OPIS PRZYPADKU / CASE REPORT
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Uncommon complication of local anaesthesia – a case report

Hanna Plata[5], Ewelina E. Bornio[4], Marcin B. Muża[1,2,3]
[1] Wydział Nauk o Zdrowiu, Uniwersytet Powiślański, Kwidzyn
[2] Szpitale Pomorskie Sp. z o. o., Wejherowo
[3] Szpital Pucki Sp. z o. o., Puck
[4] Mazowiecki Szpital Specjalistyczny, Radom
[5] Wydział Nauk Medyczny i Nauk o Zdrowiu, Uniwersytet Radom im. Kazimierza Pułaskiego, Radom

Abstract

The most commonly used substance in local anaesthesia is lignocaine. Minor allergic reactions to lignocaine are common, while anaphylactic reactions to lidocaine and local anaesthetic systemic toxicity (LAST syndrome) are rare and therefore may not be recognized when they occur. There are many positive aspects of using epinephrine to anaesthesia, but iatrogenic errors like overdose or intravascular administration of the drug can cause toxic effects. The use of adrenaline in anaesthesia may also be associated with the occurrence of an "adrenaline rush". Symptoms resulting from the above situations can pose diagnostic and therapeutic problems, so to raise awareness regarding the differentiation of complications resulting from potentially safe local anaesthesia, we present a clinical case of an 83-year-old female patient. *Anestezjologia i Ratownictwo 2024; 18: 86-89. doi:10.53139/AIR.20241818*

Keywords: epinephrine overdose , LAST syndrome, anaphylaxis, local anaesthesia, lidocaine, adrenaline, adrenaline rush

Introduction

Biopsies are performed under local anaesthesia, which achieves their effect by being administered to the region of the nerve, plexus or spinal cord. Regional anaesthesia causes a reversible block of action potential transmission across the nerve membrane. The most commonly used substance in this anaesthesia is lignocaine, which easily penetrates interstitial tissues and nerves, causing a rapid onset of action [1]. Minor allergic reactions to lignocaine are common, while anaphylactic reactions to lidocaine are rare and therefore may not be recognized when they occur [2]. When local anaesthetics are administered, a life-threatening adverse event can occur, which is called local anaesthetic systemic toxicity (LAST syndrome). The multifactorial mechanisms of LAST cause multiple cellular effects in the cardiovascular system and central nervous system. LAST can be reduced by focusing on risk factors and limiting drug dosage [3]. Prolonging the time and increasing the depth of action is possible by adding epinephrine to anaesthesia. A positive aspect of using epinephrine is also the effective prevention or minimization of blood loss during procedures. Above that, epinephrine causes vasoconstriction which reduces LA absorption and systemic toxicity. Epinephrine, through its action on both α and β-adrenergic receptors, can cause numerous cardiovascular disorders, but its toxicity is usually due to iatrogenic errors like overdose or intravascular administration of the drug. The most common manifestations are central nervous system and respiratory disorders, hypertension, tachycardia and abnormal heart rhythms. In particularly dangerous cases, there is cardiac arrest,

anaphylactic reaction, including anaphylactic shock [1,4]. Adrenaline stimulation of the sympathetic nervous system can also result in an 'adrenaline rush', which manifests as anxiety, nervousness, dizziness, palpitations, sweating, breathlessness, flushing, chest pain, tremors and nausea [9].

Case report

A 83-year-old female patient chronically suffering from chronic obstructive pulmonary diseases (COPD) and arterial hypertension was undergoing scheduled mammotome biopsy due to diagnosis of left breast tumour. The procedure was being performed in the oncology ambulatory clinic. Before the procedure the patient received local anaesthesia with 10 ml of 1% lidocaine + 500 μg of adrenaline (Lignocainum WZF + Adrenalina WZF 0,1%). Immediately after the procedure (about 10 minutes after local anaesthesia injection) muscle tremors began (primarily identified as clonic seizure) as well as agitation and reduced disorders of consciousness. The oncology clinic staff inserted peripheral intravenous cannula and administered 100 mg of hydrocortisone i.v. (suspecting potential allergic reaction) and 5 mg of diazepam i.v. (against 'clonic seizure') Resuscitation team was called with information of suspected allergic reaction to lidocaine, LAST syndrome or "adrenaline rush".

On resuscitation team arrival the proper ABCDE evaluation was difficult due to tremors and agitation so an additional 5 mg of diazepam i.v. was administered (table I).

Due to lack of clonic seizure and no history of such symptoms as tongue numbness, visual or auditory disturbances as well as relatively low dose of lidocaine, the resuscitation team did not introduce the LAST syndrome treatment protocol. No additional features of anaphylaxis (as shock, rash, gastrointestinal symptoms) made the team not introduce the anaphylaxis treatment protocol as well.

The patient was admitted to the emergency department (ED) where atrial fibrillation (HR up to 180 /min.) was observed. The emergency department team administered 5 mg of metoprolol i.v. and began the infusion with 2 g of MgSO4 and 1,5 g of KCl. Within 1 hour the sinus rhythm was obtained. After additional 3 hours of observation the patient was discharged home in good general condition (NiBP 130/80 mmHg, HR 85 /min., SpO2 94%) without any persistent signs and symptoms.

Discussion

An allergic reaction to local anaesthetics is really rare. Among such rarities is allergy to amides, and its representative is the best known and most widely used local anaesthetic – lidocaine [5,6]. Severe allergic reactions can result in anaphylaxis, which usually proceeds with a decrease in blood pressure (up to shock), in addition, bronchial spasm, urticaria, gastrointestinal symptoms and angioedema are common. Our patient did not experience the above symptoms, however, it cannot be ruled out that she did not have an allergic reaction related to the administration of lidocaine.

LAST (Local Anaesthetic Systemic Toxicity) is very rare. The most common and early symptoms of LAST are central nervous system toxicity, which manifests as seizures in 68%, and cardiovascular toxicity, which can manifest as cardiac arrhythmias [6]. Our patient developed seizures and atrial fibrillation (AF), which could suggest LAST.

Table I. ABCDE evaluation and management before and after an additional dose of diazepam was administered

	On resuscitation team arrival	After additional 5 mg of diazepam (i.v.)
A (airways)	Airways unobstructed, agitation, no verbal response, no logic contact.	Airways unobstructed, sleepy, awakes after pain stimulus → head tilt – chin lift manoeuvre
B (breathing)	Tachypnoea (RR about 50/min.) with no features of dyspnoea.	Tachypnoea (RR about 35/min.) with no features of dyspnoea, SpO2 85% → face mask and passive oxygen therapy 6 l/min.
C (circulation)	Warm and wet skin.	Skin warm and wet, NiBP 210 / 120 mm Hg, HR 130/min., ECG: sinus rhythm with numerous ventricular extrasystoles.
D (disability)	No features of clonic seizure, wide and reactive pupils (left = right), limbs tremors.	No features of clonic seizure, wide and reactive pupils (left = right) no feature of focal neurologic deficits, blood glucose level 113 mg/dl.
E (exposition)		No features of bleeding from the left breast, no features of additional trauma. No rash nor urticaria.

The systemic absorption of anaesthesia depends on the site of injection, dose, volume and the presence of a vasoconstrictor. In the case of regional anaesthesia, which was used in our patient, because of the lower concentration of the drug, the chance of developing a seizure during LAST is much lower compared to epidural anaesthesia 1/10000, and peripheral nerve block 7/10000 [7].

In our patient, anaesthesia with epinephrine, which has a vasoconstrictive effect, was used. The standard concentration of epinephrine used in local anaesthesia is 5 μg/ml (1:200 000). Our patient had an overdose of the drug, and the concentration of epinephrine that was administered was 50 μg /ml. The patient developed symptoms characteristic of an epinephrine overdose, such as restlessness, muscle tremors, hypertension, and tachycardia. During the traction of observation into the ED, the patient also developed AF, which can occur with an epinephrine overdose. The patient recovered after several hours of observation, which may be characteristic of an epinephrine overdose, the symptoms of which are short-lived because of the rapid breakdown of catecholamines.

Nowadays, local anaesthesia is safe, but it is important to remember that there is still a risk of a toxic reaction in the case of an intravascular injection. The surgeon performing the anaesthesia denied the appearance of blood during aspiration before the drug was administered. However it is worth to notice the fact that our patient represented the initial symptoms of LA toxicity such as seizures, making it impossible to rule out physician oversight [8].

The most probable explanation for our patient's symptoms is an 'adrenaline rush.' The intravascular half-life of epinephrine is only 1.7 minutes, yet the symptoms associated with an 'adrenaline rush' can persist for up to 10 minutes post-injection, as observed in our patient. This phenomenon is attributed to the slow extravascular degradation of epinephrine. In one seminal study involving 387 participants, eight patients (2.2%) exhibited symptoms of an 'adrenaline rush.' These symptoms included anxiety, tremors, tachycardia, and others, all of which were present in our patient. The likelihood of experiencing an 'adrenaline rush' increases with the epinephrine dose, indicating that our patient's symptoms were likely due to an overdose [9]."

Conclusion

Given all the symptoms our patient presented, it is difficult to conclusively determine what could have caused them. Tachypnea and very severe tremor can occur in anaphylaxis, LAST, and 'adrenaline rush.' Tachycardia and restlessness are more commonly associated with anaphylaxis and 'adrenaline rush,' while elevated blood pressure may be indicative of LAST. Some of the symptoms presented by the patient may raise suspicion of an epinephrine overdose or accidental intravascular administration after local infiltration of 1% lidocaine + 500 μg of adrenaline. However, the most likely diagnosis seems to be 'adrenaline rush,' due to the symptoms and the timing of their onset after the injection of this local anesthetic."

Conflict of interest
None

ORCID
Hanna Plata ORCID: 0009-0000-9913-8568
Ewelina Bornio ORCID: 0009-0001-5550-0462
Marcin Muża ORCID: 0000-0003-4903-8774

Correspondence address
Ewelina Bornio
Mazowiecki Szpital Specjalistyczny
ul. Juliana Aleksandrowicza 5, 26-617 Radom
(+48) 789 177 103
ewelina.bornio@interia.com

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