

1 **UPDATES IN DENTAL LOCAL ANESTHESIOLOGY**

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2 **EXPERIENCE AND EXPECTATIONS OF LOCAL ANESTHESIA**3 **THE INJECTION & PATIENT DISSATISFACTION**

- Related to many dissatisfaction reports
- #1 way dentists are judged
- Comfortable injections are considered the best practice builder
- Most reports of bad dental experience relate to pain during care
- Proficiency and efficiency in anesthetic administration should be a priority goal for dental care teams

4 **MEDIA NAVIGATION**

- The "YELP Era"
 - In 2010, more than 112,000 individual doctors were reviewed, compared with 2,475 in 2005
 - 23% of 2137 adults surveyed for JAMA use rating sites such as Healthgrades, Vitals, RateMDs, and ZocDoc.
 - Harvard business school found a one-star drop in a rating can reduce revenue by almost 10%

5 **THE DENTAL NEEDLE**6 **PRACTICE CHARACTERISTICS-DENTAL NEEDLE**7 **PRACTICE CHARACTERISTICS**

- Over the last 30 years, shift toward the use of smaller diameter needles
- Based on assumptions of less trauma and discomfort with smaller needle
- Assumptions contradicted by published research using intraoral needles and evaluation of pain

8 **NEEDLE PROPERTIES**

- Exists considerable variation in how a needle is selected
 - Needle types (not manufacturer necessarily) familiar with during training
 - Peer influence
 - Economics
 - "A needle is a needle"
- Differences in manufacturing/design

9 **NEEDLE GAUGE**

- The diameter of the needle (25, 27, 30) – higher the gauge the smaller the diameter
- Shift to using smaller diameter needles
- Conjecture that smaller needles equal smaller pain perception

10 **NEEDLE GAUGE**

- Comparisons by Fuller and Brownbill have shown that a 25- gauge needle can be used as painlessly as a 30- gauge needle
- Hamburg reported that patients are unable to differentiate among different gauge needles

- Flanagan et al concluded that there was no statistically significant difference in pain perception among subjects analyzed

11 **THE BEVEL**

- Sloping tip of the needle
- Five main types of bevel

12 **THE BEVEL**

- The role of the bevel is to provide a cutting surface that offers little resistance to mucosa as the needle penetrates and withdrawals from tissue
- As opposed to needle gauge, several researchers advocate that the sharpness and structure of the bevel plays a more important role in decreasing pain response

13 **BETTER BEVEL = DECREASED FORCE**14 **THE BEVEL**

- As resistance to tissue decreases patient comfort has been reported to improve
- Designs with low tissue resistance
 - Multibeveled point design
 - Scalpel bevel design

15 **THE BEVEL**

- Scalpel Design – Evolution Needle
 - “The novel design needed less force than the standard version to penetrate a thin membrane when used at 30° and 150° to the surface and to penetrate a polyvinyl siloxane block to a depth of 10mm but required more force to penetrate a thin membrane at 90°.”

16 **THE BEVEL (ANESTHETIC SUCCESS)**

- MYTH: the bevel should ALWAYS be oriented toward the area to be anesthetized which would allow for a directional flow of anesthetic toward the nerve and increased anesthetic success
- Steinkruger et al. demonstrated that bevel orientation toward or away from the target area does not affect anesthesia success

17 **THE BEVEL (ANESTHETIC SUCCESS)**

- ACTUALLY: This theory should be based on bevel displacement or deflection
- Because of bevel design; the needle tip is assymetric creating an off balance aspect to the needle tip

18 **THE BEVEL (ANESTHETIC SUCCESS)**19 **THE BORE OR LUMEN**

- The hollow portion or tube of the needle
- The bore design correlates with patient comfort due to injection pressure
 - *There exists a variable with provider technique*

20 **THE BORE OR LUMEN**

- Injection Pressure

21 **THE BORE OR LUMEN**

- Injection pressure was found to directly influence the intensity of pain perceived by patients
 - Although some studies show once pressure above 500 mm Hg / 10 psi that pain does not

significantly increase.

- Anesthetic and ischemia by pressure
- Pashley et al. revealed that the pressure generated during LA administration had high values
 - 325-675 PSI

22 **BORE SIZE AND PAIN PERCEPTION**

- Found no difference in large or standard bore needles and pain perception (n=20)
- Limitation of the study:
 - Only 1 time interval was used per injection site (ie, 15 seconds for the IA injection and 5 seconds for the LB injection).
 - "It may be possible that other time intervals or rates of injection may have shown a significant effect on the perception of pain between the different bore sizes."

23 **INJECTION PRESSURE AND INFILTRATION ANESTHESIA**

- Yoshida et al, suggest that when injection pressure of subperiosteal infiltration anesthesia is low, infiltration of local anesthetic to the jawbone of rabbits may be reduced, while transfer to oral mucosa and blood may be increased.
 - As injection pressure increases, the quantity of lidocaine concentration increased and serum lidocaine concentration decreased.

24 **SELECTING A QUALITY NEEDLE**

- A review of available research does provide the ideal needle characteristics such as: multi-beveled / scapel-bevel point; a bevel design that is centralized with the long axis of the needle; larger bore needles; silicon coating; appropriate metal alloy used in manufacturing; non-deflecting needle design, and appropriate metal finishing.
- Ultimately, the design should aid the practitioner in providing the most effective and safe anesthetic administration while causing the least amount of pain as possible.

25 **MICROSCOPIC ASSESSMENT**

26 **SELECTING A QUALITY NEEDLE**

- Given conclusions that significant differences exist between the needles of each manufacturer, further research is needed that compare the quality, efficacy, and safety, of available dental hypodermic needles

27 **LOCAL ANESTHETIC PHARMACOLOGY & THERAPEUTICS**

28 **SEARCHING FOR THE IDEAL LOCAL ANESTHETIC**

- Non-irritating to tissue.
- Non-allergenic.
- Completely reversible effects.
- Minimal systemic toxicity.
- Rapid onset and adequate duration.
- No post-injection complications.
- Selective to nociception (pain sensation).

29 **COCAINE**

- CNS Stimulation
 - Provides a sense of well-being, endurance and euphoria.
- High doses induce and potentiate convulsions.

- Cardiovascular stimulation with increases in blood pressure, heart rate and arrhythmias.
- Direct and indirect hyperpyrexia.
- Local anesthesia with limited indications.
 - Upper respiratory procedures
 - TAC for laceration repair

30 **PROCAINE**

- Brand name is Novocaine
- Hydrolyzed to para-aminobenzoic acid and diethyl amino alcohol.
- Poor efficacy and profundity.
- Short durations--requires a vasoconstrictor.
- High incidence of allergy

31 **LIDOCAINE**

- Brand Name: Xylocaine® and Lignospan®
- Available in cartridges as
 - 2% lidocaine; 1:100,000 epinephrine
 - 2% lidocaine, 1:50,000 epinephrine
- Excellent onset times and profundity (when combined with a vasoconstrictor)
- "Gold standard" for comparison to other anesthetics.

32 **PRILOCAINE**

- Brand Name: Citanest®
- Preparations in dentistry are
 - 4% prilocaine plain
 - 4% prilocaine; 1:200,000 epinephrine
- Anesthetic characteristics similar to lidocaine with epinephrine.
- Metabolic product (toluidine) may be the cause of reports of methemoglobinemia.

33 **METHEMOGLOBINEMIA**

- ✓Increased quantities of hemoglobin with iron oxidized to the ferric form (Fe^{3+}).
- ✓Acquired: NADH cytochrome b_5 reductase deficiency (The Blue Fugates of Kentucky)
- ✓Normal levels 0-2%, Cyanosis 10-30%, Lethargy and Respiratory distress 30-60%, Death >70%.
- ✓Induced: nitrates, sulfonamides, benzocaine or prilocaine
 - ✓Prilocaine's primary metabolite toluidine, induces met- ortho-hemoglobinemia.
- ✓Treatment: methylene blue 1-2 mg/kg i.v. infusion.

34 **PRILOCAINE AND METHEMOGLOBIN LEVELS**

- Ninety children, 3-6 years of age, undergoing dental rehabilitation under general anesthesia: group 1, 4% prilocaine plain, group 2, 2% lidocaine with 1 : 100,000 epinephrine, group 3, no local anesthetic.
- Prilocaine, at 5 mg/kg in pediatric dental patients, resulted in significantly higher peak SpMET levels than lidocaine and no local anesthetic.
-

35 **MEPIVACAINE**

- Somewhat shorter duration of pulpal anesthesia than lidocaine/epi.
- Available in cartridges as:
 - 3% mepivacaine
 - 2% mepivacaine; 1:20,000 levonordefrin
- Minimal vasodilating properties.

36 **BUPIVACAINE**

- Marketed as Marcaine® and Vivacaine®
- Provides prolonged duration of soft tissue anesthesia to delay the postoperative pain.
- 0.5% bupivacaine, 1:200,000 epinephrine.
- Onset time is longer than other drugs b/c of elevated pKa
- Long duration due to binding to tissue proteins (about 80%).

37 **BUPIVACAINE AND CELLULAR FUNCTION**

- Recent clinical studies suggest that bupivacaine stimulates the inflammatory response
 - May increase the amount of post operative pain at time of maximal inflammation (48 hours) in spite of decreased pain in the immediate postoperative period
 - Similarities in studies suggest BUPIV is effective for blocking pain during the surgical procedure and provides analgesia up to 24 hours
 - Although pain increases between 24 and 48 hours
 - Addition of NSAID or COX 2 before and/or after surgery allows some suppression of pain

38 39 **BUPIVACAINE AND CELLULAR FUNCTION**

- Evidence suggests that bupivacaine activates inflammation and increases inflammation from the tissue injury of surgical procedures
 - Can increase pain at later time period
 - Can be overcome with the addition of anti-inflammatory agent

40 **ENDO, IA INJECTION, & NSAIDS**

- Lapidus et al. evaluated 9 RCTs with patients that took ibuprofen, ketorolac, diclofenac, idomethacin, and lornoxicam – 1 hour prior to endo appointment
- Reported statistically significant difference in pain during endodontic treatment for *irreversible pulpitis* ("little or no pain")
- *MODERATE evidence* to support the use of oral NSAIDs
 - Authors state a particular moderate evidence w/ ibuprofen (600mg) 1 hour before IANB injection of 2% lidocaine w/ 1:100,000 epinephrine (1.8-3.6 mL)

41 **BENZOCAINE**

- Most widely used topical anesthetic agent
- Exists in almost 100% base form (poor systemic absorption)
- Available in 6-20% concentration (20% most widely used)
- Onset @ 0.5 to 2 minutes
- Duration @ 5-15 minutes
- MRD: Not established (never exceed 2 second administration period with spray)

42 43 **ANESTHETICS AND NEUROTOXICITY**

- All local anesthetics are neurotoxic
- Neuropathies have been associated with intraoral regional anesthesia since initiation of the modality
 - Paresthesia
 - An abnormal sensation, typically tingling or pricking.
 - Hypoesthesia
 - Refers to a reduced sense of touch or sensation, or a partial loss of sensitivity to sensory stimuli (referred to as "numbness").
 - Dysaesthesia
 - When proprioception results in some unpleasant sensation, such as pain, burning, or tingling.

44 **DYSESTHESIA AND DIFFERENTIAL DIAGNOSIS**

- Dysesthesia is commonly seen in diabetic patients, and can be relieved by using creams containing capsaicin.
- Dysesthesia may be seen in patients suffering from Guillain-Barre syndrome.
- Dysesthesia, along with polyneuropathy can be a symptom of nerve damage caused by Lyme Disease. The dysesthetic sensations continue after the successful antibiotic treatment of Lyme disease.
- Dysesthesia is a common symptom of a withdrawal from or other drugs.
- Dysesthesia is also a common symptom of Multiple Sclerosis, or MS. It is an effect of spinal cord injury.
-

45 **ORAL DYSESTHESIA IN THE DENTAL OFFICE**46 **LOCAL ANESTHETICS' ROLE IN ADVERSE NERVE EVENTS**

- Very rare compared to overall use of anesthetics

47 **NEUROPATHY AND THE LINGUAL NERVE**48 **WHY THE LINGUAL NERVE?**

- Anatomical Location
 - "It's in the way!"
Malamed
- Multifascicular VERSUS Unifascicular

– Dr. Stanley

49 **ROPIVACAINE**

- Long-acting amide local anesthetic agent
- Less lipophilic than bupivacaine and is less likely to penetrate large myelinated motor fibres, resulting in a relatively reduced motor blockade.
 - Associated with decreased potential for central nervous system toxicity and cardiotoxicity.
- Ropivacaine, in concentrations of 0.50% or higher, has been shown to be an effective alternative to bupivacaine with epinephrine for mandibular nerve blocks in patients.

- Its advantages are lower cardiovascular toxicity and no need for epinephrine to achieve prolonged duration. The limiting factor for the introduction of ropivacaine as a popular choice for routine dental local anesthesia administration will still remain the fact that it is not available in dental cartridges.

50 **FEAR AND ANXIETY**

51 **PARENT OF PATIENT ANXIETY EVALUATION**

- Prospective questionnaire-based analysis (early stage of data collection)
- Evaluating
 - Anxiety levels
 - Dental knowledge
 - Parent dental treatment history
- Evaluation of communication process between parent and pediatric patient

52 **CORAH'S ANXIETY SCALE**

- A series of questions relating to a dental visit
- Anxiety rating:
 - • 9 - 12 = moderate anxiety but have specific stressors that should be discussed and managed
 - • 13 - 14 = high anxiety
 - • 15 - 20 = severe anxiety (or phobia). May be manageable with the Dental Concerns Assessment but might require the help of a mental health therapist.
- All respondents (AR): 11.65
 - Parents of patients that required referral to moderate or deep sedation/general anesthesia (RP): 15.52

53 **DENTAL KNOWLEDGE SCORE**

- A series of five questions that gauge basic dental knowledge
 - Cavities and brushing
 - Restoration placement
 - Home oral hygiene
 - Timing of dental examination
 - Use of mouth rinse
- AR: 2.98 (59.6%)
- RP: 1.90 out of 5 (38.0%)

54 **POINTS OF MEASUREMENT**

- Parent needs sedation care
 - AR: No (57.1%)
 - RP: Yes (75.0%)
- Discuss appointment with child
 - AR: Yes (88.9%)
 - RP: Yes (81.2%)
- Description of parent's dental visit to child
 - AR:
 - Positive (58.9%)
 - Negative experience (8.0%)
 - As a positive experience but told them about a difficult appt I had in the past

(19.6%)

- Negative experience, but told them their appointment would be better (13.5%)

55 **PARENT PAST DENTAL EXPERIENCE**

- Parent had a bad experience with dental care in the past
 - AR: 50.1%
 - RP: 75.0%
- Description of parent bad experience (total selections)
 - 1 – Dentist’s attitude, way you were treated (24.1)
 - 2 – Significant pain during procedure (21.3)
 - 3 – I did not get numb and the dentist continued drilling anyway (20.6)
 - 4 – Getting a shot (19.1)

56 **OUTCOMES OF ANALYSIS**

- Did not find a “magic” question that would produce more reliability with appointment scheduling
- Investigators surprised at percentage of negative reports/connotations related to patient
- Opted to go with scripting and patient communication & knowledge gain

57 **SCRIPTING COMMUNICATION**

- Basic instruction to staff will include brief information on three verbal approaches to patient/parent fear.
 - The permissive approach (provide relevant information regarding treatment to relieve uncertainty);
 - The empathetic approach (share another person’s feelings);
 - The personal approach (create the feeling that a personal relationship exists).

58

59 **CBT AND DENTAL PHOBIA**

- Cognitive behavioral therapy (CBT) could help people with a dental phobia overcome their fear of visiting the dentist and allow them to receive dental treatment without undergoing sedation.
- Studies are beginning to show that guided internet-based CBT is highly effective in reducing anxiety and increasing the ability to deal with dental treatment.
 - One year later, half of the children were completely free of their phobia.
-

60

61 **TO BUFFER OR NOT TO BUFFER**

- Buffering is the addition of a chemical agent to a solution which increases its pH (to the body’s normal pH)
 - Decreases pain on injection
 - Possible catalytic effect of CO₂

62 **BUFFERING**

- Decreases Pain on Injection
 - Meta Analysis

- Review of 12 published abstracts: 609 observations for buffered local anesthetic and 615 for unbuffered local anesthetic.
 - Buffered local anesthetic resulted in a statistically lower weighted mean difference in visual analog scale compared with unbuffered local anesthetic.
- 63 publications, of these, 22 were human prospective randomized controlled trials directly assessing the pain of infiltration. Three papers were based on observations.
 - The evidence is that buffering with sodium bicarbonate significantly reduces the pain of local anesthetic injection.

63 **BUFFERING- CATALYTIC EFFECT**

- Sodium bicarbonate interacts with the hydrochloric acid to create water and CO₂
- CO₂ with lidocaine HCL potentiates the action of lidocaine
 - Depressed effect of axon by CO₂
 - Concentrate anesthetic inside nerve trunk
 - Changes the anesthetic charge inside nerve trunk

64 **APPLICATION IN DENTISTRY**

- Some studies present faster onset times and decrease in pain on injection that are dentistry specific.¹⁻²
- Some studies report no effect with buffering dental local anesthetics³
Evaluation of these publications Reveals a Large Variable
 - Variation in injection technique
 - Improvement with procaine
 - Accuracy of injection

65 **ADMINISTRATION OF BUFFERING AGENT**

- OnPharma Buffering System
- The practitioner should choose a volume in a ratio of 10:1 (local anesthetic solution to sodium bicarbonate solution).

66 **ADMINISTRATION OF BUFFERING AGENT**

- Must be used within first few minutes of buffering initiation
- Delay in administration causes a loss of CO₂
 - Decrease in reliability of agent
-

67 **STUDY ON BUFFERING & ONSET TIME**

68 **GOOD TIMES, BAD TIMES, I'VE HAD MY SHARE**

69 **QUALITY EVENTS AND LOCAL ANESTHESIA ADMINISTRATION**

- Complications and adverse events are extremely rare in dentistry compared to the number of patients seen each day
 - Lower adverse reports versus hospital based regional anes.
 - Lower adverse reports versus ambulatory surgical care

70 **LOCAL ANESTHESIA COMPLICATION STUDY**

71 **LA COMPLICATION STUDY**

- Variables
 - Phentolamine administration
 - Obesity

- ADHD
 - Administration of a IANB injection
 - Data collected from the standardized form reveals IANB injections to be a variable to complication incidence ($P < 0.05$, CI 95%), appearing in 22 of the 49 reports (44.9%).
- 72 **LA ANESTHESIA SPNEEDS EVALUATION**
- 73 **LA SP NEEDS EVALUATION**
- Variables
 - Obesity
 - Administration of IANB injection
 - IANB injections a true variable to complication incidence ($p < .05$, CI95%); appearing in 13 of the 14 reports.
- 74 **ORAVERSE**
- 75 **POSITIVE BENEFIT / RISK**
- OraVerse significantly accelerated time to return to normal sensation and function
 - Within one hour of injection, 51% of patients undergoing mandibular procedures and 58% patients undergoing maxillary procedures had recovered normal function
 - Only 20% of patients receiving no injection reached this level of normal function
- 76 **PHENTOLAMINE MESYLATE - ORAVERSE®**
- Proposed Mechanism of Action
 - Increase vasodilation
 - Increase elimination and clearance
 - Decrease soft tissue effects of local anesthetic deposition
- 77 **ORAVERSE CLINICAL USE [VERMA ET AL.]**
- “Only a subgroup of the dental patient population undergoing specific dental procedures would benefit from accelerated recovery from numbness.”
 - Meta-analysis of the efficacy data from 4 clinical studies supports the role of intraoral phentolamine injections in shortening the duration of numbness after local anesthesia.
 - The literature lacked substantial evidence in favor of clinical benefits, such as a decrease in self-inflicted injuries.
 - Phentolamine mesylate incurs an additional cost (in US dollars) of *\$0.13 to \$0.46 per minute* of reversing the soft tissue local anesthesia, when compared with sham or placebo injection, after a noninvasive dental procedure.
- 78 **ORAVERSE CLINICAL USE [DAUBLANDER ET AL.]**
- PM reduced the time to recovery of normal sensation and function with a difference in the median time of 70 and 79 minutes with two separate groups.
 - The PM group had, at any time point, a 2.77-fold higher chance of recovery to normal sensation and for normal function 2.94-fold higher chance of recovery to normal sensation
 - The observed incidence of AEs with PM treatment was 8.4%. No serious AEs occurred.
 - *Conclusion:* The results confirm the effectiveness, safety, and tolerability of PM used in patients with routine dental conditions in Germany, and that PM augments the safety of dental treatments.
- 79 **INDICATIONS & USE OF ORAVERSE**
- *Adults:*

- OraVerse (phentolamine mesylate) is indicated for reversal of soft-tissue anesthesia resulting from an intraoral submucosal injection of a local anesthetic containing a vasoconstrictor, following a noninvasive routine dental procedure.
- *Pediatrics (6 to 18 years of age):*
 - OraVerse is indicated for reversal of soft-tissue anesthesia resulting from an intraoral submucosal injection of a local anesthetic containing a vasoconstrictor, following a non-invasive routine dental procedure.
- *Pediatrics (<6 years of age):*
 - Safety and efficacy of OraVerse have not been established in children less than 6 years of age or weighing less than 15 kg (33 lbs). Therefore,
 - OraVerse is not recommended for use in this population

80 **DOSAGE WITH ADMINISTRATION**

- Adults:
 - The maximum recommended dose is 0.8 mg (2 cartridges).
- Pediatrics:
 - In pediatric patients weighing 15-30 kg, the maximum dose of OraVerse recommended is 0.2 mg (1/2 cartridge).
 - Use in pediatric patients under 6 years of age or weighing less than 15 kg (33 lbs) is not recommended.
 - A dose of more than 0.4 mg (1 cartridge) of OraVerse has not been studied in children less than 18 years of age.
- Caution with Hepatic and Renal Impairment
-

Administration at same location as anesthetic injection

81 **TECHNIQUE/METHOD VARIATION**

- Exclusivity exists with injection methodology, equipment, and agents between dental providers and care sites.
 - Patient population
 - Clinician gender
 - Practice location
 - Provider and staff training
 - Business models

82 **THE "ONE-TWO INJECTION"**

- Proposed by Levine in 1968
 - Recently suggested as a technique to reduce pain experience by Walton et al (endodontic practice)
- Uses a two step injection technique
 - 1- shallow injection to introduce anesthetic to free and terminal nerve endings
 - 2- the second injection occurs at the target site

83 **TWO-STAGE INJECTION TECHNIQUE**

84 **WHY A RESURGENCE IN AWARENESS?**

- 2-stage injection most likely employed at IANB injection
- Anecdotal statements on use incorporate studies that found 20% benzocaine to not consistently reduce the pain of needle-mucosa penetration with IANB injection
 - *Some studies note that a psychological connection exists which relates to reducing the expectation of pain and the role of the U.S. dental provider to reduce or eliminate the

pain experience.

•

85 **EFFECTIVENESS???**

- Research is extremely limited; however,
 - Nusstein et al.
 - No difference between 2-stage and Halsted
 - 2.2mL LIDO100
 - McCartney et al
 - Improved pain experience for women vs. men with 2-stage with LIDO100
 - Sandeep et al.
 - 2-stage provided less pain in children w/ 2% Lido w/ 1:80,000 epinephrine for IANB and infiltration

86 **ANESTHETIC SELECTION**

- Varies and depends on provider preference and patient characteristics
- Often associated with 4% prilocaine plain as the primary agent and LIDO100 or articaine formulations.
- 4% Prilocaine plain use proposed due to its pH value of 6.0-7.0

87

88 **SO, WHAT?**

- Anesthetic selection should be a controllable variable; however, conclusive information on the best agent is limited
- In a recent analysis 24 studies were evaluated
 - Majority (71%) found no significant difference between the anesthetics being tested
 - 13 of the 17 only evaluated vasoconstrictor containing agents
 - Correlation seen with vasoconstrictors vs. none
 - 3 of 14 that evaluated LIDO100 found it to provide the least discomfort
 - 3 of 5 that evaluated PRIL w/o and found it to produce the lowest pain response

89 **INTRALIGAMENTARY INJECTIONS (ILI)**

90 **ILI: METHODOLOGY**

- A type of interosseous injection
- A universal supplemental injection
- Mandible versus maxilla
- Limited spread of anesthesia

91 **ILI: ADVANTAGES**

92 **ILI: DISADVANTAGES**

93 **STANDARD ILI TECHNIQUE**

- Preparation of area
 - Antiseptic ---- Topical Anesthetics
- Syringe choice
- Anesthetic choice
- 27 gauge short or 30 gauge ultra short needle
 - Bevel orientation

- Advance to the area of the root and crestal bone at the depth of the gingival sulcus
- Administer 0.2 mL over a 10 to 20 second period
 - High pressure administration

94 **ILI TECHNIQUE**

95 **SYRINGES AND DEVICES**

- Standard Syringe
 - Allows for slow administration
 - Pressure can be difficult to overcome
 - Rubber stopper as a guide
- Peripress / Intraligamentary syringe
 - Mechanical advantage
 - One squeeze of trigger with successful mechanical engagement dispensing 0.2 mL
 - Avoid avulsion
- Computer Controlled Loc Anes Delivery (C-CLAD)
 - Technological advantage

96 **C-CLAD DEVICES**

97 **ILI - CONTRAINDICATIONS**

- Inflammation or infection of periodontal tissues
 - Attachment loss of 5mm or more
- Primary teeth when the permanent tooth bud is present
- Situations in which the psychological comfort of soft tissue anesthesia is advantageous &/or beneficial

98 **ANY QUESTIONS???**