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Medication Safety And Emergency Management In Pediatric Anesthesia: A Case Report Of An Accidental High-Dose Remifentanyl Bolus Administration

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Abstract

This case report presents a 7-year-old child scheduled for surgery due to adenoid hypertrophy, who experienced accidental high-dose remifentanyl bolus administration during anesthesia preparation. The complications that arose and the management of the case are discussed. During routine monitoring in the operating room, the patient experienced sudden loss of consciousness, generalized seizure, and respiratory arrest. The patient was intubated after receiving midazolam and rocuronium. After midazolam administration and oxygenation, the seizure ceased and vital signs returned to normal. Upon investigating the etiology of the seizure, it was found that 2 mg of remifentanyl had been accidentally administered as a bolus during preoperative preparation. Despite the effects of remifentanyl, the patient's vital signs remained stable, and the surgery was successfully completed without any complications during the postoperative period. This case highlights the importance of drug safety and emergency management in anesthesia practice.

Introduction

Anesthesia is critical to ensuring patient safety and supporting vital functions during surgical procedures. However, the drugs used in anesthesia carry risks that can lead to serious side effects, especially in pediatric patients. Medication errors are a significant safety issue in anesthesia practice and medical applications in general. Any medication error can have serious consequences on patient safety, potentially leading to life-threatening complications. The most common causes of drug administration errors include improper labeling or packaging similarities, incorrect dosage calculations, lack of communication among anesthesia providers, and improper routes of drug administration. The metabolism, drug responses, and dosage requirements of children differ significantly from adults, making it crucial for anesthesia providers to be well-trained in drug dosages, mechanisms of action, and potential side effects to prevent errors during the process. This case report discusses a medication error and its management in a 7-year-old pediatric patient with adenoid hypertrophy.

Case Report

A 7-year-old child weighing 24 kg, with no known chronic illnesses, was scheduled for surgery due to adenoid hypertrophy. After the patient was brought into the operating room, routine monitoring was performed, and 150 ml of saline was administered via an intravenous line. Subsequently, the patient developed sudden loss of consciousness, generalized seizure, and cyanosis. The patient was administered 2 mg of midazolam and attempts were made to provide manual ventilation, but mask ventilation was unsuccessful. The patient's SpO₂ value dropped to 60%. As the patient developed chest rigidity, 15 mg of rocuronium bromide was administered, and intubation

was successfully performed without any difficulty. Upon investigating the etiology of the seizure, it was found that 2 mg of remifentanyl had been accidentally added to the saline solution prepared for infusion and administered as an IV bolus. It was observed that the remifentanyl solution did not have a label, and the personnel who prepared the solution had not issued a verbal warning regarding this issue. Despite the effects of remifentanyl, the patient's vital functions remained stable, and the decision was made to proceed with the surgery. The surgery was carried out using 60 mg of propofol to induce anesthesia, with sevoflurane as the inhaled anesthetic and nitrous oxide for analgesia. The surgical procedure was completed as planned without any complications. The patient was given 240 mg of IV paracetamol for postoperative analgesia. The patient was reversed with sugammadex and woke up without any issues. After one hour of postoperative monitoring in the recovery unit, the patient was transferred to the surgical ward. No complications were observed in the postoperative period.

Discussion

This case clearly demonstrates the potential effects of medication errors on patient safety, particularly in pediatric anesthesia. In this case, the accidental high-dose remifentanyl administration led to respiratory depression and seizure in the patient. Although remifentanyl is a short-acting opioid, high doses can cause severe side effects such as respiratory depression, muscle rigidity, seizures, hypotension, and bradycardia. Literature suggests that the hemodynamic effects of remifentanyl peak within 3-5 minutes, with serious hypotension occurring in a dose-dependent manner (1,2). However, in this case, no hemodynamic changes were observed. Similar to our case, clinical literature indicates that high doses of remifentanyl can cause muscle rigidity in children, and the management of this rigidity involves discontinuing the remifentanyl infusion and administering a neuromuscular blocker to ensure ventilation (3,4).

Several safety measures should be implemented to prevent medication errors in anesthesia practice. First, medications should be properly labeled with clear warnings to reduce the risk of drug confusion and incorrect dosing (5). Additionally, implementing a double-check system during drug preparation and administration has been recommended as an effective method to prevent errors. This double-check system, especially in pediatric patients, can help ensure accurate dosage calculations and allow for early identification of potential errors, thereby increasing anesthesia safety (6, 7).

Conclusion

This case highlights the importance of preventing medication errors and managing emergencies in anesthesia practice. Education programs and safety protocols are crucial for preventing medication errors in pediatric anesthesia.

To minimize medication errors, effective communication among medical teams, correct preparation of medications, and constant monitoring during drug administration are essential. We advocate for adherence to medication safety protocols and the implementation of team training to ensure the safe use of drugs in anesthesia.

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