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CASE REPORT

Local Anesthesia Systemic Toxicity (LAST) Treated as Anaphylaxis

AMIRUDIN S, ISMAIL MS

Department of Emergency Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia Medical Centre, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia

ABSTRAK

Ketoksikan sistemik bius setempat (LAST) dan anafilaksis adalah kesan sampingan lignocaine yang boleh membawa maut. Namun, kedua-duanya mempunyai tanda-tanda dan rawatan yang berbeza. Kami melaporkan satu kes seorang perempuan berumur 35 tahun datang ke Jabatan Kecemasan (ED) dengan gejala keletihan, mengantuk, dan susah bernafas dengan rasa bendasing dan rasa logam di dalam tekak. Gejala tersebut bermula 15 minit selepas pesakit mendapatkan suntikan di bahagian bahu kanan dengan 250 mg lignocaine bercampur dengan Triamcinolone di Klinik Orthopedik. Pesakit telah dibawa ke kawasan resusitasi dan telah dirawat sebagai anafilaksis. Semasa pemeriksaan lanjut, tekanan darah tidak pernah rendah, tiada tanda-tanda salur pernafasan terjejas, tiada gejala gastrousus, dan tiada penglibatan mukosa yang menjurus kepada diagnosis LAST berbanding anafilaksis. Walau bagaimanapun, pesakit telah beransur-ansur pulih dan dibenarkan pulang selepas pemerhatian di ED selama enam jam. Ini merupakan laporan kes yang pertama yang menunjukkan LAST dirawat dengan berkesan sebagai anafilaksis.

Kata kunci: anafilaksis, ketoksikan sistemik bius setempat, lignocaine

ABSTRACT

Local anesthesia systemic toxicity (LAST) and anaphylaxis are the life-threatening adverse effects of lignocaine. Both have different presentations and treatments. We report a case of 35-year-old female who came to our Emergency Department (ED) with symptoms of lethargy, drowsiness, and difficulty breathing with foreign body sensation and a metallic taste in the throat which started 15 minutes after a right shoulder injection with 250 mg of lignocaine mixed with Triamcinolone in

Address for correspondence and reprint requests: Amirudin Sanip. Department of Emergency Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia Medical Centre, Jalan Yaacob Latiff, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia. Tel: +6012-6034863 Email: aremay_best@yahoo.com

the Orthopedic Clinic. She was pushed to the resuscitation bay and was treated as anaphylaxis. Upon further evaluation, the blood pressure was never hypotensive, no sign of compromised airway, no gastrointestinal symptom, and no mucosal involvement which directs to the diagnosis of LAST rather than anaphylaxis. Surprisingly, she was gradually improving and was discharged home after six hours of observation in the ED. This is the first case report that LAST had been effectively treated as anaphylaxis.

Keywords: anaphylaxis, lignocaine, local anesthesia systemic toxicity (LAST)

INTRODUCTION

Lignocaine had been used as local anesthesia (LA) in surgery and as a pain relief since 1949. It was founded by Nils Lofgren, a Swedish chemist (Leung 2014). However, it has a life-threatening adverse effect which is local anesthesia systemic toxicity (LAST) (Christie et al. 2014). The mechanism of action and the treatment are very different from anaphylaxis.

LAST usually happen when LA reaches the circulation trough systemic absorption or accidental intravascular injection. The lipophilic characteristic of the LA allows it to cross the cell membrane and interact with charged targets, which affects the balance between inhibitory and excitatory pathways. It causes toxic effect to various tissue especially in the heart, causing cardiac arrhythmias, and in the brain which will cause seizures (Christie et al. 2014; Sekimoto et al. 2017).

Meanwhile, anaphylaxis to LA are extremely rare. In Malaysia there was only one case that had been reported in literature with a positive skin prick test (Noormalin et al. 2005). It is more likely to occur with ester (e.g. cocaine, procaine, and benzocaine) than amide (e.g. lidocaine, bupivacaine, and ropivacaine) type LA (Christie et al. 2014). The allergy to LA may be type I (immediate hypersensitivity reaction) which is mediated by IgE antibodies or type IV (delayed hypersensitivity reaction) which is mediated by sensitised lymphocytes (Ring et al. 2010).

In this case, we presented a patient who had LAST after local anesthesia plus Triamcinolone injection to the right shoulder who improved and recovered after being treated as anaphylaxis in the Emergency Department (ED). We reported this case as there has been no case reported in the literature where LAST was treated as anaphylaxis.

CASE REPORT

A 35-year-old woman weighing 55 kg was rushed to the ED from the Orthopedics Clinic with complaint of difficulty to breath after having LA. She was well prior to the procedure. She came to the clinic for a long head bicep tendonitis follow-up. She was offered LA plus Triamcinolone injection to

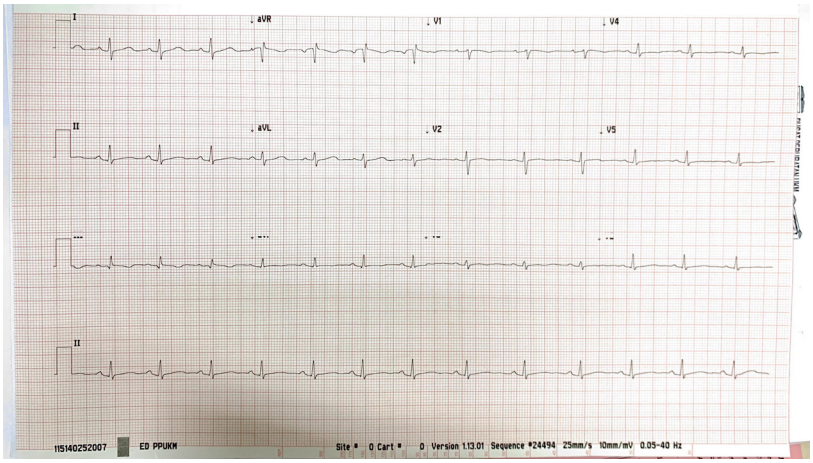

Figure 1: Patient's ECG on arrival showed sinus tachycardia

the right shoulder for pain relief. Intra-procedure, 25 ml of Lignocaine 10% (total dose of 250 mg) mixed with Triamcinolone was delivered into 3 sites of the right shoulder. No blood was drawn back on each injection. After 15 minutes, she complained of drowsiness and lethargy, followed by shortness of breath, foreign body sensation and a metallic taste in the throat. However, there was no perioral numbness and no visual or auditory disturbance. She was a known case of bronchial asthma and eczema without any proper follow-up. She had neither known drugs nor food-allergic before.

Upon arrival to the ED, she was fully conscious of the Glasgow coma scale (GCS) of 15/15. She had tremor and tachypnea with a respiratory rate of 26 breaths/minute. She was only able to talk in phrases. There was no stridor, periorbital edema, lips swelling, or rashes. Blood pressure was 165/76 mmHg, heart rate was 104 beats/minute, oxygen saturation under room air was 97%, and was afebrile. Lungs examination was unremarkable, there were no rhonchi bilaterally. Cardiovascular and central nervous system examinations were normal. Electrocardiogram (ECG) showed sinus tachycardia (Figure 1). She was pushed to resuscitation bay and was given nebulised Adrenaline 0.5 mg, intramuscular (IM) Adrenaline 0.5 mg, intravenous (IV) Hydrocortisone 200 mg, IV Chlorpheniramine 10 mg, and IV Ranitidine 50 mg. Ear, nose, and throat (ENT) assessment discovered no laryngeal edema or other sign of upper airway obstruction. Full blood count showed hemoglobin 13.6 mmol/L, total white cell count 11.6 x 10^3µL, and platelet 405 x 10^3µL. Eosinophils count was within normal range with 0.5 x 10^3µL (4.5%). Renal profile and liver function test were normal with urea 3.3 mg/dL, creatinine 60.5 mg/dL, sodium 138 mmol/L, potassium 4.1 mmol/L, albumin 44 mg/dL, alkaline phosphatase (ALP) 66 U/L, alanine transaminase (ALT) 14 U/L and bilirubin 6.5 mg/dL. Arterial blood gas (ABG) under room air showed pH 7.424, pCO_2 33.3 mmHg, pO_2 74.2 mmHg,

HCO_3 22.8 mmol/L, base excess -2.4, and lactate 3.2 mmol/L.

The symptoms gradually improved with the treatment. She was seen by the medical team and was observed for six hours before being discharged. Upon discharge, her symptoms had totally subsided. She was discharged with tablet Prednisolone 30 mg once per day, tablet Loratadine 10 mg once per day, and tablet Chlorpheniramine 4 mg on the night for five days.

DISCUSSION

Corticosteroid mixed with LA injection had been widely used and had been proven to improve short term joint pain relief for rotator cuff related shoulder pain (Cook et al. 2018). However, there is a life-threatening adverse event associated with the usage of LA which is known as LAST. The incidence of LAST reported recently is estimated around 0.03% for each of the peripheral nerve blocks (El-Boghdadly et al. 2018). Most common LAST presented as central nervous system (CNS) toxicity which is 68-77% (Gitman & Barrington 2018). The severity ranges from mild presentation such as lightheadedness, perioral numbness, metallic taste, tinnitus, slurred speech, and tremor; to severe presentation such as respiratory distress, general convulsion, and coma (Christie et al. 2014). This was quite similar to our patient, where she started with drowsiness and progressed to worst with respiratory distress.

The risk of getting LAST can be categorised into patient factor, block-related and drug factor. Patient with extreme age, pregnancy, and with underlying renal, cardiac or liver disease had higher risk compared to other population (El-Boghdadly et al. 2018). The site of the block also influences the risk of getting LAST. The high vasculature area is more prone to get LAST compared to fewer vasculature areas. The order of frequency from the lowest to the highest are such as subcutaneous injection, brachial plexus, epidural, caudal, and finally intercostal blocks and topical anesthesia (Christie et al. 2014). Besides, continuous infusion of LA had been reported to had higher incidence compared to single shot LA (Gurnaney et al. 2014). There was multiple recommended maximum dose of lidocaine between literature: Smith and colleagues recommended the maximum dose of 3 mg/kg without epinephrine and 7 mg/kg with epinephrine (Smith et al. 2013); Berde and Strichartz suggested the maximum dose of 5 mg/kg (maximum 350 mg) without epinephrine and 7 mg/kg (maximum 700 mg) with epinephrine (El-Boghdadly et al. 2018); Rosenberg et al. (2004) gathered the recommended highest dose of lidocaine in Finland, Germany, Japan, Sweden, and the United States which were 200-300 mg without epinephrine and 500 mg with epinephrine. Our patient received a total dose of 250 mg intra-articular lidocaine which was equal to 4.5 mg/kg.

The management of LAST consist of seizure control, advance cardiac life support (ACLS) and administration of 20% lipid emulsion (Sekimoto et al. 2017). The American Society of Regional Anesthesia

(ASRA) recommended the use of benzodiazepines which has minimal effect of cardiac depression as the first-line treatment for local anesthesia induced seizure. In ACLS, ASRA emphasis the importance of early recognition of toxicity, airway and cardiac arrhythmias management, and alerting nearby cardiopulmonary bypass capabilities (Mudarth & Kushelev 2018). The ASRA guidelines also recommended starting 20% lipid emulsion at the initial sign of LAST after the management of airway (Sekimoto et al. 2017).

Our patient had been initially treated as anaphylaxis instead of LAST. Anaphylaxis is defined when the patient had one of the following characteristics i.e. (1) respiratory compromise or hypotension which is associated with skin or mucosal changes; (2) two or more of this symptom after exposing to the likely allergen which are; (i) involvement of the skin mucosal tissue, (ii) respiratory compromise, (iii) hypotension or associated symptoms, (iv) persistent gastrointestinal symptoms; (3) hypotension after exposure to the known allergen (Watts & Marie Ditto 2019). None of those criteria fitted our patient. Even though she had difficulty breathing, the respiratory system was not compromised. There was no stridor and no wheezing. The patient's blood pressure was normal and no sign of mucosal involvement.

The patient had improvement with the treatments given which were very different from the treatment for LAST, i.e. intravenous lipid emulsion 20% and benzodiazepine for the patient who had associated with convulsion. Instead, she was treated with adrenaline, hydrocortisone, chlorpheniramine, and ranitidine which were the treatment for anaphylaxis. This might be the first case report that demonstrates other alternative treatments for LAST that might still be beneficial, apart from lipid emulsion.

CONCLUSION

LAST and anaphylaxis are the adverse effect of LA which both is life-threatening. However, the presentation and the management are very different. The treatment for LAST has remained the same for decades. However, not all hospital, especially at district-levels have lipid emulsion. Perhaps treatment with adrenaline, hydrocortisone, and chlorpheniramine can be offered as an alternative for the treatment of LAST. We suggest further evaluation to be done on this alternative treatment for LAST.

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