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Post-Extubation Laryngoespasm during Recovery from General Anesthesia in a Patient with Parkinson's disease

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Abstract **Case Report**

Introduction: Parkinson's disease is a common progressive neurovegetative disorder, associated with rigidity, bradykinesia, tremor and postural instability; the conditions are not only limited to the extremities but can extend to the striated muscles within the upper airways and rib cage [1]. Anesthetic management in these patients can be difficult during the preoperative, intraoperative, and postoperative period. ***Objective:*** present the clinical case of an 81-year-old man diagnosed with Cholelithiasis, who underwent laparoscopic cholecystectomy at the Hospital General Enrique Garcés, who manifested an adverse event after extubation in the recovery room. ***Conclusion:*** upper airways present modifications in Parkinson's patients, this can difficult their management. The prevention of complications during this process will be largely due to the adequate pharmacological treatment for Parkinson's disease or its prompt introduction, and knowledge of the pharmacological effects of the different agents used during the anesthetic period.

Keywords: Laryngismus, Anesthesia, Parkinson Disease.

INTRODUCTION

Parkinson's disease is a autonomic disorder that affects the extrapyramidal system, resulting in impaired motor control due to depletion of dopamine-secreting neurons in the basal ganglia, causing slow movement, muscle rigidity, and a peculiar tremor that appears usually when the patient is at rest [1, 2]. It is considered the second most frequent in the geriatric population [3], with a worldwide prevalence of 1% in people aged 65 or older [4]; increases the risk of mortality by two or three times and significantly influences the surgical and anesthetic management [5, 6].

Perioperative complications are related to motor disorders that include immobility or excessive movement due to lack of dyskinesia control or respiratory disorders; and, to non-motor disorders that include dysautonomic manifestations such as orthostatic hypotension, hypersalivation and dysphagia, and neuropsychological manifestations such as anxiety, depression, and cognitive impairment [6, 7].

Respiratory disorders occur due to failure of central control of the respiratory muscles, atony of the pharyngeal muscles, impaired cough reflex, hypokinesia of the vocal cords, etc. [8]. And because of the parasympathetic hyperreactivity, there is a chronic obstructive respiratory pattern that, added to dysphagia and sialorrhea, increases the risk of aspiration pneumonia. Concomitantly, there is a restrictive respiratory pattern caused by chest wall stiffness, along with hypokinesia. A decrease in reserve volume and vital capacity and an increase in residual volume and functional residual capacity have also been described, which correlate with the degree of the disease [9].

During anesthetic induction, patients with Parkinson's disease are predisposed to aspiration, atelectasis, laryngospasm, infections, and respiratory failure, which increase the difficulty of postoperative

care and delay patient recovery [10, 11]. In addition, the characteristic facial and cervical muscles rigidity can cause difficulties in orotracheal intubation and respiratory assistance with a face mask; however, the use of other devices or direct laryngoscopy is not contraindicated for airway management in these patients [12].

Medication currently available for Parkinson's disease has a strictly symptomatic effect, not a curative (or neuroprotective) effect, and must be adapted to the phase of the disease, type of symptoms and type of disability (motor and non-motor). Levodopa (oral dopamine precursor) is the drug of choice, as it is the most effective for the treatment of motor manifestations [13]. Medication must be administered until the morning of a scheduled surgery; sudden suspension can produce hyperpyrexia-parkinsonism syndrome, which associates rigidity, hyperpyrexia, dysautonomia, increased creatine kinase, and akinesia crises, which also cause respiratory alterations [14]. A medication interruption greater than 6 to 12 hours can greatly worsen the clinical symptoms of Parkinson's disease [11].

An adequate anesthetic evaluation in a patient with Parkinson's disease includes a complete history and physical and neurological examination in order to identify the characteristics and abnormalities inherent to the patient that could influence the perioperative risk; routine laboratory tests including blood count, coagulation parameters, serum chemistry with electrolytes, serum glucose, and renal function tests; and an evaluation of the cardiovascular system and airway. However, in chronic pathologies such as Parkinson's disease, which have a great impact on airway characteristics, it is necessary to include predictors of difficult airway and extubation criteria, important for post-anesthetic recovery [11]. Preoperative pulmonary function assessment and postoperative breathing exercises should also be considered.

General anesthesia and propofol are the preferred drugs in patients with Parkinson's disease. Anesthetics such as halothane can increase the catecholaminergic effect on the heart; isoflurane or sevoflurane, although less arrhythmogenic, may cause hypotension and should be avoided. Non-depolarizing muscle relaxants are safe, thus, rocuronium is the drug of choice [15]. Regarding the postoperative pain management, it is necessary to differentiate between that which arises from the surgical procedure and that induced by Parkinson's disease, mostly due to rigidity; the administration of opiates can worsen rigidity and should be administered with caution [2].

A rare and life-threatening case of upper airway obstruction caused by post-extubation laryngospasm secondary to lack of dopaminergic medication is presented.

CASE

An 81-year-old male, undergoing emergency laparoscopic cholecystectomy for acute cholecystitis, with history of Parkinson's disease diagnosed 3 years ago treated with carbidopa and levodopa (dose unknown by the patient and relatives), that had not been taken 48 hours ago. Arrives conscious, time disoriented, without signs of dehydration, no fever; vital signs: blood pressure: 107/75 mmHg; heart rate: 105 bpm; mean arterial pressure: 85 mmHg; oxygen saturation (room air): 88%, with 1 liter oxygen support: 92%.

During the preoperative evaluation, the presence of dysphonia and a loud voice, without stridor, were notable. The patient denied problems related to swallowing and cough reflex. As predictors of difficult airway: beard, partial edentulous and prominent hyoid; auscultation was clear, and no evidence of vocal cord issues was found.

Electrocardiogram was free of abnormalities, as well as other preoperative studies. Thus, balanced general anesthesia was conducted.

Upon admission to the operating room, non-invasive monitoring of blood pressure, heart rate, electrocardiogram, pulse oximetry and CO2 was initiated, showing an oxygen saturation of 88% (room air), improving to 98% with a face mask; blood pressure of 100/60 mmHg, and heart rate of 90 bpm.

The patient was placed in supine position, denitrogenated for 5 minutes with 100% O2 through a face mask; induction was performed with fentanyl 50mcg, propofol 1mg/kg, remifentanil 0.05mcg/kg/min and rocuronium (0. 8mg/kg). The orotracheal intubation involved a luminous stylet and was achieved on the second attempt with a smooth, rapid maneuver, without trauma.

The state of the vocal cords and their mobility could not be described with the described technique, however, during the trans-operative period no respiratory abnormalities were observed. Anesthesia was maintained with Sevoflurane at MAC 1, FiO2 0.5, and continuous remifentanil infusion (0.10 to 0.25 mcg/kg/min). Ventilation was maintained with a volume of 7 ml/kg, FiO2 0.5 and a respiratory rate of 16, maintaining EtCO2 at 30 +- 2. The patient remained hemodynamically stable throughout the procedure.

At the end of surgery, all anesthetics were discontinued, and neuromuscular blockade was reversed with neostigmine (50 mcg/kg) and atropine (0.1 mg/kg). The patient spontaneously woke and took a deep breath, with no difficulties during extubation. Initially, he was

breathing adequately and seemed comfortable, so he was transferred to the Post-Anesthesia Care Unit, however, his respiratory rate gradually increased and laryngeal stridor was heard, which was confused with the noisy breathing described preoperatively. Pain was initially considered, and a strong opioid was administered, with no improvement. A diagnosis of post-extubation laryngospasm was made secondary to the lack of medication to control Parkinson's disease, and three nebulizations with racemic adrenaline were performed every 30 minutes, with little improvement. The missing antiparkinsonian medication was not administered due to a lack of drugs in the Unit. Oxygen was maintained at 5 liters per minute by face mask, reaching oxygen saturations >95%. The patient presented laryngeal stridor audible at distance, use of accessory muscles, and tachycardia; 20 mg of propofol were administered, with complete improvement and adequate ventilation. His condition had progressed to respiratory failure requiring non-invasive ventilation due to his conflicted breathing, so the patient was transferred to the Intensive Care Unit (ICU) and placed under such ventilation. A bronchoscopy was performed revealing hypokinesia of the vocal cords, without edema or lesions that could be secondary to the use of the luminous stylet.

During the second day, the patients continued with audible laryngeal stridor at distance, so oral re-intubation were decided to reduce respiratory effort and the subjective idea of possible epiglottic edema. Due to the lack of improvement and weaning from the endotracheal tube, he remained oro-intubated for three days, planning to wait two more days and given the failure of weaning, to proceed with a tracheotomy. During this time the patient did not receive medication for his pathology in the ICU. On the third day, the patient remained in the same conditions and was administered levodopa during the day. Thirty-two hours after administration of this drug, there was improvement in laryngeal stridor with rejection of the endotracheal tube. On the sixth day he was weaned from the mechanical ventilator and remained on spontaneous ventilation with good tolerance. He did not require a new bronchoscopy and was discharged without complications to the General Surgery service, where he was kept on medication for Parkinson's and was discharged home with general measurements and warning signs.

DISCUSSION

Anesthetic management in patients with Parkinson's disease has not been widely studied, limiting the sources of up-to-date information on airway management in these patients. The high prevalence of this pathology in the geriatric population makes optimal anesthetic management even more necessary to reduce morbidity and mortality related to complications that may arise.

As reported by Robinson *et al.,* general anesthesia is associated with changes in dopaminergic activity, but its implication at a practical level is still unknown, so anesthetic management is fundamentally based on the patient's general condition, the current treatment and possible side effects [9].

There is no absolute contraindication for any type of anesthetic technique, however, it must be supported from the pre-anesthetic visit with a detailed clinical history, a rigorous physical examination, and preoperative tests according to the characteristics and needs of the patient; aspects emphasized by authors such as Lieb and Selim [11]. In this case, some specific tests were omitted because the patient underwent emergency surgery, thus limiting the access to relevant information.

In Parkinson's disease, central control of the upper airways has been lost; according to Aquinas *et al.,* and Fontana *et al.,* this dysfunction affects the immediate post-anesthetic period, resulting in laryngospasm or signs of respiratory failure due to obstruction [7, 16], which was manifested by this patient in the recovery room.

Additionally, he presented audible stridor, preoperative respiratory distress, and had not received his Parkinson’s medication for 48 hours. In this case, and similar to that described by other authors such as Roberts and Lewis and Akbar *et al.,* [5, 6], discontinuation of levodopa increased rigidity, which in turn interfered with adequate ventilation; this drug should have been administered immediately to avoid laryngospasm. Other complications could have occurred, such as aspiration pneumonia; on the other hand, a strong opioid should not have been administered for pain management, this worsened the stiffness, seeing no improvement at that time, and remarking the need of a correct characterization of the type of post-surgical pain.

Finally, in this patient, a bronchoscopy revealed hypokinesis of the vocal cords, diagnosing vocal cord paralysis, which may have been present previously due to the evolution of his disease and the lack of medication; the use of a luminous stylet did not increase the risk of its appearance, but initially limited the evaluation of the state of the vocal cords and their mobility [17].

CONCLUSION

For adequate anesthetic management in a patient with Parkinson's disease, changes in upper airways must be considered, this can difficult their management; In addition, the clinical history is essential to collect information about pharmacological treatment and adherence. The prevention of collateral events will be largely given by the treatment and its early

administration, and by knowledge about the pharmacological effects of the different agents used during the anesthetic period.

Adequate intubation material must be available and post-surgical complication must be understood.

Studies about the behavior of Parkinson's disease in specific surgical conditions should be conducted to increase knowledge and reduce the morbidity and mortality related to complications in these patients, especially in Ecuador, where the indigenous scientific evidence on this pathology is limited.

ETHICS

In this case report, the informed consent of the patient was obtained. Its elaboration and all the inherent details were based on the Helsinki Declaration.

CONFLICT OF INTEREST

All authors declare no conflict of interest.

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