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Case Report

Anaesthesia of a Patient Allergic to Multiple-Anaesthesia Drugs: A Case Report

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ABSTRACT

Anaesthesia of multiple drug allergic patients may be very challenging. Especially with a patient showing allergic signs for multiple main anaesthesia drugs and scheduled for laparoscopic robot-assisted surgery. We report the case of a 65-year-old man. The systemic allergic screenings concluded with rocuronium, atracurium, cisatracurium, propofol, chlorhexidine, latex and betalactamine contraindications. Sufentanil to be used with extreme precautions. General anaesthesia was performed with an OFA protocol. Muscle relaxation was obtained by deep sedation. A close collaboration with the surgeons made it possible to carry out the procedure with a perfect control of the postoperative pain.

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Introduction

Anaesthesia of multiple drug allergic patients may be very challenging, especially with patients showing allergic signs for opioids, muscle relaxants, sedatives, and antibiotic drugs altogether. In such a challenging situation multidisciplinary approach seems necessary considering the surgeon, the allergist, and the anesthesiologist with pre-anesthetic and pre-operative discussion about the perioperative protocol. An opioid-free anaesthesia (OFA) strategy appears to be an effective and safe solution, using fewer allergens drugs, and monitoring possibilities like nociception level index (NOL), which showed good sensitivity and specificity [1-3]. NOL monitor uses an algorithm based on the heart rate, delta heart rate, plethysmography pulse wave, skin temperature, and conductance.

Furthermore, abdominal surgery and intubation commonly go with effective muscular blockade, which would facilitate the processes. Therefore, such constraints could lead to inappropriate surgical and anesthetic conditions and then to adverse events such as hemodynamic lability, postoperative pain, for example. An anticipated approach, multidisciplinary discussed upstream before surgery, is the rational solution considering usable drugs, operative modified conditions,

anesthetic monitoring, and watchfulness of any anaphylactic signs during the procedure.

Case Report

We report the case of a 65-year-old man, American Society of Anesthesiology (ASA) III, he weighed 110 kg with a height of 191 cm (i.e., body mass index of 30.2 kg.m²). He was admitted for a second attempt of programmed partial nephrectomy for a tumor on the right kidney. The patient has a history of two per-anesthetic grade III anaphylactic reactions in 1999 (thyroidectomy); in 2020 (first attempt partial nephrectomy) and a Quincke edema reaction after penicillin use during childhood. In addition, the patient suffered from chronic hypertension, and thyroid cancer cured with a secondary surgery in 1999.

The systemic allergic screenings completed after each per-anesthetic anaphylactic reactions (using skin-prick tests, skin tests, measurement of specific IgE, and flow cytometry) concluded to rocuronium, atracurium, cisatracurium, propofol, chlorhexidine, latex, and betalactamine contraindications. The use of succinylcholine, mivacurium, and sufentanil was not contraindicated; however, they must be used with extreme precautions if necessary. After discussion between surgeons and

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anesthesiologists and based on our expertise; we decided to use an OFA protocol with the patient's consent [4]. In the aim to avoid using any neuromuscular block, we chose a volatile agent for muscle relaxation. The choice of laparoscopic robot-assisted surgery for partial nephrectomy was maintained.

The patient was admitted to the operating room at 8:00 am in June 2020 as the first surgery on the programme in order to avoid latex exposure. He was monitored with bispectral index (BIS) and NOL. A 20-gauge and 18-gauge peripheral intravenous (IV) catheters were inserted, and the crystalloid infusion was set. Mean blood pressure (MAP), heart rate (HR), BIS, and NOL goals were set to be greater than 65 mmHg, 50 beats/min (bpm), between 40 and 60, and under 20, respectively. After 5 minutes of oxygenation, infusions were started at infusion rate $8 \mu\text{g}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$ after a bolus of $50 \mu\text{g}$ for clonidine, $0.14 \text{mg}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ after a bolus of 50 mg for ketamine, and $1.40 \text{mg}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$ after a bolus of 200 mg of lidocaine. Twelve milligrams of dexamethasone were injected. Instead of propofol, pentobarbital bolus has been added at $5 \text{mg}\cdot\text{kg}^{-1}$ considering persistent signs of consciousness, iterative boluses have been used for a total of 1500 mg.

After effective loss of consciousness, intubation was performed with indirect laryngoscopy (Airtraq, Vigon, Ecouen, France) associated with Eschmann bougie led to a successful tracheal intubation. The following ventilation was set at $6 \text{mL}\cdot\text{kg}^{-1}$, PEEP at 7 cm H₂O, and desflurane was introduced to maintain the patient in unconscious state. The minimum alveolar concentration (MAC) of desflurane was modified according to the NOL objectives, any clinical signs of consciousness, and based on hemodynamic data (average MAC 0.9 during surgery time, Max. 1.2; Min. 0.7). The infusion rate of Clonidine was decreased by 20 to 40% at the anesthesiologist's discretion based on hemodynamic data. One gram of paracetamol as well as 100 mg of Ketoprofen and 20 mg of nefopam, was administered at the incision time. Anaesthesia lasted 235 minutes, surgery 170 minutes. The patient was in supine position with left tilt table around 20°.

The patient remained slightly hypotensive during the procedure, but the MAP was always maintained above 50 mm of Hg. A thirty percent mean blood pressure drop was tolerated considering the absence of cardiovascular history. Only 30 mg of ephedrine was used associated with the crystalloid infusion set around $6 \text{mL}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$ (2.5 liters), during surgery, in balance with the lowest necessary MAC to maintain the patient unconscious. The hypotensive was accompanied by persistent diuresis, which shows correct hemodynamic tolerance. BIS and NOL remained in target range for 60% and 100% of case time, respectively. No clinical signs of anaphylaxis have been noticed. No major adverse events happened during operating time. Surgical progression has been prudent, particularly during trocar insertion. The level of abdominal insufflation pressure was 12 mm of Hg for 116 min. It was the insufflation pressure usually used by the surgeon. After the removal of the 5.5x5x4.5 cm and 69 gr clear-cell carcinoma and despite less good conditions than under muscle relaxation, the surgical closure was perfectly done.

The patient was extubated in the operating room 10 minutes after the end of surgery and arrived at the post-anaesthesia care unit (PACU) with a MAP at 63 mm Hg, heart rate of 55 bpm, and pulse oximetry of 98%. Besides two-hour infusion of lidocaine $0.5 \text{mg}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$, no other analgesia

was administered. The patient had no complaints and was discharged 120 minutes after admission to the PACU. The patient required no analgesic until hospital discharge 24h after surgery. He had no complaints and did not even ask for paracetamol. He said he even had less pain after the surgery than before due to the disappearance of the pain induced by the tumor. At one month after the surgery, no modification of creatinine clearance has been identified.

Discussion

This case report demonstrates the feasibility of anaesthesia of a multi-anesthetic drugs allergic patient using a goal-directed OFA IV and inhaled anaesthesia without muscular blockade for a patient undergoing robot abdominal surgery for partial nephrectomy. Of course, other protocols have been discussed, like total nephrectomy by open surgery under epidural anaesthesia. The patient did not receive any opioids and neuromuscular blockade (NMB) during the entire perioperative and operative period. Furthermore, we show both the feasibility of applying a goal-directed antinociception protocol during OFA and intubation plus abdominal surgery without using NMB. Although, our strategy allowed for an early recovery from anaesthesia in the immediate postoperative period. However, OFA monitoring was more than satisfying, with an NOL aimed range respected during the whole anesthetic time, without resorting to last intention authorized with extreme precaution opioid drug (Sufentanil) and NMB (Succinylcholine and Mivacurium) [1-4].

The patient did not develop postoperative nausea, respiratory insufficiency. The complete omission of opioids in the perioperative analgesic management of our patient may have been a determinant factor in the patient's rapid recovery in the postoperative care unit. The impact of intraperitoneal insufflation in an abdominal cavity insufficiently released by the lack of NMB had probably a significant hemodynamic impact. This obliged to tolerate a lower MAP than expected, but well tolerated on the microcirculation plan since the urinary output was preserved ($> 2 \text{mL}\cdot\text{min}^{-1}$). The muscular blockade-free anaesthesia might lead to two different pain implications. One would be a more painful outcome due to harder traction on muscles and so more muscular lesions. On the other hand, less pain could be logical due to less muscle tears due to persistent tonicity. Our case report rather goes in the way of the second hypothesis.

Conclusion

Current anaesthesia is based on a tripod which combines sedation, muscle relaxation, and opioid analgesia by the action of three specific molecules. Our example confirms the possibility of anaesthesia based on one pod sedation, which ensures analgesia and sufficient muscle relaxation.

Author Contributions

Saleh O was the main author and in-charge of the case as resident in anesthesiology. Estebe JP helped as the chief anesthesiologist, in-charge of the patient and organized all the pre-anaesthesia discussions. Bensalah K and Khene ZE helped as surgeons, in-charge of the patient by describing surgery conditions and participated in pre-anaesthesia discussions. Rochefort-Morel C helped by describing the allergologic

field of the patient and advised usable drugs in pre-anaesthesia discussions.

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Consent

A written informed consent was obtained from the patient and manuscript adheres to the CARE guidelines.

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None.

Conflicts of Interest

None.

Abbreviation

BIS: Bispectral Index

HR: Heart Rate

NMB: Neuromuscular Blockade

NOL: Nociception Level Index

MAP: Mean blood pressure

MAC: Minimum Alveolar Concentration

OFA: Opioid Free Anaesthesia

PACU: Post Anaesthesia Care Unit

PEEP: Positive End Expiratory Pressure

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