, unstable vitals, age<16y/o, acute paralysis, known vertebral disease, and previous C-spine surgery.

- **NEXUS vs CCR:**

- One trial compared the two and showed the CCR to have superior sensitivity (99.4 vs 90.7%). It is important to note that this trial was conducted at the same institution of the original CCR and different inclusion criteria were used. This trial excluded patients <16 y/o and those with GCS<15 whereas the original NEXUS study included them. Also the original NEXUS study excluded patients whom had radiographs deemed unnecessary whereas this comparison trial included them. This leads to concerns about the study findings.

### Take Home Points

- Trauma is the most common cause of cervical spinal column injuries.
- Cervical spine injuries are classified by location, mechanism, and stability.
- ATLS protocols do not change when a cervical spine injury is suspected, however efforts should be made to keep the spine immobilized.
- Although there is no standardized approach to image traumatic C-spines, efforts are being made to guide clinicians' decisions using the NEXUS and CCR clinical decision rules.



### ABOUT THE AUTHOR

This month's case was written by Leanne Iorio. Leanne is a 4<sup>th</sup> year medical student from NSU-COM. She did her emergency medicine rotation at BHMC in August 2017. Leanne plans on pursuing a career in General Surgery after graduation.

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