

Spinal Cord Injuries: A Suggested Approach

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Abstract

This is a brief review of the evaluation and management of spinal cord injuries.

MANAGEMENT AND EVALUATION OF SPINAL CORD INJURIES

A. INITIAL MANAGEMENT AND EVALUATION

1. Immobilize C-spine
2. Protect airway and insure adequate oxygenation and ventilation. The spinal cord injured patient may have impaired spontaneous ventilatory parameters following trauma, and this impairment subjects these patients to respiratory insufficiency. Neurological deficits can be worsened by hypoxic insults to the injured cord. Many patients with cervical spine injuries may initially be able to maintain adequate ventilation, but will require elective intubation as their respiratory capabilities deteriorate. a. If necessary, oral airway. b. If necessary, two-person oral intubation with in-line C-spine traction maintained. Do not electively place a too-small tube. c. Serial Mechanics and ABG to assess ventilation and oxygenation.
3. Stabilize blood pressure. Disruption of descending sympathetic pathways results in loss of vasomotor tone and hypotension. Unopposed parasympathetic activity may result in bradycardia. Patients should be resuscitated with crystalloid, red cells and colloid to stabilize blood pressure to approximately 100-110 mm Hg systolic. This resuscitation is important since signs of hypovolemic shock (tachycardia) may be absent in the sympathectomized patient. Other sources of potential hemorrhagic shock must also be ruled out. If the patient is adequately resuscitated and remains hypotensive, dopamine infusion should be initiated.

4. Insert a nasogastric or orogastric tube. Gastric atony may compromise the respiratory status of the patient and lead to aspiration.
5. Insert a Foley catheter if there are no signs of genitourinary trauma.
6. Perform a baseline neurological assessment. Other CNS injuries should be ruled out.
7. Obtain portable C-spine (AP & lateral views) and supine chest x-ray.
8. An abdominal assessment (depending upon the mechanism of injury) may be performed to rule out intra-abdominal injuries. This could be a CT scan, a peritoneal lavage, or a FAST ultrasound.

B. METHYLPREDNISOLONE BOLUS AND INFUSION

Steroid should not be given to patients with:

1. The only spinal cord injury of nerve root or cauda equina.
2. Gunshot or penetrating injury to spine.
3. Life threatening morbidity

***STEROIDS MUST ONLY BE GIVEN WITHIN 8 HOURS OF INJURY**

Dose: 30 mg/kg administered as on IV bolus over 15 minutes 45 minute pause 23 hour continuous infusion of 5.4 mg/kg/hr (Methylprednisolone is reconstituted and diluted to a concentration of 62.5 mg/ml)

C. RADIOLOGICAL DIAGNOSIS AND ASSESSMENT

The following studies should be coordinated with neurosurgery, orthopedics and radiology to avoid multiple trips to the radiology department.

1. Complete C-spine series, i.e. 5 views
2. CT scan, tomo's, MRI and/or myelogram per neurosurgery
3. As soon as possible, a complete spine series (thoracic, lumbar, and sacral) should be performed.

D. ICU MANAGEMENT

1. Neurological
 - a. Rapid alignment of the spine to normal anatomic position, per neurosurgery. This alignment is accomplished with either closed reduction (Gardner Wells, Barton tongs, etc.) or open reduction. After adequate spinal alignment is achieved, follow up x-ray evaluation is necessary to confirm adequate alignment. When patient stability permits, attention should be directed towards achieving permanent stabilization. Advantages of early stabilization (less than 5 days) are early mobilization and rehabilitation, which may prevent the complications associated with prolonged bed rest, especially the respiratory and infectious complications. If neurosurgical stabilization is postponed, a halo is recommended. Patients should be log-rolled only or placed in a rotobed until the thoracic, lumbar and sacral spine have been cleared radiologically.
3. Cardiovascular
 - a. Patients with complete cervical or high thoracic injuries are initially managed with a CVP and arterial line for monitoring. Because of sympathetic hypotonia, a decrease in blood pressure is often seen in the early stages of spinal cord injury. Patients may require alpha agonists (dopamine or neosynephrine) to

maintain a systolic pressure greater than 100. This should only be instituted after the patient has been adequately volume resuscitated per central venous pressures. Patients may also develop bradycardia due to unopposed parasympathetic activity. This bradycardia is especially common when patients are being suctioned or receive a stimuli which produces increased vagal tone. Therefore, attempt to avoid vagal maneuvers. Unless the patient becomes hypotensive with the bradycardic episodes, there is no cause for alarm, and no indication for treatment. If the bradycardia is associated with hypotension, a bolus of atropine, 0.5 mg. may be necessary. If this does not raise the pulse rate, it should be repeated at 0.5 mg increments up to a total of 2 mgs. Temporary cardiac pacing is rarely required in these patients. Stand-by external pacing is usually initially preferred followed by temporary intravenous pacer insertion if needed.

5. Respiratory
 - a. Spontaneous ventilatory parameters (tidal volume, vital capacity, maximum inspiratory effort) are obtained every 6 hours for four days and then as needed. Significant deterioration in these parameters should alert one to impending respiratory difficulties. Patients must have meticulous pulmonary toilet. Aerosol treatments (alupent, albuteral) may be helpful. It is extremely important that patients be turned frequently to maintain adequate suctioning and prevent areas of atelectasis from developing.
7. Gastrointestinal
 - a. Patients may have gastric atony and a paralytic ileus for several days. Therefore, decompression with an orogastric or nasogastric tube is necessary. Patients should be started immediately on GI prophylaxis with sucralfate 1 gm q 6 hours. A bowel

regime should also be started on day 1 of admission (colace, orally and dulcolax, per rectum daily).

9. Genito-Urinary

- a. A Foley Catheter is placed at the time of admission and should be continued until patient stability permits. As soon as possible, patients should be switched to straight caths every 6-8 hours, depending on urine volumes. Urine residual should not be greater than 400 cc, as this increases infectious complications and promotes autonomic hyper-reflexis.

11. Metabolic

- a. Patients with spinal cord injuries may develop SIADH. They are also prone to developing immobilization complications, i.e. hypercalcemia. Early physical therapy consultation to increase mobilization and early stabilization may decrease immobilization complications.

13. Extremities

- a. DVT prophylaxis should be initiated on day 1. This is accomplished with thigh high Ted hose, pneumatic compression, and physical therapy consultation for range of motion exercises and mobilization. Some patients may experience severe spasm post-spinal cord injury which may be treated with baclofen.

15. Skin

- a. All pressure areas should be padded. The patient should be turned every two hours.

17. Nutrition

- a. Nutritional support should be started as soon as gastric residuals indicate resolution of ileus. Enteral feeding is preferred and a switch from parenteral to enteral feeding should occur as soon as

feasible.

19. Rehabilitation

- a. A spinal cord rehabilitation consult should be obtained on day 1.

21. Psycho-Social

- a. Psychiatry and Social Work consults may be necessary, depending on patient and family circumstances.
- b. The family should be encouraged to contact the Spinal Cord Injury Association

23. General

- a. Avoid full bladders, constipation, or painful sensations without anesthesia below the level of the cord transection. These can precipitate autonomic hyperreflexic crisis.
- b. The patient may not be able to sweat or shiver to maintain body temperature, therefore, temperature extremes in the environment should be avoided.
- c. Patients with spinal deficits who remain in cervical traction and are not able to be sat up may benefit from a roboted to improve pulmonary toilet.

E. CONSULT NEEDED UPON ADMISSION FOR ALL PATIENTS

1. Respiratory Therapy - Pulmonary Mechanics q 6 hrs
2. Social Services
3. Rehabilitation Medicine
4. Neurosurgery
5. Orthopedic Surgery
6. Physical Therapy

References

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