

HOMEWORK ASSIGNMENT

The Spinal cord injury syndrome in this case is Brown-Sequard Syndrome. Please complete the assignment individually. You may use books, your text, reputable health provider websites, university neuroscience websites, and journals as resources for this assignment. A minimum of 3 and maximum of 6 different resources are required in your bibliography. You will use these to understand and respond to the questions in the patient scenario, as well as to map the lesion affects in the provided template. University neuroscience websites are acceptable resources to use in the assignment as well. Chapter 18 in the text will be helpful. Please do not use your text exclusively. Please do not use Wikipedia. The assignment requires you to draw the level of the lesion pathways involved in the described case. A template /drawing is provided for you on which to draw involved pathways and to indicate a lesion. It includes a coronal view of the cerebrum plus transverse brainstem and spinal cord sections. To indicate pathways, use different colors to show each different pathway. Utilize an axon to show a pathway--be sure to show synapses. Synapses should be drawn simply like those in Text Fig. 16.5. Label spinal cord levels as appropriate. 3 transverse SC levels are provided on the drawing. Please include a bibliography at the assignment's end. Utilize APA format. Utilize citations appropriately. The assignment is due December 11th at 5 pm. The typical length of the assignment is 2-3 pages, including the drawing

Case Study:

Maryanne is a 26 year-old gymnastics coach. Eleven days ago, she sustained serious injury when demonstrating a vaulting technique for members of her team. When she missed her landing, she injured her lower neck resulting in fracture and spinal cord injury. Maryann's cervical spine was immediately immobilized with a C-collar on scene by medical personnel. She was taken by ambulance to a nearby trauma center. She was alert and oriented to person, time and place on arrival at the ER, although she was hypotensive. Bradycardia was also present. CT scanning revealed a non-displaced left vertebral arch fracture of the C7 vertebra. The C8 vertebral pedicle also showed a small, non-displaced fracture on the left side. MRI revealed that several spinal ligaments were partially torn. Of greater concern, a contusion injury to the spinal cord was revealed, though the cord was not severed. Surgery was performed later on the same day of the injury to stabilize the bony defects. Neurosurgeons utilized titanium screws and wires to accomplish the fixation. Six days later, the patient was transferred to a spinal cord injury unit of another hospital. The trauma team's clinical evaluation included the following: (this only includes observations about affected tracts and is not complete)

1. Vibration & discriminative touch were absent on her left side at the C8 level and below.
2. Paralysis was revealed for left upper and lower extremities below (and including) the C8 level. The patient was able to move the right ankle and toes as well as the right upper extremity
3. Pain and Temperature were absent below T2 on the right side.

Left Patellar and Achilles tendon reflexes were absent with testing as was the Left abdominal reflex.

- I. On the diagram (template) show the location of the lesion in the cord, based on the description. (items 1, 2, & 3). You may shade involved cord regions in the manner shown in Figure 18.22 (p. 370).
- II. Utilize the multiple cross-sections (transverse sections) as needed. Show and Label appropriate ascending/descending tracts, synapses. Use of different colors may help you clarify differences in structures.

- III. Refer to Diagrams and Tables in Ch. 18 of the text to assist you in exploring the region of injury. Table 18-4 will help you to determine which functions were retained.

Case, continued: Follow-up imaging (MRI) 5 days later confirmed that at the level of the lesion, the spinal cord was contused (as previously seen) and that edema affected the sensory and motor functions noted previously. The patient was successfully administered corticosteroid medication to reduce the cord edema. It was determined that Maryanne had sustained an incomplete SCI (Spinal Cord Injury). Eight days after her accident, Maryanne experienced some return of sensation for the anal/perianal region. She also regained some partial voluntary bladder function, (A urinary catheter had been inserted in her bladder in the emergency department on Day 1) On the 10th day after the injury, Maryanne regained discriminative touch along the left medial forearm. Her wrist and elbow extensor musculature was graded 4/5 bilaterally. (see p. 374)

II. Briefly answer the following: All responses should be in your own words.

1. When is mechanical ventilation required for traumatic spinal cord injury?
2. What is spinal shock. How long does it typically last?
3. Provide a definition for incomplete spinal cord injury.
4. Briefly describe how bradycardia and hypotension may result after cervical spinal cord injury.
5. Using a non-text source, provide a description of the Brown-Sequard syndrome. What is the typical etiology for this syndrome?
6. Using a dermatome chart, which spinal level corresponds to the return of sensation for the medial forearm
7. Describe the abdominal reflex (noted above) and what it indicates
8. Describe flaccid (atonic) bladder as it relates to spinal cord injury.
9. Describe the condition known as autonomic dysreflexia. Why is it dangerous? Identify one factor that may trigger it.
10. How are pressure ulcers problematic with the health of patients with spinal cord injury?

HOMEWORK ASSIGNMENT

The Spinal cord injury syndrome in this case is Brown-Sequard Syndrome. Please complete the assignment individually. You may use books, your text, reputable health provider websites, university neuroscience websites, and journals as resources for this assignment. A minimum of 3 and maximum of 6 different resources are required in your bibliography. You will use these to understand and respond to the questions in the patient scenario, as well as to map the lesion affects in the provided template. University neuroscience websites are acceptable resources to use in the assignment as well. Chapter 18 in the text will be helpful. Please do not use your text exclusively. Please do not use Wikipedia. The assignment requires you to draw the level of the lesion pathways involved in the described case. A template /drawing is provided for you on which to draw involved pathways and to indicate a lesion. It includes a coronal view of the cerebrum plus transverse brainstem and spinal cord sections. To indicate pathways, use different colors to show each different pathway. Utilize an axon to show a pathway--be sure to show synapses. Synapses should be drawn simply like those in Text Fig. 16.5. Label spinal cord levels as appropriate. 3 transverse SC levels are provided on the drawing. Please include a bibliography at the assignment's end. Utilize APA format. Utilize citations appropriately. The assignment is due December 11th at 5 pm. The typical length of the assignment is 2-3 pages, including the drawing

Case Study:

Maryanne is a 26 year-old gymnastics coach. Eleven days ago, she sustained serious injury when demonstrating a vaulting technique for members of her team. When she missed her landing, she injured her lower neck resulting in fracture and spinal cord injury. Maryann's cervical spine was immediately immobilized with a C-collar on scene by medical personnel. She was taken by ambulance to a nearby trauma center. She was alert and oriented to person, time and place on arrival at the ER, although she was hypotensive. Bradycardia was also present. CT scanning revealed a non-displaced left vertebral arch fracture of the C7 vertebra. The C8 vertebral pedicle also showed a small, non-displaced fracture on the left side. MRI revealed that several spinal ligaments were partially torn. Of greater concern, a contusion injury to the spinal cord was revealed, though the cord was not severed. Surgery was performed later on the same day of the injury to stabilize the bony defects. Neurosurgeons utilized titanium screws and wires to accomplish the fixation. Six days later, the patient was transferred to a spinal cord injury unit of another hospital. The trauma team's clinical evaluation included the following: (this only includes observations about affected tracts and is not complete)

1. Vibration & discriminative touch were absent on her left side at the C8 level and below.
2. Paralysis was revealed for left upper and lower extremities below (and including) the C8 level. The patient was able to move the right ankle and toes as well as the right upper extremity
3. Pain and Temperature were absent below T2 on the right side.

Left Patellar and Achilles tendon reflexes were absent with testing as was the Left abdominal reflex.

- I. On the diagram (template) show the location of the lesion in the cord, based on the description. (items 1, 2, & 3). You may shade involved cord regions in the manner shown in Figure 18.22 (p. 370).
- II. Utilize the multiple cross-sections (transverse sections) as needed. Show and Label appropriate ascending/descending tracts, synapses. Use of different colors may help you clarify differences in structures.

- III. Refer to Diagrams and Tables in Ch. 18 of the text to assist you in exploring the region of injury. Table 18-4 will help you to determine which functions were retained.

Case, continued: Follow-up imaging (MRI) 5 days later confirmed that at the level of the lesion, the spinal cord was contused (as previously seen) and that edema affected the sensory and motor functions noted previously. The patient was successfully administered corticosteroid medication to reduce the cord edema. It was determined that Maryanne had sustained an incomplete SCI (Spinal Cord Injury). Eight days after her accident, Maryanne experienced some return of sensation for the anal/perianal region. She also regained some partial voluntary bladder function, (A urinary catheter had been inserted in her bladder in the emergency department on Day 1) On the 10th day after the injury, Maryanne regained discriminative touch along the left medial forearm. Her wrist and elbow extensor musculature was graded 4/5 bilaterally. (see p. 374)

II. Briefly answer the following: All responses should be in your own words.

1. When is mechanical ventilation required for traumatic spinal cord injury?
2. What is spinal shock. How long does it typically last?
3. Provide a definition for incomplete spinal cord injury.
4. Briefly describe how bradycardia and hypotension may result after cervical spinal cord injury.
5. Using a non-text source, provide a description of the Brown-Sequard syndrome. What is the typical etiology for this syndrome?
6. Using a dermatome chart, which spinal level corresponds to the return of sensation for the medial forearm
7. Describe the abdominal reflex (noted above) and what it indicates
8. Describe flaccid (atonic) bladder as it relates to spinal cord injury.
9. Describe the condition known as autonomic dysreflexia. Why is it dangerous? Identify one factor that may trigger it.
10. How are pressure ulcers problematic with the health of patients with spinal cord injury?

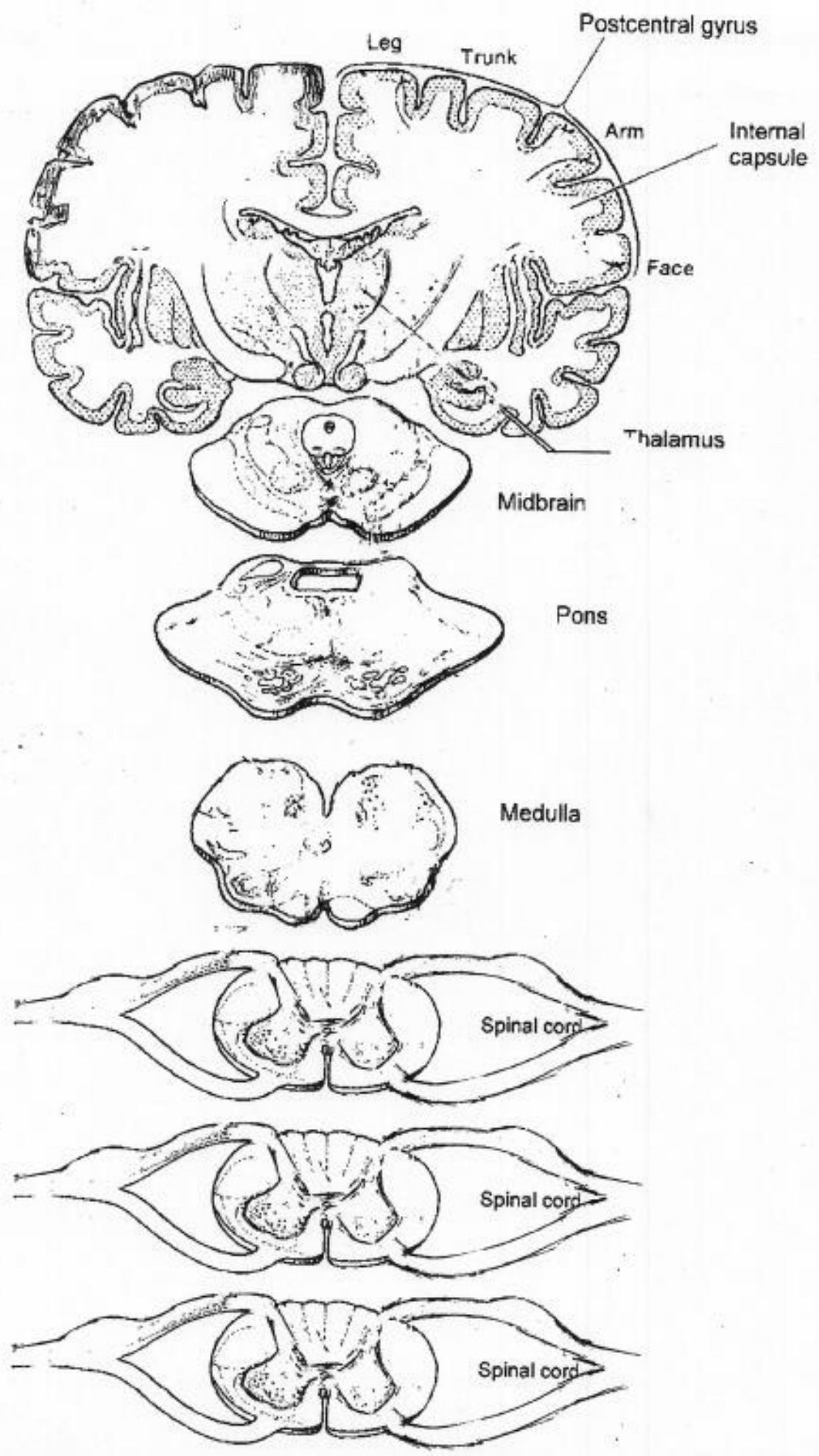


Table 18.4

TABLE 13-3 FUNCTIONAL ABILITIES ASSOCIATED WITH COMPLETE SPINAL CORD LESIONS AT VARIOUS LEVELS

Level of Lesion	Motor Capability*	Intact Sensation	Mobility	ADLs/Transfers	Limitations
C1-C3	Facial muscles, upper trapezius, sternocleidomastoid	Neck and head (cranial nerves from face; C2: posterior head, upper neck; C3: lower neck)	Breath/chin controlled power wheelchair (WC)	Dependent in all activities of daily living (ADLs)/transfers	Ventilator dependent
C4	Diaphragm	Upper shoulder	Breath/chin controlled power WC	Dependent in all ADLs/transfers	No upper limb movement
C5	Elbow flexors	Lateral upper arm	Hand controlled power WC; able to use manual WC with rim projections but requires excessive time and energy	Able to perform some ADLs with adaptive equipment if an assistant sets up required items. Dependent in transfers	Unable to extend elbow or move hand
C6	Wrist extensors	Lateral forearm and lateral hand	Manual WC with rim projections; drive using hand controls	Independent ADLs except lower limb dressing. Transfers independent except toilet	Unable to extend elbow or move hand
C7	Elbow extensors	Middle finger	WC on level surfaces	Independent except foot/WC transfers	Unable to move fingers and thumb
C8	Finger flexors	Medial hand	Up/down 2–4 inch curbs in WC	Independent living	Some intrinsic hand muscle function; difficulty with fine motor tasks
T1	Finger abductors	Medial forearm			No lower abdominals
T2-T6		T2: medial upper arm; T3-T6: torso	WC up/down 6 inch curbs		No lower abdominals
T7-T12	Abdominals, lateral spine flexion	T7-T12: torso (T10: level of umbilicus)	Sit-to-stand and walk with orthoses indoors		No hip flexors
L1	—	Anterior upper thigh			
L2	Hip flexors	Anterior thigh, below L1	Community walking with orthoses		No quadriceps
L3	Knee extensors	Anterior knee			No gluteus maximus
L4	Ankle dorsiflexors	Medial leg			
L5	Long toe extensors	Lateral leg, dorsum of foot			
S1	Ankle plantarflexors	Posterior calf and lateral foot			No bowel/bladder voluntary control
S2	—	Posterior thigh			
S3	—	Ring surrounding S4-S5			
S4-S5	Voluntary anal contraction	Ring surrounding anus			

*Each additional level adds functions to the capabilities of the higher levels. Muscles listed may be only partially innervated at the level indicated. Thus the quadriceps usually has some voluntary activity if the L3 level is intact; however, the action is weak unless the L4 level is also intact. ADLs (activities of daily living) include eating, bathing, dressing, grooming, work, housework, and leisure.

Figure 18.22

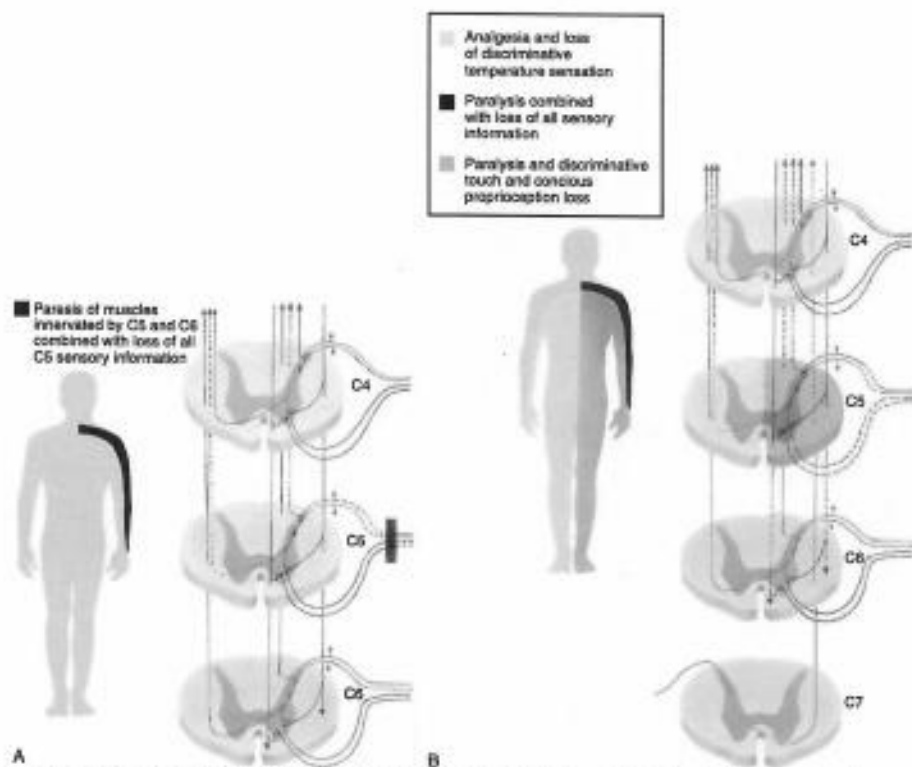


Fig. 13-18 Spinal region lesions: segmental signs versus vertical tract signs. Dotted lines indicate neural pathways that have been interrupted and do not convey information. **A**, The lesion interrupts all axons in the left C5 spinal nerve. This produces loss of sensation from the C5 dermatome and weakness of the biceps and brachioradialis, partially innervated by the C5 spinal nerve. The biceps and brachioradialis are not paralyzed because C6 also supplies these muscles. Thus the losses are limited to only part of the left arm. The entire remainder of the nervous system functions normally. **B**, In contrast, the hemisection of the cord at C5 produces the following conditions below the C5 level: paralysis on the left side, loss of discriminative touch and conscious proprioceptive information from the left side, and analgesia and loss of discriminative temperature sensation from the right side. In addition, segmental losses are the same as in lesion **A**.

- Altered or lost sensation in a dermatome
- Decreased or lost muscle power in a myotome
- Decreased or lost phasic stretch reflex
- Spinal region vertical tract signs include:
- Altered or lost sensation below the level of the lesion
- Altered or lost descending control of blood pressure, pelvic viscera, and thermoregulation
- Upper motor neuron signs including: decrease or loss of muscle power, spasticity, muscle hypertonia, and if the lateral corticospinal tract is involved, positive Babinski's sign and clonus

SPINAL REGION SYNDROMES

Syndromes are collections of signs and symptoms that do not indicate a specific cause. The following syndromes usually result from tumors or trauma (Figure 13-19):

- **Anterior cord syndrome** (Figure 13-19, **A**) interrupts ascending spinothalamic tracts and descending motor tracts and damages the somas of lower motor neurons. Thus anterior cord syndrome interferes with pain and temperature sensation and with motor control. Because tracts that convey proprioception and discriminative touch

Figure 18.22

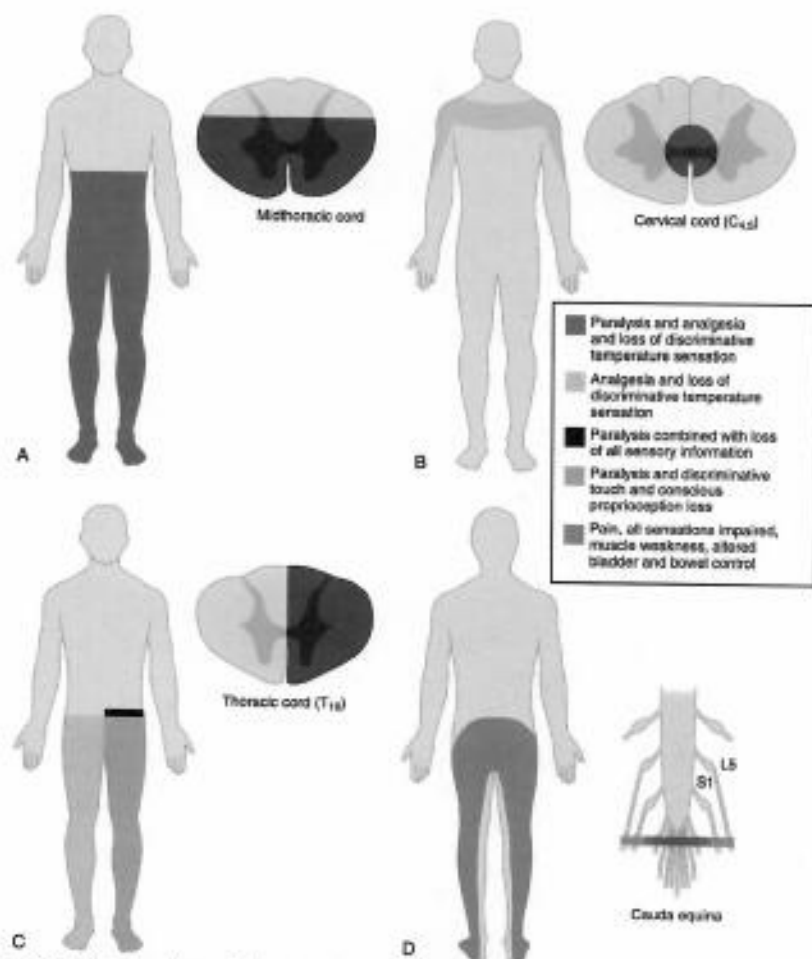


Fig. 13-19 Spinal cord syndromes. A, Anterior. B, Central. C, Brown-Séquard. D, Cauda equina. The cauda equina syndrome shows affects nerve roots L5 through S5, causing paralysis of the foot and toe dorsiflexors and plantarflexors and the bladder and anal sphincters.

information are located in the posterior cord, these functions are spared.

- Central cord syndrome (Figure 13-19, B) usually occurs at the cervical level. If the lesion is small, loss of pain and temperature information occurs at the level of the lesion because spinothalamic fibers crossing the midline are interrupted. Larger lesions additionally impair upper limb motor

function due to the medial location of upper limb fibers in the lateral corticospinal tracts.

- Brown-Séquard syndrome (Figure 13-19, C) results from a hemisection of the cord. Segmental losses are ipsilateral and include loss of lower motor neurons and all sensations. Below the level of the lesion, voluntary motor control, conscious proprioception, and discriminative touch are lost