How safe is therapeutic dose of lignocaine with epinephrine: An overview

Sir

Newer advancements in the dental care facility have helped the patients with severe systemic diseases to seek dental treatment. In addition to this, older age of an average periodontal patient increases the likelihood of underlying systemic diseases. The most reliable means of providing painless surgery is the effective administration of local anesthesia (LA), and profound infiltration of the local anesthetic agent is an essential fundamental factor for successful periodontal procedures.[1] Cardiovascular diseases are of major concern for the dentist since its pathological disturbances may produce alarming results. These conditions include hypertension, angina pectoris, myocardial infarction, previous coronary artery bypass graft surgery, previous cerebrovascular accidents, and congestive heart failure, presence of cardiac pacemakers or automatic cardiac cardioverter-defibrillators, and infective endocarditis.[2] The use of local anesthetic agents with vasoconstrictors in cardiac patients has been a matter of much debate. In 1964, a conclusion was drawn by the workshop-conference of the American Dental Association and the American Heart Association that vasoconstrictors were allowed for usage in LA without contraindications in patients with cardiovascular disease if administrated cautiously and with prior aspiration.

The commonly used dental cartridge contains 1.8 mL of (2% lignocaine) local anesthetic solution. In this cartridge, the concentration of epinephrine varies in concentration from 1:200,000 (5 μg/mL), 1:100,000 (10 μg/mL) to as high as 1:50,000 (20 μg/mL).[3] The maximum dose of LA with epinephrine is 7 mg/kg and concentration of LA used is 2% (20 mg/mL), thus the maximum volume of LA, which can be safely used, is 0.35 mL/kg. In an average 60 kg adult, the maximum volume of LA which can be used is 21 mL (0.35 mL/kg × 60 kg) or 11 cartridges. The 21 mL volume of LA (1:200,000) preparation will deliver 105 μg of epinephrine, 21 mL volume of LA (1:100,000) preparation will deliver 210 μg of epinephrine and (1:50,000) preparation of LA will deliver 420 μg of epinephrine, whereas maximum recommended dose of epinephrine per appointment in a dental patient is only 40 μg.[3] As higher dosage can produce systemic vasoconstriction leading to myocardial ischemia in high-risk cardiac patients, undergoing dental procedure.[4] Thus, for cardiac patients undergoing a dental procedure, the dose of LA which can be safely given with 1:50,000 epinephrine is 2 mL (40 μg/20 μg mL^{-1}) with 1:100,000 is 4 mL (40 μg/10 μg mL^{-1}) and with 1: 200,000 is 8 mL (40 μg/5 μg mL^{-1}).

It has to be taken into consideration that safe upper limit of LA with epinephrine is 7 mg/kg (up to 21 mL for 60 kg body weight) but simultaneously, it will deliver very high concentration of epinephrine, which can cause detrimental effects; so, safe upper limit of LA with epinephrine to be used in cardiac patients is no more than 8 mL (4 cartridges) of 2% lignocaine with 1:200,000 epinephrine; 4 mL (2 cartridges) of 2% lidocaine with 1:100,000 epinephrine and only 2 mL (1 cartridge) of 2% lignocaine with 1:50,000 epinephrine should be used for any dental procedure for older adults with cardiovascular disease.[5] For patients with stabilized cardiovascular diseases, routine dental treatment may usually be delivered. However, patients with unstable cardiac condition dental care should be deferred until their medical conditions have been stabilized under the care of their physicians.

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