

velocity injury mechanism, such as a ground level fall.³⁻⁵ In young patients, cord compression usually results from a fracture dislocation or herniation secondary to hyperflexion injury.⁶ Clinically, this syndrome manifests with prominent weakness in the upper extremities and less weakness in the lower extremities. Tendon reflexes are lost at the level of the spinal cord lesion. Bladder symptoms are rare, and when present, usually include urinary retention. Pain and temperature sensations are preserved above and below the level of the lesion. However, with disruption of crossing spinothalamic fibers in the ventral commissure, pain and temperature sensations may be absent at several adjacent dermatomes, creating the “suspended sensory level”.⁷

Anterior Cord Syndrome. This syndrome results from a vascular-type injury to the anterior spinal artery, the primary blood supply to the anterior spinal cord. The anterior two-thirds of the spinal cord is affected. This syndrome characteristically results in loss of motor function and pain and temperature sensation distal the level of the lesion; however, proprioception, vibratory sense, two-point discrimination, and fine touch are preserved.⁸

Posterior Cord Syndrome. This incomplete SCI, characterized by isolated loss of proprioception, is an extremely rare injury. Motor function, and all other sensory functions, are preserved. This pattern is due to the dorsal location of the proprioceptive tracts in the spinal cord.

Brown-Sequard Syndrome. This syndrome can be caused by sharp hemi-transection of the spinal cord from blunt traumatic injury and cervical epidural hematoma. It has the best prognosis of all incomplete SCIs. This syndrome manifests as ipsilateral loss of motor function at the level of injury, as well as loss of dorsal column function (proprioception, vibratory sensation). Contralateral loss of pain and temperature sensation also occurs, which is related to the decussation of the spinothalamic tracts, typically occurring one to two levels below the level of the injury.

Conus Medullaris Syndrome. Injury or compression to the distal aspect of the spinal cord, typically between T12 and L1 is the cause of this syndrome.⁹ It manifests with bladder and bowel dysfunction, sexual dysfunction, loss of sensation around the perineum, and mild motor symptoms involving the lower extremities.⁹

Cauda Equina Syndrome. This syndrome’s constellation of symptoms is related to an injury to the intrathecal nerve roots distal to the conus that comprise the cauda equina. Incomplete cauda equina syndrome presents with bilateral sciatica, variable sensory and motor deficits in the lower extremities, which may be asymmetric. Complete cauda equina syndrome has these symptoms plus urinary and/or bowel retention or incontinence.^{9,10}

Acute Phase Conditions

Patients sustaining SCI often present with somatic dysfunction, including circulatory dysregulation from loss of sympathetic tone. *Neurogenic shock* is characterized by hypotension without compensatory tachycardia resulting from injury to the spinal cord’s autonomic pathways that lead to collapse of resting sympathetic tone and systemic vascular resistance.¹¹ This constellation of findings can lead to end organ failure and death. Differentiate neurogenic shock from *spinal shock*, a loss of all spinal cord function and reflex activity.¹² Spinal shock is characterized by flaccid areflexic paralysis, including loss of the bulbocavernosus reflex. Typically, acute spinal shock resolves within 48 hours of injury. See section on Spinal Shock on page 52 for more information.

American Spinal Injury Association (ASIA) Classification¹³

Use the ASIA classification of SCI to stratify the severity of the injury. To accurately assign an ASIA impairment grade, complete the assessment after the period in which spinal shock may occur. Refer to Table 5 for the ASIA classification descriptions. Refer to the Physical Examination section and Figure 2 on page 19 for documentation of the ASIA assessment.

References

1. Kirshblum S, Snider B, Rupp R, Read MS. Updates of the International Standards for Neurologic Classification of Spinal Cord Injury: 2015 and 2019. *Physical Medicine and Rehabilitation Clinics of North America*. 2020; 31: 319–330. doi: 10.1016/j.pmr.2020.03.005
2. Chiu RG, Siddiqui N, Fuentes A, et al. Early versus late surgical intervention for central cord syndrome: A nationwide all-payer inpatient analysis of length of stay, discharge destination and cost of care. *Clinical Neurology and Neurosurgery*. 2020; 196: 106029. doi: 10.1016/j.clineuro.2020.106029