General Anesthesia for a Patient Treated with a MAO-Type B Inhibitor for Parkinson's Disease

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Abstract

Presented is a case study involving the anesthetic management during elective surgery for a patient prescribed rasagiline, a second generation monoamine oxidase (MAO) type B inhibitor for Parkinson’s disease. Anecdotal reports have recommended discontinuing MAO inhibitors 2 to 3 weeks before elective surgery, however rasagiline was not discontinued and elective surgery proceeded. Although recent literature supports uneventful anesthesia for patients on MAOIs, this case presents hemodynamic fluctuations and discusses the potential causes and treatments for these fluctuations. This case appears to be the only recent publication on second generation MAO type B inhibitors for the treatment of Parkinson’s disease and hemodynamic instability. Conclusions are that anesthetic plans must be tailored to blunt the SNS response, avoid drug interactions, provide quick intubation technique, and whenever possible, implement regional anesthesia.
Monoamine oxidase inhibitors (MAOIs) have a long history of being prescribed for mood stabilization by preventing the breakdown of biochemical neurotransmitters resulting in adrenergic stimulation.\textsuperscript{1,2} These medications have also been effective for the treatment of Parkinson’s disease. Although levodopa is the most widely prescribed medication for Parkinson’s disease, monoamine oxidase (MAO) type B inhibitors like rasagiline are being prescribed more frequently as initial monotherapy or in adjunct with levodopa for Parkinson’s disease.\textsuperscript{1} Anecdotal reports have recommended that MAO inhibitors be discontinued for 2 to 3 weeks prior to elective surgery.\textsuperscript{2,3} Consequently, this is a case where we felt discontinuation of the MAO inhibitor for Parkinson’s disease may have become more problematic. Therefore, it is extremely important for the anesthetist to understand the risks of anesthesia for this patient population when MAOIs are not discontinued preoperatively.

**Case Report**

A 94kg, 172cm, 76-year-old male arrived at the hospital for elective surgery to laparoscopically repair a right inguinal hernia that had been present 3 weeks prior to his arranged surgical date. Past medical history was significant for hypertension, sleep apnea, anxiety, gastroesophageal reflux, arthritis, and recently diagnosed Parkinson’s disease. His past surgical history included bilateral knee scopes, appendectomy, tonsilloadenioidectomy, lipoma excision, cataract, and vitrectomy surgeries. The patient was prescribed rasagiline, a second generation MAO type B inhibitor indicated for the treatment of idiopathic Parkinson’s disease as an initial monotherapy. A collaborative decision was made to proceed with surgery using a specific anesthetic plan aimed at avoiding...
medications that could exacerbate the sympathetic nervous system (SNS).

Current patient medications included: baby aspirin 81mg daily, rasagiline 1mg daily, nebivolol 2.5mg twice per day, furosamide 40mg daily, potassium 20meq daily, levothyroxine 88mg daily, gemfibrazil 600mg twice per day, montelukast sodium 10 mg daily, and ondansetron 4mg every 4 hours as needed for 2 days. According to the physical examination, the patient was obese with a body mass index of 31.4, a blood pressure (BP) of 131/68 mmHg, a heart rate (HR) of 59 beats per minute (bpm), and a temperature of 97.1 degrees fahrenheit. Preoperative laboratory tests included a chemistry panel and a 12-lead electrocardiogram (EKG). Lab values were normal, except for a slightly high chloride value of 112 mmol/L. Preoperative EKG reflected a normal sinus rhythm. It was decided to proceed with surgery using a specific anesthetic plan aimed at avoiding medications that could exacerbate the sympathetic nervous system (SNS).

Anesthesia began with 2mg midazolam preoperatively. The patient was transferred into the operating room where routine EKG leads, blood pressure cuff, and pulse oximeter probe were applied. Anesthetic induction consisted of lidocaine 100mg, morphine 10mg, rocuronium defasciculating dose of 10mg, propofol 200 mg, and succinylcholine 100 mg IV for a smooth intubation. Tracheal intubation was achieved and anesthesia was initially maintained with desflurane at 1.3 MAC. Shortly after intubation, pneumoperitoneum was initiated. The patient’s BP shot up to 203/96 mmHg and remained high with a dramatic decrease in HR to the 30s. Desflurane was titrated up slightly, but with caution not to further drop the patient’s HR. It was agreed to start a propofol drip at 75 mcg/kg/min to help bring down the BP and use it in
conjunction with .5 MAC of anesthetic gas. Our next BP reading was then 64/40 with a continued HR in the 30s. Lactated Ringer’s fluid was increased to quickly give a 500 ml bolus and the dramatic hemodynamic fluctuations were mentioned to the surgeon. Laparoscopic CO2 insufflation was abolished by the surgeon. Once removed, the patient’s HR rose to 48-52 bpm. Glycopyrrolate was then given and HR finally returned to the patient’s preoperative state of 58-60 bpm. Insufflation was restarted and the anesthetic gas was changed from desflurane to sevoflurane 1.5%. The patient’s hemodynamics stabilized and presented no further complications throughout the rest of the case.

Discussion

Parkinson’s disease is systemic disease due to loss of dopamine-generating cells in the substantia nigra. The substantia nigra is a structure in the midbrain that plays an important role in reward, addition, and movement. Loss of dopamine-generating neurons results in loss of catecholamine production of dopamine, norepinephrine, and serotonin and unopposed acetylcholine activity. Therefore, Parkinson’s manifests as both motor symptoms such as tremor, bradykinesia, rigidity and postural instability, and non-motor symptoms such as autonomic dysfunction, mood, behavior or thought alterations, and sleep disturbances.

Anecdotal reports have recommended discontinuing MAOIs 2 to 3 weeks before elective surgery, however there is more current literature stating the disagreement about whether to discontinue use before surgery. Trends in anesthetic management suggest that it is not necessary to discontinue the MAOIs because literature details uneventful anesthesia. Most of these articles are case
In addition, the theory is that sudden discontinuation can lead to withdrawal symptoms, laryngospasm with intubation, obstructive lung disease, violent tremors, and hallucinations; the recognized complications of Parkinson’s disease, also known as Parkinson’s disease attacks. Rasagiline has a 10-fold greater in potency than first generation MAO type B inhibitors, therefore, we decided that discontinuation of the medication could potentially lead to further complications or a dramatic potentiation of the patient’s Parkinson’s symptoms.

Given our patient’s current diagnosis and medication therapy, after physical examination we felt it unnecessary to discontinue his rasagiline for well controlled Parkinson’s symptoms. Therefore, we proceeded with the case.

Anesthesia was tailored and included (1) decreasing sympathetic tone preoperatively with premedication of midazalom; no drug interactions have been reported between midazalom and rasagiline. (2) Avoiding fentanyl due to possible exacerbations of this potent narcotic from hepatic enzyme inhibition related to MAOI therapy. (3) Decreasing sympathetic tone before intubation with intravenous lidocaine; no drug interactions found between lidocaine and rasagiline. (4) Inhibiting myomyalgia with a defasciculating dose of rocuronium prior to succinylcholine administration; no drug interactions have been found between rocuronium and rasagline or succinylcholine and rasagiline. (5) Quick intubation technique with use of succinylcholine to minimize the stress response with intubation. (6) Treatment of hypotension with crystalloids and hypertension with rocuroinum was also used to inhibit transient peaks in HR caused by myomyalgia from succinylcholine administration.
gas anesthetics and propofol both of which have no drug interaction with rasagiline.

(7) Avoidance of sympathomimetic medications which can cause an exacerbated hemodynamic response for patients taking MAOIs.³ (8) Avoidance of meperidine as it is absolutely contraindicated with MAOIs because of the serotonergic crisis that can arise if given with MAOIs;³,⁷ and (9) postoperative management with an extubating dose of morphine to blunt the SNS response and provide lasting analgesia. Anecdotal reports also suggest that narcotics when given with MAOIs may cause additive CNS depression, drowsiness, dizziness or hypotension, so it is suggested that opioids and MAOIs be used with caution; lower initial dosages of the analgesic are recommended followed by careful titration.³ It is also recommended to avoid the combination within 14 days of MAOI use. However, some case reports have shown uneventful anesthesia. One case report using alfentanil with a patient receiving a MAOI,⁹ and another case report using sufentanil on induction and a continuous sufentanil drip with a patient receiving both an MAOI and tricyclic antidepressant.³ In addition, according to the rasagiline package insert, drug contraindications with opioids state an absolute contraindication with meperidine and a suggested contraindication with analgesic agents tramadol, methadone, and propoxyphene only.⁷ There are no contraindications listed against the use of morphine, dilaudid, alfentanil, sufentanil, or fentanyl by the manufacturers of rasagiline. As always, each patient’s situation demands an individualized assessment as to whether the anesthesia professional deems it safe to administer opioid narcotics, or anesthesia at all to patients taking MAOIs.
Literature to support uneventful anesthesia for patients on MAOIs has been documented in case reports. Unfortunately, this case presents hemodynamic fluctuations with rasagiline (a new generation MAO type B inhibitor) and general anesthesia. It is inconclusive as to whether it was our anesthetic technique that potentiated these fluctuations, in combination with the medication rasagiline that created the hemodynamic instability seen here. If rasagiline alone created the fluctuations, it seems justifiable to say that hemodynamic instability would have been seen preoperatively. In addition, it is also well known that CO2 insufflation can potentiate a vagal response resulting in severe bradycardia. It was described in our case, that removal of the CO2 insufflation resulted in improved HR. However, it was not until the administration of glycopyrrolate (an anticholinergic), and switching the gas anesthetic from desflurane to sevoflurane, that the HR comfortably improved to allow the patient to reach hemodynamic stability. Desflurane is also known to potentiate a SNS response, although it does not occur in every patient. For this reason, we switched our gases intraoperatively from desflurane to sevoflurane. Sevoflurane is also known to be more cardiac stable. No drug interactions have been found between glycopyrrolate and rasagiline.

Regional techniques seem to be superior to general anesthesia for patients with Parkinson’s disease because this technique allows for communication of the subjective feelings accompanying Parkinson’s disease attacks, thereby allowing for more prompt treatment intraoperatively. However, laparoscopic surgery with CO2 insufflation necessitates general anesthesia with a secured airway to prevent aspiration pneumonitis. Case reports of using .5 MAC of gas anesthetic
and continuous infusion of sufentanil have also been recorded with uneventful success when general anesthesia was warranted. Perhaps performing general anesthesia with a similar approach to higher narcotic doses, despite the past warnings of liver enzyme inhibition to metabolizing narcotics, is showing more promising results of smooth anesthesia for patients taking MAOIs.

Mentor: Art Shimata, CRNA, MAE
References


