Advanced Block Techniques and New Anesthetics Can Improve Dental Practice

Written by Lynne Lederman

It is important for dentists to enhance their techniques for nerve blocks and understand recent developments in dental anesthetics to retain patients, improve pain control and patient satisfaction, and minimize treatment complications and chair time. Alan W. Budenz, MS, DDS, MBA, University of The Pacific Arthur A. Dugoni School of Dentistry, San Francisco, California, USA, and Mel Hawkins, DDS, Dentist/Dentist Anesthesiologist, Toronto, Ontario, Canada, discussed their experiences with local anesthesia techniques and pharmacology.

Advanced block approaches for local anesthesia include the Vazirani–Akinosi (closed mouth), Gow–Gates (condylar neck or high ramal), and conventional nerve blocks. The traditional, conventional, or inferior alveolar nerve blocks prohibit 1 of the 3 terminal branches of the V3 nerve, in contrast to a "true mandibular block," which acts before the root of V3 branches. All of these blocks are within the pteryomandibular triangle area. Failure of anesthesia can result from anatomic variations in hard- and soft-tissue anatomy.

At the level of the conventional block, there is dense connective tissue and vascularity with a chance of positive aspiration, noted Dr Hawkins. The Vazirani–Akinosi block level is about one-half-inch higher, and the area is less vascular with more fat cells. The Gow–Gates area, which is even higher, is predominantly adipose tissue, with little connective or vascular tissue. Local anesthetics (LAs) are fat soluble and diffuse more readily through higher fat tissues. Therefore, LAs work better at these higher levels, and the success rate of profound anesthesia goes up. The advantages of the conventional block include a history of more than 100 years of use, with rapid onset of anesthesia when done accurately. Disadvantages include a possible lack of efficacy in patients with anatomic variants in the area and inability to visualize landmarks in patients with a large tongue. Buccal anesthesia may still be required, and paresthesia may occur.

The Vazirani–Akinosi block was originally developed for patients with facial injuries or other issues leading to inability to open their mouth. Vazirani–Akinosi technique advantages include being less threatening to phobic patients, bypassing the tongue; having low risks of trismus, positive aspiration, and paresthesia; and causing less pain. Disadvantages of the Vazirani–Akinosi technique include difficulties in visualizing the area being injected and in gauging depth, and a possible need for buccal anesthesia.

The Gow–Gates technique has the advantage of an easily visualized, perceptible bony target zone with decreased vascularity and virtually no risk of mechanical or anesthetic nerve damage, good buccal nerve anesthesia, increased duration of anesthesia, and control of postoperative pain. Gow–Gates disadvantages include a requirement for the mouth to be open wide. All of these block techniques will require local infiltration injections with a vasoconstrictor containing anesthetic if there is a need for hemostasis.

Drs Hawkins and Budenz approach the timing and amount of anesthetic differently. Dr Budenz gives 1 cartridge slowly and waits 5 minutes to assess numbness; at 10 minutes, if numbness has increased, he does not give more anesthetic. Dr Hawkins gives a second cartridge after the onset of soft-tissue anesthesia has been ensured and injects this one more rapidly. The dose depends on the anesthetic, each of which has its own maximum 24-hour dose; these doses are summative.

Dr Hawkins noted that children seem to be at a higher risk for morbidity and mortality due to an increased rate of anesthetic movement into the blood, decreased anesthetic metabolism, and an immature blood–brain barrier. Anesthetic doses in children should be calculated

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based on body weight rather than age. Parents should be warned to watch out for lip and tongue biting.

Vasoconstrictors are added to anesthetics to delay absorption, reduce toxicity and hemorrhage, and prolong duration, so they are useful in long procedures. Epinephrine is generally acceptable even in patients with hypertension. Patients receiving nonselective β-blockers should be assessed after each cartridge, or vasopressors should not be used. It might be possible for a patient to switch to a cardioselective agent to avoid drug interactions. Patients experiencing symptomatic hypertension require emergency treatment.

Dr Hawkins offered "tips and tricks" for conventional mandibular anesthesia, including elevating the patient's chin, using a scissor mouth "rester" rather than a wedge to keep the mouth open, orienting the needle bevel to face the midsagittal plane, using a self-aspirating syringe, and waiting sufficient time for anesthesia onset.

According to a study, infiltration of articaine was more successful for pulpal anesthesia than infiltration of lidocaine [Brandt RC et al. *J Am Dent Assoc.* 2011]. Dr Hawkins, who consults for 2 companies that manufacture articaine, noted that articaine may also provide more successful mandibular block than lidocaine, but this is more variable. This may be due to articaine's increased lipid solubility. Although paresthesias have been reported with all anesthetic agents, including articaine, in both the United States and Canada, the incidence is low, and it is not known if the cause is the anesthetic or mechanical damage [Garisto GA et al. *J Am Dent Assoc.* 2010]. However, because all clinically used LAs can be neurotoxic at large concentrations, only the minimum needed for a successful block should be used. Dr Hawkins suggested that articaine should be used with caution and selectively for conventional blocks, possibly obtaining patient consent. In the case of paresthesias, patients should not be abandoned but should be followed frequently and referred for a second opinion. The condition usually resolves. External compresses are effective only for pressure (hematoma) paresthesias.

Phentolamine mesylate injection (OraVerse) reverses the vasoconstriction associated with local anesthesia and thereby accelerates the return to normal sensation. It may be useful for young children and special needs patients to avoid local tissue injury, and for those who need to speak quickly after procedures [Tavares M et al. *J Am Dent Assoc.* 2008]. Disadvantages include patient resistance to another injection, cost, and the possibility of needle-related trismus or paresthesia.

A sodium bicarbonate buffering solution (OnSet) can reduce the onset time for LAs and make the injections more comfortable. The cost of the product may be offset by the reduction in time to pulpal anesthesia from 10 to 15 minutes to less than 2 minutes.

Studies are ongoing on an intranasal LA (eg, Comparison of Intranasal Kovacaine Mist, Tetracaine Alone, and Placebo for Anesthetizing Maxillary Teeth in Adults [NCT01710787]). The spray contains tetracaine plus oxymetazoline, an α-adrenergic agonist, and it appears to work from bicuspid to bicuspid (teeth numbers 4 to 14).

Effective and safe use of LAs requires dentists to select the most appropriate block technique and agent for their particular patients. New anesthetics in development could obviate the need for injection in some patients.