

## Spinal Cord Injuries

SCI is a life-changing event that affects all aspects of an individual's life. The goal of all phases of rehabilitation is to help the individual to reach their full potential after the injury. Depending on the severity of the lesion, functional goals, adjustments to injury, and discharge options will all impact the length of time an individual spends in rehabilitation. With occupational therapy, the main focus during rehabilitation is to aid individuals in achieving optimal independence and functioning, as well as offering emotional support and intervention.



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### Complications

#### Spinal Shock

##### Spine Shocked

A Spinal Shock is a period of altered reflex activity right after a traumatic SCI. As a result of injury, spinal cord segments below the level of the lesion are deprived of excitatory input from higher CNS centers. What is observed clinically during this phase is a flaccid paralysis of muscles below the level of injury and an absence of reflexes. The bladder is also flaccid, requiring catheterization, which is a procedure to enable the flow of urine by way of insertion of a latex tube into the bladder by way of the urethra when there is no voluntary control of the bladder. Spinal shock generally lasts from 1 week to 3 months after an injury. Once the spinal shock subsides, the areas of the spinal cord above the level of the injury will operate as they did pre-morbidly, and below the lesion, reflexes will return if the reflex arc is intact.

#### Respiratory Complications

##### Complicated Lungs

People with spinal cord injuries at or below the level of T12 generally have a normal respiratory status. Injuries above that level, however, compromise the respiratory system to some degree. Segments T7 through T12 innervate the abdominal musculature, segments T1 through T12 serve the intercostal muscles, and C4 innervates the diaphragm. People with complete injuries above C4 usually need a respirator. Generally, people with complete injuries at C4 and below do not use respirators, but respiratory complications may persist. Breathing may be shallow, and the ability to cough productively may be compromised. Prevention and early management of respiratory complications are crucial.

#### Autonomic Dysreflexia (Hyperreflexia)

##### Atomic-automobile with Disc-reflex-hammer

Autonomic Dysreflexia involves an exaggerated response of the autonomic nervous system (ANS) and occurs mostly in people with SCI above the T6 level. Autonomic Dysreflexia is a life-threatening condition, and it is vital to look for signs such as a sudden pounding headache, flushing or sweating, anxiety, a sudden increase in blood pressure, vision changes, or goose bumps on the arms and legs. If possible, you should be kept in a sitting position to keep blood flowing to the legs and feet and help reduce blood pressure.

#### Orthostatic Hypotension

##### Oar Hippo-BP

Orthostatic hypotension is mostly seen in people who have sustained cervical or thoracic SCIs. Blood tends to pool distally in the lower extremities as a result of reduced muscle tone in the trunk and legs. Symptoms include light-headedness, dizziness, pallor, sudden weakness, and unresponsiveness. Preventive measures include an abdominal binder and anti-embolism hosiery to aid with circulation. Another preventive method is assuming an

upright posture slowly, and if symptoms appear, a reclined or semi-reclined position should be maintained.

## Deep Vein Thrombosis

### Deep V-neck Trombone

Deep vein thrombosis is a potential complication with SCI due to reduced circulation caused by decreased muscle tone, frequency of direct trauma to legs causing vascular damage, and prolonged bed rest. Clinical signs of DVT include swelling, localized redness, and low-grade fever.

## Thermal Regulation

### Thermal Referee

Thermal Regulation is another function of ANS that can be disturbed after SCI. Maintaining the appropriate body temperature is often a problem whose injuries are above T6. During the first year after injury, the body tends to assume the temperature of the external environment. This condition is called poikilothermia. In time, some adjustment usually occurs. Cold weather often causes discomfort, as blood vessels below the level of injury do not constrict sufficiently to conserve the body's heat. Excessive sweating may occur above the level of injury in warmer weather but not below, which hampers the body's efforts to prevent hyperthermia. Because of this, extreme temperatures should be avoided, and attention should be given to the extent and type of clothing worn in all conditions.

## Circulatory Problems

### Circulatory Problem-cube

Changes in circulation, including blood pressure instability, abnormal heart rhythms (arrhythmias), and blood clots may appear days after the injury. Blood pressure needs to be closely monitored. Because the brain's control of the cardiac nerves can be cut off, your heart can beat at a dangerously slow pace, or it can pound rapidly and irregularly. Changes in the control of blood vessels can cause them to widen and allow blood to pool in the small arteries far away from the heart. People with spinal cord injuries are at increased risk for blood clots due to the stagnation of blood flow in the large veins in the legs. Treatment includes anticoagulant drugs and compression stockings to increase blood flow in the lower legs and feet.

## Spasticity

### Spaz-tick

Reflexes become exaggerated over time, causing muscle spasticity below the level of injury after the spinal shock resides. An increase in muscle tone is triggered by factors such as infections, positioning, pressure ulcers, UTIs, and heightened emotional states. Excessive spasticity can result in contractures, pain, and reduced ability to participate in activities.

## Dermal Complications

### Complicated Deer-mouse

Decubitus ulcers are the major reason for hospitalization in individuals with SCI. Pressure sores are areas of skin that have broken down because of continuous pressure on the skin and reduced blood flow to the area. People with paraplegia and tetraplegia are susceptible to pressure sores. As a result, individuals must follow a pressure relief schedule with the assistance of a caregiver.

## Genitourinary Complications

### Complicated Urinary-tract

Individuals with SCI are prone to UTI or bladder infections. The individual needs to use a catheter to empty the bladder or learn ways to empty the bowels. Nerves in the rectal musculature are stimulated, triggering reflexive peristalsis, which is a process of muscle contractions resulting in the movement of food through the digestive tract and relaxation of the rectal sphincters. A bowel movement may be prevented at this step of the process if the brain overrides this reflex, sending down an impulse to tighten the sphincter muscles until an appropriate time. An SCI can interfere with bowel function in much the same way as it impedes the bladder. The bowel can become spastic or flaccid. This stimulation may be done manually through digital stimulation or in conjunction with the use of suppositories. Establishing and following a regular schedule for bowel management can reduce occurrences of incontinence.

## Spinal Cord Injury Syndromes

## **Anterior Cord Syndrome**

### **Anterior Cord**

Anterior cord syndrome results from damage to the anterior spinal artery or indirect damage to anterior spinal cord tissue. Clinical signs include loss of motor function below the level of injury and loss of thermal, pain, and tactile sensation below the level of injury. With this syndrome, light touch and proprioception awareness are generally intact.

## **Central Cord Syndrome**

### **Center Cord**

With this lesion, the neural fibers serving the upper extremity are more impaired than those of the lower extremities. This syndrome occurs because the fibers that intervene in the upper extremity travel more centrally in the cords, and the central structure is damaged.

## **Brown-Sequard's Syndrome**

### **Cleveland-Brown-Centaur**

Brown-Sequard's Syndrome occurs when only one side of the cord is damaged and is below the level of the injury. Brown-Sequard's Syndrome clinical signs include ipsilateral loss of motor function below the level of injury as well as reduction of deep touch and proprioceptive awareness, contralateral loss of pain, temperature, and touch.

## **Conus Medullaris Syndrome**

### **Cone Medusa**

Conus Medullaris Syndrome involves injury of the sacral cord (conus) and lumbar nerve roots within the neural canal, which usually results in an areflexic bladder, bowel, and lower extremities.

## **Cauda Equina Syndrome**

### **Cod Horsetail**

Cauda equina syndrome involves peripheral nerves rather than directly involving the spinal cord. This type of injury usually occurs with fractures below the L2 level and results in flaccid-type paralysis. Peripheral nerves possess a regenerating capacity that the cord does not. This injury is associated with a better prognosis for recovery. Patterns of sensory and motor deficits are highly variable and asymmetric in cauda equina injuries.