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Spinal Cord Injuries

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Spinal Cord Injury Facts

- Currently approximately 294,000 people living in the U.S. with SCI
- 17,810 new cases each year
- Average age at injury is 43 years old
- 58.9% Caucasian
- 23.9% non-Hispanic and Blacks
- 78% male

Causes:

- Motor vehicle accident (MVA) 38.6%
- Falls 32.2%
- Violence 14.0%
- Sports 7.8%
- 25% of SCI have some alcohol involvement

Spinal Cord Injury Facts

- Mortality is increased with age and higher the level of injury
- Leading cases of death with SCI
  - Pneumonia
  - Septicemia

Costs of Spinal Cord Injury

Severity of injury	Average yearly expenses (2019 dollars)	
	First year	Subsequent years
High tetraplegia (C1-C4)	$1,149,629	$199,637
Low tetraplegia (C5-C8)	$830,708	$122,468
Paraplegia	$560,2867	$74,221
Motor function at any level	$375,196	$45,572

Historical Life Expectancy

Life expectancy (years) for post injury by severity of injury and age at injury for persons surviving at least 1 year post injury						
Age at injury	No SCI	Motor function at ANY level	Para	Low tetra (C5-C8)	High tetra (C1-C4)	Ventilator dependent any level
20	59.4	52.3	45.1	40.0	33.6	16.9
40	40.7	35.1	29.9	25.4	21.7	13.1
60	23.3	19.4	16.4	13.7	12.4	7.9

Some Interesting things About SCIs

Spinal cord syndrome

- There are multiple spinal cord syndromes that cause patients to have differing amounts of sensation below the level of injury
- Never assume that the patient has no feeling below the level of injury
- Function and sensations can be different on either side of the patient
- Some syndromes cause more sensation and function in lower extremities than upper extremities

Upper versus Lower Spinal cord Injury

Upper motor neuron injury

- Injury above T12
- Patient will often have SPASTIC paralysis

Lower motor neuron injury

- Injury below T12
- Characterized by extreme weakness of muscles and loss of muscle tone

American Spinal Injury Association (ASIA) Test

American Spinal Injury Association (ASIA) Test

- This is a system of tests used to define and describe the extent and severity of a patient's spinal cord injury and help determine future rehabilitation and recovery needs. It is ideally completed within 72 hours after the initial injury
- The patient's grade is based on how much sensation he or she can feel at multiple points on the body, as well as tests of motor function

American Spinal Injury Association (ASIA) Test

Grade A
- Complete lack of motor and sensory function below the level of injury (including the anal area)

Grade B
- Some sensation below the level of the injury (including anal sensation)

Grade C
- Some muscle movement is spared below the level of injury, but 50 percent of the muscles below the level of injury cannot move against gravity

Grade D
- Most (more than 50 percent) of the muscles that are spared below the level of injury are strong enough to move against gravity

Grade E
- All neurologic function has returned

Definitions

Paraplegia

- Loss of function of the lower extremities
- SCI at the Thoracic level and below
- May involve the chest and torso

Tetraplegia **(Previously Quadriplegia)**

- Spinal Cord injury above the Thoracic level (C1-C8)
- Involves some loss of function of all four limbs and the torso

Autonomic Dysreflexia

- A medical EMERGENCY!
- Occurs in 48-90% of those with injuries at or above T6, especially cervical injuries
- More common in Males 4:1
- Characterized by increased BP (20-40mmHG > baseline)
- Bradycardia
- Flushing
- Perspiration
- Goose pimples
- Nasal congestion
- Impending sense of doom

Autonomic Dysreflexia

Caused by a stimulation below the level of the injury:

- Distended bladder
- Fecal impaction
- Pressure injury
- Urological procedures
- OB/GYN procedures
- Ingrown toenails
- Fractures
- Restrictive clothing
- DVT
- Kidney stones
- Sexual activity

Be diligent to prevent these things from happening when caring for a SCI patient
Educate, educate, educate

Problems with SCI Patients: Spasticity

- Inhibitory and excitatory impulses become imbalanced
- Appears in 65-78% of SCI- more frequent in UMN and more severe in cervical injuries
- Increased with certain positions/movements, pain, pressure sores, UTIs, GI issues, hemorrhoids, fecal impaction, emotional/physical stress, and some antidepressants
- Complications include contractures, pain, skin breakdown, sleep disturbances, and impaired function

Interventions-interdisciplinary

- Correct posture, positioning, and alignment
- Muscle stretching, ROM exercises BID
- Cold and warm compresses, topical anesthetics to decrease excitability, decrease clonus, improve ROM and increase motor function
- Casting, splinting, orthotics, surgical interventions, and Botox
- Pain management for acute episodes
- Spasticity meds are not universally beneficial and have side effects

Problems with SCI Patients

Skin integrity

- Pressure Injuries are a MAJOR complication- one of the primary causes of septicemia in SCI patients!

Interventions:

- Regular skin assessment
- Turning q 2 hours
- Educate patient and family on positioning, friction, sheer, and moisture
- Educate patient and family on pressure release techniques
- Educate patient and family on s/s of pressure sores
- Educate on diet – high protein, iron, and adequate calories

Problems with SCI Patients: Respiratory Function

Respiratory complications:

- Atelectasis
- Pneumonia
- Respiratory failure
- Increased with age, completeness of the injury, and the level of the injury

Management:

- Meds and respiratory treatments
- Hydration
- Ventilation
- Deep breathing, chest physiotherapy, and postural drainage/percussion
- Quad cough
- Cough assist

Problems with SCI Patients: Bradycardia

- Occurs most often with lesions above T5
- Contributed to anything that can stimulate the vagal nerve
  - Tracheal suctioning
  - Defecation
  - Positional turning
  - Turning to a prone position
- Usually only need to be treated if symptomatic

Problems with SCI Patients: Thermoregulation

- The ability to regulate heat loss or sweating and vasodilation to facilitate heat loss is reduced after SCI especially with lesions above T5
- Cold room may cause a drop in core temperature and the patient is unable to shiver to increase temp
- Warm room may cause the core temp to be elevated

Interventions:

- Maintain an ambient temperature
- Keep patient hydrated
- Dress appropriately
- Patient and family education

Problems with SCI Patients: Orthostatic Hypotension

- Baroreceptors in the carotid and aortic arteries perceive the fall in BP, but the sympathetic pathways are disrupted and cause decreased sympathetic response
- Orthostatic and pooling of venous blood in the lower extremities
- Lessens over time
- More common with lesions over T6

Interventions:

- Tilt blood pressures frequently
- Gradual changes from sitting to standing
- May need to wrap legs or use teds and even abdominal binders prior to changing positions
- If this occurs, immediately lower back to a level position

Problems with SCI Patients: Depression and Suicidal Thoughts

Problems with SCI Patients: Depression and Suicidal Thoughts

- Profound sense of loss due to physical abilities, social relationships, financial resources, and personal identity
- Past history of coping will help to predict the patient's resiliency, but it is individual

Interventions:

- Ongoing depression and suicidal evaluations
- Refer to psychology when needed
- Assess for self-medication with alcohol or illegal drugs
- Careful supportive listening

Problems with SCI Patients: Thrombolytic Problems

- DVT and PE are common following SCI
- Usually occurs within the first two weeks after injury
- Leading cause of death within the first year of injury

Interventions:

- Anticoagulant therapy
- Pneumonic compression devices and compression hose
- Frequent monitoring for s/s of PE: shortness of breath, chest pain, apprehension, cough, fever, heaviness in chest
- Keep hydrated
- Proper positioning
- Non-restrictive garments

Sexuality following a SCI

Sexuality following a SCI

Men
- Frequently experience erectile dysfunction/loss of sensation following a SCI
- May be able to achieve erection with medications
- May or may not be able to ejaculate with intercourse
- May require assisted reproductive techniques in order to father children

Women
- Continue to have menstrual cycles and fertility as they did prior to injury
- Must continue with their well woman checks annually
- May have loss of sensation with intercourse
- Must be educated that AD may occur with intercourse and/or gynecological exams
- If they become pregnant, they must be educated that AD may occur during labor and delivery

Problems with SCI Patient: Other

Neurogenic pain
- Increased with tetraplegia, cold weather, sudden movements, irritable mood

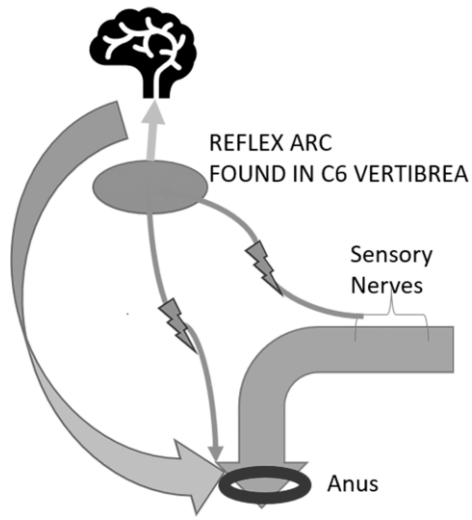
Heterotrophic ossification
- Overgrowth of bone in the soft tissue surrounding a joint
- 13-37% develop this in the first six months
- Red swollen joints with decreased ROM, pain, lower fever

Osteoporosis due to loss of weight-bearing activities
- Lose approximately 25% of bone mass in UE in the first year
- Lose approximately 40% of bone mass in distal femur and tibia in first year

Problems with SCI Patient: Bowel & Bladder Function

Understanding Normal Bowel Function with Intact Spinal Cord

1. Stool is pushed into the rectum by peristalsis
2. The presence of the stool stimulates sensory nerve fibers which:
   a. Trigger anal reflex action that contracts sphincter keeping it closed
   b. Sends pressure sensation to the brain so the person realizes he needs to defecate
3. The anal reflex can be voluntarily overridden when it is time to have a bowel movement

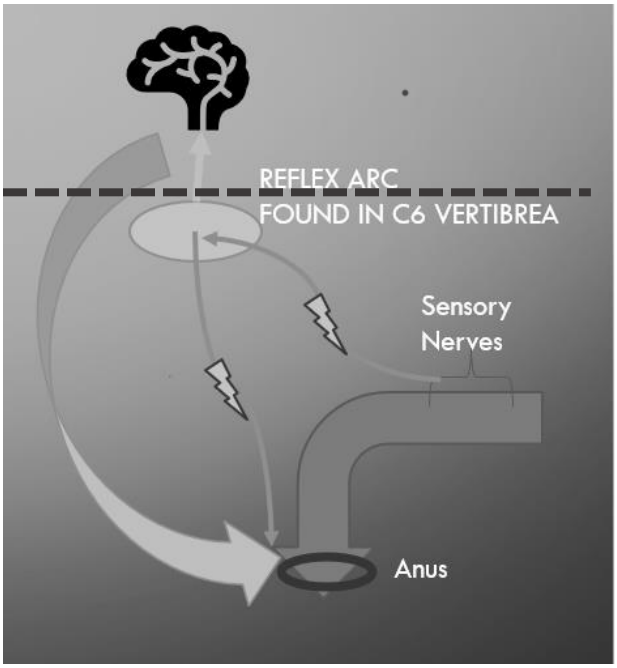


Understanding Normal Bowel Function with Intact Spinal Cord

- The reflex arch is stored in the sixth thoracic vertebra
- Bowel function in a spinal cord injury depends on where the spinal cord is injured in relation to T6
  - Above T6 is considered a reflexive bowel
  - Below T6 is considered a non-reflexive or flaccid bowel

SCI Below the Reflex Arch

1. The rectum fills with stool, stretches then pushes on the nerves in the rectum
2. Nerve signal never reaches the spinal cord due to the injury
   - No reflex occurs to close the sphincter, no pressure is felt by the patient to voluntarily hold the sphincter closed
3. The rectal sphincter remains loose so when stool enters the rectum, it comes right out

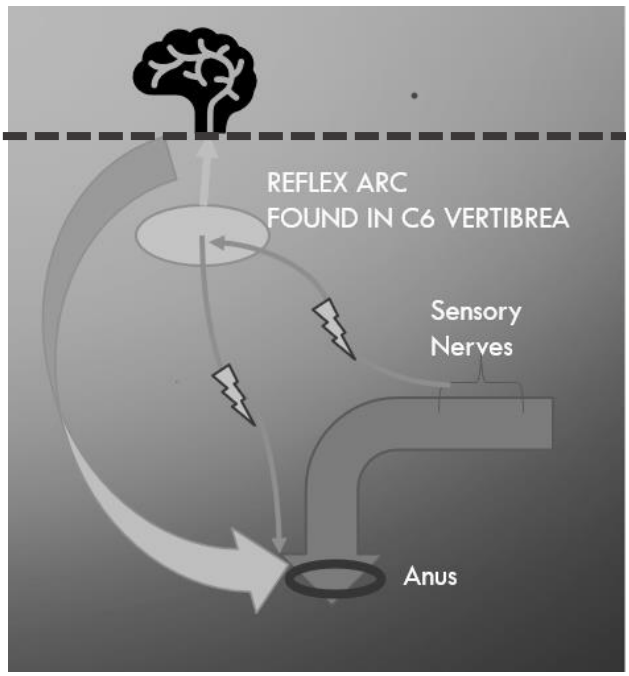


Flaccid Bowel Management

- Needs to keep stools firm to help prevent unexpected incontinent episodes
- May need to perform bowel program multiple times per day to prevent incontinence (i.e., after every meal)

SCI Above the Reflex Arch

1. The rectum gets full of stool, stretches and pushes on the area nerves
2. Messages are sent from the bowel to the spinal cord
3. The anal sphincter is closed reflexively
4. The brain does not feel that the bowel is full so voluntary emptying is not initiated
5. Stool will build up in the rectum and colon and may cause over distention, autonomic dysreflexia, and occasional episodes of incontinence



Reflexive Bowel Management

- Need to keep stools soft for easy passage of stool
- Must be educated on signs and symptoms of autonomic dysreflexia and the actions to take if they began to have symptoms

Bowel Program Goals

1. Allow the SCI patient to have regular, predictable bowel movements
2. Give SCI patient control over their bowel movements and decrease anxiety about being incontinent of bowel at undesired times
3. Have patient be independent in performing or directing his bowel program
4. Have patient be knowledgeable about dietary and medication choices that affect the bowel program

Bowel Programs Work Best When They Are Done:

- At the same time, every day
- On the patient's pre-injury defecation schedule
- Using the same techniques every day

How To Perform a Bowel Program

1. Prepare the patient and gather all supplies (suppository, lubricant, gloves, shower chair/bedside commode, wipes, and towels)
2. Position the patient to lying in bed (left side) or sitting in an upright position on the toilet or shower chair
3. Can be done with or without a suppository. If using a suppository, insert and allow 15-20 minutes for the medication to work
4. If patient is not already over the toilet or on a bedside commode, place the patient in this position
5. If bowel movement does not occur naturally after 15-20 minutes, using a gloved, lubricated finger or dil stick, gently put the finger or dil stick into the rectum past the muscle
    - If the patient has feeling in the muscle, lidocaine gel may be used as a lubricant. Stimulate as before for 10-15 seconds and repeat as needed until all stool has passed (clean glove)
6. Clean patient

Other Methods to Assist with Bowel Movements

- Squatting position
- Warm drinks and food
- Abdominal massage
- Valsalva
- Changing positions

Problems with SCI Patients: Bladder Control

Problems with SCI Patients: Bladder Control

- Varies depending on the level of the injury
- Patient must be educated to have the most appropriate bladder program for the patient's level of functioning

Interventions:

- Timed straight catheterization
  - Patient must be taught sterile versus clean technique
  - Must be taught fluid balancing
- Suprapubic catheter
  - Surgically inserted into the bladder
  - Must be changed monthly
- Indwelling catheter
  - Least desirable choice for long-term care

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