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Case Report

Masseter Muscle Rigidity After Initiating Monitored Anaesthesia Care of Propofol and Remifentanyl

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ABSTRACT

Masseter muscle rigidity can be seen following administration of opioids, succinylcholine, and non-depolarizing muscle relaxants. We report a case of a 56-year-old male patient in a “Cannot Intubate Cannot Ventilate Situation” due to masseter muscle rigidity after initiating monitored anaesthesia care (MAC) with remifentanyl and propofol using target-controlled infusion in procedural cardiology. For rapid effect and equilibrium between plasma-concentration and effect site-concentration using target-controlled infusion, remifentanyl overdose is possible during the induction period of MAC. Moreover, the presence of propofol could result in a significantly greater remifentanyl concentration. To manage masseter muscle rigidity, muscle relaxants and emergent ventilation systems should be prepared to secure airway maintenance. In addition, alternative airway management devices and techniques should be on hand even if no airway difficulties are expected.

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Introduction

Masseter muscle rigidity is a known complication of drugs such as succinylcholine and especially in patients with muscular diseases such as myotonia and malignant hyperthermia [1]. This complication can be seen following administration of opioids and non-depolarizing muscle relaxants [2-5]. We herein report a case of a “Cannot Intubate Cannot Ventilate Situation” with masseter muscle rigidity after initiating monitored anaesthesia care (MAC) with remifentanyl and propofol using target-controlled infusion in procedural cardiology.

Case Presentation

A 56-year-old male patient (height 174 cm, weight 73 kg) was scheduled for elective radiofrequency catheter ablation. The patient was treated with Concor® (bisoprolol), Pradaxa® (dabigatran etexilate), and Rytmonorm® (propafenone hydrochloride) for atrial fibrillation, and previous medical history revealed hand surgery under general anaesthesia without any complications. The patient exhibited no difficulties in opening his mouth, and the distance between his upper and

lower incisors was greater than 4 cm, resulting in a reported Mallampati score of II. The patient had normal neck movements. Patient consciousness was monitored through the Bispectral index score, and capnography monitors with Vamos Plus® (Dräger) were used to evaluate adequate ventilation. Sedation was induced with IV 1% lidocaine 40 mg for pain relief from the propofol injection, and remifentanyl and propofol were administered at target concentrations of 1.5 ng/mL and 1.0 µg/mL, respectively, using an Orchestra base Primea 2x DPS visio syringe pump® (Fresenius Kabi).

Minutes after sedation, capnography level was unreadable, and SpO₂ level decreased to 85%. Remifentanyl and propofol infusions were stopped immediately, resulting in total infused doses of remifentanyl and propofol of 36.5 µg and 41.4 mg, respectively. Manual bag ventilation with a facemask using the triple airway maneuver was attempted but failed. Initial attempts to perform oropharyngeal airway insertion and laryngeal mask airway insertion both failed. Upon palpation, a massive spasm of both masseteric muscles was detected, but there was no rigidity or spasticity in any limbs and no tonic-clonic activity in any limbs.

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Mouth opening was not possible, and all attempts to insert a laryngoscope blade or alternative airway management device also failed. Ventilation remained virtually impossible, and the patient appeared cyanotic. Rocuronium 50 mg was intravenously injected to relax the masseter muscle. Soon after injection, manual bag ventilation through a face mask became possible, and the patient's mouth began to open. Intubation with a size 7.0 endotracheal tube was attempted using a laryngoscope blade. After successful endotracheal intubation, general anaesthesia was continued with sevoflurane during the procedure. The Bispectral index score level was measured at 50-70, and SpO₂ increased up to 100%. No tachycardia was present, and no excessive increase in expiratory CO₂ level was observed. In addition, no hyperthermia or any other signs that might indicate malignant hyperthermia were observed. There were no further complications during anaesthesia or for the remainder of the procedure.

Postoperatively, there were no signs of impaired opening of the mouth, with opening measured as the same as that at the preoperative visit. The patient did not recall the event and had no neurologic deficits.

Discussion

In our case, when the masseter spasms occurred, orotracheal intubation was impossible, and other airway devices could not be used. In addition, ventilation with a face mask could not be performed. This is a potentially life-threatening situation that is often described in literature as 'the nightmare.' Malignant hyperthermia is the most important condition relevant to muscle rigidity [1]. In this situation, malignant hyperthermia was thought to be less likely since there were no other clinical signs such as generalized muscle rigidity, tachycardia, hyperthermia, or hypercapnia. One possible reason of the masseter spasms is opioid overdose during target-controlled infusion-based anaesthesia. Muscle rigidity is a known side-effect of opioid overdose, and short-lasting, highly potent substances such as fentanyl can cause skeletal muscle rigidity [2]. The target-controlled infusion system consists of a single bolus injection and continuous infusion to maintain the target effect-site concentration. For rapid effect and to achieve equilibrium between plasma-concentration and effect site-concentration, overshooting of the plasma concentration at the early stage of infusion may occur [6]. As a result, there is a possibility of opioid overdose during the induction period of MAC. Moreover, the presence of propofol in the body could result in a significantly greater remifentanyl concentration compared with remifentanyl infusion alone [7]. For these reasons, the target concentration must be carefully selected to avoid overdose of remifentanyl.

Propofol is another possible reason for muscle rigidity of the masseter muscle. A previous case of masseter muscle rigidity with propofol was attributed to serotonin syndrome, but the patient in our case was not administered serotonin-related drugs [8]. In addition, this hypnotic drug is used to reduce muscle rigidity caused by other drugs such as succinylcholine in usual practice [9].

For clinicians, the inability to intubate during a cannot ventilate situation is a dire experience. During routine anaesthesia, the incidence of difficult tracheal intubation was 5.8%, and Cannot Intubate Cannot Ventilate Situations occur in less than 1 in 32,000 cases conducted under general anaesthesia [10, 11]. Unexpected difficult intubation is associated with

morbidity and mortality, and repeated intubation attempts aggravate this situation [12-14]. In addition, airway management difficulties are more frequent outside the operating room. Schwartz *et al.* reported an 11% initial failure rate for intubation in the intensive care unit, and Mort reported intubation failure in 1 in 10-20 cases in all areas outside the operating room [13, 15]. MAC in remote locations is increasing for the need of sedation in radiology, procedural cardiology, and endoscopy suites. Since there may be pain during these diagnostic or therapeutic procedures, such procedures under MAC may require shallow to moderate sedation without proper airway securement. Unfortunately, there are few devices and personnel to handle airway issues properly in these locations. For these reasons, there are more difficulties and risks during MAC. Therefore, clinicians should be aware that emergency situations occur frequently outside the operation room and be adequately prepare for those situations.

In conclusion, clinicians should be aware that severe masseter muscle rigidity could occur after initiating MAC with remifentanyl and propofol using target-controlled infusion. The target concentration should be carefully selected to avoid rapid infusion and overdose of remifentanyl during MAC. To manage this condition, it is recommended that muscle relaxants and emergent ventilation systems to secure airway maintenance be prepared.

Conflicts of Interest

None.

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