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Case Report

Intraoperative Anaphylaxis or Glottis Edema by Laryngeal Mask Contact in a Patient with Sleep Apnea

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Abstract

Background: Intraoperative anaphylaxis can result from either nonspecific mast cell activation or IgE-dependent mechanisms. Supraglottic devices have been introduced on advantages in airway management. i-gel® is a disposable medical device, latex- and PVC-free, composed of medical-grade thermoplastic elastomer.

Objectives: To describe the first case report of hypersensitivity to supraglottic device i-gel®, characterized by long-lasting glottis edema.

Methods: Intraoperative anaphylaxis was suspected in a 52 years-old man suffering from sleep apnea. Blood tests, serum tryptase levels, Skin Prick (SPT) and Intradermal (IDT) tests for general anesthetics, latex and cefazolin were performed. Patch testing was carried out with SIDAPA baseline series, additional series of happens for gum/rubber, and with the material of the laryngeal mask. Three healthy patients were challenged to verify the absence of unspecific reactions.

Results: Blood tests and tryptase levels were normal. SPT and IDT for all the substances tested resulted negative. Patch tests produced a positive result at 24 (+) and 48 hours (++) only for the material of the laryngeal mask.

Conclusions: This is the first case report of documented hypersensitivity to i-gel® with intraoperative reaction and long-lasting glottis edema. The rapid onset of symptoms brought us to the hypothesis of an anaphylactic reaction with IgE-mediated mechanism. Nevertheless, this has not been demonstrated by any of our allergic tests and can be related to the patient's specific conditions (obesity, sleep apnea and supine surgical position). A cell-mediated mechanism, as suggested by positive patch test, could have been triggered by the long contact time of SLM with the laryngeal mucosa.

Keywords: Anaphylaxis; Intraoperative anaphylaxis; Laryngeal mask; glottis edema; patch test; sleep apnea

Abbreviations

SLM: Supraglottic Laryngeal Mask; BMI: Body Mass Index; SpO2: Peripheral Capillary Oxygen Saturation; SPT: Skin Prick Test; IDT: Intradermal Test; SIDAPA: Italian Society of Professional and Environmental Allergological Dermatology; IgE: Immunoglobulin E

Case Presentation

Anesthesia is a complex medical procedure that has major risks; intraoperative anaphylaxis is the most severe and life-threatening [1].

IgE-mediated (Gell and Coombs Type I) anaphylaxis involves the release of vasoactive mediators such as histamine, leukotrienes, prostaglandins and other factors from basophils and mast cells. Non IgE-mediated anaphylactic reactions are caused by direct nonimmune-mediated mediator release or by direct complement activation and do not require prior sensitizing exposure. However, both mechanisms exhibit similar clinical manifestations [2,3].

The most common causal agents of perioperative anaphylaxis are neuromuscular blocking agents, antibiotics, dyes or chlorhexidine and latex [4].

Supraglottic devices, including Supraglottic Laryngeal Mask (SLM), have been introduced in the field of anesthesia with the goal of creating an intermediate form of airway management, in between a face mask and an endotracheal tube, with advantages including: easy and fast insertion, reduced trauma, superior seal pressure, gastric access and easy anesthetic management [5].

The SLM i-gel® is a disposable medical device, latex- and PVC-free, composed of medical-grade thermoplastic elastomer that does not require cuff inflation [6,7].

In this report, we present, at our knowledge, the first case of a patient with reactivity to the supraglottic airway device i-gel® characterized by long-lasting glottis edema.

A 52 years-old male patient was referred to our Allergy Unit because of a suspected perioperative anaphylaxis. He was overweight (BMI=32.87), without medical and familiar history of allergic diseases and without known allergic reactions to drugs and latex, but loud snoring and obstructive sleep apnea. Previously, he successfully underwent several nephrolithotomies for renal stones, under general anesthesia through tracheal intubation.

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In 2019, the patient underwent again to left ureterorenoscopy under general anesthesia: ten minutes after induction, hypotension (blood pressure 80/40 mmHg) and bronchial spasms started and were treated with rapid fluid bolus, bronchodilator (Salbutamol 200 µg), $MgSO_4$ 2 g iv, methylprednisolone 20 mg iv and sevoflurane, with rapid regression of the bronchoconstriction. SpO2 remained stable during all the intervention (100%).

Two hours and half after the induction, the patient's respiratory conditions worsened again and his airways were evaluated by means of a fiberscope, finding upper and, mostly, lower glottis edema. An otorhinolaryngologist tried to intubate the patient with negative outcome and a tracheostomy was needed to normalize respiratory function. The edema lasted for two additional days despite the therapy with high doses of dexamethasone (8 mg iv each day).

During the surgery, instead of endotracheal intubation, the supraglottic laryngeal mask i-gel® was used for the first time. As the patient recovered, we performed allergological examination at our Unit.

Routine blood tests, basal serum tryptase levels, Skin Prick (SPT) and Intradermal (IDT) Tests for propofol, sufentanil, fentanyl, remifentanil, rocuronium and cefazolin, as well as SPT for latex, midazolam hydrochloride, fentanyl citrate, thiopental natrium and vecuronium bromide [8,9], were performed.

Patch testing was performed, according to the Italian Society of Professional and Environmental Allergological Dermatology (SIDAPA) criteria [9,10], on healthy skin of the upper back with the allergens of the SIDAPA baseline series (Euromedical - Italy, Chemotechnique Diagnostics – Sweden), comprising additional series of haptens for gum/rubber, and with the material of the laryngeal mask. The letter patch test was performed in three healthy patients to verify the absence of unspecific reactions.

After evaluating the patient's post-operative report and the anesthesiologist's notes, we excluded drugs and medications used during the surgery to cause the anaphylaxis, since they were used again during and after the tracheostomy and later to sedate the patient without any adverse effects.

SPT and IDT resulted negative; routine blood tests and serum tryptase levels were within the normal range, except for slightly high serum total IgE level (123 kU/L). Patch tests produced a positive result at 24 (+) and 48 hours (++) only for the material of the laryngeal mask.

Ortho-phthalaldehyde, a chemical agent used to disinfect the cystoscope and reported to induce anaphylactic reaction, was not used during this intervention.

Discussion

To our best knowledge, this is the first case report of an intraoperative reaction in which allergy to SLM is implicated. The diagnosis of intraoperative anaphylaxis is complicated and multiple factors have to be considered when analyzing possible causes and outcomes.

The rapid onset of the first respiratory crisis and hypotension brought us to the hypothesis of an anaphylactic reaction with IgE-mediated mechanism. Nevertheless, this has not been demonstrated by any of our clinical allergic tests and was probably due to the patient's specific respiratory conditions (obesity, sleeping apnea and the supine surgical position).

The analysis of the medical devices used, instead, showed that the SLM used could have been implicated in the reaction. In fact, only patch tests performed with the laryngeal mask gave positive results.

A cell-mediated immunological mechanism, as suggested by the positive patch test, could have been triggered by the long contact time of SLM with the laryngeal mucosa, even if it is unlikely to cause such a fast reaction, while the cell-mediated hypersensitivity could be responsible for the long-lasting glottis edema, that took two days to recede.

It is possible to suspect an IgE-mediated mechanism versus a component of the laryngeal mask, as for latex allergy, but we do not have diagnostic test to support this hypothesis. An intraoperative serum tryptase measurement would have helped to clarify if an intraoperative anaphylaxis occurred.

Moreover, after the over described episode, the patient underwent another surgery using the same pharmacological cocktail but using endotracheal intubation, with positive outcome and no adverse reactions. This allowed us to rule out the involvement of the anestethic used during the first surgery and support the hypothesis that the SLM i-gel® is involved in the adverse reaction, since it was the only difference between the two procedures.

The final diagnosis can be divided in a series of concauses: first, the patient's dyspneic episode and hypotension can be associated with his obstructive sleep apnea disorder, excess of weight and the supine surgical position. Subsequently, the contact of the glottis with the laryngeal mask caused edema and respiratory intraoperative crisis.

References

1. Mertes PM, Ebo DG, Garcez T, Rose M, Sabato V, Takazawa T, et al. Comparative epidemiology of suspected perioperative hypersensitivity reactions. Br J Anaesth. 2019; 123: 16-28.
2. Ebo DG, Clarke RC, Mertes PM, Platt PR, Sabato V, Sadleir PHM. Molecular mechanisms and pathophysiology of perioperative hypersensitivity and anaphylaxis: a narrative review. Br J Anaesth. 2019; 123: 38-49.
3. Simons FE, Ardusso LR, Bilo MB, El-Gamal YM, Ledford DK, Ring J, et al. World allergy organization guidelines for the assessment and management of anaphylaxis. World Allergy Organ J. 2011; 4: 13-37.
4. Garvey LH, Dewachter P, Hepner DL, Mertes PM, Voltolini S, Clarke R, et al. Management of suspected immediate perioperative allergic reactions: an international overview and consensus recommendations. Br J Anaesth. 2019; 123: 50-64.
5. Jannu A, Shekar A, Balakrishna R, Sudarshan H, Veena GC, Bhuvaneshwari S. Advantages, Disadvantages, Indications, Contraindications and Surgical Technique of Laryngeal Airway Mask. Arch Craniofac Surg. 2017; 18: 223-229.
6. An J, Nam SB, Lee JS, Lee J, Yoo H, Lee HM, et al. Comparison of the i-gel and other supraglottic airways in adult manikin studies: Systematic review and meta-analysis. Medicine (Baltimore). 2017; 96: 5801.
7. Lai CJ, Liu CM, Wu CY, Tsai FF, Tseng PH, Fan SZ. I-Gel is a suitable alternative to endotracheal tubes in the laparoscopic pneumoperitoneum and trendelenburg position. BMC Anesthesiol. 2017; 17: 3.
8. Brockow K, Garvey LH, Aberer W, Atanaskovic-Markovic M, Barbaud A, Bilo MB, et al. Skin test concentrations for systemically administered drugs -- an

ENDA/EAACI Drug Allergy Interest Group position paper. Allergy. 2013; 68: 702-712.

9. Angelini G, Bonamonte D, Cristaudo A, Foti C, Gola M, Lisi P, et al. The SIDAPA guidelines on contact dermatitis. Ann Ital Dermatol Allergol Clin Sper. 2009; 63: 45-87.

10. Stingeni L, Bianchi L, Hansel K, Corazza M, Gallo R, Guarneri F, et al. Italian Guidelines in Patch Testing - adapted from the European Society of Contact Dermatitis (ESCD). G Ital Dermatol Venereol. 2019; 154: 227-253.