

ALTERNATE INJECTION LOCATIONS

Gow-Gates and Vazirani-Akinosi Techniques

The Gow-Gates technique⁶³ has been reported to have a higher success rate than the conventional inferior alveolar nerve block.^{26, 64} However, experimental studies have failed to show that the Gow-Gates technique is superior.^{25, 65-67, 68} The Vazirani-Akinosi^{26, 69} technique has not been found to be superior to the standard inferior alveolar injection.^{65, 70-72} Neither technique is better than the inferior alveolar nerve block in reducing the pain of injection.⁷³ These techniques do not replace the conventional inferior alveolar nerve block. The Vazirani-Akinosi technique is indicated when there is limited mandibular opening (for example, trismus).

Incisive Nerve Block at the Mental Foramen

Nist and co-authors,⁷⁴ and Joyce and Donnelly⁷⁵ demonstrated the incisive nerve block alone was successful in anesthetizing the premolar teeth. However, Nist et al⁷⁴ showed that the technique did not anesthetize the central and lateral incisors. Although Nist et al⁷⁴ demonstrated an increased success rate (70%) in the first molar when the incisive nerve block was combined with the inferior alveolar nerve block, an intraosseous injection would be a better choice for supplemental anesthesia of the first molar if the inferior alveolar nerve block fails (90% success rate).

Mandibular Infiltration Injections of a Lidocaine Solution

Labial or lingual infiltration injections of a lidocaine solution alone are not very effective for pulpal anesthesia in mandibular teeth.^{45, 46, 76} A combination of a labial and lingual infiltration will significantly increase success in anterior teeth over either a labial or lingual infiltration alone.⁷⁷

Meechan et al⁷⁸ using 1.8 mL of 2% lidocaine with 1:100,000 epinephrine for either a buccal or buccal plus lingual infiltration of the mandibular first molar resulted in a 32 to 39% success rate (no response to pulp testing).

Mandibular Infiltration Injection of a Lidocaine Solution Following an Inferior Alveolar Nerve Block

Adding a labial infiltration (1.8 mL of 2% lidocaine with 1:100,000 epinephrine) to a conventional inferior alveolar injection increases the success of anterior pulpal anesthesia.⁷⁹ However, adding a supplemental intraosseous injection should result in a higher success rate.⁷⁹

Foster et al⁸⁰ found that adding a labial or lingual infiltration injection, using 1.8 mL of 2% lidocaine with 1:100,000 epinephrine after an inferior alveolar nerve block, did not significantly result in more profound anesthesia in the first molar.

Mandibular First Molar Infiltration Injections of an Articaine Solution

A recent study⁸¹ showed articaine was significantly better than lidocaine for a primary buccal infiltration of the mandibular first molar. Articaine only had a 64% success rate (two consecutive 80 readings with the electric pulp tester). Jung et al⁸² also used a primary first molar buccal

infiltration of an articaine formulation and found a 54% success rate. However, another recent study⁸³ found an 87% success rate (two consecutive 80 readings with the electric pulp tester) for a primary articaine buccal infiltration of the mandibular first molar versus a 57% success rate for a lidocaine solution. The duration of pulpal anesthesia declined over 60 minutes for both anesthetic solutions.

Mandibular First Molar Infiltration Injections of an Articaine Solution Following an Inferior Alveolar Nerve Block

Haase et al⁸⁴ in a prospective, randomized, double-blind, crossover study comparing the degree of pulpal anesthesia achieved by means of mandibular first molar buccal infiltrations of two anesthetic solutions: 4% articaine with 1:100,000 epinephrine and 2% lidocaine with 1:100,000 epinephrine following an inferior alveolar nerve block (using 4% articaine with 1:100,000 epinephrine). They found that 4% articaine with 1:100,000 epinephrine resulted in a higher success rate (88%) than 2% lidocaine with 1:100,000 epinephrine (71%). Success was defined as achieving two consecutive 80 readings within 10 minutes following the inferior alveolar nerve block plus infiltration injections and the 80 reading was continuously sustained through 60th minutes.

Infiltrations of Articaine Following Maxillary or Mandibular Anesthesia in Patients With Irreversible Pulpitis

Rosenberg et al⁸⁵ found no significant differences between an articaine solution and a lidocaine solution when used as a supplemental infiltration after inferior alveolar nerve blocks or maxillary infiltrations in patients with irreversible pulpitis.

Matthews et al⁸⁶ found only a 58% success rate for the mandibular first molar in patients with **irreversible pulpitis** using a supplemental buccal infiltration of articaine.

Methods That Have Tried to Increase Success of the Inferior Alveolar Nerve Block

Increasing the Anesthetic Volume

One potential method to increase anesthetic success is to double the injection volume of local anesthetic solution. However, increasing the volume of 2% lidocaine with epinephrine to 3.6 mL (two cartridges) does not increase the incidence of pulpal anesthesia with the inferior alveolar nerve block^{1, 24, 87-89}.

Increasing the Epinephrine Concentration

A second approach for increasing the success of inferior alveolar nerve blocks is to increase the concentration of epinephrine. However, when evaluated in clinically normal teeth, there was no advantage to using a higher concentration (1:50,000) of epinephrine in an inferior alveolar nerve block.^{21, 90}

Diphenhydramine as a Local Anesthetic Agent

Diphenhydramine (Benadryl®) has been advocated for patients who are allergic to commonly used local anesthetics. Two studies^{91, 92} found diphenhydramine was less effective than lidocaine for extractions. Willett and co-authors⁹³ found the combination of lidocaine/diphenhydramine with epinephrine and diphenhydramine with epinephrine were significantly less effective for pulpal anesthesia than lidocaine with epinephrine for inferior alveolar nerve blocks. They also

found that the diphenhydramine solutions were more painful upon injection and had a high incidence of moderate postoperative pain.