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Case Report

Summadex Application for Bariatric Surgery of Life- Threatening Obesity Children with Prader–Willi syndrome and Severe Pulmonary

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Abstract

Background : Children with Prader–Willi syndrome（PWS）often accompanied by obesity, mental retardation and other severe complications. Bariatric surgery becomes an option for these patients especially for severe obesity children to manage their weight, but anesthesia for such children is a great challenge.

Case: A 9-year-old boy (weight:121 kg, height:140 cm, BMI:61.7 kg/m^2) with Prader-Willi syndrome and severe pulmonary arterial hypertension was scheduled for laparoscopic sleeve gastrectomy under general anesthesia. After the operation, antagonize the muscle relaxant effect of rocuronium with sugammadex and the endotracheal tube was successfully extubated within 1 minute.

Conclusion: The safety and efficacy of Summadex in pediatricians have not been established at present, but it has great advantages for airway management for bariatric surgery of life- threatening obesity children with Prader–Willi syndrome in this case. Therefore, summadex seems to be extremely helpful for airway management in children with severe obesity undergoing general anesthesia surgery.

Keywords: Prader–Willi syndrome; Bariatric surgery; Sugammadex; Pulmonary arterial hypertension; Airway management.

Introduction

Prader–Willi syndrome is a congenital, rare genetic disorder of lifelong non Mendelian inheritance of epigenetic disease resulting from abnormalities of the long arm of chromosome 15 (position 15q11-q13) and is a complex syndrome of multisystemic abnormalities. This genetic disorder has an estimated prevalence that ranges between 1/10,000-1/30,000[1], The number of individuals worldwide with PWS is estimated at 400,000[2]. The course of PWS is historically divided into two clinical stages with failure to thrive representing the first stage and hyperphagia with the onset of obesity representing the second stage[3]. The patients are often accompanied by mental retardation, obesity, physical development abnormalities. At present, there is no way to cure it, so the patients need to live under supervision for life. Prader-Willi syndrome is the most common known genetic cause of life-threatening obesity in humans, so weight management is one of the most important aspects of treatment for individuals with PWS. With the development of bariatric surgery, it has been explored as an option to reduce appetite and treat obesity[4]. Anesthesia for these children is a challenge for anesthesiologists. Here, we describe a case of anesthetic management with sugammadex for bariatric surgery of life-threatening obesity children with Prader–Willi syndrome which has not been reported previously.

Case report

The University's Institutional Review Board (JiNan University) waives review requirements for this case. Written informed consent for the procedure and publication of relevant, non-identifiable history and anesthesia in the form of the case report was obtained from the patient's parents. A 9-year-old boy (weight:121 kg, height:140 cm, BMI:61.7 kg/m2) who was diagnosed with Prader–Willi syndrome, obstructive sleep apnea syndrome, respiratory failure, severe obesity, Severe pulmonary arterial hypertension (Pulmonary arterial pressure was 77 mmHg) was scheduled for laparoscopic sleeve gastrectomy under general anesthesia (Figure 1).

Figure 1: A life-threatening obese patient with Prader–Willi syndrome.

The patient was not premedicated and had no venous access because of noncompliance before being brought to the operating theater. He was monitored in the operating room by electrocardiography, noninvasive blood pressure, body temperature and pulse oximetry. His vital signs before anesthesia was a blood pressure of 150/73 mmHg, a heart rate of 100beats/minute, a body temperature of 36.8 °C, and an oxygen saturation of 92%. Because of the difficulty in cooperating of the kid, we allowed his mother to enter the operating room to help the anesthesiologist to complete the anesthesia. After preoxygenation with 100% oxygen via a face mask, 6%sevoflurane and 100%oxygen were administrated with the help of his mother and followed by immediate ultrasound-guided establishment of venous access and invasive arterial pressure monitoring for the patient. Midazolam 3 mg, fentanyl 0.3 mg, propofol 120 mg, rocuronium 15 mg were administered intravenously, and 1 minute after injection, the endotracheal tube was intubated (ID7.0) under a visual laryngoscope. Intraoperative monitoring of noninvasive blood pressure, oxygen saturation, electrocardiogram, body temperature, end tidal carbon dioxide, depth of anaesthesia, invasive arterial blood pressure, cardiac output, stroke volume variability, cardiac index, Muscle relaxation, urine output. Anesthesia was maintained with total intravenous anesthetics: sufentanil, propofol, rocuronium bromide, dexmedetomidine during surgery[5]. After the operation, sugammadex 200mg was injected intravenously, approximately 48seconds later the patient regained spontaneous breathing, opened eyes, tented to extubate endotracheal tube himself, seemed to be dysphoric, and TOF ratio was 93% at this time and we extubate the tube. Mask oxygen was administered immediately after the endotracheal tube was removed, but the patient cannot cooperate with mask oxygen inhalation, at this time oxygen saturation was 90%。 We again require his mother entering into operating room to pacify the patient and transfer the kid into post-operating care unit. In the post-operating care unit, the patient's oxygen saturation was 97% on 3 L/min of oxygen via a nasal cannula. No opioid was administered postoperatively because the patient had remained pain-free. He was transferred to the intensive care unit of the weight management center for continuous close monitoring with no respiratory complications after 2hour observation. Four hours after the operation, the patient was able to get out of bed without obvious pain sensation, breathing was regular and smooth, self-report showed no obvious discomfort.

Discussion

Children with Prader–Willi syndrome, severe obesity and severe pulmonary hypertension undergoing bariatric surgery pose a great challenge to anesthesia. The obese patient is at risk of perioperative respiratory complications which essentially include difficult access to the airways (intubation, difficult or even impossible ventilation), and postextubation respiratory distress secondary to the formation of atelectasis or obstruction of the airways. Pulmonary hypertension has become a significantly elevated risk of perioperative morbidity and mortality for children, with rates perhaps 20-fold greater than all children undergoing anesthesia[6]. The effect of pulmonary hypertension on noncardiac surgery outcomes is less well studied, but there are data that suggest pulmonary hypertension is a notable risk factor for poor outcomes. Morbidity rates range from 2% to 42% and include acute respiratory failure, acute heart failure, dysrhythmia, and prolonged intubation and intensive care unit stay

[7-10]. The overarching goal of anesthetic management for patient with Prader-Willi syndrome, severe obesity and severe pulmonary arterial hypertension is to provide adequate anesthesia, analgesia and safe airway management for the procedure, while avoiding right heart failure, increased pulmonary vascular resistance(PVR), low small vessel resistance(SVR) and coronary ischemia. Induction of anesthesia is arguably the riskiest time of the anesthetic. The child can not cooperate with anesthesia, to avoid the huge hemodynamic fluctuation caused by emotional agitation and irritability which may cause the increase of pulmonary arterial pressure and heart failure, we allowed his mother to accompany him to help the anesthesiologists perform anesthesia. The anesthesia depth, cardiac output, cardiac index, stroke volume variability, muscle relaxation were monitored continuously during the operation. To our best knowledge, commonly occurring respiratory cabnormalities include Pickwickian syndrome, obstructive sleep apnea, decreased functional residual capacity, and increased closing capacity, which all contribute to atelectasis and rapidly occurring hypoxemia. These respiratory changes may also lead to polycythemia and corpulmonale[11]. Normocapnia (relative to the patient's baseline) are key components to maintaining baseline PVR[12]. Therefore, accurate monitoring of muscle relaxants and complete antagonism of muscle relaxants are needed to avoid respiratory complications after surgery. It's reported that Compared with neostigmine or placebo, sugammadex may reverse rocuronium-induced neuromuscular blockade in pediatric patients rapidly and safely. We administrate summadex to Antagonistic

effect of rocuronium, the patient received 4 mg/kg summadex according to his ideal body weight. He regained spontaneous breathing and the train-of-four (TOF) ratio was 93% within 1 minute. No cardiopulmonary complications occurred during the recovery period. The child returned to the intensive care unit of our weight management center for continuous close monitoring safely and the patient have normal pulse saturation after returning to the ward without ventilator assisted ventilation.

Severe obese children are often complicated with cardiopulmonary complications. It is very difficult to anesthetize these patients. The antagonism of muscle relaxants is a very important aspect for the anesthesia management of patients. In this case, we applied summadex to antagonize rocuronium, and achieved very good results. Therefore, in some obese children, it can be considered to antagonize muscle relaxants, which will benefit for smoothly extubating the endotracheal tube, obtaining good spontaneous breathing and reducing pulmonary complications.

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References

1. Muscogiuri G, Formoso G, Pugliese G, Ruggeri RM, Scarano E, et al. (2019) Prader- Willi syndrome: An uptodate on endocrine and metabolic complications. Rev Endocr Metab Disord. 20: 239-250.
2. Butler MG. (2006) Management of obesity in Prader-Willi syndrome. Nat Clin Pract Endocrinol Metab. 2: 592-593.
3. Miller JL, Lynn CH, Driscoll DC, Goldstone AP, Gold JA, et al. (2011) Nutritional phases in Prader-Willi syndrome. Am J Med Genet A.155A: 1040-1049.
4. Butler MG, Miller JL, Forster JL (2019) Prader-Willi Syndrome - Clinical Genetics, Diagnosis and Treatment Approaches: An Update. Curr Pediatr Rev. 15: 207-244.
5. Fleisher LA, Fleischmann KE, Auerbach AD, Barnason SA, Beckman JA, et al. (2015) 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines. Developed in collaboration with the American College of Surgeons, American Society of Anesthesiologists, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Anesthesiologists, and Society of Vascular Medicine Endorsed by the Society of Hospital Medicine. J Nucl Cardiol. 22: 162-215.
6. Latham GJ, Yung D. (2019) Current understanding and perioperative management of pediatric pulmonary hypertension. Paediatr Anaesth. 29: 441-456.
7. Lai HC, Lai HC, Wang KY, Lee WL, Ting CT, et al.(2007) Severe pulmonary hypertension complicates postoperative outcome of non-cardiac surgery. Br J Anaesth. 99: 184-190.
8. Price LC, Montani D, Jaïs X, Dick JR, Simonneau G, et al. (2010) Noncardiothoracic nonobstetric surgery in mild-to-moderate pulmonary hypertension. Eur Respir J. 35: 1294-1302.
9. Ramakrishna G, Sprung J, Ravi BS, Chandrasekaran K, McGoon MD. (2005) Impact of pulmonary hypertension on the outcomes of noncardiac surgery: predictors of perioperative morbidity and mortality. J Am Coll Cardiol. 45: 1691-1699.
10. Kaw R, Pasupuleti V, Deshpande A, Hamieh T, Walker E, et al.(2011) Pulmonary hypertension: an important predictor of outcomes in patients undergoing non-cardiac surgery. Respir Med. 105: 619-624.
11. Thompson J, Bordi S, Boytim M, Elisha S, Heiner J, et al. (2011)Anesthesia case management for bariatric surgery. AANA J. 79: 147-160.
12. Cashen K, Reeder R, Dalton HJ, Berg RA, Shanley TP, et al. (2018) Hyperoxia and Hypocapnia During Pediatric Extracorporeal Membrane Oxygenation: Associations With Complications, Mortality, and Functional Status Among Survivors. Pediatr Crit Care Med. 19: 245-253.