CLINICAL PEDIATRIC DENTISTRY I

LOCAL ANESTHESIA AND PAIN CONTROL FOR THE CHILD AND ADOLESCENT

(DENTISTRY FOR THE CHILD AND ADOLESCENT, 8ED
MCDONALD, AVERY DEAN, 2005; CHAPTER 13 MANAGEMENT OF THE DEVELOPING OCCLUSION, PAGES 270-284 (ONLY)

(12)

Tuesday 3/12/2013
1:00 pm-2:00 pm
LOCAL ANESTHESIA AND PAIN CONTROL FOR THE CHILD AND ADOLESCENT

LEARNER OBJECTIVES

Upon completion of this presentation, students will be able to:

1. Define local anaesthesia (LA).
2. Use Inferior Alveolar Nerve Block.
3. Use Lingual Nerve Block
4. Use Long Buccal Nerve Block
5. Use Infiltration Anesthesia for Mandibular Primary Molars
6. Use Infiltration for Mandibular Incisors
7. Use Anesthetization of maxillary primary molars and premolars
8. Anesthetization of maxillary permanent molars
9. Anesthetization of the palatal tissues
10. Supplemental injection techniques
11. Complications after a local anesthetic
12. Electronic dental anesthesia Analgesics
LECTURE OUTLINE

- LOCAL ANESTHESIA BY CONVENTIONAL INJECTION
- ANESTHETIZATION OF MANDIBULAR TEETH AND SOFT TISSUE
  - Inferior Alveolar Nerve Block (Conventional Mandibular Block)
  - Lingual Nerve Block
  - Long Buccal Nerve Block
  - Infiltration Anesthesia for Mandibular Primary Molars
  - Infiltration for Mandibular Incisors
  - Mandibular Conduction Anesthesia (Gow-Gates Mandibular Block Technique)
- ANESTHETIZATION OF MAXILLARY PRIMARY AND PERMANENT INCISORS AND CANINES
- ANESTHETIZATION OF MAXILLARY PRIMARY MOLARS AND PREMOLARS
- ANESTHETIZATION OF MAXILLARY PERMANENT MOLARS
- ANESTHETIZATION OF THE PALATAL TISSUES
- SUPPLEMENTAL INJECTION TECHNIQUES
- COMPLICATIONS AFTER A LOCAL ANESTHETIC
- ELECTRONIC DENTAL ANESTHESIA ANALGESICS
WHAT ARE LOCAL ANESTHETICS?

Local anesthesia is the temporary loss of sensation including pain in one part of the body produced by a topically-applied or injected agent without depressing the level of consciousness.

Advantages:

1. Nurture the relationship of patient and dentist
2. Building trust
3. Allaying fear & anxiety
4. Promoting positive dental attitude
LOCAL ANESTHETIC AGENTS

GENERAL TYPES OF LA CHEMICAL FORMULATIONS:

1- ESTERS: Cocaine, Benzoic Acid Ester Derivatives: Benzocaine, Procaine (Novocain), Tetracaine (Pontocaine), And Chloroprocaine (Nesacaine)

Allergic Reactions

2- AMIDES: Lidocaine Synthesis, Diethylaminoacetic Acid Derivatives: Mepivacaine (Carbocaine), Prilocaine (Citanest), Bupivaine (Marcaine), Articaine And Etidocaine (Duranest). Free From Allergic Reactions
TOPICAL ANESTHETICS

Reduce discomfort associated with insertion of the needle
Provides temporary numbing to the surface of the oral mucosa (2-3 mm in depth).
Forms: Gel, liquid, ointment, and pressurized spray. Pleasant-tasting And Quick-acting.

Ethyl Aminobenzoate, Butacaine Sulfate, Cocaine, Dyclonine, Lidocaine, Tetracaine. Ethyl Aminobenzoate (Benzocaine) liquid, ointment, gel are best. More rapid onset and longer duration of anesthesia. NOT produce systemic toxicity.

The mucosa is dried with gauze, and a small amount of the topical anesthetic agent is applied with a cotton swab.
JET INJECTION

Based on small quantities of liquids forced through very small openings under high pressure to penetrate mucous membrane or skin without causing excessive tissue trauma.

Used instead of topical anesthetics.

Quick and painless, but abruptness of the injection produce anxiety.

For gingival anesthesia for rubber dam clamp

In partially erupted molars

For removal of very loose (soft tissue–retained) primary tooth.

Nasopalatine, anterior palatine, and long buccal nerve blocks.
LOCAL ANESTHESIA BY CONVENTIONAL INJECTION

Needle length: long 32 mm, short 20 mm, and ultrashort 10 mm.
Needle breakage is rarely.
Avoid bending.
Avoid patient movement after insertion.
Aspirating syringe.
INFERIOR ALVEOLAR NERVE BLOCK (CONVENTIONAL MANDIBULAR BLOCK)

Mandibular foramen is situated at a level LOWER than the occlusal plane of the primary teeth. Injection must be made slightly lower and more posteriorly than for an adult patient.

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 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 averages about 15 mm but varies 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

Block the lingual nerve
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 are injected during insertion and withdrawal of the needle for the inferior alveolar nerve block, the lingual nerve will be anesthetized.
LONG BUCCAL NERVE BLOCK

Indications:
Removal of mandibular molars
Placement of a rubber dam clamp
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 for operative procedures, with EXCEPTION of the tissue facial to the central and lateral incisors, which receive innervation from overlapping nerve fibers from the opposite side.
The mandibular infiltration technique is less effective than mandibular block for extraction and pulpotomy. Mandibular block anesthesia produces more profound anesthesia of mandibular primary molars, infiltration may produce adequate anesthesia in mandibular primary 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 innervation of the mandibular incisors.

Indications: Superficial caries excavation of mandibular incisors and Removal of a partially exfoliated primary incisor.

Infiltration injection is made close to the mid-line on the side of the block anesthesia, but the solution is deposited on the opposite side of the midline.
MANDIBULAR CONDUCTION ANESTHESIA (GOW-GATES 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. Nerve block procedure that anesthetizes the entire distribution of the fifth cranial nerve including the inferior alveolar, lingual, buccal, mental, incisive, auriculotemporal, and mylohyoid nerves.

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.
SUPRAPERIOSTEAL TECHNIQUE (LOCAL INFILTRATION)

Injection should be made **CLOSER** to the gingival margin than in the patient with permanent teeth, and the solution should be deposited close to the bone. After the needle tip has penetrated the soft tissue at the mucobuccal fold, it needs little advancement before the solution is deposited (2 mm at most) because the apices of the maxillary primary anterior teeth are at the level of the mucobuccal fold. pull the upper lip down over the needle tip to penetrate the tissue rather than advancing the needle upward.

Nasopalatine injection provides adequate anesthesia for the palatal tissues of all four incisors and at least partial anesthesia of the canine areas. Nerve fibers from the greater (anterior) palatine nerve usually extend to the canine area.
Middle superior alveolar nerve supplies the maxillary primary molars, the premolars, and the mesiobuccal root of the first permanent molar. Bone thickness approaching 1 cm overlying the buccal roots of the first permanent and second primary molars in the skulls of children. Bone overlying the first primary molar is thin, and this tooth can be adequately anesthetized by injection of anesthetic solution opposite the apices of the roots. Thick zygomatic process overlies the buccal roots of the second primary and first permanent molars in the primary and early mixed dentition. This thickness of bone renders the supraperiosteal injection at the apices of the roots of the second primary molar much less effective; the injection should be supplemented with a second injection superior to the maxillary tuberosity area to block the posterior superior alveolar nerve as has been traditionally taught for permanent molars. The greater palatine injection is indicated if maxillary primary molars or premolars are to be extracted or if palatal tissue surgery is planned.
ANESTHETIZATION OF MAXILLARY PERMANENT MOLARS

Instruct the child to partially close the mouth to allow the cheek and lips to be stretched laterally. The tip of the dentist's left forefinger (for a right-handed dentist) will rest in a concavity in the mucobuccal fold and is rotated to allow the fingernail to be adjacent to the mucosa. The ball of the finger is in contact with the posterior surface of the zygomatic process. Finger be on a plane at right angles to the occlusal surfaces of the maxillary teeth and at a 45-degree angle to the patient's sagittal plane. The index finger should point in the direction of the needle during the injection. The puncture point is in the mucobuccal fold above and distal to the distobuccal root of the first permanent molar. Injection should be made above the second molar. The needle is advanced upward and distally, depositing the solution over the apices of the teeth. The needle is inserted for a distance of approximately 3/4 inch (2 cm) in a posterior and upward direction; it should be positioned close to the bone, with the bevel toward the bone.
ANESTHETIZATION OF THE PALATAL TISSUES

Painful procedures. After buccal infiltration, interdental (interpapillary) infiltration, with slow injection of the anesthetic solution as the needle is penetrating the papilla. The interdental infiltration allows diffusion of the anesthetic to the palatal aspect via the craterlike area of the interproximal oral mucosa joining the lingual and buccal interdental papillae, known as the col. Blanching of the area is indicative of sufficient anesthesia of the superficial soft tissues; however, additional palatal infiltration may be given as needed.
NASOPALATINE NERVE BLOCK

Blocking the nasopalatine nerve will anesthetize the palatal tissues of the SIX anterior teeth. Painful procedures. The path of insertion of the needle is alongside the incisive papilla, just posterior to the central incisors. The needle is directed upward into the incisive canal. The discomfort associated with the injection can be reduced by deposition of the anesthetic solution in advance of the needle. When anesthesia of the canine area is required, inject a small amount of anesthetic solution into the gingival tissue adjacent to the lingual aspect of the canine to anesthetize overlapping branches of the greater palatine nerve.
GREATER (ANTERIOR) PALATINE INJECTION

Anesthetize the mucoperiosteum of the palate from the tuberosity to the canine region and from the median line to the gingival crest on the injected side. The innervation of the soft tissues of the posterior two thirds of the palate is derived from the greater and lesser palatine nerves.

Before the injection is made, it is helpful to bisect an imaginary line drawn from the gingival border of the most posterior molar that has erupted to the midline. In the child in whom only the primary dentition has erupted, the injection should be made approximately 10 mm posterior to the distal surface of the second primary molar. It is not necessary to enter the greater palatine foramen.
SUPPLEMENTAL INJECTION TECHNIQUES

INFRAORBITAL NERVE BLOCK AND MENTAL NERVE BLOCK
PERIODONTAL LIGAMENT INJECTION
(INTRALIGAMENTARY INJECTION)
INTRAOSSEOUS INJECTION, INTERSEPTAL INJECTION, AND INTRAPULPAL INJECTION
COMPUTER-CONTROLLED LOCAL ANESTHETIC DELIVERY SYSTEM (WAND)
COMPLICATIONS AFTER A LOCAL ANESTHETIC

ANESTHETIC TOXICITY
TRAUMA TO SOFT TISSUE
COMPLICATIONS AFTER A LOCAL ANESTHETIC

TRAUMA TO SOFT TISSUE
Parents should be warned that the soft tissue in the area will be without sensation for a period of 1 hour or more.
Should be observed carefully.
Bite the lip, tongue, or inner surface of the cheek. There is no contraindication to the use of bilateral mandibular block anesthesia in pediatric patients.
ELECTRONIC DENTAL ANESTHESIA

Renewed interest in electronic dental anesthesia (EDA) A noninvasive method to block pain electronically by using a low current of electricity through contact pads that target a specific electronic waveform directly to the nerve bundle at the root of the tooth. Cannot be performed efficiently, and effectiveness of anesthesia is not consistently as reliable as with conventional techniques. Further research on EDA and the refinement of EDA delivery systems are required.

Benefits to the patient:

• No needles.
• No post-operative numbness or swelling.
• Chemical-free method of anesthesia.
• No risk of cross-contamination.
• Reduces fear and anxiety.
• Patients have control over their own comfort level.
These analgesics may be needed in instances of moderate to severe pain associated with trauma or infectious processes such as abscessed teeth, or they may be administered preoperatively or postoperatively in association with a dental procedure that may cause pain for the child. Cases of severe pain in which CODEINE and ACETAMINOPHEN are not effective, MEPERIDINE may be indicated.
# Maximum Recommended Doses of LA for Children

<table>
<thead>
<tr>
<th>Patient Weight Kg(\text{lb}) 1Kg=2.3Lbs</th>
<th>Milligrams 36.4 mg(\text{cartridge})</th>
<th>No. of Cartridges 1.8 ml(\text{cartridge})</th>
</tr>
</thead>
<tbody>
<tr>
<td>10(\text{\text{23}})</td>
<td>44</td>
<td>1.2</td>
</tr>
<tr>
<td>15(\text{\text{34.5}})</td>
<td>66</td>
<td>1.8</td>
</tr>
<tr>
<td>20(\text{\text{46}})</td>
<td>88</td>
<td>2.4</td>
</tr>
<tr>
<td>25(\text{\text{57.5}})</td>
<td>100</td>
<td>2.7</td>
</tr>
<tr>
<td>30(\text{\text{69}})</td>
<td>132</td>
<td>3.6</td>
</tr>
<tr>
<td>40(\text{\text{92}})</td>
<td>176</td>
<td>4.8</td>
</tr>
<tr>
<td>50(\text{\text{115}})</td>
<td>220</td>
<td>6.1</td>
</tr>
<tr>
<td>60(\text{\text{138}})</td>
<td>264</td>
<td>7.3</td>
</tr>
<tr>
<td>70(\text{\text{161}})</td>
<td>300</td>
<td>8.3</td>
</tr>
</tbody>
</table>

*Professor Othman Al-Ajlouni*  
*Sunday, November 09, 2014*
THANKS FOR YOUR KIND ATTENTION