Oral Surgery

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Local anesthesia is administered to reduce pain during dental treatments, but may itself cause pain and contribute to increased dental fear. However, as good as they are, LAs are not perfect:

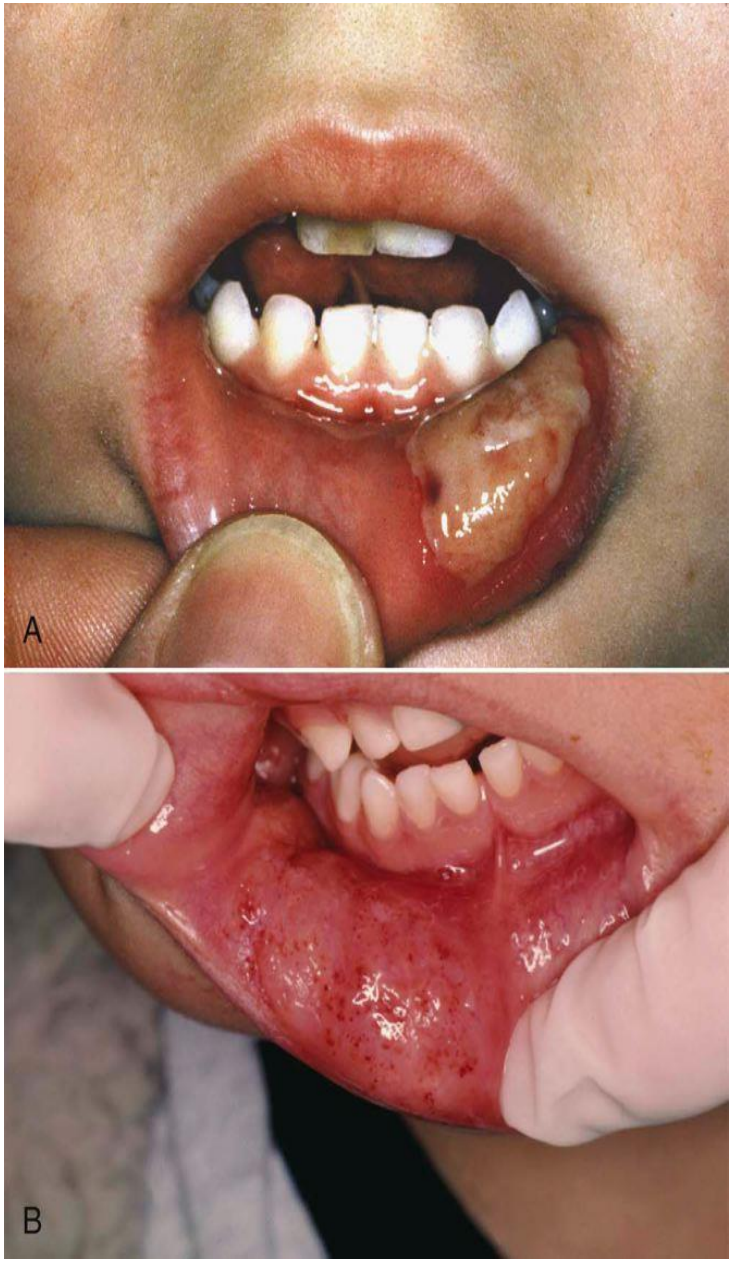
- LAs containing a vasopressor sting on injection.
- LAs are associated with a degree of postinjection tissue injury.
- LAs have relatively slow onset.
- LAs do not work as reliably in the presence of infection and inflammation.

These drawbacks can be addressed by buffering the anesthetic solution to a more physiologic pH:

- Eliminates the sting on injection
- Reduces tissue injury and postinjection soreness
- Reduces latency
- Introduces the independent anesthetic effect of carbon dioxide
- Introduces the catalytic effect of carbon dioxide

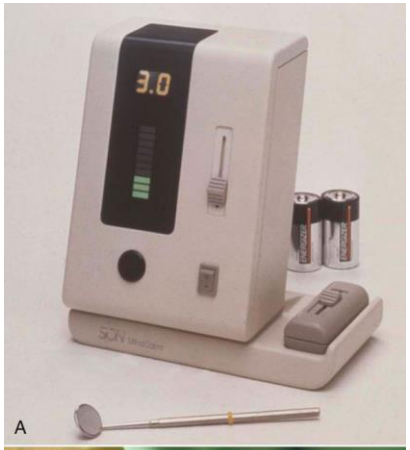
- Because the addition of $NaHCO_3$ must occur within minutes of injection, it is not possible for the local anesthetic manufacturer to produce buffered LA cartridges.
- Until recently, dentists who attempted to buffer Las would do so by expelling a volume of LA from the cartridge and replacing it with an equal volume of $NaHCO_3$. This means of buffering led to inconsistent results.

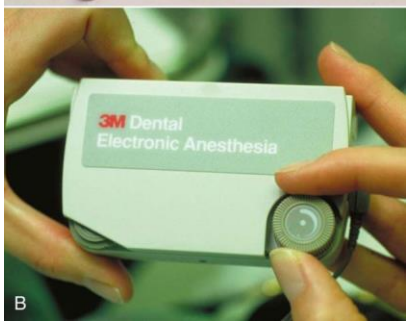
- A prospective study on children revealed 18% of children younger than 4 years, 16% of children between 4 and 7 years, and 13% of children between 8 and 11 years displayed postdental treatment soft tissue trauma after receiving mandibular nerve block injection.
- Unintentional biting and injury of the lips, tongue, and cheeks has been reported in pediatric patients due to prolonged STA.

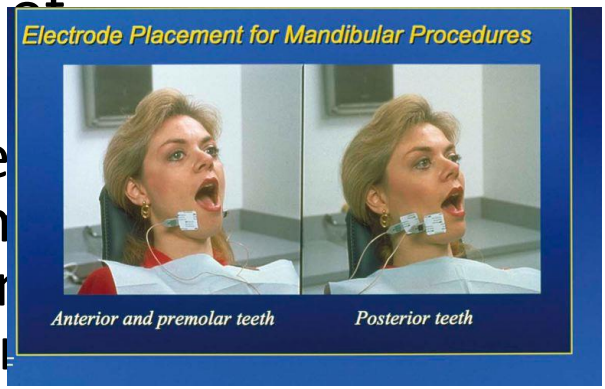


Transcutaneous electrical nerve stimulation

- To reduce the prolonged STA, a procedure used in the field of medicine to provide relief from chronic pain and edema with the delivery of a low-frequency electrical stimulus to an area, was employed.
- TENS increases tissue perfusion produced by capillary and arteriolar dilation while stimulating the contraction of skeletal muscles to the area applied. Thus, the local anesthetic drug would undergo a more rapid redistribution into the capillaries and venules in that area thereby reducing the duration of residual STA.
- The application of intraoral TENS was not ve well accepted because of its cumberson apparatus and difficulty in placing ar stabilizing the electrodes intraorally resulti in achievement of limited success







Phentolamine mesylate

- The administration of phentolamine mesylate causes vasodilation at the site where the anesthetic agent is injected which leads to enhanced absorption of local anesthetic and thus shortens the duration of anesthesia.
- Phentolamine is available as a 5 mg/mL solution for parenteral administration

Septodont Inc. Lancaster, Pa), contains 0.4 mg PM, (0.235 mg/mL) packaged in a 1.7 mL dental cartridge

- The dose of oral submucosal injections of phentolamine approved by the FDA is 0.2-0.8 mg.

- Most notably hypotension or tachycardia has been associated with the approved dose of phentolamine.

- The use of phentolamine may be indicated in the management of pediatric, geriatric patients along with the medically compromised and differently-abled patients.

- It can be administered when performing conservative dental procedures and nonsurgical periodontics.

Local Anesthesia "Reversal" Agent

- OraVerse is indicated for reversal of soft-tissue anesthesia, i.e., anesthesia of the lip and tongue, and the associated functional deficits.

- OraVerse is not recommended for use in children less than 6 years of age or weighing less than 15 kg (33 lbs)

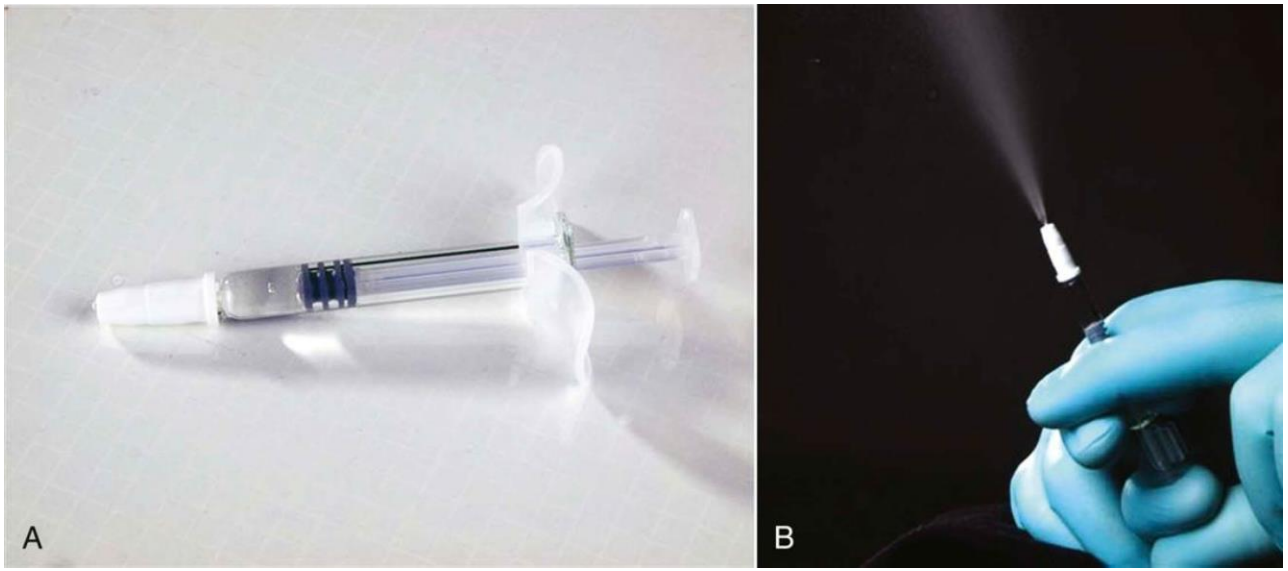
Intranasal Local Anesthesia

- Absorption of drugs through the nasal mucosa to achieve a systemic effect has a long and varied history.
- The nares are extremely vascular, so most drugs instilled into them will be absorbed rapidly and distributed systemically

- **Cocaine is an example of illicit use of this route of drug administration.**

- **Many patients receiving IN tetracaine have commented on how their upper teeth felt numb.**

- **For dental application, the vasoconstrictor oxymetazoline was added to the tetracaine to enhance effectiveness.**



Computer-controlled local anesthetic delivery

- Because dental treatments may be painful, appropriate local anesthesia is necessary to reduce pain during such treatments.
- The term trypanophobia is the extreme and irrational fear of medical and dental procedures involving injection.
- CCLAD It is a device that slowly administers anesthetics by using a computerized device to control the injection speed.
- which permits continuous administration of a small amount of anesthetic at a slow speed

Complications of local anesthesia

Complications related to local anesthesia can be divided into two categories:

1. Preoperative (during giving anesthesia) complications.
2. Postoperative complications.

Both can usually be avoided buy using the correct technique and dosage however if complications occur the dentist should know how to manage them. Each dentist dealing with local anesthesia should know:

1. The possible complications of local anesthesia.
2. The preventive measures of these complications.
3. The treatment possibilities of these complications

I-Peroperative complication

1**. Pain at injection: Pain during administration of LA solution can be caused by many reasons.**

A- Factor depending on the solution:

1-Low PH value; this could irritate the tissue.

2-Temp of the solution: warmer solution feeling more comfortable than cold. The cartridge can be warmed in the dentist hand or in warm water before the injection.

B- The practitioner related factors: This is related to the technique used can be avoided by

1 - Fast inj and high inj pressure cause rapid swelling of the tissue & pain.

This a slower inj technique.

2- Aggressive insertion of the needle can tear soft tissue, blood vessel, nerve & periosteum & cause more pain & other.

Complications

An inaccurate inj site can lead to an intramuscular or intraneural inj. when the needle penetrates a nerve; the patient feels a sudden (Electrical shock) in the distal area of the nerve. Pain after intramuscular inj is due to fibrosis or inflammation inside the muscle.

2. Lack of effect:

Some time the dentist face a problem, where the patient despite a conventional anesthesia still feels pain during treatment. The problem is most common with block anesthesia especially in lower jaw. Reasons behind his failure in LA can be classified as:

1- Anatomical.

2- Pathological.

3- Psychological.

4- Poor inj technique.

1- Anatomical reasons include :

- accessory nerve supply

- Abnormal course of the nerves.

- Thick cortical plate of the mandibular alveolus precludes infiltration of anesthesia & therefore infiltration anesthesia is insufficient in the lower jaw.

- Variation in the foramen location.

- Some times the teeth can be innervated by more than one nerve.

2- Pathological reasons are :

A- Trismus (limited mouth opening) in these cases it is impossible to use conventional technique of inferior alveolar nerve block. Therefore the so called Akinosi (closed mouth) technique is useful. In these cases there will be an increased possibility of failure of achieving adequate anesthesia.

B- Infection & inflammation: if the pulp is inflamed, the low tissue PH may cause lack of effective anesthesia in that area. However this does not explain failure in block anesthesia, where the solution is inj 4-5 cm from the inflamed area.

A possible cause is hyperalgesia; the inflammation makes the nerve more sensitive. A minimal stimulation can cause pain perception. In those patient to obtain sufficient anesthesia more solution has to be injected, for example by combining a block & infiltration anesthesia. Supplemental intralligamentarly or intra osseous inj can be used if necessary.

C- Previous surgery or trauma.

3- Psychological reasons :

- Fear & anxiety. They can cause failure in LA,
- to enable successful anesthesia, relaxation of the patient is some time needed.
- For this the use of a sedative like benzodiazepine may be helpful.

4- Poor technique: Is the most common cause for insufficient anesthesia in inferior alveolar nerve block anesthesia. Common mistakes are:

A- Injection of anesthesia too soon on the anterior ascending ramus as the needle point touches the lingual cortical bone anterior to lingula

B- Another mistake is to inj inferior to mandibular foramen

C- The solution can directed away from a nerve if it inj too rapidly & forcefully. So when ever possible it is advisable to follow accurate technique to prevent this complication

3- Fainting & vasovagal attack

Collapse of the patient in the dental clinic may or may not be loss of consciousness.

Vasovagal attack is a reflex of nervous system that cause the heart to slow down (bradycardia), at the same time affect he nerves to blood vessel in the legs permitting these vessel to dilate (widen). As a result the heart ejects less blood so the blood pressure drops.

Consequently the circulating blood goes to the legs rather than to the head, so the brain is deprived of 02 & the fainting episode occurs. In an attempt to redistribute the blood to the vital organs.

Note: pain & anxiety are the most important predisposing factor to vasovagal attacks.

Signs and symptoms:

The patients often complain of the following symptoms:

1-Dizziness 2-weakness 3-nausea & following signs:

I-The skin is pale immediately before the collapse.

2- Cold skin 3- clammy skin 4- weak & slow pulse.

First aid should be taken immediately:

The head should be lowered quickly by adjusting the back of the dental chair so that the patient assume the supine position with legs elevated.

Tight collar & belts should be loosened and respiration is stimulated. Spontaneous recovery is usual, but if sign of recovery are not apparent within 30-45 sec of the first aide measure, the collapse probably is not a vasovagal attack & in this case medical emergency team should be asked immediately for help. Meanwhile, we need to maintain a patent air way & supplementary O2 & consider the need for CPR (cardio-pulmonary resuscitation).

4. Hypersensitivity or allergy to LA :

This phenomenon occurs due to sensitivity of some individual to certain substance known as (allergens). Any LA agent may evoke such a response, but it is more commonly seen with ester type agent (e.g. Procaine) than amide type (e.g. lidocaine).

true allergy to amide type is extremely rare.

Hypersensitivity reaction could be due to:

1- LA agent.

2- Vasoconstrictor.

3- Additives: e.g. bisulphite which used as preservative.

In general hypersensitivity reaction to LA is very rare & represent less than 1% of all complications of LA.

- Many of complications suspected to be allergic are actually psychogenic reactions caused by fear of dental treatment.
- Other reasons may also be the presence of adrenaline in LA solution which can cause several general symptoms including palpitation, restlessness & nausea.
- True allergic response to LA may be localized or generalized & immediate or delayed in onset. They may vary from mild skin irritation or rashes to an anaphylactic reaction. Local reactions are seen more frequently than systemic & usually resolve without active treatment. If any degree of allergic reaction is observed, it is very important to determine the actual cause (allergen).
- Inadequate diagnosis & treatment can be life threatening to the patient.

Anaphylactic shock: It rarely occurs but it is life threatening it is characterized by:

1- Profound fall in blood pressure

2- Dyspnea & respiratory embarrassment

3- Facial & laryngeal edema

4- Loss of consciousness.

5- Urticaria.

It is life threatening condition since it causes air way obstruction in association with laryngeal edema .unless treatment is initiated immediately; the condition may progress to fatal termination.

Management of anaphylaxis:

- If you suspect the anaphylactic reaction occurring, immediately seek medical help. The treatment must begin before BP & breathing problem become life threatening. epinephrine is the most imp medication for the treatment of anaphylaxis; it is inj into a muscle.
- Epinephrine works rapidly to make blood vessel contract, preventing them from leaking more fluid. It also relax air way, helping the individual breathe easier, relieves cramping in the GIT & stop itching, rapidly reverse the life threatening symptom of anaphylactic shock, if given in time.
- Even if the individual responds to the epinephrine, it is vitally imp to go to an emergency room immediately.
- O2 & medication may be given to improve breathing. - IV fluid may be necessary to restore adequate BP.
- Additional medication (anti-histamine) to contract the effect of histamine & to help in prevention of delayed allergic reaction.
- If the victim stops breathing, perform cardio pulmonary resuscitation (CPR) immediately.
- Continue CPR until the person begins breathing again.