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**Multiple Sclerosis and the Implications of Anesthesia**

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**Introduction**

Multiple Sclerosis (MS) is an autoimmune process characterized by inflammation and demyelination of the brain and spinal cord (Schneider, 2005). According to MacLean (2020), 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 prepare a safe, individualized anesthetic plan, taking all essential precautions when caring for a patient with multiple sclerosis.

**Pathophysiological Process**

**Underlying pathophysiology:**

The etiology of MS is unclear; however, there is speculation that the activation of auto-reactive T lymphocytes occurs secondary to the exposure to environmental factors, an infectious process or viruses (Ward-Abel, 2001). After T lymphocytes are activated, they infiltrate the central nervous system (CNS), by breaking through the blood brain barrier. T lymphocytes also activate an inflammatory cascade, which encompasses CD4+ and CD8+ T cells, B cells, interleukin 1, 5, 11, 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 atrophy and eventual neuron and axons in the brain and spinal cord (Schneider, 2005). Demyelination impairs conduction and transmission of nerve impulses, thus creating cognitive and motor complications throughout the body.

**Symptomatology**

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 symptoms of MS can be categorized as subjective or objective.

**Subjective symptoms:**

- Pain
- Fatigue
- Trigeminal Neuralgia
- Muscle Soreness
- Weakness
- Parasthesias
- Cognitive Dysfunction
- Sexual Dysfunction
- Mood Instability

**Objective Symptoms:**

- Ataxia
- Dyssomnia

(MacLean, 2020)

**Significance of pathophysiology related to anesthesia:**

The pathophysiological significance of MS is individualized. The severity of one patient's symptoms may differ from another's, and even within a patient, one type of symptom may be more prevalent than another. This necessitates that healthcare providers in their plan of treatment. The four conceptions that are important to consider include 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. If the patient has respiratory weakness secondary to MS, then the NA would likely elect to place the patient under general anesthesia. Studies have shown that the use of spinal anesthesia has led to nondepolarizing neuromuscular blocking agents have been proven to be safe for administration, but the effects can be prolonged or resistant depending on the individual's degree of muscular involvement (Schneider, 2005).

**Types of Multiple Sclerosis**

- Relapsing-remitting MS
- Primary progressive MS
- Secondary progressive MS
- Progressive relapsing MS

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).

**Implications for Anesthesia**

- Nondepolarizing neuromuscular blocking agents have been proven to be safe for administration, but the effects can be prolonged or resistant depending on the individual’s degree of muscular involvement (Schneider, 2005).
- Important considerations when discussing regional anesthesia, often used during labor and delivery, cesarean sections, and orthopedic surgery, are the use of epidural versus spinal approaches to anesthesia. Studies have shown that the use of spinal anesthesia has led to less 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 have shown that an increase in °C can be significant and exacerbate an acute relapse of symptoms (Schneider, 2005).
- Lastly, bowel dysfunction is a major problem for some individuals with MS. It is well known that general anesthesia often creates a restrictive area. 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.

**References**


**Conclusions**

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 must create an anesthetic plan for each MS patient he or she encounters individually, depending on the patient’s complications and degree of disease progression.