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CASO CLÍNICO

General Anesthesia in a Patient with a Lung Carcinoid Tumor with Hepatic and Bone Metastases: A Case Report

Anestesia Geral num Doente com Tumor Carcinóide Pulmonar com Metástases Hepáticas e Ósseas: Caso Clínico

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ABSTRACT

Carcinoid tumors have the potential to metastasize and the ability to secrete bioactive substances. Carcinoid crisis is a serious event that may be triggered during anesthesia. It is a challenge to the anesthesiologist because it can provoke oscillations of blood pressure, flushing, bronchospasm and arrhythmias.

We report our anesthetic management of a 63-year-old male with a lung carcinoid tumor with liver and bone metastases that was submitted to surgical correction of bilateral inguinal hernia. Octreotide infusion was initiated at 25 µg/h preoperatively and was maintained for 24 hours after the surgery. There were no complications, with hemodynamic and ventilatory stability.

Carcinoid crisis is a life-threatening complication. The anesthesiologist must focus on preventing stressful situations that can provoke the release of bioactive substances. Octreotide is the drug of choice to prevent and treat carcinoid crisis and should be readily available for patients with carcinoid tumors.

RESUMO

Os tumores carcinóides têm capacidade de metastização e de secretar substâncias bioativas. A crise carcinóide é um evento grave que pode ser desencadeado durante a anestesia. É um desafio para o anestesiologista, pois pode provocar oscilações da pressão arterial, rubor, broncospasmo e arritmias.

Descrevemos o manuseio anestésico de um homem de 63 anos com tumor carcinóide pulmonar, com metástases hepáticas e ósseas que foi submetido a correção cirúrgica de hérnia inguinal bilateral. A perfusão de octreotido foi iniciada a 25 µg/h no pré-operatório e mantida por 24 horas após a cirurgia. Não houve complicações, mantendo-se estabilidade hemodinâmica e ventilatória.

A crise carcinóide acarreta risco de vida. O anestesiologista deve focar-se na prevenção de situações que podem provocar a libertação de substâncias bioativas. O octreotido é o fármaco de escolha para prevenir e tratar crises carcinóides e deve estar prontamente disponível para estes pacientes.

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INTRODUCTION

Carcinoid tumors originate from neuroendocrine cells, are uncommon and present with slow growth, but have the potential to metastasize. Their incidence ranges from 0.2 to 10/100 000 but nowadays due to improvements in the diagnostic tools available and disease awareness this number is increasing.[1] The gastrointestinal tract is the most frequent site of carcinoid tumors followed by the bronchopulmonary system.[1,2] These tumors can be asymptomatic but they have the ability to secrete bioactive substances like serotonin, histamine, dopamine, substance P, prostaglandins and kallikreins that can lead to a carcinoid syndrome.[3] This syndrome occurs in 15% to 18% of patients with carcinoid tumors[4] and is associated with symptoms like flushing, diarrhea, wheezing and carcinoid heart disease.[1] In fact, approximately 50% of patients with carcinoid syndrome progress to develop carcinoid heart disease.[5] This syndrome is also more commonly related to hepatic metastases and tumors that drain directly into the systemic circulation, bypassing the liver metabolism, such as bronchopulmonary tumors.[1,3] Carcinoid crisis is a life-threatening exacerbation of the carcinoid syndrome that may be triggered by manipulation

of the tumor or during induction and maintenance of anesthesia.[1] It is characterized by severe oscillations of blood pressure, flushing, bronchospasm and arrhythmias and it is unresponsive to conventional therapies.[1,6,7] Octreotide is a long acting synthetic octapeptide and analog of somatostatin that prevents the secretion of various bioactive substances. It has been used to treat carcinoid syndrome symptoms and to prevent and treat carcinoid crisis during the perioperative period.[3,7] Since the introduction of octreotide, the prognosis of patients with carcinoid tumors has significantly improved.[1] We present here our anesthetic management of a patient with a lung carcinoid tumor with hepatic and bone metastases submitted to surgical correction of bilateral inguinal hernia.

CASE REPORT

We report a case of a 63-year-old male, with 72 kg and 167 cm of height, with a lung carcinoid tumor with hepatic and bone metastases that was submitted to surgical correction of bilateral inguinal hernia. He was evaluated in a pre-anesthesia consultation and was considered status III in the American Society of Anesthesioloy physical status classification system. There were no signs of difficult airway. He had been submitted to a right lower lobectomy in 2001 without surgical or anesthetic complications. Besides the tumor, the patient also had a history of arterial hypertension, dyslipidemia and asthma and his usual medication was candesartan, fenofibrate and a monthly intramuscular injection of 30 mg of long-acting octreotide. The lung carcinoid tumor was diagnosed in 2001 and the patient was submitted to a right lower lobectomy. In 2007 the patient was diagnosed with hepatic metastases that remained stable with somatostatin analog therapy. In 2011 bone metastases were detected and the patient was submitted to three cycles of peptide receptor radionuclide therapy with lutetium-177. After performing this treatment, the metastases remained stable with somatostatin analog therapy. The patient had been regularly evaluated with computed tomography scans.

Pre-operatively blood tests were within normal ranges and the electrocardiogram showed sinus rhythm with a first-degree atrioventricular block and nonspecific T-wave alteration. The echocardiogram demonstrated a mild tricuspid and mitral insufficiency and conserved biventricular systolic function. The chest radiograph was compatible with previous right lower lobectomy and did not present any other changes. The lung function tests revealed a mild obstructive ventilatory defect with a positive bronchodilator reversibility test and normal value of the carbon monoxide diffusing capacity. There were no signs of cardiorespiratory dysfunction in the pre-operative assessment. Routine monitoring was applied, including electrocardiography, pulse oximetry, non-invasive blood pressure and heart rate. Baseline blood pressure and heart rate were 158/103 mmof mercury and 76 beats per minute, respectively. Bispectral index score monitoring was used for assessment of anesthesia depth and train of four (TOF) was utilized to monitor neuromuscular blockade. Octreotide infusion was initiated at 25 µg/h and maintained throughout the surgery. Before induction an arterial catheter was placed in the left radial artery. Previously to the induction 50 mg of ranitidine was administered. Pre-oxygenation was performed during approximately 3 minutes. The induction started with the administration of 0.05 mg of fentanyl and 200 mg of propofol. Mask ventilation was assured before giving 40 mg of rocuronium. The intubation was performed with laryngoscope and a polyvinyl 7.5 cuffed tube was placed. The anesthesia was maintained with sevoflurane of 2% concentration and 40% oxygen. Before the incision 0.05 mg of fentanyl and 4 mg of dexamethasone were administered. During the procedure due to bradycardia 0.5 mg of atropine was given to the patient with heart rate returning immediately to normal range and another 20 mg of rocuronium were administered. The blood glucose was monitored during the intraoperative period and was within normal ranges. For post-operative analgesia 1000 mg of paracetamol and 30 mg of ketorolac were given and 4 mg of ondansetron to prevent nauseas and vomiting. The patient was decurarised with 200 mg of sugammadex and extubated with a TOF ratio > 0.9.

The procedure had a duration of approximately 60 minutes and there were no surgical or anesthetic complications, with hemodynamic and ventilatory stability. The patient was transferred to the post anesthesia care unit, where he stayed for 24 hours. The octreotide infusion was maintained for 24 hours after surgery and the patient was discharged from the hospital on the following day.

DISCUSSION

The perioperative management of patients with carcinoid tumors presents as a real challenge to the anesthesiologist. Both surgical and anesthetic stimuli can trigger a carcinoid crisis due to an unpredictable release of bioactive substances. This crisis is characterized by severe oscillations of blood pressure and can lead to hemodynamic instability that is unresponsive to conventional therapy.[1,6,7] So, the main goal during the perioperative period is to avoid factors that stimulate the release of bioactive substances.

Preoperative evaluation of these patients is essential to identify signs of carcinoid cardiac disease and excessive neuropeptide activity which can indicate uncontrolled carcinoid syndrome. Patients with carcinoid heart disease or elevated levels of urinary 5-hydroxyindoleacetic acid (5-HIAA) are at increased risk of postoperative complications.[4] Preoperative echocardiography is important to exclude cardiac dysfunction or structural abnormalities and, in case of diarrhea, electrolytes and fluid intravascular volume evaluation are necessary prior to surgery.[3]

The use of anxiolytic medications in the preoperative setting may be valuable because emotional stress can be a trigger

for carcinoid crisis. Most patients with carcinoid tumors are submitted to general anesthesia to avoid sympathectomy related to neuraxial anesthesia although both spinal and epidural anesthesia have been used with success.[1,6] Prior to induction, placement of an arterial catheter is recommended since the induction drugs may produce hypotension which can trigger a carcinoid crisis.[1,3] Light or stressful intubation are not recommended.[6] We decided to induce our patient with propofol since it is more effective in supressing the sympathetic reaction to intubation and it may be the most appropriate induction agent for patients with carcinoid tumors.[1] Maintenance with volatile agents is considered safe.[1,8] Opioids and non-depolarizing neuromuscular blocking agents that cause histamine release must be avoided[1,3,6] and succinylcholine should not be used because fasciculations theoretically can promote tumor activity[3], therefore we used fentanyl and rocuronium. A good anesthetic depth and analgesia are essential to prevent stimulation of sympathetic activity and consequently carcinoid crisis.[1] Complications can be unpredictable and occur at any time and are characterized by cardiovascular instability (most common), bronchospasm, flushing and hyperglycemia.[1] Consequently, monitoring blood glucose during the intraoperative period is important, also because octreotide can cause hyperglycemia.[3] Anesthesia emergence can be delayed if the levels of serum serotonin are increased.[4]

Octreotide is a synthetic analog of somatostatin with a longer half-life (1.5-2 hours) and is the drug of choice to prevent and treat carcinoid crisis during the perioperative period as it blocks the secretion of some peptides and amines.[1,7] However, there are no concrete guidelines about the ideal form of administration and dosage of octreotide for the anesthetic management of these patients. Massimino *et al* stated that a prophylactic bolus of 500 µg preoperatively was uncapable of preventing carcinoid crisis.[9] E. A. Woltering *et al* determined that a 500 µg/h continuous infusion of octreotide preoperatively, intraoperatively and postoperatively could reduce the incidence of carcinoid crisis.[7] Despite contradictory data, octreotide continues to be used by many anesthesiologists due to its low cost and high safety profile. Normally, it is suggested that intravenous octreotide therapy should be started prior to surgery (from 2 weeks to 24 hours) and maintained with a continuous intraoperative infusion with additional supplemental administration if carcinoid crisis is suspected.[1,4,8,10] Doses of octreotide up to 500 mg/h have been used intraoperatively, allegedly with no major side effects.[1] In our case report we describe a successful anesthetic management of a patient with lung carcinoid tumor with hepatic and bone metastases with a 25 µg/h continuous infusion of octreotide initiated preoperatively, maintained during the intraoperative period and suspended 24 hours after the surgery. In the postoperative period, patients should be monitored in intensive care units, and it is recommended to continue octreotide therapy because residual tumor or metastatic disease can promote release of vasoactive neuropeptides leading to hemodynamic instability.[3]

Carcinoid crisis is a life-threatening complication and can be difficult to manage. During the anesthetic management of these patients, the anesthesiologist must focus on preventing stressful situations that can provoke the release of bioactive substances and must be alert in order to identify and treat complications as soon as possible. Although controversial, octreotide appears to play a role in the prevention and treatment of carcinoid crisis and therefore should be readily available for patients with carcinoid tumors.

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