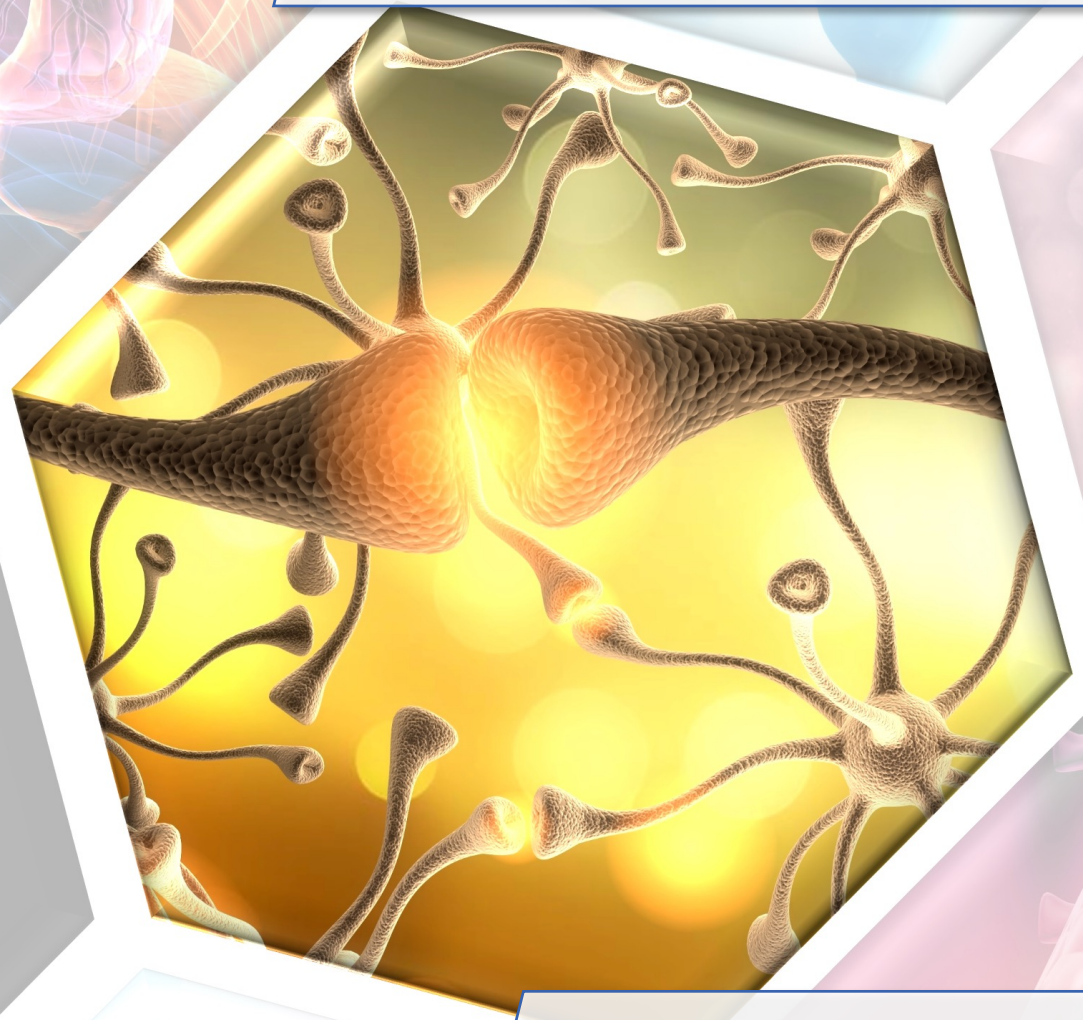
IMPERIAL

Tutorial – disorders of the CNS



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Case 1 – An unfortunate fall

A 25-year-old man fell from scaffolding and fractured his spine in the mid-thoracic region. When examined he had no movement in the right leg and proprioception and sensation for fine discriminative touch was impaired below T10 on the right. However, he could feel pain and changes in temperature in his right leg. In contrast his left leg moved normally, had normal touch sensation but retained no sensation for pain or temperature.

Case 1 - question 1

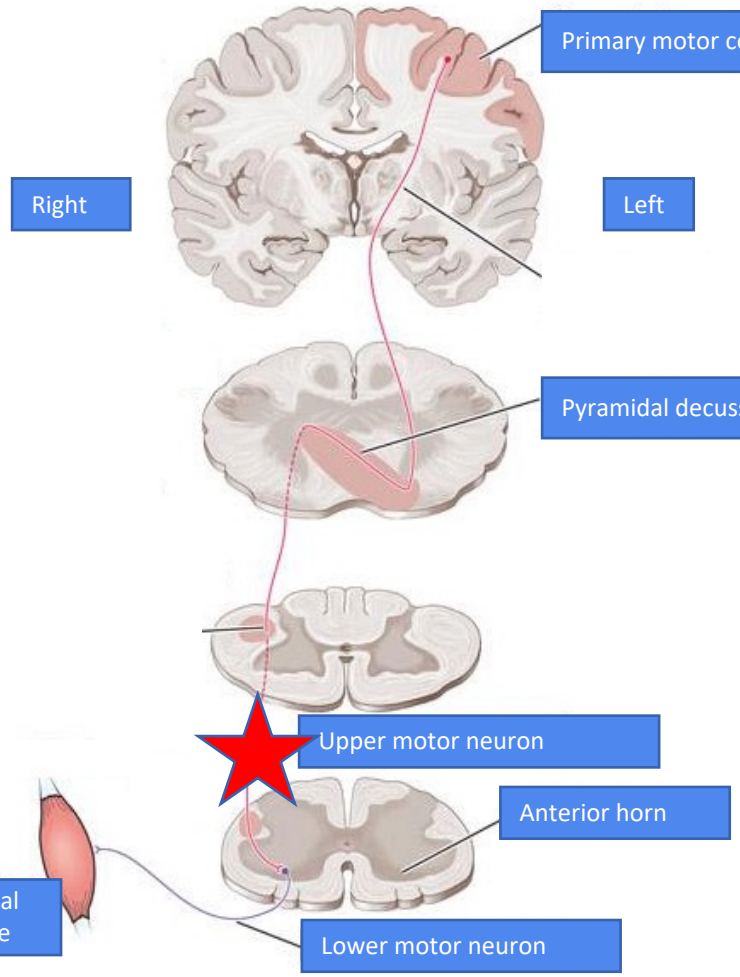
What is the site and extent of the lesion?

Mid-thoracic (T10 spinal level) hemisection of the spinal cord (Brown-Sequard syndrome) on the right side.

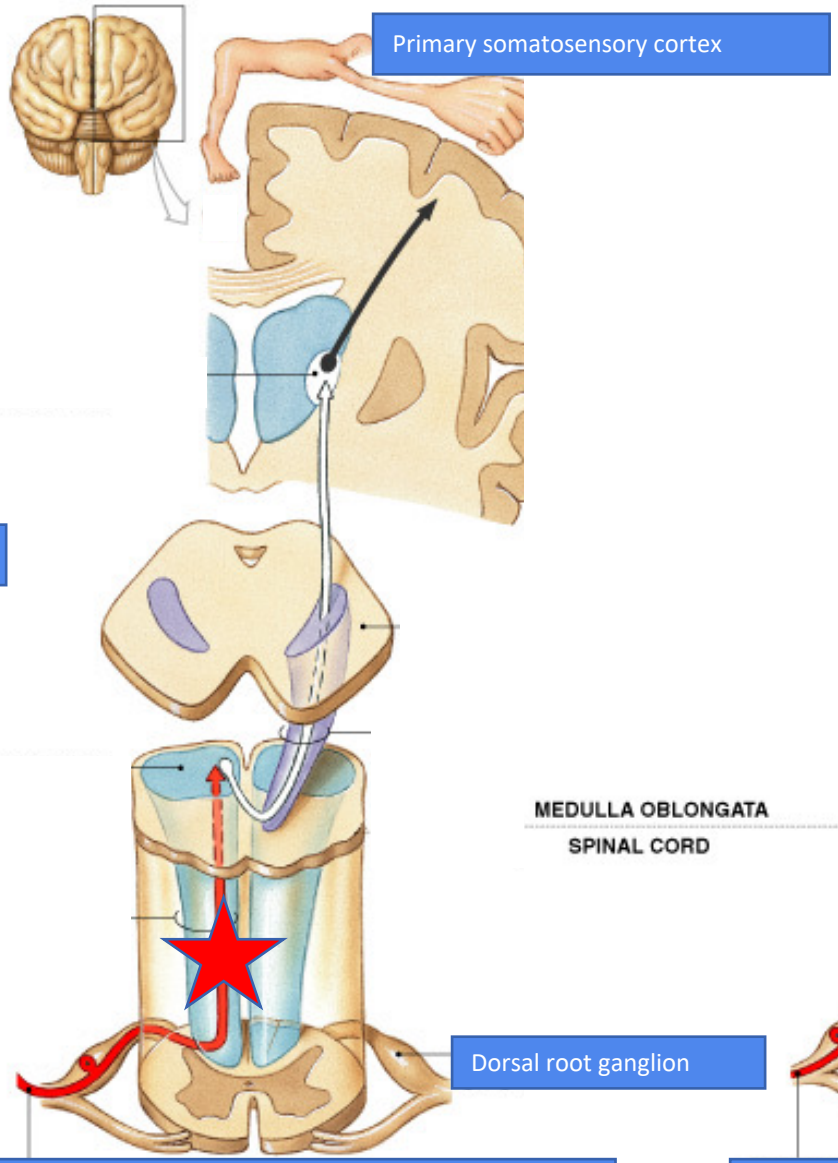
Case 1 - question 2

Explain the pattern of symptoms in neuroanatomical terms.

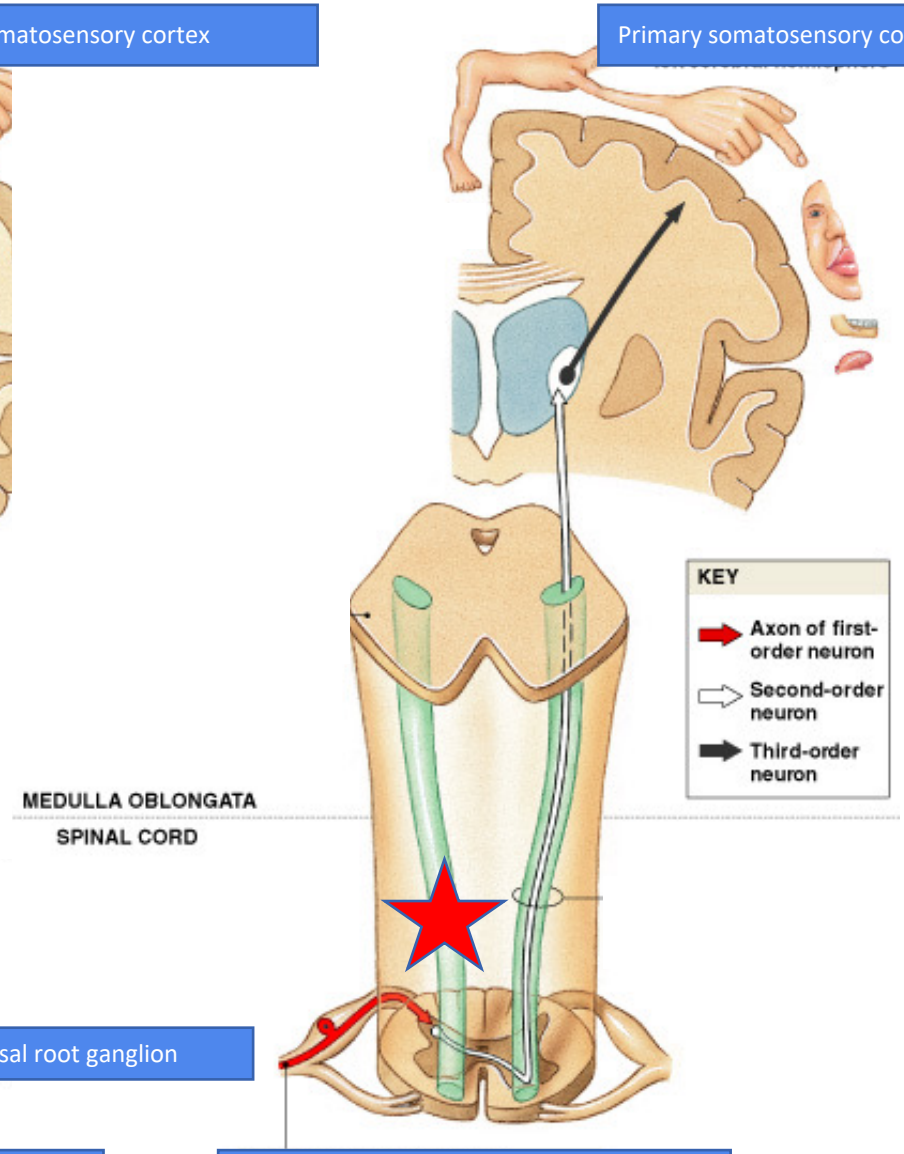
Interrupts right lateral corticospinal tract projecting to ipsilateral motor neurones and right ascending dorsal columns tract from ipsilateral leg. Therefore, loss of function below the injury. There is no loss of pain and temperature in the ipsilateral leg because the ascending spinothalamic tract crosses the midline within a few segments of the level of entry of the sensory information into the spinal cord. The spinothalamic tract from the contralateral leg will be interrupted by the lesion, hence the loss of pain and temperature sensation in that leg.



Lateral corticospinal tract



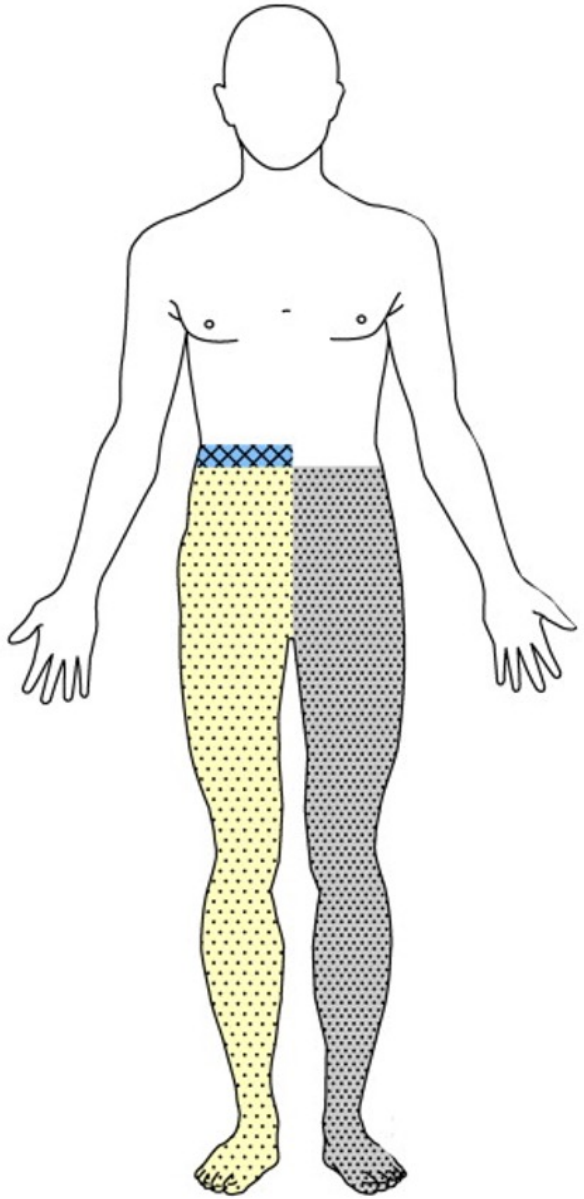
Dorsal column pathway



Spinothalamic tract

Brown-Sequard syndrome

- Ipsilateral loss of all sensory modalities at the level of the lesion
- Ipsilateral flacid paralysis at the level of the lesion
- Ipsilateral spastic paraparesis below the lesion
- Ipsilateral loss of vibration and position sense below the lesion
- Contralateral loss of pain and temperature below the lesion



Case 1 - question 3

Is he likely to recover the lost movement and sensation?

If the tracts are completely disrupted it is very unlikely that there will be any regeneration in the CNS. However, if some parts of the pathways have only been temporarily affected by compression or inflammation at the site of injury there may be some recovery of function after this has subsided. There may also be some synaptic plasticity.

Additionally, there may be segmental loss of pain and temperature ipsilaterally at the level of the injury due to direct damage to the cord and/or nerve receiving the information.

Case 2 – A stroke of bad luck

A 75-year-old patient had a stroke, the immediate signs of which were moderate weakness and loss of sensation in the left hand and forearm. During the following weeks the weakness and sensory disturbance resolved, but periodically she had strange sensations in her left hand, such as sudden coldness or feeling of increased pressure. Occasionally the feeling spread up her arm and sometimes these episodes were accompanied by jerking movements of the arm, which she could not control.

Case 2 - question 1

What was the location of the infarct that led to the initial stroke symptoms?

Right parietal cortex in or close to the primary somatosensory cortex, hence disturbance of sensation in left hand.

Case 2 - question 2

What are the strange sensations and jerking movements a sign of?

Active epileptic focus formed as a result of tissue damage from stroke. Jerks caused by propagation of discharge to arm area of motor cortex in frontal lobe.

Case 2 - question 3

What treatment could be given to reduce or prevent these involuntary movements?

Anticonvulsants.

Case 2 - question 4

What is likely to happen if the condition is left untreated?

Seizures may spread to involve whole motor cortex and even propagate to other hemisphere to produce generalised seizures.

Also, data suggest that recurring seizures may contribute to neuronal injury within the brain; this may be associated with cognitive decline and reduced quality of life.