


Novel Perspective on Sedation with Nasal Continuous Positive Airway Pressure (CPAP) Mask: Deep Sedation for Prolonged Dental Procedure in a Child with Rocuronium Allergy, a Case Report

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ABSTRACT

Background: General anesthesia is preferred when prolonged and multiple dental procedures are required in the pediatric population. In children for whom neuromuscular blockers (NMBs) are contraindicated, dental treatments can be performed under deep sedation, but there is an increased risk of respiratory complications such as hypoxia and foreign body aspiration.

Case Report: In this case report, due to a rocuronium allergy detected during the preoperative evaluation process, the application of nasal positive pressure ventilation support allowing prolonged deep sedation with complete immobilization was presented.

Conclusion: Prolonged deep sedation using a nasal continuous positive airway pressure (CPAP) mask can be used as an alternative to general anesthesia during dental procedures, especially in patients with contraindications to NMBs. This approach can reduce the risk of hypoxia and hypercarbia with ventilatory support while providing total immobility with deep sedation.

Keywords: Deep sedation, generalized maculopapular rash, dental procedure, nasal continuous positive airway pressure (CPAP) mask, rocuronium, allergy.

INTRODUCTION

During deep sedation, the patient is typically given oxygen support through a nasal cannula. However, it has been reported that mild hypoxia developed in 24% of pediatric patients who received oxygen support with a nasal cannula during dental procedures performed under deep sedation.¹ With the nasal continuous positive airway pressure (CPAP) mask, it is possible to apply non-invasive ventilation support in a way that does not hinder dentists from working in the oral cavity. This approach supports the ventilation of patients with shallow breathing or apnea risk under deep sedation and helps avoid hypoxia during these periods. The etiology of maculopapular rash includes allergic reactions secondary to drugs.² Neuromuscular blockers are the highest-risk group of drugs used in general anesthesia for their potential to cause allergic reactions.³



Figure 1. Generalized maculopapular rash that desquamated during the healing period. Images show the generalized maculopapular rash in different parts of the body during past episodes in the desquamation phase.

The aim of this case report is to present the perioperative anesthesia management of a patient who underwent deep sedation using a nasal CPAP mask during multiple dental procedures due to a rocuronium allergy, including ventilatory parameters and measures taken to prevent complications. The secondary aim is to draw attention to the possibility of undetected drug allergies in patients with undiagnosed generalized rashes. To the best of our knowledge, there has been no publication in the literature in which ventilation was supported with a nasal CPAP mask during deep sedation or general anesthesia.

CASE REPORT

A 6-year-old male patient presented for anesthesia for two tooth extractions and five filling procedures (#85, 73, 75, 64, 65, 54, 55). The patient had a medical history of generalized maculopapular rash episodes triggered by fever, stress, and antibiotic use since birth, with no diagnosis and no identified allergy despite detailed investigations (Fig. 1). The patient had no previous surgery or diagnosed disease, and the physical examination was normal. In the preoperative period, an increased risk of allergy was predicted in relation to generalized rash episodes. The patient was referred to the allergy department, and an allergy test was requested. The test revealed a rocuronium allergy. Deep sedation was planned in the operating room, avoiding neuromuscular blockers and endotracheal intubation.

The holes of the pediatric-sized nasal CPAP mask (Fisher & Paykel F&P Flexifit) were covered with a drape (Fig. 2). Anaphylaxis precautions were prepared. For sedation induction, 1% propofol and fentanyl were titrated as intravenous bolus (2 propofol bolus doses of 20 mg and 10 mg, and a 10 mcg fentanyl bolus dose were administered intravenously). The nasal CPAP mask was placed, and ventilation support was started. A posterior lingual packing was placed (Fig. 2). Minimal cooling water was used. Intravenous 2% propofol infusion (mean 5 mg/kg/h)

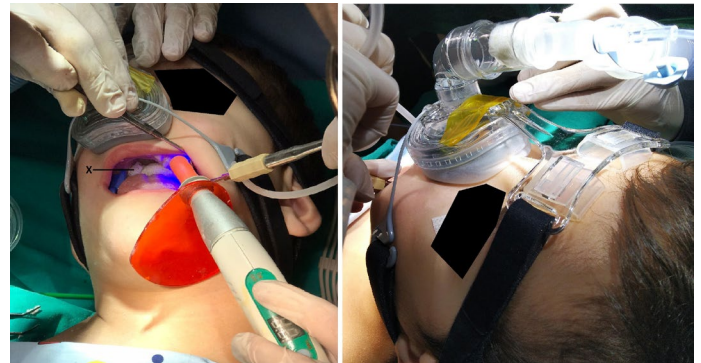


Figure 2. Nasal continuous positive airway pressure (CPAP) mask and posterior lingual packing placement during deep sedation and dental procedures performed with the mask. "X", indicates the posterior lingual packing.

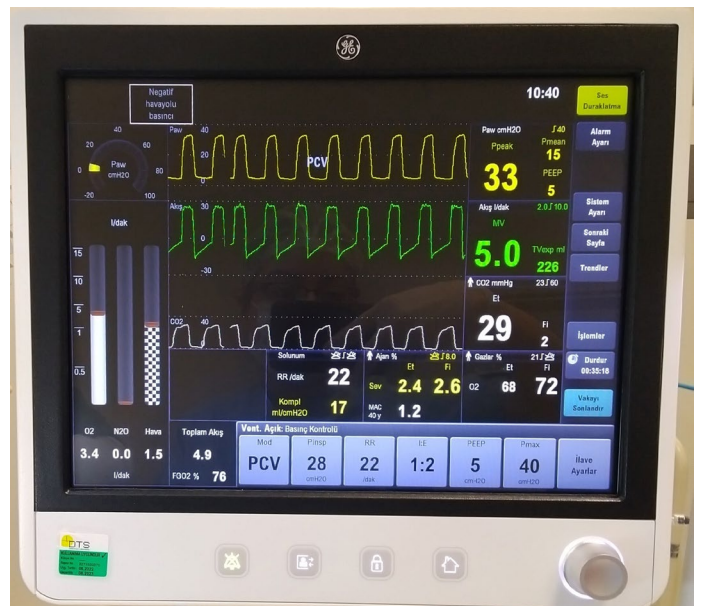


Figure 3. Ventilation parameters monitored via the anesthesia machine.

and sevoflurane (1 MAC in a 70% O₂/30% air mixture) were used to maintain sedation. Shallow breathing continued, and ventilation was supported in pressure-controlled ventilation (PCV) mode (inspiratory pressure: 25±3 cmH₂O, respiratory rate: 20±2 breaths/min, positive end-expiratory pressure (PEEP): 5 cmH₂O, fresh gas flow: 5 L/min, and inspiratory-to-expiratory ratio (I:E ratio): 1:2). With these parameters, end-tidal carbon dioxide (EtCO₂) was 27±3 mmHg, tidal volume (TV) was 240±25 ml, minute volume (MV) was 4.5±0.5 L, and peak pressure (Ppeak) was 31±2 cmH₂O (Fig. 3). Vital parameters remained stable throughout the 90-minute procedure, with no

hemodynamic or physical reactions observed. Propofol infusion and sevoflurane were gradually decreased and discontinued. No significant air leakage or complications occurred during the procedure. At 10 minutes post-procedure, the patient's Modified Aldrete score was 10. The patient was observed in the inpatient ward with monitoring of vital parameters and was discharged after 4 hours of follow-up.

DISCUSSION

Routine pre-anesthetic allergy testing is not recommended for patients with rashes. However, since the patient had a history of undiagnosed generalized maculopapular rash episodes despite detailed investigations, allergy testing for neuromuscular blockers was requested, and a rocuronium allergy was detected. It has been reported that patients allergic to rocuronium may also be allergic to other neuromuscular blockers, including succinylcholine.³ Therefore, deep sedation was performed by supporting ventilation through a nasal CPAP mask in this case.

To reduce the risk of complications, deep sedation should not be applied without careful observation and monitoring.⁴ Ventilation parameters and inspiratory and expiratory gas concentrations should be closely monitored during deep sedation with a nasal CPAP mask. After placing the nasal mask, packing should be placed on the root of the tongue, and minimal cooling water should be used to avoid the risks of foreign body aspiration and airway obstruction.

It has been reported that a maximum of 3–4 g/kg/day lipid can be given by parenteral infusion in children.⁵ Both 1% and 2% propofol solutions contain 0.1 g/ml lipid. By using 2% propofol, the lipid load can be halved for the same dose. In this case, 2% propofol was preferred for infusion to reduce the lipid load.

CONCLUSION

Although allergy testing for drugs to be used in general anesthesia is not routinely recommended in diseases with generalized rash, the possibility of allergy to neuromuscular blocking agents should be considered. Supporting ventilation with a nasal CPAP mask under deep sedation or general anesthesia in patients such as in this case may be considered

as an alternative to general anesthesia with endotracheal intubation in appropriate procedures. It was considered that when ventilation support is applied with a nasal CPAP mask during deep sedation, the procedure time can be extended, patient safety can be increased, and respiratory complications due to deep sedation can be reduced.

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Informed Consent: Written informed consent was obtained from the patient's family for the publication of this case report and the accompanying images.

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