Multiple Sclerosis and the Implications of Anesthesia

Timothy B. Maiden
Otterbein University, timothy.maiden@otterbein.edu

Follow this and additional works at: https://digitalcommons.otterbein.edu/stu_msn

Part of the Medical Pathology Commons, Nervous System Diseases Commons, and the Nursing Commons

Recommended Citation
Maiden, Timothy B., "Multiple Sclerosis and the Implications of Anesthesia" (2015). Nursing Student Class Projects (Formerly MSN). 127.
https://digitalcommons.otterbein.edu/stu_msn/127

This Project is brought to you for free and open access by the Student Research & Creative Work at Digital Commons @ Otterbein. It has been accepted for inclusion in Nursing Student Class Projects (Formerly MSN) by an authorized administrator of Digital Commons @ Otterbein. For more information, please contact digitalcommons07@otterbein.edu.
Introduction
Multiple Sclerosis (MS) is an autoimmune process characterized by inflammation and demyelination of the brain and spinal cord (Schneider, 2005). According to MacLean (2010), MS is one of the most common debilitating neurological disorders in young adults. The intent of this research project is to explain the pathophysiological process and become familiar with the implications of anesthesia related to MS. This research will enable me to provide a safe, individualized anesthetic plan, taking all essential precautions when caring for a patient with multiple sclerosis.

Symptomology
Symptoms associated with MS are expressed with varying degrees of severity and can occur at different times and locations throughout the disease process. The variability and ambiguous nature of the symptoms pose a challenge to physicians when attempting to diagnose an individual with MS. The symptomatology of MS can be categorized as subjective or objective.

Subjective symptoms:
- Pain
- Fatigue
- Trigeminal Neuralgia
- Muscle Soreness
- Weakness
- Parasthesias
- Copropesia Deficits
- Visual Field Deficits
- Mood Instability

Objective symptoms:
- Ataxia
- Dyssoria

(Maclean, 2010)

Significance of pathophysiology related to anesthesia:
The pathophysiological significance of MS is individualized. The severity of one patient’s condition may range from being a debilitating disease process that guides healthcare providers in their plan of treatment. The four concepts that are thought to provide a relief of MS symptoms are, infection, the post partum period, high stress environments, and hyperthermia (Ward et al., 2001). Therefore, it is paramount that anesthesia providers conduct an extensive review of one’s surgical history, medical and family history in order to create a safe plan for anesthesia. In combination with a detailed history, the nurse anesthetist (NA) must also conduct a thorough head to toe assessment. The physical assessment provides insight regarding physical frailties, such as respiratory, cardiovascular, neurological or bowel complications that the individual may experience, which further guides the nurse anesthetist’s plan for anesthesia. Patient education is also vital to the prevention of MS relapse during the pre and postoperative phases.

Pathophysiological Process
Underlying pathophysiology:
The etiology of MS is unknown, however there is speculation that the activation of auto-reactive T lymphocytes occur secondary to the exposure to environmental factors, an infectious process or viruses (Ward-Abel, Vernon, & Warner, 2014). After T lymphocytes are activated, they infiltrate the central nervous system (CNS), through by breaking the blood brain barrier. T lymphocytes also activate an inflammatory cascade, which encompasses CD4+ and CD8+ T cells, B cells, interleukin-1, and tumor necrosis factor, leading to the destruction of oligodendrocytes and myelin (Gupta et al., 2014). Destruction of oligodendrocytes, cells that produce myelin, inhibits the body’s ability to remyelinate neurons over time, leading to the formation on the neuron leading to MS lesions (Schneider, 2005). Demyelination impedes conduction and transmission of nerve impulses, thus creating tentative and motor complications throughout the body.

(Maclean, 2010)

Types of Multiple Sclerosis
The symptoms include remissions, relapses, and progression.

1. Remissions:
   - MS relapse during the pre and postoperative phases.
   - Studies have shown that the use of spinal anesthesia has led to exacerbations in MS symptoms along with having a higher risk of postoperative ileus. Consequently, it is important for the anesthetist’s plan for anesthesia. Patient education is also vital to the prevention of complications that the individual may experience, which further guides the nurse anesthetist regarding physical frailties, such as respiratory, cardiovascular, neurological or bowel complications.

2. Relapses:
   - More than 65% of people who are initially diagnosed with relapsing-remitting MS will enter this phase within 15 years of being diagnosed (Boeh et al., 2008).
   - Secondary progression occurs when someone has a sustained progression of MS without any relapses having taken place. Some people may continue to have relapses.

3. Progression:
   - In conclusion, Multiple Sclerosis is an autoimmune process leading to the demyelination of axons, which slows the conduction and transmission of nerve impulses throughout the body. A wide array of neuroanatomical complications can occur secondary to neuronal damage. Nurse anesthetists should develop an anesthetic plan for each MS patient or he encounters individually, depending on the patient’s complications and degree of disease progression.

Implications for Anesthesia
According to Schneider (2005), the stress of surgery and use of anesthetic agents will lead to an exacerbation of MS symptoms, yet the complications of surgery, such as infection and hypothermia have the potential to trigger a relapse. The anesthetic provider must consider the individual’s severity of debilitation when devising an anesthetic plan. If the patient has respiratory weakness secondary to MS, then the NA would likely elect to place the patient under general anesthesia, to mechanically ventilate the patient (Schneider, 2005). Depending on the severity of weakness the patient may be difficult to extubate immediately after the operation, so a plan should be made with the intensive care team for postoperative care. Temperature control is crucial for all MS patients. Demyelinated axons are sensitive to increases in a patient’s body temperature, further blocking the conduction of nerve impulses (Schneider, 2005). Studies show that an increase of 1°C can be significant and exacerbation of symptoms could ensue (Schneider, 2005). Therefore, the NA should have a cooling blanket under the patient prior to positioning for surgery.

Knowing an individual’s degree of illness enables the NA to choose the appropriate neurovascular blocking agent. Individuals who exhibit extreme muscle weakness and atrophy are known to receive excessive potassium from their cells after administration of succinylcholine, which could be devastating to an individual with MS who also has heart disease (Schneider, 2005).

Nondepolarizing neuromuscular blocking agents have been proven to be safe for administration, but the effects can be prolonged or resistant depending since age, on the individual’s degree of neuroanatomical involvement (Schneider, 2005).

Important considerations when discussing regional anesthesia, often used during labor and delivery, cesarean sections, and orthopedic cases, is the epidural varus spinopelvic approach to anesthesia. Studies have shown that the use of spinal anesthesia has led to exacerbations in MS symptoms along with having a higher risk of nerve damage (Schneider, 2005).

Epidural anesthesia and peripheral nerve block are safe, effective and are the preferred routes of regional anesthesia, when caring for a patient with MS (Schneider, 2005). Lastly, bowel dysfunction is a major problem for some individuals with MS. It is well known that general anesthesia often creates a substantial bowel obstruction. Consequently, it is important for the NA to ensure the patient is on a bowel regimen including anticholinergic, stool softeners, and probiotic medications if needed.

(Maclean, 2010)

References

Additional Sources