**SUCCESSFUL INTRALIPID ADMINISTRATION FOR INTRAVENOUS LIDOCAINE RELATED SEIZURE AND BRADYCARDIA IN AN INFANT WITH AN ATRIAL SEPTAL DEFECT**

***Running head:*** Intralipid administration for lidocaine related bradycardia

***Article category:*** Case report

Menekse Ozcelik1, Bengi Safak1, Zekeriyya Alanoglu1, Neslihan Alkis1

1Department of Anesthesiology and ICM, Ankara University Faculty of Medicine, Turkey

***Corresponding author:***

Dr.M.Ozcelik

Ankara Tıp Cebeci

Anesteziyoloji AD

Dikimevi/Ankara 06600, Turkey

e-mail: ozcelikmenekse@yahoo.com

Phone: +905333521400

**SUCCESSFUL INTRALIPID ADMINISTRATION FOR INTRAVENOUS LIDOCAINE RELATED SEIZURE AND BRADYCARDIA IN AN INFANT WITH AN ATRIAL SEPTAL DEFECT**

***SUMMARY***

A successful intravenous lipid emulsion treatment of a six-month infant with an atrial septal defect and anemia, developing tonic-clonic seizure and persistent bradycardia without hypoxia after repetitive administration of lidocaine to prevent propofol injection pain for monitored anesthesia care undergoing external beam radiation therapy for Willms’ tumour was presented.

**Keywords:** Outpatient, ambulatory; Adverse events, complications; Epilepsy, neurological disease; Infant, age

Lidocaine is a commonly used local anesthetic for preventing propofol pain on injection. We report a successful use of intravenous 20% lipid emulsion (ILE) for the treatment of everlasting bradycardia following a tonic-clonic seizure after intravenous administration of lidocaine 1 mg/kg for propofol pain in a 6-month girl undertaking consecutive radiotherapy sessions with Monitored Anesthesia Care (MAC).

***CASE***

A 6-month girl weighing 8 kg presented to anesthesiology outpatient clinic for MAC during adjuvant external beam radiation therapy (EBRT) due to Wilms’ tumor operated two weeks before at another institution. Pre-procedural evaluation of the patient revealed mild physiological anemia (11,1gr/dL) and atrial septal defect. The EBRT was planned as 5 consecutive processes. The first two MAC were uneventful. Before the third EBRT, oxygen saturation and heart rate were 96% and 140beats/min, respectively. Few seconds after the administration of lidocaine 1mg/kg from peripheral intravenous route, the patient developed tonic-clonic seizure and bradycardia. As the patient became apneic, she has been ventilated via facemask. After propofol 20mg was administered, seizure activity was immediately diminished. However, bradycardia persisted for more than 15 minutes. During this period, she started to breath spontaneously and became responsive only to painful stimulus. Arterial blood gas analysis revealed normal arterial oxygen saturation and methemoglobin levels. However, due to resistant bradycardia, 20% ILE 1,5 mL/kg was administered through the port catheter. After 5 minutes, the heart rate was 140beats/min and she became fully awake. She was monitored for 60 minutes without any adverse event and then transferred to pediatric intensive care unit for further evaluation. She was kept under observation for 6 hours in the pediatric ICU. Consecutive ERBT sessions were uneventful.

**Discussion**

Wilms’ tumor is the most common type of kidney cancer in children. Radiotherapy is usually added as an adjunct to the treatment algorithm in addition to surgery and chemotherapy (1). Principally, immobilization of the child is a must for an effective and accurate radiotherapy on the tumor. Anesthesiologists frequently apply MAC during the radiotherapy sessions and it is generally considered as a challenging practice. Propofol is one of the most preferred agents for MAC and lidocaine is the first choice to alleviate the propofol related on site injection pain.

Local anesthetics (LAs) undergo plasma protein binding mainly to alfa-1 acid glycoprotein (AAG) when they enter into systemic circulation. As plasma concentration of AAG is low before 1 year of age compared to adults, the limited protection offered by AAG against systemic toxicity due to increased unbound free form of LAs is decreased (2). In addition to this, anemia reduces red cell storage of LAs and its protective effects against systemic toxicity of LAs. The lungs acts as a clearance site for aminoamide LAs but in children with right to left shunt tend to have considerable increase in arterial plasma concentration of LAs because of possible pulmonary bypass. The first-pass uptake of lidocaine in the lungs has been shown to be even as high as 64% in adults (3). Therefore, we can speculate that this patient has a tendency of systemic toxicity due to her age range, physiologic anemia and ASD.

Lidocaine is metabolized within hepatic microsomes by the cytochrome p-450 enzyme system, which is defective in infants compared to adults. This immaturity of the enzyme system may represent clinically relevant consequences especially repetitive administration of lidocaine. This phenomen may partly explain why this patient becomes toxic after the third administration of lidocaine.

Less potent LAs may have a different sequence of cardiovascular toxicity compared to more potent drugs. For instance, increasing doses of lidocaine may lead to hypotension, bradycardia and hypoxia whereas bupivacaine often results in sudden cardiovascular collapse. Based on this knowledge, resistant feature of bradycardia was assessed as a cardiovascular toxicity of a less potent local anesthetic rather than a consequence of hypoxic episode, which is more common in pediatrics. Therefore, in this patient ILE was given intravenously to treat and prevent the potential cardiovascular system toxicity. According to a systemic review, experts suggest using ILE in case of life-threatening toxicity due to lidocaine as a weak recommendation with moderate level of evidence (4).

The aim of this case presentation is to remind practitioners that

* An infant with an ASD and anemia may be prone to systemic toxicity after repetitive applications of low potency LAs,
* Hypoxia may not be the sole triggering factor for bradycardia in this kind of setting,
* ILE administration may be a treatment choice that should be always in the agenda for possible cardiovascular consequences of a LAs’ systemic toxicity.

**Funding:** This research was carried out without funding.

**Conflict of interest:** No conflicts of interest declared.

**References**

1. Whyte SD, Ansermino JM. Anesthetic considerations in the management of Wilms’ tumor. Pediatr Anesth 2006;16:504-13.
2. Lerman J, Strong HA, LeDez KM, et al. Effects of age on the serum concentration of α1-acid glycoprotein and the binding of lidocaine in pediatric patients. Clin Pharmacol Ther 1989;46:219-25.
3. Jorfeldt L, Lewis DH, Löfström JB, Post C. Lung uptake of lidocaine in healthy volunteers. Acta Anaesthesiol Scand 1979;23:567-74.
4. Gosselin S, Hoegberg LCG, Hoffman RS, et al. Evidence-based recommendations on the use of intravenous lipid emulsion therapy in poisoning. Clin Toxicol 2016;54:899-923.