Local Anesthesia and Premedication Modified Methods for Children

Local Anesthesia for the Child and Adolescent

It is generally agreed that one of the most important aspect of child behavior guidance is the control of pain. If children experience pain during restorative or surgical procedures their future as dental patients may be damaged. Since there is some discomfort associated with the procedure, a local anesthetic is usually indicated when operative work is to be performed on the permanent teeth and primary teeth. Dental procedures can be carried out more effectively if the child is comfortable and free of pain. The local anesthetic can prevent discomfort that may be associated with placing a rubber dam clamp, ligating teeth, and cutting tooth structure. Even the youngest child treated in the dental office normally has no contraindications for the use of a local anesthetic.

The most widely accepted theory on the mode of action of Local anesthetics states that local anesthetic solution prevents the normal passage of ions through the nerve membrane, thus preventing the conduction of nerve impulse.

Topical Anesthetics

Topical anesthetics reduce the slight discomfort that may be associated with the insertion of the needle before the injection of the local anesthetic. Some present disadvantage if they have disagreeable taste to the child. Also additional time required to apply them may allow the child to become apprehensive.

Topical anesthetics are available in gel, liquid, ointment, spray forms. The pleasant-testing and quick-acting liquid, gel or ointment preparations seem to be preferred by most dentists. These agents are applied to the oral mucous membrane with a cotton-tapped applicator and lubricate the injection site with it. Numerous anesthetic agents have been used in topical anesthetic preparations, including ethyl aminobenzoate, butacaine sulfate, cocaine, dyclonine, lidocaine, and tetracaine.
Ethyl aminobenzoate (benzocaine) liquid, ointment, or gel preparations are probably best suited for topical anesthesia in dentistry. They offer a more rapid onset and longer duration of anesthesia than other topical agents. They are not known to produce systemic toxicity as oral topical anesthetics, but a few localized allergic reactions have been reported from prolonged or repeated use. Examples of commercially available products are Hurricaine, Topicale and Gingicaine. All three products are available in gel form. Gingicaine is also available in liquid and spray forms, Hurricaine as a liquid, and Topicale in ointment and patch forms. All products are supplied in a variety of flavors. The mucosa at the site of the intended needle insertion is dried with gauze, and small amount of the topical anesthetic agent is applied to the tissue with a cotton swab. Topical anesthetics should be produced in approximately 30 seconds.

**Jet Injection**

Jet injection is based on the principle that small quantities of liquid forced through very small openings under high pressure (jet) can penetrate mucous membrane or skin without causing excessive tissue trauma.

1. Pressure injection procedure surface anesthesia and used by some dentists instead of topical anesthesia. The method is quick, painless although abruptness of injection may produce momentary anxiety.

2. The technique also useful on obtaining gingival anesthesia before a rubber dam is placed and in some cases when local anesthetic not required such as placing sealant in quadrants in which no operative procedure are planned.

3. Also soft tissue anesthesia before band adaptation of partially erupted molars or for removal of a very loose (soft tissue retained) primary tooth. The Syrijet may be used instead of needle injections for nasopalatine, anterior palatine, and long buccal nerve blocks.

During the application of the topical anesthetic, the dentist should prepare the child for the injection. The explanation should not necessarily be a detailed description but simply an indication that the tooth is going to be put to sleep so that the treatment can proceed without discomfort.

**Local anesthesia by conventional injection**

It is generally agreed that the anesthetic solution should be injected slowly, and that the dentist should watch the patient closely for any evidence of an unexpected reaction.
Special Considerations in Local Anesthetic Techniques in the Pedodontic Patient

Anesthetizing mandibular teeth and soft tissue

Inferior alveolar nerve block (conventional mandibular block)

When operative or surgical procedures are undertaken for the mandibular primary or permanent teeth, the inferior alveolar nerve must be blocked. The infiltration injection technique may sometimes be useful in anesthetizing primary incisors. But it cannot be relied on for complete anesthesia of the mandibular primary or permanent molars. The mandibular foramen is situated at a level lower than the occlusal plane of the primary teeth. Therefore, the injection must be slightly lower and more posteriorly than for an adult patient. The accepted technique is one in which the thumb is laid on the occlusal surface of the molars with the tip of the thumb resting on the internal oblique ridge and the ball of the thumb resting in the retromolar fossa. Firm support during the injection procedure can be given when the ball of the middle finger is resting on the posterior border of the mandible. The barrel of the syringe should be directed on a plane between the two primary molars on the opposite side of the arch. It is advisable to inject a small amount of the solution as soon as the tissue is penetrated and to continue to inject minute quantities as the needle is directed toward the mandibular foramen. The depth of insertion about 15 mm but will vary with the size of the mandible and its changing proportions depending on the age of the patient. Approximately 1 ml of the solution should be deposited around the inferior alveolar nerve.
**Lingual nerve block**

One can block the lingual nerve by bringing the syringe to the opposite side with the injection of a small quantity of the solution as the needle is withdrawn. If small amounts of anesthetic solution injected during insertion and withdrawal of the needle for the inferior alveolar nerve block, the lingual nerve will invariable be anesthetized as well.

**Long buccal nerve**

For the removal of mandibular permanent molars or some time for the placement of a rubber dam clamp on these teeth, it is necessary to anesthetize the long buccal nerve. A small quantity of the solution may be deposited in the mucobuccal fold at a point distal and buccal to the indicated tooth.

All facial mandibular gingival tissue on the side that has been injected will be anesthetized for operative procedures, with the possible exception of the tissue facial to the central and lateral incisors, which may receive innervation from overlapping nerve fibers from the opposite side.

**Infiltration anesthesia for mandibular primary molars**

Articaine is unique among local anesthetics because it contains a thiophene group and both ester and amide groups. Articaine is an amide anesthetic (it has an amide intermediate chain) that is metabolized in the liver. The associated ester group also allows for plasma metabolism via pseudocholinesterase, which purportedly increases the rate of breakdown and reduces toxicity. This difference in metabolism gives articaine the advantage of having a 30-minute half-life;
lidocaine, for example, has a 90-minute half-life. The behavior in young children can be adversely affected by the painful mandibular block. It is well known that articaine has a high bone-penetrating ability, which suggests that it may be more successful as a locally injected infiltration. From these, one may infer that mandibular infiltration anesthesia may produce adequate anesthesia in mandibular deciduous molars for most restorative procedures.

**Infiltration for mandibular incisors**

The terminal ends of the inferior alveolar nerves cross over the mandibular midline slightly and provide conjoined innervations of the mandibular incisors. Therefore, a single inferior alveolar nerve block may not be adequate for operative or surgical procedures on the incisors even on the side of the block anesthesia. The labial cortical bone overlying the mandibular incisors is usually thin enough for supraperiosteal anesthesia infiltration anesthesia technique to be effective.

If only superficial caries excavation of mandibular incisors is needed or if the removal of a partially exfoliated primary incisors is planned, infiltration anesthesia alone may be adequate. Infiltration anesthesia is most useful as an additional adjunct to an inferior alveolar nerve block when total anesthesia of the quadrant is desired. In this case the infiltration injection is made close to the midline on the side of the block anesthesia, but the solution is deposited labial to the incisors on the opposite side of the midline. For example, if block anesthesia is used for the mandibular right quadrant, anesthetic solution is infiltrated over the left mandibular incisors by insertion of the needle just to the right of the midline diagonally toward the left incisors. Bilateral inferior alveolar nerve block are discouraged especially in younger children, unless absolutely necessary.

**Mandibular conduction anesthesia (Gow-Gate Mandibular Block Technique)**

This approach uses external anatomic landmarks to align the needle so that anesthetic solution is deposited at the base of the neck of the mandibular condyle. This technique is a nerve block procedure that anesthetizes virtually the entire distribution of the fifth cranial nerve in the mandibular area, including the inferior alveolar, lingual, buccal, mental, incisive, auriculotemporal, and mylohyoid nerves. Thus with a single injection, the entire right or left half of the mandibular teeth and soft tissues can be anesthetized, except possibly the mandibular incisors, which may receive partial innervation from the incisive nerves of the opposite side.
Gow-Gates suggested that, once the technique is learned properly, it rarely fails to produce good mandibular anesthesia.

The external landmarks to help align the needle for this injection are the tragus of the ear and the corner of the mouth. The needle is inserted just medial to the tendon of the temporal muscle and considerably superior to the insertion point for conventional mandibular block anesthesia. The needle is also inclined upward and parallel to a line from the corner of the patient’s mouth to the lower border of the tragus (intertragic notch). The needle and the barrel of the syringe should be directed toward the injection site from the corner of the mouth on the opposite side.