

Neuro case studies essay sample



**ASSIGN
BUSTER**

Brett reached into a clogged snow blower to clear the chute while it was still running. He completely severed one finger and partially severed another on his left hand. After lengthy surgery to reattach his fingers, he has regained much of his motor ability but has lost some of his sensory function. What factors are involved that affect the regeneration of Brett's neurons and neuron function?

Clinical answer:

For regeneration of neurons (getting sensory feeling back), his type of injury involves the PNS neurons that were involved, rather than CNS neurons, so the chances of his neurons regenerating increase. Nerve regeneration depends on location of the injury, inflammatory responses, and the process of scarring. When nerves are cut, they often form connective tissue scars that block or slow regenerating axonal branches. This process of the nerves "healing" is called Wallerian degeneration. This is a neurological cellular process that results when a nerve fiber is cut or crushed (in this case severed), in which the part of the axon separated from the neuron's cell body degenerates distal to the injury. This is also known as anterograde or orthograde degeneration.

During this process, after a few days, the nerve fiber's neurolemma does not degenerate and remains as a hollow tube. Within 96 hours of the injury, the distal end of the portion of the nerve fiber proximal to the lesion sends out sprouts towards those tubes and these sprouts are attracted by growth factors produced by Schwann cells in the tubes. If a sprout reaches the tube, it grows into it and advances about 1 mm per day, eventually reaching and

re-innervating the target tissue. This is all dependent on Schwann cells and neurilemma remaining intact (to form a guiding tunnel) if scar tissue does not block the distal ends. Layman's terms:

After a healing process, the new nerve “ endings” will grow back, so the target tissue (the tips of his fingers) will/should gain sensory function as these new nerve endings reach the tips of his fingers, depending on the amount of scar tissue involved in the healing process.

Question #2

Mr. White, 39, a construction worker, was admitted to the emergency department with a ruptured disk. He and another worker were carrying a 125-pound bag of concrete when his partner tripped on a rock and fell. Mr. White tried to hold the bag but felt excruciating pain in his lower back. The x-ray revealed a ruptured disk in L4. What happened to Mr. White?

Mr. White has experienced spinal cord trauma resulting in a spinal cord injury. In laymen terms, Mr. White has a ruptured/herniated disc. This is where the outer, fibrous portion of the vertebral disc tears allowing the inner portion to push through the fibers. The inner portion, a softer, jelly-like material, pushes through and can compress the nerves around the disc. This compression can cause pain that radiates through the back and depending on the location of the ruptured disc, down the arms or legs of a patient. These discs, when healthy, act as shock absorbers for the spine and help to keep the spine flexible.

Herniated discs are usually associated with a sudden twisting movement, sports-related injuries, and in Mr. White's case, poor lifting habits. The risk factors that can increase your chance of disc herniation include the age of an individual (most common in 35-45 year olds), the individual's body weight (high BMI can cause added stress on the lower back), and the individual's occupation. We know that Mr. White has two of these risk factors, age (he is 39) and occupation (works in construction/heavy lifting). In medical terms, a herniated disc is the rupturing of the tissue that separates the vertebral bones of the spinal column. The center of the disc is a soft, jelly-like material called the nucleus. The annulus, or the outer ring of the disc, helps to provide structure and strength for the disc. The annulus consists of a fibrous material that is interwoven and holds the nucleus in place.

The herniation of the disc occurs when the nuclear tissue is forced out of the center portion of the disc. The tissue of the nucleus can cause the annulus to rupture when placed under an extreme amount of pressure. This pressure can be caused by a fall, car accidents, blunt force trauma, or degenerative condition. The pain that a patient feels from a herniated disc is most likely caused from the pressure that the nucleus places against spinal nerves.

Possible symptoms of a herniated disc include pain that radiates through the back and possibly down the arms or legs, depending on the location of the herniation.

There can also be noted numbness and weakness of the arms and neck.

Some people may not even know that they have a herniated disc because not all cases present with leg or back pain. Other signs and symptoms of a herniated disc may include muscle spasms or deep muscle pain. In extreme

cases, a patient may present with weakness in both legs and/or the loss of bladder control and bowel control. This is a serious problem called cauda equine syndrome and requires immediate medical attention. Treatment for a herniated disc can include either surgical or non-surgical options. There are many tests that can be performed such as x-rays, CT scans, MRIs, myelograms, and nerve tests. All of these tests can be performed to help diagnose the location and degree of herniation.

Some of the non-surgical treatments include over-the-counter pain medication, prescribed pain medication if the pain does not improve with over-the-counter pain medication, nerve-pain medication if there is nerve damage, muscle relaxers, and cortisone injections. The use of cold (to reduce inflammation and relieve pain) and heat (for relief and comfort) may also help during the healing process. All of these treatments focus on relieving the pain which can be the most frustrating part of the condition.

Physical therapy can also be a treatment option for helping to relieve pain by teaching the patient exercises and positions that are designed to strengthen the core and promote back health and help minimize the pain from the herniated disc. If these non-surgical options do not work, then surgery may be needed. A small number of herniated disc patients actually require surgery to fix the condition. Prevention of herniated discs can be as simple as exercising, maintaining good posture, and maintaining a healthy weight. Core-muscle exercises can strengthen muscles and help to provide stabilization and support of the spine.

The maintaining of good posture helps to decrease the pressure on the lower spine and discs. One should also learn the appropriate way to lift and carry heavy objects so that there is less strain on the lower back. Maintaining a healthy weight can help to minimize any extra pressure that may be placed on the spine. Excess weight can put more pressure on an individual's spine and disc, making them more susceptible to future herniation injuries.

In Mr. White's case, he should be instructed to try over-the-counter pain medication, ice and heat packs, and no lifting. He should be advised to take it easy, however too much bed rest can cause weak muscles and stiff joints. If the over-the-counter pain medication does not work, he needs to see his primary physician for a prescription for either nerve-pain or narcotic medication or muscle relaxers and possibly a referral to a neurologist if further treatment is required.

Question # 3

Mrs. Bronnell was brought to the emergency department after suffering a seizure at home. Which diagnostic test is appropriate for this person and why?

Seizures are neurological dysfunctions that cause sudden changes in behavior, sensory and motor perception and activity. It is a result from abnormal firing of neurons in the central nervous system (Pillow, 2011). Seizures are classified differently by the site of origin, clinical manifestations, EEG correlates, and response to therapy (McCance, Huether, Brashers, & Rote, 2010). There are three types of classifications of seizures: generalized, partial and unclassified. Generalized seizures account for 30% of all seizures

and originate from a deeper brain focus or subcortical. Consciousness is almost always lost or impaired. Partial seizures have a local or focal onset unlike generalized seizures that do not have a focal onset.

They usually originate from areas that are structurally abnormal on the cortical brain tissue (McCance et al, 2010). Many diagnostic tests can be used to diagnose and evaluate seizures. The American College of Emergency Physicians policy recommends certain blood tests for first time seizure patients: serum glucose and sodium levels, and pregnancy tests in women, electrical panel and urine tests. Those patients that have a history of seizures on medication should have blood levels of the antiepileptic medications drawn (Pillow, 2011). New seizure patients should also have a CT scan of the head because approximately 3-41% of patients with first time seizures will show some abnormal findings on the CT.

MRI may also be obtained because of its ability to identify smaller lesions. Seizures can cause arrhythmias; therefore an ECG may be obtained. EEG is important for prediction of seizure recurrence and is helpful in determining the type of seizure and may help determine its focus (McCance, 2010).

Lumbar puncture may be considered for those that have a persistent fever, severe headache, altered mental status, and those that are immunocompromised (Pillow, 2011). Obtaining a health history is the most critical aspect of all in diagnosing seizure disorders and determining the cause. It will also help identify any systemic diseases that are known for seizure activity (McCance, 2010).

Mr. Black was working in his garage when one of the shelves gave way and landed on his head. He was brought to the emergency department and was diagnosed with a subarachnoid hemorrhage. What causes subarachnoid hemorrhage?

Mr. Black has suffered a subarachnoid hemorrhage from the direct impact to his head from the shelf hitting the skull with blunt force. When force is applied to the head, the brain that is surrounded by a tissue layer inside the skull moves, dependent on the type and strength of the force the brain may move and hit the skull and then bounce back and hit the skull again. When the brain bounces from side to side in the skull it causes damage by either friction or shearing to the tissues and vessels.

This force causes a leak or tears in a blood vessel of the subarachnoid space which is located in the thin space between the arachnoid membrane and the pia mater surrounding the brain. In this injury a vascular injury occurred in the subarachnoid space causing blood to pool into the space. Depending on the vessels level of injury blood can be leaked by a small opening in the vessel or it could pool into the space from a large tear and pumping of blood in the small space from the torn vessel. This blood irritates the meningeal tissue causing impaired cerebral spinal fluid reabsorption causing immediate increases in intracranial pressure which in turn decreases cerebral blood flow to brain tissue.

The expanding area by the leaked blood compresses and displaces brain tissue causing granulation and scarring of the meninges which causes hydrocephalus and ischemia. This process can develop slowly over days or

weeks or can occur rapidly within days depending on the grade of injury. Subarachnoid hemorrhages have an overall 50% mortality rate and one third of survivors are dependent (McCance, Huether, Brashers, & Rote, 2010). In layman's terms; the patient has a brain bleed from injuring the head that causes bleeding in the brain and with the tight bony skull there is no place for the blood to go so the brain swells and dies without surgery to remove the blood.

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