

Stabilization and Interfacility Management of Spinal Cord Injuries

Guidelines from the Alaska Trauma Systems Review Committee

Spinal fractures, spinal ligamentous injuries, and spinal cord injuries (SCI) represent a small proportion of traumatic injuries in Alaska and yet have immense impact on the injured as well as upon state resources due to associated long-term disability, health care costs and transfer needs. The Alaska Trauma Registry has documented an average of 51 spinal cord injuries per year during the years of 2016 through 2020. While this represents only 1.3% of total trauma patients, approximately 40% will require out of state transfer for specialty care evaluation, continued management and rehabilitation. The goal of early management of spinal cord injuries is to limit secondary injury. Rural and remote hospitals in Alaska need to be prepared to stabilize patients with suspected or confirmed spinal cord injury.

This document is intended to guide initial management and stabilization of patients at acute care centers prior to transfer to higher-level trauma centers with capability for definitive care of spinal cord injuries. Prehospital providers seeking guidance on the management of spine injury are referred to “Spinal Care” in the 2022 NASEMSO Model EMS Clinical Guidelines (<https://tinyurl.com/23rt8mw5>). These guidelines address the management of SCI and is not inclusive of spinal column fractures.

SCI is frequently associated with other severe injuries. The most common mechanism for spinal cord injury is vehicular trauma. Other mechanisms include unintentional falls, firearm injuries, and sports-related injuries. Polytrauma is common in high-mechanism injuries. Older adults are at increased risk of spinal injuries due to comorbidities, including osteoporosis and osteopenia. Multi-system trauma injuries should be addressed according to principles of Advanced Trauma Life Support®. Level 1 and level 2 trauma centers are best resourced for the optimal care of patients with SCI and early consultation and transfer is recommended.

INITIAL MANAGEMENT

- 1) Initial management of all trauma patients includes an organized primary and secondary survey with stabilization of immediate life threats. Identify and treat life-threatening injuries within the capabilities of the sending facility.
 - a) SCI above the level of T6 may predispose the patient to ventilatory compromise. The maintenance of the supine position may further impair ventilation and oxygenation: carefully consider the need for ventilatory support prior to transfer. If intubation is required, secondary injury associated with peri-intubation hypoxemia, hypotension, hyper/hypocarbica and excess spinal movement must be strictly avoided.
 - b) Hemorrhage remains the leading cause of shock in trauma patients. Neurogenic shock may be present in association of high-level spinal cord injury. However, occult

hemorrhage must be assumed in SCI with associated serious trauma and must be excluded clinically. Cardiovascular compromise in the setting of neurogenic shock will be unexplained by hypovolemic/hemorrhagic shock and is often associated with bradycardia.

- c) Disability exam may be suggestive of spinal cord injury when the following is present:
 - i) Absence of equal movement in the upper and/or lower extremities combined with gross sensory deficit.
 - ii) Loss of bladder or bowel function.
 - iii) Priapism.

SPINAL MOTION RESTRICTION

- 1) SCI patients should be maintained with spinal motion restriction (SMR).
 - a. Maintain neutral spine alignment.
 - i. Consider full body lift (“forklift lift”) or logroll as needed for transfers and turns. Ensure that sufficient people are available to assist with patient transfers. A slider board or air mattress (e.g. HoverMatt®) may be helpful adjuncts.
 - ii. Children have disproportionately large heads and may require padding to elevate the torso to prevent head flexion.
 - iii. SMR should be maintained during transport, with preference for vacuum mattress. Do not use a long spine board other than for extrication.
 - iv. Removal of long spine board, scoop stretcher, or vacuum mattress should be accomplished in a timely fashion once in an acute care setting. The use of hard boards during long transfers is explicitly discouraged, given the risk of pressure injury.
 - b. If indicated by injury, a cervical collar.
 - i. The neck should be in a neutral position without undue flexion, extension, or lengthening. Care must be taken to assure cervical collars are applied so they do not impede jugular venous return or create undue pressure on submandibular area, anterior neck, and other soft tissues. Padding may be necessary to accommodate anatomy.
 - ii. Prior to interfacility transfer, if a cervical collar is indicated, extrication collars should be replaced with a collar designed for treatment (i.e., Miami J or Aspen) when available.
 - iii. Certain patients with pre-injury conditions, such as severe kyphosis, may not tolerate a cervical collar. An alternative means of cervical SMR should be used if application of the collar increases pain or requires significantly altering the position of comfort assumed by the patient.
 - iv. Use of cervical collars with SCI from penetrating mechanisms has been shown to be harmful and should be avoided.
 - c. Alternatives for cervical spinal restriction include head blocks, “horse collar” (a blanket roll or similar that frames the head and neck and is secured) or other commercial or improvised methods.

- d. When the cervical spine has motion restriction it is mandatory that the rest of the torso is also restricted to avoid it becoming a lever against the cervical restraint.
- e. Special considerations for the helmeted patient, including timing and technique of removal are addressed in Appendix A.

HEMODYNAMICS

- 1) Prevention of hypotension is critical to reduce the risk of secondary spinal cord injury. Reverse treatable causes of shock. Sources of hemorrhage should be identified and controlled. Maintain a systolic BP of at least 90mm/hg or MAP > 65 during initial resuscitation. Limited evidence and international treatment guidelines suggest increased circulatory support may be beneficial during the acute and subacute phase of spinal cord injury.
 - a) In consultation with a trauma/spine specialist, consider augmentation of the MAP >85 mmHg to improve spinal cord perfusion.
 - b) Initial treatment of hypotension due to neurogenic shock will include volume resuscitation. Vasopressor use once initial resuscitation is achieved may be preferred to avoid volume overload.

REEXAMINE AND DOCUMENT

- 1) Perform repeat neurological examinations prior to and during transfer to definitive care.
 - a) A standardized motor and sensory exam improves interrater reliability. If time allows, clinical documentation using a standardized tool published by the American Spinal Injury Association (ASIA) should be used. Please see Appendix B.
 - b) Neurochecks should be performed by a health care provider, at least hourly until patient is transferred to a definitive care center.

TRANSFER

- 1) Early decision to transfer, within 2 hours, is strongly encouraged. Transfer should be to a higher-level trauma center.
 - a. Obtain early consultation with a spine specialist, with use of telemedicine as appropriate.
 - b. Use of methylprednisolone for early treatment of spinal cord injury cannot be definitively recommended. Steroid therapy should not be initiated without the guided direction of an accepting facility's spine specialist.
 - c. Blunt cerebrovascular injury is a common complication of cervical SCI and radiographic screening with CT angiography of the neck should be included in the diagnostic workup if it does not delay transfer.

References:

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3. Spine Injury Guidelines. American College of Surgeons Trauma Quality Programs Best Practices Guidelines. Updated March 2022. Accessed March 7, 2022. https://www.facs.org/-/media/files/quality-programs/trauma/tqip/spine_injury_guidelines.ashx
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