


EDITORIAL

Safety of Dental Anesthesia in ICD Recipients

Ricardo Alkmim Teixeira^{1,2} 

Universidade do Vale do Sapucaí (UNIVÁS),¹ Pouso Alegre, MG – Brazil

Hospital Renascentista,² Pouso Alegre, MG – Brazil

Editorial referring to the article: Favorable Safety Experience of Local Dental Anesthesia in ICD Recipients with Cardiac Channelopathies

Some anesthetic agents administered during general anesthesia can cause heart rhythm disorders, mainly associated with autonomic imbalance. Off-target cardiac sodium channel blockade is considered the canonical mechanism behind cardiotoxicity.¹

Lidocaine, the most common local anesthetic, produces a transient loss of sensory, motor, and autonomic function when the drug is injected or applied close to neural tissues; furthermore, it has a good safety margin before reaching toxic blood levels. However, care must be taken to keep track of the total dose given to minimize its systemic toxicity. In addition to direct nerve toxicity, systemic toxicity affecting the brain and/or cardiac muscle can also occur. Cardiovascular toxicity usually appears as tachycardia and hypertension; however, with increasing toxicity, bradycardia and hypotension can occur. Ventricular arrhythmias and cardiac arrest also have been described.² Because of its potential effects upon the heart, it is also commonly used as an antiarrhythmic agent to depress ventricular arrhythmias in controlled doses.³

Lidocaine toxicity is not only determined by the total dose (usually 4.5 mg/kg), but also by the rate of absorption, which is dependent on the blood flow of that tissue. To reduce blood flow to the injection site, and therefore the rate of absorption, vasoconstrictors, such as epinephrine, are frequently used and may increase the toxic dose.³ On the other hand, epinephrine mucosal infiltration can itself result in

increases in heart rate and blood pressure, sometimes inducing heart arrhythmias.⁴

There is a lack of evidence about the use of local anesthetics in patients with cardiovascular diseases in dental procedures. Guimarães et. al.,⁵ conducted a systematic review and meta-analysis (most of studies showed a high risk of bias) to evaluate the safety of using local anesthetics with vasoconstrictors to determine the risk of cardiovascular events in patients with cardiovascular diseases. Ten randomized controlled trials (n = 478) were included. Meta-analysis demonstrated a decrease in the systolic blood pressure with the use of local anesthetics with vasoconstrictors (standard mean difference -0.95, 95% CI -1.35 to -0.55) after procedure. Overall, for the other assessed outcomes, no statistical difference was found. The quality of evidence was considered low according to the GRADE profile.

Anesthetics with epinephrine used in dentistry may have considerable effects upon the sensing and function of cardiac implantable electronic devices [pacemaker, implantable cardioverter-defibrillator (ICD)].⁶ In this sense, ICD therapy discharge can result from induced ventricular arrhythmia or due to inappropriate detection, such as sinus tachycardia, atrial arrhythmia, or sensing dysfunction.

Considering the overall effects of the association of Lidocaine and epinephrin, heart rhythm disorders and/or ICD discharge can occur, especially in those patients with some electrical predisposition, like inherited ionic channel disease.

Side effects following local infiltration into the oral cavity have been previously described.⁷ Nevertheless, Oliveira et. al. demonstrated that the use of local dental anesthesia with and without epinephrine in selected stable patients with Long-QT Syndrome and Brugada Syndrome did not result in life-threatening

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Mailing Address: Ricardo Alkmim Teixeira

Hospital Renascentista, Arritmias e Marcapassos. Rua Salvador dos Santos Nora, 25, 102. Postal code: 37553-628. Pouso Alegre, MG – Brazil

E-mail: ricardo.alkmim@gmail.com

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arrhythmias, though the maximum HR increased after the use of vasoconstrictors during the anesthesia period.⁸ Once the risk for dental treatment in patients with channelopathies and ICD is unknown, Oliveira et al. published, in this issue of IJCS, a sub-analysis of that study in cases with cardiac channelopathies (CCh) and ICD.⁹

The authors hypothesized that the use of local dental anesthesia with 2% lidocaine with 1:100,000 epinephrine or without a vasoconstrictor could be safe in selected ICD and CCh patients, not resulting in life-threatening events (LTE). Restorative dental treatment was made in two sessions, with a wash-out period of 7 days (cross-over trial), conducting with a 28h-Holter monitoring, 12-lead electrocardiography, digital sphygmomanometry, and anxiety scale assessments. All patients were in stable conditions, with no recent events before dental care. Twenty-four consecutive procedures were performed in 12 patients (9 women, 3 men) with CCh and ICD: 7 (58.3%) showed a long QT syndrome, 4 (33.3%) Brugada syndrome, and 1

(8.3%) Catecholaminergic polymorphic ventricular tachycardia. Holter analysis showed no increased heart rate or sustained arrhythmias. Blood pressure, electrocardiographic changes, and anxiety measurement showed no statistically significant differences. No LTE occurred during dental treatment, regardless of the type of anesthesia. The authors concluded that lidocaine administration, with or without epinephrine, can be safely used in selected CCh-ICD patients.

Clinical practice has demonstrated that relevant side effects related to local anesthesia are quite rare. However, these preliminary findings published by Oliveira et. al., despite the need for confirmation in a larger population, fill in the gaps in clinical evidence with important impact. The increasing number of patients with cardiac devices, including ICD, can also be found at dental clinics and, even today, no well-constructed protocol exists in most of the services. Doubts still affect patients, physicians and dentists regarding specific populations, and this paper, can help to manage CCh patients with ICD.

References

1. Plakhotnik J, Zhang L, Estrada M, Coles JG, Lonnqvist PA, Maynes JT. Local Anesthetic Cardiac Toxicity Is Mediated by Cardiomyocyte Calcium Dynamics. *Anesthesiology*. 2022 Dec 1;137(6):687-703. doi: 10.1097/ALN.0000000000004389.
2. Donald MJ, Derbyshire S. Lignocaine toxicity; a complication of local anaesthesia administered in the community. *Emerg Med J*. 2004 Mar;21(2):249-50. doi: 10.1136/emj.2003.008730.
3. Torp KD, Metheny E, Simon LV. Lidocaine Toxicity. 2022 Nov 21. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023. PMID: 29494086; ID: NBK482479.
4. Usami N, Tooyama M, Oda W, Kawamoto Y, Kishimoto S, Minamide A, et al. A case of wide QRS tachycardia after the local administration of Epinephrine to reduce bleeding during general anesthesia. *Anesth Prog*. 2022 Jun 1;69(2):38-40. doi: 10.2344/anpr-68-03-05.
5. Guimaraes CC, Lopes LC, Bergamaschi CC, Ramacciato JC, Silva MT, Araújo JO, et al. Local anaesthetics combined with vasoconstrictors in patients with cardiovascular disease undergoing dental procedures: systematic review and meta-analysis. *BMJ Open*. 2021 Jul 15;11(7):e044357. doi: 10.1136/bmjopen-2020-044357.
6. Tom J. Management of Patients With Cardiovascular Implantable Electronic Devices in Dental, Oral, and Maxillofacial Surgery. *Anesth Prog*. 2016;63(2):95-104. Doi: 10.2344/0003-3006-63.2.95.
7. Sato K, Miyamae Y, Kan M, Sato S, Yaegashi M, Sakanoue W, Sakai H, Sakamoto S, Vaba K. Accelerated Idioventricular Rhythm Following Intraoral Local Anesthetic Injection During General Anesthesia. *Anesth Prog*. 2021 Dec 1;68(4):230-4. doi: 10.2344/anpr-68-03-09.
8. Oliveira ACG, Neves I, Scanavacca M, Sacilotto L, Olivetti N, Hachul D, et al. Arrhythmic Events in Patients With Cardiac Channelopathies Submitted to Local Dental Anesthesia. A Randomized Pilot Study. *Circulation*. 2017;136(Suppl 1):A16474.
9. Oliveira ACG, Neves ILI, Sacilotto L, Quintella SO, Bueno SCP, Pessente GD, et al. Favorable Safety Experience of Local Dental Anesthesia in ICD Recipients with Cardiac Channelopathies. *Int J Cardiovasc Sci*. 2023;36:e20200312. Doi: 10.36660/ijcs.20200312

