Anesthetic Considerations for Parkinson’s Disease
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Abstract
Parkinson disease, a neurodegenerative disease, is commonly increased in elderly people and becoming a big challenge for anesthesia. There are approximately 60,000 American people diagnosed with PD each year. The majority of people have diseases at the age of 50 years or later. Parkinson Disease (PD) is a type of neurodegenerative disorder of the loss of dopaminergic neurons in substantia nigra. It has been the hallmark of Parkinson’s disease for over 300 years and yet there are no causes and cures found. However, there are many etiologic factors, such as: organophosphate exposure, dietary factors, and lifestyle factors. The epidemiology is associated with increased aging, tremendously decreasing motor neurons; therefore, it causes rigidity, resting tremor, and involuntary movement. Ecstasy is also known for the disruption of the transportation for neurotransmitter such as dopamine and serotonin. In fact, there are many clinical manifestations to optimize the neurological conditions and physiological changes in the preoperative, intraoperative, and postoperative parameter. Particularly, the considerations of pharmacological agents are administered in anesthesia management in stereotactic pallidotomy and deep brain stimulation. The review is the consolidation of knowledge and skills for anesthesia care of patients with Parkinson’s disease.

Introduction
Parkinson Disease: type of neurodegenerative disorder with the loss of dopaminergic neurons in substantia nigra.
• Idiopathic and 80% in ages 65 years and above

Complications in Patients with PD
Impaired functioning: respiratory, cardiovascular, gastrointestinal, urological, endocrine and musculoskeletal.
Respiratory
• Obstruction Respiratory Dysfunction
• Respiratory Infection
• Laryngospasm
• Airway Collapse
• Aspiration Pneumonia
Cardiovascular
• Orthostatic Hypotension
• QT Prolongation
• Valvular Heart Disease

Surgical Management
Preoperatively
Respiratory complications resulting from dysphagia and pulmonary dysfunction are common causes of morbidity and mortality. Tests: chest X-ray, pulmonary function tests, arterial blood gas analysis
Cardiovascular complications include orthostatic hypotension and ventricular arrhythmia (particularly with the use of drugs commonly prescribed for patients with PD)
Tests: ECG, echocardiogram

Intraoperatively
Patients with PD have been reported to develop dyskinesia in response to propofol administration
For extended procedures, regular dosing with PD medication via a nasogastric tube reduces the risk of rigidity and patient distress on emergence from anesthesia

Postoperatively
PD medications should be used as soon as possible
Adherence to individual dosing schedules for each patient with PD may reduce morbidity
Adverse reactions may result from the use of certain drugs such as fentanyl for analgesia, as well as serotonergic agents concurrent to selegiline or rasagiline

Clinical Manifestations
• PD patients with hip fracture surgery have a 3-month mortality rate that is doubled of non-PD patients.
• Cohort study shows high risk of aspiration pneumonia, bacterial infections, and urinary tract infections in 234 patients.
• Serotonin toxicity has been reported due to excessive rasagiline alone (4mg/day instead of 1mg/day)
• Rotigotine: a new dopamine agonist administered via transdermal patch and steady concentration for 24h.
• Dexametadime preserves respiration and patients can be awaken easily by verbal stimulation. The study shows it provided patient comfort, not interfere with electrophysiological mapping, hemodynamic stability. The ideal dosage range of 03 to 06 µg/kg/h.

Perioperative Considerations
Common medications prescribed for patients with PD may influence anesthetic management
Selegiline and rasagiline
Serotonin toxicity with the concurrent use of: Certain opioids (e.g. pethidine, tramadol) SSRIs (e.g. citalopram, fluoxetine) TCAs (e.g. amitriptyline, imipramine) Drugs of abuse (e.g. cocaine, MDMA) Antibiotics (e.g. ciprofloxacin, fluconazole, linezolid)

Pergolide and cabergoline
Increased risk of valvular heart disease

Domperidone
Prolongation of the QT interval and risk of sudden cardiac death

Antidepressants
Exacerbation of symptoms of orthostatic hypotension with the use of TCAs (e.g. amitriptyline, imipramine) Prolongation of the QT interval with SSRIs particularly citalopram Serotonin toxicity

Quetiapine
Prolongation of the QT interval

Phenothiazines, butyrophenones and thiothixene derivatives
Exacerbation of PD symptoms Alternatives for the control of nausea and vomiting include ondansetron and cyclizine

Conclusion
PD patients require unique anesthetic management which decrease morbidity, mortality perioperatively and complications postoperatively. Severe exposure to anesthesia in pediatrics may be a contributing risk factor for PD development. The animal study of rats observed an increased apoptosis after six-hour administrating nitrous oxide, isoflurane and midazolam. However, epidemiology of PD in human populations do not indicate the similar association.

References

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Acknowledgements
Parkinson’s disease treatment options
- Dopaminergic therapies:
  - L-DOPA + COMT inhibitors
  - MAO-B inhibitors
- Non dopaminergic therapies:
  - Amantadine
  - Antidepressants

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References