Anaphylaxis due to perioperative intravenous Lidocaine

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The incidence of clinical anaphylaxis during anaesthesia has been estimated to be between 1 in 1,250 and 10,000 in several series from different countries. Amide local anaesthetics have been involved in less than 0.6% of the perioperative reactions (1). Lidocaine is an amide local anaesthetic and a Class 1b antiarrhythmic agent, which was first synthesized in 1942 and launched in 1948 in Sweden after approval for human use (2). Initially, it was used intravenously as an antiarrhythmic agent. Besides, it was proposed that intravenous lidocaine could be potentially beneficial in perioperative settings such as decrease in postoperative pain(3), prevention of propofol-induced injection pain, prevention of hyperalgesia, bronchotracheal relaxation, etc (4). Lidocaine blocks voltage-gated sodium channels that induce inhibition of both propagation of action potential and neuronal excitability (3). However, the underlying mechanism of IV lidocaine may be more complex than the blockade of peripheral impulses to the nerve (5).

Although severe anaphylactic reactions have been reported with both types of local anaesthetics, amide compounds are considered to be less likely to produce such reactions than the amino-ester group. Ester group produces metabolites related to para-aminobenzoic acid, which are more likely to provoke an allergic reaction (1). However, patients with a true allergy to amides have been reported, some of them with documented cross-reactivity within the amide group (6).

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Subcutaneous challenge tests following negative skin tests (skin prick tests and intradermal tests) remain the gold standard to diagnose anaphylaxis induced by local anaesthetics (1). Although true allergy to amide local anaesthetics is rare, some cases of anaphylactic reactions following the administration of lidocaine have been reported (7). Notwithstanding, among them, there are only few reported cases of anaphylactic reaction following intravenous administration of lidocaine (8).

A 70-year-old man with history of IgE-mediated pyrazolone allergy and no other personal or family history of allergies was attended in our Allergy Unit due to an adverse reaction during the anaesthetic induction, prior to a retrograde intrarenal surgery (RIRS). Anaesthesia was induced with fentanyl 0.15mg, lidocaine 40mg, propofol 130 mg, and suxamethonium chloride 100mg. Amoxicillin in combination with clavulanic acid 2 gm was administered 30 minutes before the reaction onset. All these drugs were administered intravenously. Immediately after induction, he developed a generalized erythema, tachycardia (130/min), hypotension (58/32mm Hg), bronchospasm (wheeze), and labial angioedema. Phenylephrine 200 mcg, hydrocortisone 100mg IV and dexchlorpheniramine 5mg IV were administered. A few minutes after the administration of these drugs, his heart rate and blood pressure recovered progressively. Wheeze and cutaneous erythema disappeared progressively until reaching normality. The surgery was suspended until finding out which agent was responsible for the reaction. After 4 weeks, he was evaluated in our service. Local anaesthetics had been used in dental procedures some years before. The results of

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skin prick test were negative for latex. Prick and intradermal tests were also negative for PPL (Major Determinant Benzylpenicilloyl poly-L-lysine), MDM (Minor Determinant Mix), penicillin G, amoxicillin, clavulanic acid, fentanyl, propofol, suxamethonium chloride, bupivacaine, mepivacaine, and articaine. Prick test with 1% lidocaine (20mg/ml) was positive (9mm). The single-blind controlled oral challenge with amoxicillin clavulanate was negative. Mepivacaine and bupivacaine were both well-tolerated at the single-blind controlled subcutaneous challenge. Total IgE serum was 214 kU/L. Specific IgE serum for penicillin V and G were negative. Specific IgE for amoxicillin was not available at that moment. Tryptase value one hour after the reaction was 38.8mcg/L, and 2 hours after the reaction it was 44.7mcg/L. The basal value of tryptase was 5.84 mcg/L.

The evaluation of patients with perioperative reactions must include a detailed history, in vitro determinations performed during the acute phase and tests with all the suspected agents once the reaction has been resolved (6, 9). Such tests include SPTs (skin prick tests), IDTs (intradermal tests) and drug provocation test (9). Provocation test is crucial to confirm the lack of sensitization when skin tests are negative and to reassure the safe future administration of drugs (1) Subcutaneous challenges are not risk-free and it is recommended that the clinician estimates the risk–benefit relationship for each case before initiating the test (6).

It is important to perform challenges to rule out cross reactivity with others local anaesthetics. There are reports of patients with true allergy to amides and documented cross reactivity within the amide group (6). In our case, strongly positive prick test suggested that lidocaine was the trigger of the allergic reaction;

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therefore, challenge test following negative skin tests was especially important to provide the patient with alternative local anaesthetic agents.

SPTs, including negative controls, were performed twice, reaffirming the result. For both, different production batches were used. Lidocaine provocation test in this case, should be considered as a high-risk procedure and serious reaction could occur. To avoid putting the patient through an additional risk, it was considered more ethical not to perform this challenge. The tests carried out within the patient's clinical context, were deemed sufficient for diagnosis.

There is no a reliable serum test to identify patients with sensitivity to local anaesthetics. (9). Serum tryptase determination has proved to be more useful than other mast cell mediators such in the diagnostic of anaphylaxis (10). However, the currently available literature on lidocaine anaesthetic allergy rarely refer to tryptase-level measures (6). In our case, the tryptase value increased up to six-fold the basal determination.

True allergy to amide local anaesthetics during anaesthetic induction is rare, and the cases caused by an intravenous administration are even rarer(8). We believe this case will be useful and contribute to the knowledge of these less suspected agents which can cause perioperative anaphylaxis. In our case, good tolerance to mepivacaine and bupivacaine was evidenced.

The investigation of patients with suspected allergy to local anaesthetics should begin with a detailed history, followed by the appropriate tests that lead to an accurate diagnosis of the patient, which finally permits the prescription of safe

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and valid alternatives. Lidocaine hypersensitivity should be considered in the evaluation of patients who have experienced a perioperative anaphylactic reaction.

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References

1. Mertes PM, Tajima K, Regnier-Kimmoun MA, Lambert M, Iohom G, Gueant-Rodriguez RM, et al. Perioperative anaphylaxis. Med Clin North Am. 2010;94(4):761-89.
2. Weinberg L. Pharmacokinetics and pharmacodynamics of lignocaine: A review. World Journal of Anesthesiology. 2015;4(2).
3. Estebe JP. Intravenous lidocaine. Best Pract Res Clin Anaesthesiol. 2017;31(4):513-21.
4. Jalota L, Kalira V, George E, Shi YY, Hornuss C, Radke O, et al. Prevention of pain on injection of propofol: systematic review and meta-analysis. BMJ. 2011;342:d1110.
5. Barletta M, Reed R. Local Anesthetics: Pharmacology and Special Preparations. Vet Clin North Am Small Anim Pract. 2019;49(6):1109-25.
6. Bhole MV, Manson AL, Seneviratne SL, Misbah SA. IgE-mediated allergy to local anaesthetics: separating fact from perception: a UK perspective. Br J Anaesth. 2012;108(6):903-11.
7. Chan TYK. Fatal anaphylactic reactions to lignocaine. Forensic Sci Int. 2016;266:449-52.
8. Ismail K, Simpson PJ. Anaphylactic shock following intravenous administration of lignocaine. Acta Anaesthesiol Scand. 1997;41:1071-2
9. Laguna JJ, Archilla J, Dona I, Corominas M, Gastaminza G, Mayorga C, et al. Practical Guidelines for Perioperative Hypersensitivity Reactions. J Investig Allergol Clin Immunol. 2018;28(4):216-32.
10. Gonzalez-de-Olano D, Alvarez-Twose I. Mast Cells as Key Players in Allergy and Inflammation. J Investig Allergol Clin Immunol. 2018;28(6):365-78.

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