CASE REPORTS

Acute Respiratory Failure Immediately Following Surgery for Morbid Obesity

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Patients with sleep apnea-hypopnea syndrome have a higher probability of presenting more postoperative complications, yet early treatment with continuous positive airway pressure can prevent them. We report the case of a patient who underwent surgery for morbid obesity and who developed acute respiratory failure in the immediate postoperative period, requiring readmission to the recovery unit. The patient's condition progressed favorably following treatment with bilevel positive airway pressure. It was subsequently confirmed that the patient suffered from sleep apnea-hypopnea syndrome.

Key words: *Sleep apnea syndrome. Anesthesia. Surgery*

Insuficiencia respiratoria aguda en el postoperatorio inmediato de cirugía por obesidad mórbida

Los pacientes con síndrome de apneas-hipopneas durante el sueño tienen una mayor probabilidad de presentar más complicaciones postoperatorias. La utilización precoz de tratamiento con presión positiva continua de la vía aérea puede evitar su aparición. Se presenta el caso de un paciente intervenido de obesidad mórbida que desarrolló, en el postoperatorio inmediato, un cuadro de insuficiencia respiratoria aguda, que precisó el reingreso en la unidad de reanimación y evolucionó favorablemente tras la instauración de tratamiento con presión positiva con 2 niveles de presión. Posteriormente se confirmó que presentaba síndrome de apneas-hipopneas durante el sueño.

Palabras clave: *Síndrome de apnea del sueño. Anestesia. Cirugía.*

Introduction

Surgery and anesthesia can both lead to impaired lung function, and abnormal gas exchange and respiratory mechanics, which in turn lead to respiratory complications. Patients with sleep apnea-hypopnea syndrome (SAHS) may present more perioperative complications than the general population.[1-3] Surgical risk has long been underestimated for these patients, however, probably due to poor understanding of the disease. Perioperative complications may be due to multiple factors, including collapse of the upper airway, difficult intubation, chronic lack of sleep, type of surgery and anesthesia, and other associated diseases. Obesity is very common in SAHS and more than 50% of morbidly obese patients who are assessed for bariatric surgery suffer from moderate to severe SAHS, which is often not diagnosed. Given the surgical complications that SAHS patients undergoing bariatric surgery may present, some authors recommend systematically performing polysomnography as part of preoperative assessment.[4,5] Nighttime treatment with nasal positive airway pressure can then be initiated early.

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We report the case of a morbidly obese patient who presented acute hypercapnic respiratory failure immediately after bariatric surgery. The condition responded well to nasal positive airway pressure and the diagnosis of SAHS was subsequently confirmed

Case Description

The patient was a 31-year-old man with morbid obesity that had commenced at puberty; he had progressively gained weight and had followed several diets without significant weight change. The patient's history included hypertension, carbohydrate intolerance, and primary hypothyroidism treated with augmentation therapy. Retrospectively, the patient reported intense snoring with nocturnal apnea and a tendency toward sleepiness during the day. The physical examination revealed morbid obesity (body mass index, 60 kg/m^2), with a waist circumference of 150 cm, limited ability to open the mouth, a short neck, and a class-III Mallampati classification.

Other examinations included a transthoracic echocardiogram that revealed enlargement of the heart chambers and general hypokinesia, causing slight depression of overall ventricular function. Spirometry showed a forced vital capacity (FVC) of 4890 mL (87% of reference), forced expiratory volume in 1 second (FEV_1) of 4210 mL (91%), and FEV_1/FVC of 86%. Resting arterial blood gas analysis showed a pH of 7.36,

$PaCO_2$ of 75 mmHg, and bicarbonate (HCO_3) of 24 mEq/L. Biochemistry values were normal, except glucose (111 mg/dL), uric acid (7.2 mg/dL), and alanine aminotransferase (66 U/L). A complete blood count showed a red blood cell count of 5 500 000 cells/mL; other parameters were normal in all 3 series. Calcium and phosphorous metabolism values were normal. Analysis of thyroid hormones showed the following values: thyroxine, 0.74 ng/dL; thyrotropic hormone, 4.2 mU/L; zinc, 127 µg/dL; copper, 65 µg/dL; 25-OH vitamin D_3, 14.3 pg/mL. The other parameters were normal. Chest x-ray showed no significant abnormalities.

The patient underwent a distal gastrectomy and biliopancreatic diversion (Scopinaro technique). Intubation presented no difficulty during surgery and there were no complications. Six hours after surgery, the patient began to present dyspnea and intense tachypnea, and arterial blood gas analysis showed a pH of 7.24, $PaCO_2$ of 78 mm Hg, and PaO_2 of 53 mm Hg. The patient required admission to the postoperative recovery unit and noninvasive bilevel positive airway pressure and oxygen therapy were instated with good clinical and arterial blood gas response. Arterial blood gases were normal on discharge. The patient continued using nasal continuous positive airway pressure at home. Polysomnography later detected 96 obstructive apneas and 179 hypopneas, for an apnea-hypopnea index of 42. Oxygen saturation at the beginning of the study was 94%; minimum oxygen saturation was 80%; the desaturation index was 3% (58 events/h), and remained 16% below 90% oxygen saturation.

Discussion

Few published studies have evaluated postoperative complications in patients with SAHS. In a controlled case study of patients undergoing knee or hip surgery, Gupta et al[6] found that 24% of patients diagnosed with SAHS and only 9% of controls developed complications. The complications described included a higher number of unscheduled admissions to intensive care, longer mean stays in hospital, greater risk of obstruction of the upper airway after extubation, more severe oxygen desaturation than in the general population, greater risk of atrial fibrillation, and even cardiopulmonary arrest.[6-8]

In the case of our patient, the prior absence of lung disease, a medical history indicative of SAHS, onset of respiratory failure immediately after surgery, and the good response to positive airway pressure suggested a diagnosis of SAHS; this diagnosis was subsequently confirmed by the polysomnography. Initiating positive airway pressure and oxygen therapy in the initial stages resolved the respiratory failure in this patient.

Positive airway pressure—whether continuous or bilevel—is the treatment of choice in this situation,[9-11] though there are very few controlled trials of its efficacy. There is a lack of consensus regarding the use of noninvasive ventilation through a nasal mask in patients undergoing bariatric surgery, due to the risk of leaks or ruptures. A recent study,[12] however, showed that nasal continuous positive airway pressure does not appear to contribute to these complications. In patients diagnosed with SAHS who are scheduled for surgery, this treatment prior to surgery and in the days following the operation can prevent the appearance of more complications than in the general population, even if these patients receive morphine.[5,13]

The literature provides no data to indicate how long before surgery such treatment should begin. Some authors suggest a period of at least 4-6 weeks before scheduled surgery,[9,14] in order to prevent edema of the upper airway and associated complications, thus allowing the patient to adapt correctly. Positive airway pressure, whether continuous or bilevel, should be restarted immediately after surgery. In patients undergoing bariatric surgery, the presence of respiratory disturbances during sleep should be reassessed once the patient has lost a considerable amount of weight, in order to evaluate the clinical results and the need to continue with nasal positive airway pressure as well as to retitrate to establish the optimal level of pressure if neccessary.[9,11]

REFERENCES

1. Lan CHK, Rose MW. Perioperative management of obstructive sleep apnea. Sleep Med Clin. 2006;1:541-8.
2. Practice guidelines for the perioperative management of patients with obstructive sleep apnea: a report by the American Society of Anesthesiologists Task Force on Perioperative Management of patients with obstructive sleep apnea. Anesthesiology. 2006;104:1081-93.
3. Durán-Cantolla J, González-Mangado N. Documento de consenso nacional sobre el síndrome de apneas-hipopneas durante el sueño. Arch Bronconeumol. 2005;41 Supl 4:102-6.
4. O'Keeffe T, Patterson EJ. Evidence supporting routine polysomnography before bariatric surgery. Obes Surg. 2004;14: 23-6.
5. Hallowell PT, Stellato TA, Schuster M, Graf K, Robinson A, Crouse C, et al. Potentially life threatening sleep apnea is unrecognized without aggressive evaluation. Am J Surg. 2007;193:364-7.
6. Gupta RM, Parvizi J, Hanssen AD, Gay PC. Postoperative complications in patients with obstructive sleep apnea syndrome undergoing hip or knee replacement: a case-control study. Mayo Clin Proc. 2001;76:897-905.
7. Kehlet H, Rosenberg J. Late postoperative hypoxemia and organ dysfunction. Eur J Anaesthesiol. 1995;12:31-4.
8. Ballantyne GH, Svahn J, Capella RF, Capella JF, Schmidt HJ, Wasielewski A, et al. Predictors of prolonged hospital stay following open and laparoscopic gastric bypass for morbid obesity: body mass index, length of surgery, sleep apnea, asthma, and the metabolic syndrome. Obes Surg. 2004;14:1042-50.
9. Haines KL, Nelson LG, González R, Torrella T, Martin T, Kandil A, et al. Objective evidence that bariatric surgery improves obesity related obstructive sleep apnea. Surgery. 2007;141:354-8.
10. Sturani C, Galavotti V, Scarduelli C, Sella D, Rosa A, Cauzzi R, et al. Acute respiratory failure, due to severe obstructive sleep apnoea syndrome, managed with nasal positive pressure ventilation. Monaldi Arch Chest Dis. 1994;49:558-60.
11. Cuvelier A, Rabec C. La ventilation mécanique au cours de l'insuffissance respiratoire hypercampnique du sujet obèse. Spéficités de la ventilation non invasive. Réanimation. 2007;16:75-81.
12. Huerta S, DeShields S, Shpiner R, Li Z, Liu C, Sawicki M, et al. Safety and efficacy of postoperative continuous positive airway pressure to prevent pulmonary complications after Roux-en-Y gastric bypass. J Gastrointest Surg. 2002;6:354-8.
13. Rennotte MT, Baele P, Aubert G, Rodenstein DO. Nasal continuous positive airway pressure in the perioperative management of patients with obstructive sleep apnea submitted to surgery. Chest. 1995; 107:367-74.
14. Mehta Y, Manikappa S, Juneja R, Trehan N. Obstructive sleep apnea syndrome: anesthetic implications in the cardiac surgical patient. J Cardiothorac Vasc Anesth. 2000;14:449-53.