A Physicians’ Approach to a Case of Acute Spinal Cord Injury

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“The final outcome of a spinal cord injury depends upon the accuracy, adequacy, and speed of first aid management, diagnosis, and treatment within the first few hours.”

—Charles Tator

Acute spinal cord injuries are one of the most devastating traumatic injuries that are fairly common worldwide. These injuries lead to massive social, emotional and financial burden on patients as well as the society, in general. There is no ideal treatment for acute spinal cord injuries. Early recognition and management of these injuries are critical in order to identify any spine fractures and treat them so as to minimize the chances of secondary injury to the spinal cord. The current approach to care of acute spinal cord injury involves three main factors:

• Diagnosis of cord compression, gross mis-alignments of the spine and other structural problems and relieving the same
• Minimizing cellular damage if possible
• Stabilization of the vertebrae to prevent further injury

Approach to a Patient with Suspected Acute Spinal Cord Injury: Prehospital Management

The initial few hours after the occurrence of acute spinal cord injury is critical as proper management can help prevent the development of secondary neurological deficits. Furthermore, it is estimated that all patients with acute spinal cord injury may experience neurological deterioration in the first 72 h after the injury. The three main objectives of prehospital management include:

• Stabilizing the patient
• Preventing further loss of neurological function
• Reducing existing neurological deficits

Stabilizing the patient involves preservation of the ABCs; namely Airway, Breathing and Circulation.

• Upper airway obstruction can be treated by using an oral or nasal airway
• If there is a severe injury to the airway or airway edema, a field tracheostomy or cricothyroidotomy may be necessary in order to preserve the status of the airway
• Endotracheal or nasotracheal intubation may be needed if the patient has paradoxical breathing, shortness of breath, cyanosis and a progressive decline in mental status
• After the airway status has been stabilized, it is important to assess systemic blood pressure and obtain intravenous access as soon as possible. The emergency medical staff must make every effort to maintain mean arterial pressure above 90 mmHg. The use of vasopressors is indicated if bradycardia and hypotension is unresponsive to fluid replacement (lactated Ringer’s or normal saline)

Preventing further loss of neurological function and reducing existing neurological deficits are critical components of emergency prehospital care in acute spinal cord injury.

• Adult Trauma Life Support (ATLS) guidelines issued by the American College of Surgeons stress that it is vital to immobilize the patient’s neck in a rigid cervical collar. Rolled towels or sandbags and tape can be used to secure the neck to a backboard in case a collar is unavailable
• Transport of the patient to a trauma center should be arranged immediately by using a rigid backboard
• It is unlikely that all patients with acute spinal cord injury will require spinal immobilization, but this practice is crucial to reduce the risk of further deterioration of the injury.

In summary, the essential components of pre-hospital management of acute spinal cord injury include:

• Examination of the patient
• En bloc immobilization of the spine
• Oxygenation and careful management of the airway
• Cardiovascular support

Approach to a Patient with Suspected Acute Spinal Cord Injury: Hospital Management

On arrival at the hospital emergency room, physicians must

• Recheck on the ABCs
• Evaluate cervical spine
• Evaluate thoracolumbar spine
• Initiate therapy according to evaluation of the above

Evaluation of the cervical spine (C-spine) is a critical step in order to ensure that it is clear. Another important decision with regard to the C-spine is whether to go for radiographs or not. There are two widely accepted decision rules on radiography of the immobilized cervical spine, namely, the National Emergency X-Radiography Utilization Study (NEXUS) low-risk criteria (NLC) and the Canadian C-spine rule (CCR, Figures 1 and 2).

The prevalence of thoracic and the lumbar spine fractures is 2–3% in blunt trauma victims. In most cases, it may not be necessary to perform this evaluation, but it is advisable in order to complete the examination (Figure 3). Other essential examinations include:

Meets all low-risk criteria?
1. No posterior midline cervical-spine tenderness
2. No evidence of intoxication
3. A normal level of alertness
4. No focal neurologic deficit
5. No painful distracting injuries

Yes
No radiography

No
Radiography

Fig. 1 : NEXUS criteria for radiography of C-spine

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Evaluation of reflexes
- Documenting motor and sensory functions
- Evaluating for cauda equina syndrome

**Imaging Modalities**

Spinal CT scans and spinal MRIs must be judiciously used when indicated. Spine CT is used to evaluate areas of tenderness or to better view fractures indicated on X-rays. Spinal MRI is indicated for examining soft-tissue structures and to determine cord injury, cord compression and acute herniated disc. Multi-detector computed tomography (MDCT) is a newer modality that is advocated by many authorities as being important to evaluate spine injuries in blunt trauma patients.

**Evaluation and Management of Acute Spinal Cord Injury**

A simple algorithm that takes into consideration all the above-mentioned factors with regards to evaluation and the proposed management of acute spinal cord injury is depicted in Figure 4.

**Key Points**
- Manage the ABCs first with judicious use of intubation if required
Try to remove immobilization devices as they can impede healing if left for a long time.

Use the NLC and CCR rules to clear the cervical spine.

Use MDCT and MRI to rule out fractures undetected by conventional X-rays and in cases where there is persistent pain or neurologic deficit.

The ideal approach in the management of acute spinal cord injury is to consider immobilization as part of initial management, with the decision to prevent, identify and treat existing spine fractures before the occurrence of further injury to the spinal cord.

**References**


