

December 2016 version

# **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**

Dr. Glenn Reside

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**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

anesthesia reversal with Phentolamine mesylate. Anes Prog 55:40, 2008

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

- b. False
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 V<sub>2</sub>: Maxillary Nerve

Review anatomic/sensory nerve pathways for V<sub>3</sub>: 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 2<sup>nd</sup> 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 ad ministration

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.

- a. True
- b. False

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

Haas et al: A 21 year retrospective study of reports of paresthesia following local anesthetic administration. J Can Dent Assoc., 61:319, 1995

### **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

Sisk AL: Vasoconstrictors in local anesthesia for dentistry. Anesth Prog 39:187, 1992

Perusse R et al: Contraindications to vasoconstrictors in dentistry. Oral Surg Oral Med Oral Path Part 1 74:679, Part 2 74:687, Part 3 74:692 1992

### **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**