



Management Issues in Patients with Acute and Chronic Spinal Cord Injury

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Key Learning Points

- There are 12,000 new cases of spinal cord injury (SCI) each year in the United States; 35% from MVAs and an estimated first year cost of \$225,000.
- The ASIA impairment scale is used to document function after a SCI: A = complete absence of motor and sensory below the neurologic level, E = normal motor / sensory function.
- Spinal shock results in loss of motor and sensory function though if the lesion is incomplete the perianal response to pinprick is generally intact. For prognosis, the exam at 72 hours and 30 days is generally used.
- Spinal cord injury is associated with necrosis (immediate - primary insult) and apoptosis (delayed cell death from secondary insult).
- Methylprednisolone has questionable value in improving outcomes in SCI and evidence based guidelines from the American Academy of Neurologic Surgeons consider its use an “option.”
- The most common complications during rehabilitation from SCI are pressure ulcers, DVT and PE, atelectasis and pneumonia, and autonomic dysregulation.
- Autonomic dysfunction can result initially in hypotension during the first days following SCI followed by sympathetic hyperactivity with hypertension.
- Autonomic hyperreflexia can result in hypertension and headache; management focuses on removing noxious stimuli such as bladder distention or fecal impaction: Alpha blocking drugs can be used in refractory cases.

- Neuropathic spinal pain can be extremely difficult to control; management generally involves use of centrally acting agents such as tricyclics or anticonvulsants.
- Suprasacral SCI generally allows for return of bladder reflexes; absence of perianal pinprick sensation and toe position sense at 72 hours predicts no return of volitional bladder function.
- Infection, calculi, and stones are potential complications in SCI patients.
- Hypertrophic bone formation can cause localized swelling and dysfunction; it may mimic DVT.
- Spasticity results from upper motor neuron damage and is treated with physical therapy and baclofen.

Annotated Bibliography

1. Guidelines for the Management of Acute Cervical Spine and SCI. Neurosurg 2002;50 (suppl) :1-200

This 200 page practice guideline written by the American Academy of Neurologic Surgeons was published as a supplement to the journal Neurosurgery. The supplement has 22 chapter covering topics ranging from the prehospital management of spine trauma, imaging of the spine, surgical management of spine fractures, medical management of traumatic conditions including spinal cord trauma and carotid and vertebral artery dissections. The document was written using a carefully described methodology and though being evidence based was met with tremendous controversy regarding its recommendations on the use of methylprednisolone.

2. Bracken M. Steroid for acute spinal cord injury. Cochrane database systemic Review 2002;3:CD001046

Controversial review from the Cochrane database that threatened the Cochrane Database's. The review concluded in favor of the use of methylprednisolone but was written by a PhD who was a principle investigator in NASCIS 2. Not only was the author a nonclinician and reviewing his own work but there were no co-authors to provide secondary review which is generally a requirement in an evidence based work.

3. Saulino M, Vaccaro A. Rehabilitation of persons with spinal cord injuries. Emedicine 2003; www.imecine.com

Outstanding overview of the subacute and chronic problems encountered by patients with spinal cord injury. Discusses thromboembolic disease, autonomic dysfunction, neuropathic pain, neurogenic bladder and bowel, hyertrophic bone formation, pressure ulceration, spasticity, and neurologic outcome. Management recommendations with drug doses are given.

4. Burns A, Ditunno J. Establishing prognosis and maximizing functional outcomes after spinal cord injury. Spine 2001; 26:S137-145.

Well written systematic review of the literature on prognosis after spinal cord injuries. The authors establish that prognosis can be estimated based on the neurologic exam at 72 hours and one month post injury. An overview is given of advances on the horizon that may impact functional outcomes in these patients.

5. Marino R, Ditunno J, Donovan W, Maynard F. Neurologic recovery after traumatic spinal cord injury: Data from the Model Spinal Cord Injury Systems. Arch Phys Med Rehab 1999; 80:1391-1396.

Review of a data base on 3585 spinal cord injured patients. Authors establish the importance of sacral sparing to prognosis with 54% of those with sacral sparing converting to motor incomplete status. Overall, neurologic recovery was found to be related to etiology and severity of the injury with sacral sparing the ASIA B patients having an important prognostic value.

6. Chen D, Apple D, Hudson L, Bode R. Medical complications during acute rehabilitation following spinal cord injury: Current experience of the Model Systems. Arch Phys Med Rehab 1999; 80:1397-1401.

Review of the medical complications in 1649 patients. Pressure ulcers were the most common complication in the subacute phase, reported in 24% of patients. Autonomic dysreflexia and pneumonias were also reported frequently. DVT and PE demonstrated a decline in incidence compared to prior analyses most likely secondary to improved supportive care. Cardiac arrest and GI hemorrhage were rare occurrences.

7. DeVivo M. Causes and costs of spinal cord injury in the United States. Spinal Cord 1997; 35:809-813.

A cross sectional multicenter study that estimated the incidence, causes, and cost of spinal cord injury in the United States based on data from 1995. Motor vehicles were found to be the most common cause of spinal cord injury and associated with a first year cost of \$234,000. Average lifetime charges for patients with spinal cord injury from motor vehicle injury were estimated at \$970,000.

8. Ditunno J, Formal C. Chronic spinal cord injury. NEJM 1994; 330:550-556

Excellent collective review of the epidemiology, diagnosis, and long term care of patients with spinal cord injury. Though ten years old, this review is still valid and provides a clear picture of the challenges confronting the clinician caring for these patients.

9. Ramirez A, Rivera V, Mawad M. Spinal cord ischemia. Stroke Clin Updates 1994; 5:13-16.

Good review of the pathophysiology and spinal cord ischemia with clear graphics of the vascular anatomy of the cord.

10. Chilton J, Dagi TF. Acute cervical spinal cord injury. Am J Emerg Med 1985;3:340-350.

Old article but very well written. Provides an excellent primer for understanding the pathophysiology of cord injury and the approach to management.