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1. A 44-YR-OLD MALE WAS INVOLVED IN A BAR FIGHT. IN THE ED, HE IS COMPLAINING OF “ NECK PAIN”. ON EXAMINATION, IT WAS NOTICED, HE CANNOT MOVE HIS RIGHT ARM AGAINST GRAVITY, BUT HE HAS FULL RANGE OF MOTION WHEN GRAVITY IS ELIMINATED. WHAT IS THE MOTOR STRENGTH GRADE OF HIS RIGHT C5 (BICEPS)?

- A. 0/5
- B. 3/5
- C. 2/5
- D. 4/5

Go to Q 2



A. 0/5

Assessment of the trauma patient includes airway, breathing, circulation and disability. Secondary survey involves a head to toe exam. If any abnormalities are discovered during the initial exam, a detailed neurological exam must be performed. In the upper extremity, C4 9 deltoid), C5 (biceps), C6(wrist extensors), C7(triceps), T1 9 finger abduction.). If the motor exam reveals 0/5, the patients exhibits complete paralysis. (no active movement).

Try again

Wrong
answer

B. 3/5

If the patient can demonstrate muscle contraction against gravity, the motor strength grade is 3/5. However this patient cannot move his arm against gravity.

Try again

Wrong
answer

C. 2/5



This patient has a motor strength grade of 2/5, since he has range of motion only when gravity is eliminated.

AMERICAN SPINAL INJURY ASSOCIATION (ASIA)
<http://www.asia-spinalinjury.org/>. International Standards for the
Classification of Spinal Cord Injury
Motor Exam Guide

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Go to Q 2



D. 4/5

Motor strength 4/5 indicates movement against some resistance. It also indicates patient can contract against gravity.

However this patient cannot move his arm against gravity

Try again

Wrong
answer

2. TREATMENT OF TRAUMATIC SPINE INJURIES (TSI) INCLUDES ALL EXCEPT:

- A. Stress ulcer prophylaxis
- B. Indwelling urinary catheter
- C. High dose steroids
- D. Correct hypotension

Go to Q 3



A. STRESS ULCER PROPHYLAXIS

Gastrointestinal hemorrhage is potentially a serious complication in spinal cord injured patients. Appropriate prophylaxis, early diagnosis and prompt management may help avoiding a possible fatality.

Albert TJ, Levine MJ, Balderston RA, Cotler JM. Gastrointestinal complications in spinal cord injury. Spine (Phila Pa 1976). 1991;16:S522-5.

[Try again](#)

Wrong
answer

B. INDWELLING URINARY CATHETER

Patients with thoracic spinal injuries need an indwelling urinary catheter, to monitor volume status and treat urinary retention.

Licina P, Nowitzke AM. Approach and considerations regarding the patient with spinal injury. Injury. 2005;36(Suppl 2):B2-12

Try again

Wrong
answer

C. HIGH DOSE STEROIDS



National Acute Spinal Cord Injury Studies (NASCIS) trials. NASCIS II concluded there was efficacy of high-dose methylprednisolone in patients who had received the drug within 8 h after injury. However, there are increased complications, such as pneumonia and gastrointestinal bleeding in patients treated with steroids. Based on these circumstances, the most recent version of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons' Guidelines for the Management of Acute Cervical Spine and Spinal Cord Injuries state: "Administration of methylprednisolone (MP) for the treatment of acute SCI is not recommended".

Hurlbert RJ¹, Hadley MN, Walters BC, Aarabi B, Dhall SS, Gelb DE, Rozzelle CJ, Ryken TC, Theodore N. Pharmacological therapy for acute spinal cord injury Neurosurgery 2015 Mar;76 Suppl 1:S71-83. doi: 10.1227/01.neu.0000462080.04196.f7.

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Go to Q3



D. CORRECT HYPOTENSION

First line treatment of neurogenic shock is always fluid resuscitation to ensure euvolemia and increase in the circulating blood volume. Aim for MAP \geq 90 mm Hg

Second-line therapy is vasopressors and/or inotropes.

Perfusion to the spinal cord must be maintained by correcting hypotension.

Stevens RD, Bhardwaj A, Kirsch JR, Mirski MA. Critical care and perioperative management in traumatic spinal cord injury.

J Neurosurg Anesthesiol. 2003;15:215-29

Try again

Wrong
answer

3. A YOUNG 32 YR-OLD MALE WAS INVOLVED IN A GANG FIGHT. HE RECEIVED KNIFE WOUNDS TO HIS BACK. HE PRESENTED TO THE ED WITH HEMIPLEGIA WITH LOSS OF IPSILATERAL LIGHT TOUCH AND CONTRALATERAL PAIN AND TEMPERATURE SENSATION. THIS PRESENTATION IS DESCRIBED AS

- A. Central Cord Syndrome
- B. Anterior Cord Syndrome
- C. SCIWORA(spinal cord injury without radiographic abnormality)
- D. Brown-Sequard Syndrome

Go to Q 4



A. CENTRAL CORD SYNDROME

It is commonly seen in elderly patients with cervical stenosis often due to hyperextension injury. It presents with the loss of cervical motor function with relative sparing of lower extremity strength. It is usually not associated with a fracture, but rather with a buckling of the ligamentum flavum that contuses the cord, causing hemorrhage within the center of the cord. The amount of damage to the laterally located corticospinal tracts is variable and determines the amount of lower extremity weakness.

[Try again](#)

Wrong
answer

B. ANTERIOR CORD SYNDROME

It is caused by injury to the anterior spinal cord, commonly from contusion or occlusion of the anterior spinal artery. It is associated with axial compression causing burst fractures of the spinal column with fragment retropulsion. Patients often present with as a loss of pain/temperature and motor function with preservation of light touch.

Try again

Wrong
answer

C. SCIWORA (SPINAL CORD INJURY WITHOUT RADIOGRAPHIC ABNORMALITY)

Young pediatric patients are also at risk of SCI without radiographic abnormality (SCIWORA), a condition that should always be considered in children with signs of SCI or with unreliable exam, in the absence of abnormalities on plain films or CT scan imaging.

[Try again](#)

Wrong
answer

D. BROWN-SEQUARD SYNDROME



It is most frequently seen with penetrating cord injury, often from missiles or knife wounds, or a lateral mass fracture of the spine. It occurs due to traumatic hemisection of the cord. Patients commonly present with hemiplegia with loss of ipsilateral light touch and contralateral pain/temperature sensation.

Aarabi B, Alexander M, Mirvis SE, et al. Predictors of outcome in acute traumatic central cord syndrome due to spinal stenosis. J Neurosurg Spine. 2011;14:122-30.

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Go to Q 4



4. A YOUNG FEMALE WAS INVOLVED IN A FENDER-BENDER MVA. SHE ARRIVED IN THE ED WITH THE CERVICAL SPINE COLLAR . SHE IS AWAKE AND NO DISTRESS. SHE IS NOT INTOXICATED, HAS NO DISTRACTING INJURIES, NO FOCAL NEUROLOGICAL DEFICITS. ON EXAMINATION, SHE HAS POSTERIOR C-SPINE TENDERNESS. THE NEXT STEP USING CANADIAN C-SPINE RULES (CCR) IS :

- A. CT scan of the neck
- B. Remove the collar
- C. Ask the patient rotate her head 45 to the left and right
- D. 3-view cervical spine radiograph series

[Go to Q 5](#)



A. CT SCAN OF THE NECK

The NEXUS criteria require the physician to identify signs of intoxication, to assess for the presence of focal neurologic deficits, presence of painful distracting injuries, the patient has a normal level of alertness and presence of posterior midline tenderness to palpation. Using the NEXUS criteria, if no painful response is elicited, and the patient has met all prior criteria, the C-collar can be removed and C-spine imaging is not required. Using NEXUS criteria, with the presence of posterior c-spine tenderness, the next step would be imaging.

However, Canadian C-Spine Rules (CCR) does not preclude clinical clearance solely due to posterior neck tenderness. The patient may still avoid imaging.

[Try again](#)

Wrong
answer

B. REMOVE THE COLLAR

In the CCR, the final stage of clearance is to have the patient rotate, his/her neck 45 ° to the right and left. Inability to perform this maneuver, is an indication for imaging. The c-collar cannot be removed at this time.

[Try again](#)

Wrong
answer

C. ASK THE PATIENT ROTATE HER HEAD 45 TO THE LEFT AND RIGHT



In the CCR, that is the final stage of clearance. If the patient does not complain of pain and is able to move her head 45° to the right and left, her c-spine is cleared. No further imaging is required and the c-collar can be removed.

Back to the Q



Go to Q 5



D. 3-VIEW CERVICAL SPINE RADIOGRAPH SERIES

In the past 3-view spine radiograph series was the standard initial evaluation. Recently the Eastern Association for the Surgery of Trauma (EAST) and the American College of Radiology have recommended the CT Scan with multi-planer reconstruction.

Como JJ, Diaz JJ, Dunham CM, et al. Practice Management guidelines for identification of cervical spine injuries following trauma: update from the eastern association for the surgery of trauma practice guidelines committee. J. Trauma 2009; 67: 651-9

Try again

Wrong
answer

5. A 60-YR-OLD MALE, WAS INVOLVED IN A HIGH SPEED MVA. HE SUSTAINED LEFT FRACTURE SHAFT FEMUR, T-4 TO T-10 SPINE FRACTURES AND RIGHT HUMERUS FRACTURE. HIS PMH IS SIGNIFICANT FOR HYPERTENSION, CONTROLLED WITH ATENOLOL. HIS VITAL SIGNS INCLUDE HR: 58/MIN, BP: 91/52 MM HG, RR: 28/MIN, SPO2 96% ON 8L O2 BY FM. NEXT STEP IS:

- A. Treat neurogenic shock
- B. Treat spinal shock
- C. Treat cardiogenic shock
- D. Rule out hemorrhagic shock

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A. TREAT NEUROGENIC SHOCK

Patients with SCI above the T4 level are at high risk of the development of neurogenic shock. The patient suffers a sympathectomy, resulting in unopposed vagal tone. This leads to a distributive shock with hypotension and bradycardia. However, this patient also sustained fracture shaft femur (estimated blood loss 1 liter) and humerus (300-500 cc). Assessment must include signs of bleeding and appropriate resuscitation.

Krassioukov A, Claydon VE. The clinical problems in cardiovascular control following spinal cord injury: an overview. Prog Brain Res. 2006;152:223-9

[Try again](#)

Wrong
answer

B. TREAT SPINAL SHOCK

Spinal shock “spinal shock” has nothing to do with hemodynamics, but rather refers to the loss of spinal reflexes below the level of injury.

Nacimientto W, Noth J. What, if anything, is spinal shock? Arch Neurol. 1999;56:1033-5

[Try again](#)

Wrong
answer

C. TREAT CARDIOGENIC SHOCK

Cardiogenic shock may occur in patients with previous ischemic heart who have suffered myocardial injury. Presence of arrhythmias and ST-T changes on 12 lead EKG must be evaluated if myocardial injury is suspected.

[Try again](#)

Wrong
answer

D. RULE OUT HEMORRHAGIC SHOCK



In patients who have sustained T-4 or higher spinal fractures may present as neurogenic shock. Adequate resuscitation includes euvoemia and pressors or inotropes as needed. The aim is to maintain MAP \geq 90 mm Hg. With multiple trauma injuries, it is important to rule out hemorrhagic shock. This may include surgery to stop the bleeding and blood transfusion.

Saboe LA, Reid DC, Davis LA, Warren SA, Grace MG. Spine trauma and associated injuries. J Trauma. 1991;31:43-8.

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End of set



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