Local Anesthesia for Procedures on Dental and Oral Structures

INTRODUCTION

This distance-learning seminar series was created to assist those providing direct patient care. This educational approach allows for viewing and study in the home location eliminating the need to travel, potentially interrupting patient care. The individual seminars can be viewed alone or in combination. Completion of the seminar series including the evaluations could qualify for continuing education credit or for meeting qualification for clinical use of local anesthesia in the oral cavity.

GOAL

Provide a distance learning educational tool to complement existing comprehensive texts such as Malamed’s Handbook of Local Anesthesia.

TARGET AUDIENCE

Clinicians not trained in Dentistry
Dental Hygienists who were not trained in Local Anesthesia Practices
Dentists seeking a review of current Local Anesthesia Concepts

FORMAT

A series of video recorded seminars with participation of students, residents, and faculty from an academic clinical center
Objectives, Outlines, and Evaluation Questions with each seminar
Suggested References with each seminar
Option to practice technique with simulated procedures
COURSE FACULTY

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Dr. Ray White

AVAILABLE: By subscription
**SEMINAR TOPICS**

Seminar One: Neurophysiology of Local Anesthetic Action

Seminar Two: Pharmacology of Local Anesthetic and Vasopressor Drugs

Seminar Three: Review of Anatomy of the Sensory Components of the Trigeminal Nerve and Associated Structures

Seminar Four: Equipment Essential to Drug Administration

Seminar Five: Maxillary Injection Options

Seminar Six: Mandibular Injection Options

Seminar Seven: Complications and Side Effects of Local Anesthetic Administration

Seminar Eight: Special Considerations for Patients with a Compromised Health Status

LAB Sessions:
Simulated Maxillary and Mandibular Injections

CLINIC Sessions:
Maxillary Buccal Infiltrations
Maxillary Palatal Infiltration
Mandibular Block Injection
Seminar One: Neurophysiology of Local Anesthetic Action

Resources (38 min.)
Chapter One: Neurophysiology,
   Handbook of Local Anesthesia: Malamed/Elsevier

OUTLINE
Anatomic Peripheral Nerve Components
Propagation of a Noxious Impulse (eg. Pain from Periphery)
Local Anesthetics, pH, and Buffering
Effectiveness of Local Anesthetics with Local Inflammation
Local Anesthetic Dosage and Nerve Cell Toxicity

OBJECTIVES
Explain how sensory nerves function
Relate the pharmacologic action of local anesthetic drugs to nerve function

Evaluation Seminar One
1. Smaller diameter nerve fibers are more affected by local anesthetic drugs as compared to larger diameter fibers with myelin sheaths.
   a. True
   b. False

2. Smaller diameter nerve fibers conduct pain impulses as rapidly as larger diameter nerve fibers.
   a. True
   b. False
3. Buffering Local Anesthetic Formulations Containing Vasopressors
   a. decreases onset of anesthesia
   b. increases number of de-ionized (Base) molecules of the drug
   c. could decrease required drug dosage
   d. all of the above

4. Persistent nerve dysfunction after local anesthetic administration though rare, is likely attributed to a toxic effect on the involved nerve fibers.
   a. True
   b. False

5. Cold applied to the skin surface can effectively block smaller sensory nerve fibers.
   a. True
   b. False

6. It is more difficult to achieve mandibular pulpal/bone anesthesia in the anterior alveolus than the molar region with a nerve block in the medial aspect of the ramus.
   a. True
   b. False
Seminar Two: Pharmacology of Local Anesthetic and Vasopressor Drugs (47.5 min.)

RESOURCES
Chapter Two: Pharmacology of Local Anesthetics and
Chapter Three: Pharmacology of Vasoconstrictors,
Handbook of Local Anesthesia: Malamed/Elsevier
Moore et al: Pharmacokinetics of Lidocaine with Epinephrine following local
Hersh et al: Reversal of soft-tissue local anesthesia with phentolamine mesylate in adolescents and adults. JADA 139:1080, 2008

OUTLINE
Chemical structure of local anesthetic drugs and clinical effectiveness
Chemical structure of vasopressor drugs and clinical importance if combined with local anesthetics
Clinical options for use of local anesthetic drugs

OBJECTIVES
Explain how chemical structure of local anesthetic drugs affects clinical usage.
What Advantages/Disadvantages do vasopressor drugs added to local anesthetics offer?

Evaluation Seminar Two
1. Making the chemical structure of a local anesthetic more lipophilic
   a. improves diffusion
   b. increases the duration of the local anesthetic
   c. eliminates the need for adding a vasopressor
   d. limits usage to block anesthesia
   e. Increases shelf-life

2. Adding a preservative to a local anesthetic is needed to lengthen the shelf-life of the vasopressor
   a. True
   b. False

3. Clinicians should not inject different local anesthetic drugs during the same procedure to the same patient
   a. True
   b. False

4. Intraoral injections of local anesthetic drugs can only be administered with a specially designed dental syringe
   a. True
   b. False

5. Most local anesthetic drugs are vasodilators
   a. True
6. Long acting local anesthetic drugs tend to be more lipophilic
   a. True
   b. False

7. Local anesthetic drugs post-procedure can reduce the cumulative dosage of opioids
   a. True
   b. False

8. The $\alpha$ effect of a vasopressor impacts clinicians use of the drug to reduce bleeding
   a. True
   b. False

Seminar Three: Review of Anatomy of the Sensory Components of the Trigeminal Nerve and Associated Structures (20 min.)

RESOURCES

Chapter Twelve: Anatomic Considerations, Handbook of Local Anesthesia: Malamed/Elsevier
REQUIRED READING
Overview Mandibular Anesthesia
https://www.youtube.com/watch?v=OrsEYc5NTCA#

OUTLINE
Review anatomic/sensory nerve pathways for V₂: Maxillary Nerve
Review anatomic/sensory nerve pathways for V₃: Mandibular Nerve

OBJECTIVES
Understand the anatomic pathways for sensory nerve innervation of the Maxilla

and the Mandible as a prelude to local anesthetic injections

Anticipate the Anatomic Boundaries for Specific Local Anesthetic injections

Evaluation Seminar Three
1. To acquire pulpal/periosteal anesthesia for a procedure on mandibular 2nd molar which of the following sensory nerves must be anesthetized?
   a. lingual N
   b. mylohyoid N
   c. inferior Alveolar N
   d. buccal N
   e. All but answer b

2. The Buccal Sensory N is a branch of the Facial Nerve.
   a. True
b. False

3. The Nasopalatine N traverses the Nasal Septum before terminating in the palate.
   a. True
   b. False

4. An Infraorbital N block can substitute for separate injections over Maxillary Incisor, Canine, and Premolar teeth.
   a. True
   b. False
Seminar Four: Equipment Essential to Drug Administration

RESOURCES
Part II: The Armamentarium,
   Handbook of Local Anesthesia: Malamed/Elsevier

OUTLINE
Options available for drug administration
Detailed Components of the of the dental anesthesia syringe
Components required for use of a disposable syringe
Options for Buffering Local Anesthetics

OBJECTIVES
Be able to choose an appropriate method of drug administration
Understand the rationale underlying the design of the dental anesthesia syringe

Evaluation Seminar Four
1. Intraoral local anesthesia can only be delivered with a dental anesthesia syringe.
   a. True 
   b. False

2. In adult patients a 30 gauge needle is more effective way to deliver a local anesthetic than a 27 gauge needle.
3. Local anesthetic drugs supplied in multi-dose vials are less effective than drugs in dental carpules.
   a. True
   b. False

4. The components of a sterilizable dental anesthetic syringe are securely welded together so they never fall apart.
   a. True
   b. False

5. The piston with the harpoon is the most sturdy component of the aspirating syringe used for local anesthesia and least likely to break.
   a. True
   b. False
SEMINAR FIVE: Maxillary Injection Options

RESOURCES
Chapter 13: Handbook of Local Anesthesia: Malamed/Elsevier

REQUIRED READING
Maxillary Injections
Intro 2min
https://www.youtube.com/watch?v=JZeJepwiOo8

PSA 4min
https://www.youtube.com/watch?v=nrYUpzPUdyw

Maxillary V2 Block 4min
https://www.youtube.com/watch?v=0irRxI8tWAi

Maxillary (Palatal) Injection includes manikin 6min
https://www.youtube.com/watch?v=px1zQh7HJpM

Infraorbital nerve block 4min
https://www.youtube.com/watch?v=rIOrVSC2fE8

OBJECTIVES
Understand:
Technique options for maxillary anesthesia and associated soft tissues
Rationale for choosing among options

OUTLINE
Posterior Superior Alveolar Nerve Block Technique
Infraorbital Nerve Block Technique
Nasopalatine Nerve Block Technique
Maxillary (V2) Nerve Block Technique

Evaluation Seminar Five

1. The posterior superior alveolar nerve block will reliably and completely anesthetize the entire maxillary first molar tooth.
   a. True
   b. False

2. The Maxillary (V2) nerve block will provide anesthesia and hemostasis when performing deep scaling and curettage in the entire maxillary posterior dentition.
   a. True
   b. False

3. The posterior superior alveolar nerve block has a negligible incidence of hematoma formation.
   a. True
   b. False

4. The nasopalatine nerve block will anesthetize soft tissue on the palate adjacent to the incisors and canines bilaterally.
   a. True
   b. False

5. One of the primary landmarks for the infraorbital nerve block injection is the lateral junction of the upper and lower eyelids.
   a. True
   b. False
SEMINAR SIX: Mandibular Injection Options (44 min.)

RESOURCES
Chapter 14: Handbook of Local Anesthesia: Malamed/Elsevier

REQUIRED READING
Halstead Technique 5min
https://www.youtube.com/watch?v=kmPqV-dMo98#
Halstead Technique 11min
https://www.youtube.com/watch?v=-f10Z-OYH1Q#
Gow Gates Technique 5min
https://www.youtube.com/watch?v=8i0eVX1vEpA#
Akinosi (closed mouth) Technique 4.5 min
https://www.youtube.com/watch?v=yEcVhYQsXOk#

OUTLINE
Halsted-Shields Technique
Gow Gates Technique
Akinosi Closed Mouth Technique

OBJECTIVES
Understand:
Technique options for mandibular anesthesia and associated soft tissues
Rationale for choosing among options
Evaluation Seminar Six

1. The Halstead technique for mandibular block anesthesia requires that the anesthetic drug be deposited in separate anatomic locations.
   a. True
   b. False

2. If a patient cannot open their mouth the Akinosi technique may achieve adequate anesthesia.
   a. True
   b. False

3. With which technique is a patient more likely to comment, “I feel like the effect is like a wave from front to back”?
   a. Akinosi-closed mouth
   b. Shields
   c. Gow Gates
   d. Halstead

4. Mandibular block injections can be administered with a plastic syringe and attached 27 gauge injection needle.
   a. True
   b. False
SEMINAR SEVEN: Complications and Side Effects of Local Anesthetic Administration (44.5 min.)

RESOURCES
Chapter 17: Handbook of Local Anesthesia: Malamed/Elsevier

OUTLINE
Clinical Strategy to Minimize Complications and Side Effects

OBJECTIVES
Discuss Rationale and Prevention for the following:
- Syncope
- Bleeding along Injection Path
- Drug Overdosage
- Anesthesia of Adjacent Nerves
- Allergy
- Prolonged Nerve Dysfunction

Evaluation Seminar Seven
1. Syncope is common in clinical settings only for patients with a previous history of the condition.
   a. True
   b. False
2. Only patients on “blood thinners” can have excessive bleeding along an injection path.
   a. True
   b. False

3. If a patient has an asymmetric smile after a mandibular block injection the facial nerve was anesthetized.
   a. True
   b. False

4. Maximum suggested dosages of local anesthetic drugs aim to minimize systemic effects of the administered drugs.
   a. True
   b. False

5. Oculomotor dysfunction after a maxillary injection though disturbing to the patient is usually time limited.
   a. True
   b. False

6. Anesthetic drug formulation without vasopressors usually do not contain sulfites as preservatives.
   a. True
   b. False

7. Prolonged sensory nerve dysfunction longer than a month without signs of sensation recovery requires specialist consultation.
   a. True
   b. False
Seminar Eight: Special Considerations for Patients with a Compromised Health Status (40 min.)

RESOURCES
Chapter 17: Handbook of Local Anesthesia: Malamed/Elsevier

OUTLINE
Lidocaine Precautions
Epinephrine Precautions

OBJECTIVES
Understand metabolism of amide type local anesthetics relative to renal and liver disease.
Understand metabolism of epinephrine as it relates to cardiovascular disease and asthma.
Explain interactions and systemic effects between epinephrine and Beta Blockers, Tricyclic anti-depressants, and Cocaine

Evaluation Seminar Eight
1. A patient who has a liver transplant scheduled wants all her dental work involving all anatomic quadrants completed in one appointment. This has few risks and the patient’s wishes should be accommodated.
   a. True
   b. False
2. A patient being treated for esophageal cancer has been told he has a “fatty liver”. This suggests decreased liver function.
   a. True
   b. False

3. A patient routinely takes propranolol, a non-selective beta blocker, to calm down before presentations at work. His risk for dental treatment incorporating a local anesthetic with epinephrine is
   a. stroke
   b. transient elevation in blood pressure
   c. syncope
   d. an allergic rash
   e. none of the above

4. A patient has taken several different cardio-selective beta blockers over time. His cardiac status is at minimal or no risk for an interaction with local anesthetics and epinephrine in usual clinical dosages.
   a. True
   b. False

5. Many clinicians accept that a “heart patient” should receive no more than 4cc of a local anesthetic containing 1/100k epinephrine. This guideline is based on decades of clinical investigation.
   a. True
   b. False

6. A clinician is correctly concerned about minimizing the dose of injected epinephrine in a patient. This means a needed supplemental injection of lidocaine with epinephrine should not be given an hour into the procedure.
   a. True
   b. False
LAB Sessions:
Local anesthesia devices
Simulated Maxillary and Mandibular Injections

CLINIC Sessions:
a-Clinicians choice of techniques for Mandibular Block
b-Anterior Maxillary infiltration
c-Clinicians choice of palatal injection
d-Anterior Mandibular infiltration with a disposable syringe