Case Report / Olgu Sunumu

An Experience of General Anesthesia in a Case of Parkinson's Disease

Parkinson Hastalığı Olan Olguda Genel Anestezi Deneyimi

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Abstract

Parkinson's disease (PD) is a neurodegenerative disease which is resulted from loss of dopaminergic neurones in the substantia nigra of the basal ganglia and is a characterized by the triad of resting tremor, muscle rigidity, and bradykinesia. PD is an important cause of perioperative morbidity and a major risk factor for postoperative complications in the elderly surgical patients. In these patients, the postoperative risks are determined with the presence of additional diseases, interaction of antiparkinsonian medication and anesthesic drugs. In the patients with PD, general anesthesia may mask neurological symptoms in the intraoperative period so the general anesthesia is preferred in these patients. Randomized clinical trials about the preference of anesthetic technique in the PD are not enough. Premedication, induction and continuation of anesthesia, and drugs for postoperative pain must not affect the dopamine senthesis. Treated for PD for 8 year at the age of 73, a female patient and with American Society of Anesthesiologists physical classification III (chronic kidney disease and chronic obstructive lung disease) was planned for undergoing operation of L4 fracture. In this case, we aimed to report a patient with PD who underwent general anesthesia. During the operation hemodynamic data was stable and the operation was successfully carried out without any complication.

Keywords
Parkinson's disease, aged, general anesthesia

Anahtar Kelimeler
Parkinson hastalığı, yaşlı, genel anestezi

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Öz

Parkinson hastalığı (PD) bazal gangliyon substantia nigrada dopaminerjik nöronların kaybına bağlı olarak istirahat tremoru, rijidite, bradikinezi semptomlarıyla karakterize, nörodejeneratif bir hastalıktır. Bu hastalarda ileri yaş, ek hastalıkların varlığı ve tedavide kullanılan ilaçlarla anestezik ilaçların etkileşimi ameliyat sonrası riskleri belirlemektedir. Parkinson hastalarında intraoperatif dönemdeki nörolojik bulguları genel anestezi baskıladığı için, sıklıkla bu hastalarda genel anestezi tercih edilir. Parkinson hastalarında ideal anestezi seçimiyle ilgili yeterli sayıda kanıtlanmış kontrollü klinik çalışma bulunmamaktadır. Premedikasyon, anestezi indüksiyon ve idamesi, postoperatif ağrı tedavisinde kullanılacak ilaçlar dopamin sentezini etkilememelidir. Yaklaşık 8 yıldır PD tanısı ve beraberinde, kronik böbrek ve akciğer hastalığı olan 73 yaşında Amerikan Anesteziyoloji Derneği fiziksel sınıflaması III olan kadın hastada, L4 vertebra kırığı ameliyatındaki genel anestezi deneyimimizi sunduk. Ameliyat süresince hastanın hemodinamik değerleri stabil olup, herhangi bir komplikasyon gelişmeden ameliyat tamamlandı.

Introduction

Parkinson's disease (PD) is a progressive, neurodegenerative disease associated with dopaminergic neuronal damage, of which the symptoms include resting tremor, rigidity, flexion posture, bradykinesia, and loss of postural reflexes. These patients also experience orthostatic hypotension, dysphagia, diaphragmatic spasm, dementia and depression (1).

PD typically starts in the middle and late adulthood (between 50 and 60 years of age) and progresses during the next 10 to 20 years after the onset. The prevalence of the disease has been reported to be between 18 and 328 per 100.000 populations. The most common form of parkinsonism is PD cases with rates of 75-80%. In our country, the number of patients with PD is about 100.000 to 130.000, who are frequently exposed to anesthesia during various surgical procedures (2). While the exact etiology of the disease remains unknown, more than 15 genes have been identified which may cause familial or sporadic PD (3). Neurotransmitter imbalance caused by a relative dopamine deficiency in the caudate nucleus and putamen together with the intracytoplasmic accumulation of α-synuclein and Lewy body in the major fibrillar component have been considered to play a role in the pathogenesis of the disease (4). A dopaminergic cell loss of 60-70% is required for manifestation of clinical symptoms.

Levodopa, dopamine agonists (apomorphine, bromocriptine, cabergoline), monoamine oxidase B inhibitors (selegiline, amantadine), anticholinergics (biperiden, bornaprine), peripheral dopamine blockers (domperidone) and catecholamine methyltransferase inhibitors are used in the medical treatment of the disease to maintain the balance between the cholinergic and dopaminergic activity (5).

In these patients, post-operative risks are determined by the presence of comorbidities as well as advanced age together with interactions of the drugs used in the treatment with other drugs. The clinical manifestations of the patients and the used drugs complicate the selection of the ideal anesthesia method. General anesthesia is commonly preferred in PD. Care should also be taken to ensure that the drugs used for the induction and maintenance of anesthesia do not affect dopamine synthesis. In this article, the anesthetic approach to a patient who was planned to undergo surgery for L4 vertebral fracture which had occurred following a fall accident was discussed.

Case Report

The pre-anesthetic evaluation revealed that she had been receiving treatment for PD, hypertension and coronary artery disease for 8 years. She was using 100 mg L-Dopa+25 mg benserazide, 0.25 mg pramipexole, 25 mg carvedilol, rasagiline, 150 mg irbesartan, 12.5 mg hydrochlorothiazide and 100 mg acetylsalicylic acid tablets. The respiratory tract examination revealed rough breath sounds and prolonged expiration. The pulmonary function tests revealed that forced expiratory volume in 1 second (FEV1): 1.21 L, forced vital capacity (FVC): 1.81 L and the FEV1/FVC ratio was 66%. Ipratropium bromide and salbutamol nebule were initiated with the diagnosis of chronic obstructive pulmonary disease.

Her relatives told that, during her previous surgery, symptoms resembling extrapyramidal side effects had been observed following administration of metoclopramide. The physical examination revealed hypersecretion and motor function loss in the lower extremities. Her laboratory results did not show pathologies other than hemoglobin: 10.7 mg/dL, urea: 83 mg/dL, creatinine: 1.75 and blood urea nitrogen/creatinine ratio: 22.16. The nephrology consultation obtained due to the impaired renal function tests led to the recommendation to avoid nephrotoxic agents, discontinuation of irbesartan + hydrochlorothiazide therapy three days before surgery and reinitiating treatment five days after surgery. She was recommended to take long-acting calcium channel blocker (amlodipine) if her blood pressure was determined to be elevated.

In the patient who was physically classified as class III according to the American Society of Anesthesiology criteria, general anesthesia was planned. She was transferred to the operating room, standard monitoring was applied, and intravenous access was obtained. Following preoxygenation, anesthesia was induced with 1 mg kg-1 lidocaine, 1 µg kg-1 fentanyl, 3 mg kg-1 propofol and 0.6 mg kg-1 rocuronium. She was orotracheally intubated using a internal diamater 7 mm spiral intubation tube. The location of the intubation tube was confirmed by inflating the balloon of the tube, and the tube was connected to

the anesthesia device. The anesthesia was maintained with 2 L min-1 fresh gas flow (a mixture of 40% O_2 and 60% air) and 1.1% isoflurane. The patient was turned to the prone position, the regions with risk of pressure sore were supported with pillows; then, the lungs were examined by auscultation and intubation tube was checked. Since her blood pressure was 80/40 mmHg 15 minutes following anesthesia induction, the amount of the intravenous maintenance fluid was increased, and 10 mg ephedrine was administered. Anesthesia was maintained with isoflurane and remifentanil infusion. During the procedure, the patient's blood pressure, pulse, oxygen saturation and electrocardiography were used for monitoring and recorded. 150 mg sugammadex was used to antagonize the neuromuscular block. The patient was transferred to the recovery unit, and then to the ward without any complication.

Discussion

Patients with PD may encounter significant problems due to the interaction of dopaminergic drugs they use for their treatment and anesthetic agents to which they are exposed during surgeries that they frequently undergo because of their advanced age. Therefore, detailed preoperative evaluation and selection of appropriate anesthetics are required.

Sudden discontinuation of L-Dopa, which has a short half-life, can cause muscle rigidity, difficulty in spontaneous respiration, and requirement of mechanical ventilation (1). Therefore, L-Dopa should be used until the day of surgery in patients with PD. If necessary, it should be given via nasogastric tube during the surgery and the postoperative period (6). Our patient received the drug orally in the morning of the surgery day with a little amount of water as recommended. In our country, carbidopa- benserazide combinations that prolong the active period of L-Dopa by preventing it from converting to dopamine in the periphery are available. In our patient, L-Dopa therapy in combination with benserazide was used.

In these patients, tremors that may be seen following general and local anesthesia should be distinguished from Parkinson's-like symptoms. Moreover, postoperative confusions and hallucinations are more common in PD. Some drugs, such as butyrophenones and metoclopramide, primarily phenothiazines, used as premedication can cause extrapyramidal symptoms. Such drugs are thought to antagonize the postsynaptic dopamine receptors in the corpus striatum; thus, postsynaptic cholinergic receptors are activated in this way, leading to the development of signs and symptoms (7). Preoperative use of these drugs as premedication before surgery in PD should be avoided. No premedication was administered to our patient. Since she had hypersecretion during the induction period, intubation was performed after oral aspiration. Aspiration through the tube was performed after the intubation.

Propofol, which is rapidly metabolized and prevents tremors, is commonly used for anesthesia in Parkinson's patients. However, use of propofol can lead to hypotension. Moreover, autonomic dysfunction and hypotension associated with vasodilation may be seen in all dopamine agonists. Orthostatic hypotension can cause severe impairment in hemodynamics during induction. We believe that the development of intraoperative hypotension in our patient was due to pramipexole, a dopamine agonist, along with L-Dopa and by the effect of propofol. After giving fluid and ephedrine for the management of hypotension, her blood pressure normalized. Many cases have been observed in which opioid-associated dystonia and rigidity were observed following use of alfentanil and fentanyl in Parkinson's patients (8,9). However, in our patient, we did not observe problems such as dystonia and rigidity despite the use of fentanyl infusion for the induction anesthesia and remifentanil infusion during the intraoperative period.

Inhaled anesthetic agents have complex effects on brain dopamine concentrations. Since sensitivity to catecholamines in the heart is increased in patients using L-Dopa, these agents, especially halothane, should be avoided in such patients. Isoflurane and sevoflurane show less arrhythmogenicity (6). We used isoflurane as the inhaled agent in our patient and observed no arrhythmia.

Several animal studies demonstrated reduced dopamine release from striatum following thiopental administration (10). In a study, Parkinson's-like episodes were reported following thiopental; however, the exact cause could not be explained (11). For these reasons, we did not prefer to use thiopental in our patient. In PD, since the other muscles surrounding the larynx and the airway are also affected, secretions that cannot be expectorated can

cause various complications. Such complications seen during recovery from anesthesia may be atelectasis, aspiration, and laryngospasm. Other complications seen following anesthesia may include respiratory failure (12). Since our patient had increased secretion, deep tracheal aspiration was performed before intubation. No hypersecretion was observed thereafter.

Among the central dopaminergic side effects of L-dopa, hallucinations and psychotic symptoms can cause important problems. Moreover, symptoms such as confusion, depression, agitation, on-off syndrome and dyskinesia that are associated with long-term use of the drug limit the therapy (13,14). This can lead to pain due to residual block and insufficient analgesia during recovery from anesthesia in the postoperative period. Therefore, neuromuscular antagonism and postoperative pain management should be performed carefully. In our patient, in order not to confuse drug- and disease-related symptoms, neuromuscular antagonism was provided using sugammadex instead of specific anticholinergic agents. Tramadol was used for analgesia, and no additional dose was required while the patient was in the recovery unit.

Reduction in the severity of dyskinesia at low doses and increased dyskinesia at high doses of morphine were demonstrated (15). Agitation, muscle rigidity and hyperthermia associated with combined use of meperidine and selegiline may be seen. Therefore, it should be tried to reduce the use of opioids by using a potent non-steroidal anti-inflammatory agent (16). We avoided to use of nonsteroidal anti-inflammatory drugs and morphine by using tramadol for postoperative analgesia. We did not observe Parkinson's-like symptoms in the postoperative period.

Cardiac valvulopathies and pulmonary-retroperitoneal fibrosis may develop with long-term use and high doses of ergot derivative dopamine agonists, particularly pergolide and cabergoline (17,18). We did not encounter such problems in our patient since we used a non-ergot derivative, pramipexole.

It is obvious that there is no simple and single anesthesia technique to be preferred in patients with PD. There is limited data on the safety of the recommended anesthetics or techniques. We, therefore, believe that postoperative mortality and morbidity will decrease if a comprehensive evaluation is performed before anesthesia, drug-drug interactions are determined in advance, and an appropriate anesthesia method is selected in patients with PD.

Ethics

Informed Consent: It was not taken.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: S.Y., M.B., F.G., Concept: S.Y., F.G., Design: S.Y., F.G., Data Collection or Processing: S.Y., M.B., Analysis or Interpretation: S.Y., F.G., Literature Search: S.Y., M.B., Writing: S.Y., M.B., F.G.

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