Initial Management of Patients With Traumatic Spinal Cord Injuries

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What are the initial steps you take when a patient presents with a traumatic spinal cord injury?

Trauma patients are worked up in the emergency department through the general surgery trauma team in conjunction with the orthopedic trauma team. Initial management is done under the guidelines of the Advanced Trauma Life Support (ATLS) protocol, where we recognize and manage potential vital threats immediately and stabilize the patient. Evaluation for spinal injury occurs in the secondary survey once the patient is hemodynamically stable.

What are the most common traumatic spinal cord injuries?

Spinal cord injuries occur mainly in young men (late 20s to early 30s). The approximate incidence of spinal cord injuries is 10,000 to 12,000 per year in the United States. These injuries do not occur frequently but are devastating for the patients. We differentiate between quadriplegia and paraplegia. Quadriplegia is typically caused by injuries that originate from the cervical spine and is the most frequently occurring spinal injury, at approximately 60%. Paraplegia is more likely to occur with injuries at the T-spine and L-spine and accounts for approximately 40% of all spinal injuries. With both, patients can have incomplete or complete spinal cord injuries. With incomplete injuries, the patient has some residual function below the level of injury and is likely to benefit from rehabilitation and have a better outcome; with complete injuries, the patient has a poor likelihood of recovering any neurological function.

How does polytrauma change your initial management strategy?

Polytrauma patients are those who, by definition, have a high likelihood of dying and are highly susceptible to any delayed or unnecessary treatment. The golden rule with polytrauma patients is “less is more.” We want to get them stabilized and to the intensive care unit as soon as possible. Unstable vertebral fractures should be stabilized early to allow for management of the polytrauma patient in the intensive care unit, which may include prone positioning, mobilizing out of bed, and sitting upright (for associated brain injuries).
It is important to establish proactive interdisciplinary protocols, such as “Spine Damage Control,” which mandates that any unstable spine fracture in polytrauma patients needs to be fixed from the back within 24 hours so the patients can be mobilized. Once they are fully resuscitated, they can come back to the operating room for any bigger spine surgeries from the front. This protocol is rare in the United States and originated in Europe in the 1990s. The basic concept is equivalent to placing an external fixator on a broken femur and taking the patient back several days later for intramedullary nailing to avoid an increased burden to the injured patient. If the patient with a spine injury cannot be positioned properly in the intensive care unit, then the spine surgeon could be responsible for a poor outcome because the patient may suffer from complications, including pressure sores, thrombotic events, and lung infections. The key is to stabilize the spine early on to get the patient mobilized as soon as possible.

What are the initial treatment options for patients also experiencing traumatic hemorrhagic shock?

Patients with traumatic hemorrhagic shock are likely to die unless immediate resuscitation strategies are applied. This entails recognizing which subset of patients is coagulopathic. Approximately 30% of all polytrauma patients are coagulopathic on admission, and their mortality is drastically increased. We need to recognize coagulopathy and reverse it quickly to allow the blood to clot. An aggressive resuscitation strategy is also beneficial to the injured spinal cord because low blood pressure and poor oxygen to the spinal cord will lead to secondary spinal cord injury.

What role does imaging play in diagnosing patients with traumatic spinal cord injuries?

Multiply injured patients who are hemodynamically stable are immediately worked up by a multispecial, whole-body computed tomography scan, which provides thin-section computed tomography images of the entire spine, along with 2- and 3-dimensional reconstructions. The imaging modality has changed drastically in the past 10 to 15 years. We no longer take full-length conventional radiographs of the entire spine to prevent missing another vertebral fracture at a different level (which occurs in approximately 10% of all cases).

Magnetic resonance imaging allows visualization of the soft tissues in and about the spinal cord (ie, spinal cord contusion) to detect injuries to the disks and ligaments or bleeding around the cord. Magnetic resonance imaging must never be done in patients who are not hemodynamically stable.

How do you determine when surgical treatment is needed for patients with traumatic spinal cord injuries?

B-type injuries (unstable fractures including flexion/distraction or hyperextension) or C-type injuries (any rotationally unstable injuries or fractures) exclusively require operative repair. In contrast, A-type injuries are frequently managed nonoperatively, including stable burst fractures.

What complications should physicians be aware of when treating patients with traumatic spinal cord injuries?

Spine surgeons need to be aware of the important entity of a “neglected injury,” which means not addressing an unstable spine fracture early on and thus contributing to the patient’s adverse outcome. Polytrauma is a systemic disease that needs to be addressed by a team that works hand-in-hand. It’s not just about looking through a tunnel view to see the spine fracture and determining whether it requires surgical fixation; it’s about understanding that nonfixed, unstable spine fractures contribute to the patient’s poor outcomes. Neglected care can lead to complications, such as pneumonia, adult respiratory distress syndrome, multiple organ failure, and death. In addition, incidences of deep vein thrombosis and pulmonary embolisms are significantly increased in these patients, so they should undergo formal anticoagulation as early as possible once bleeding from other sources is controlled.

How has the initial management of patients with traumatic spinal cord injuries changed in the past 20 years?

Since the late 1970s, we learned to manage trauma patients using the ATLS protocol—the most standardized and globally applied guideline for initial management—whose core message is to save life first and restore function after. We’ve also seen some change in philosophy in the past few years in that we finally understand that spinal injuries contribute to the mortality of these highly vulnerable patients. Also, for many years, we used high-dose steroids as part of the standard of care for acute spinal cord injuries until recently, when further research revealed that steroids caused increased complications. Therefore, at this point, the use of steroids is considered obsolete, with few exceptions.

What does the future hold for the initial management of patients with traumatic spinal cord injuries?

Currently, not a single pharmacological “golden bullet” exists that would prevent the development of further spinal cord insults or that would restore function. The future relies on ongoing research to determine the pathophysiological mechanisms that lead to spinal cord injuries and to design a pharmacological strategy that would help heal the injured spinal cord.