LOCAL ANESTHESIA

“What’s New?”

MAUI, HAWAII

35th Annual Hawaiian Dental Forum

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Local Anesthesia

Buccal and Lingual Infiltration of Mandibular Molars

Lingual Infiltration

Advantages:

- Thin cortical plate
- Lingual foramina
- Patient acceptance
- Lingual nerve blocked already

Disadvantages:

- Ballooning of tissue
- Avoiding submandibular salivary gland
- Vision

Patient selection criteria enhancement:

- Missing adjacent teeth
- Thinner alveolar anatomy
- Younger/older patients
- Root anatomy visible
- Vertical buccal shelf form

Technique:

- Apical to mucogingival junction
- Tissue expands
- Avoid submandibular gland
- Vision enhanced by position and tongue retraction
Lingual Infiltration - Summary

Technique:
• Where? Just apical to mucogingival junction
• Bevel – facing bone
• Depth: 2-3 mm
• Volume: 0.5 - 0.7 cc
• Onset time: ~ 5 minutes

PART 3

ARTICAINE STATUS, REVERSING, BUFFERING, INHALING LOCAL ANESTHESIA AND TOPICALS

EFFICACY OF LOCAL ANESTHESIA SOLUTIONS

Panacea or Problem?

Articaine

Articaine Brands: “100” / “200” epinephrine

Ultracaine® Orabloc® Astracaine® Septanest®

Septocaine® Orabloc® Articadent® Zorcaine®
Articaine

A statistically significant scientific study demonstrated that 4% articaine 1:100K performed more efficaciously than 2% lidocaine 1:100K in controlled clinical administrations.

Kanaa, MD et al, J.Endod 32:296-298,2006

Articaine

The pulpal anesthetic efficacy of articaine versus lidocaine in dentistry:

Articaine solutions had a probability of achieving anesthetic success superior to lidocaine when analyzing infiltration.

Brandt RC et al JADA 142(5):493-504 2011

Articaine

The pulpal anesthetic efficacy of articaine versus lidocaine in dentistry:

• **Weaker**, but still significant evidence of articaine’s superiority for mandibular block anesthesia.
• No difference for **symptomatic** teeth (e.g. irreversible pulpitis)

Brandt RC et al JADA 142(5):493-504 2011

Chemistry: Sulfur atom

The sulfur atom forming the highly lipid soluble thiophene ring is non-reactive.

There is NO cross allergenicity (Ag-Ab) interaction for a patient allergic to “sulfas” or “sodium or potassium metabisulfites”

Metabolism – ester component

Although classified as an amide local anesthetic, the **articaine molecule** is 90% inactivated by plasma **cholinesterases** and only 10% by **hepatic enzymes**.
Metabolism

The good news is:
1. The metabolite from the ester linkage inactivation is **NOT** para-amino benzoic acid (PABA), a known allergen.
2. The **FAST action** results in a short $\frac{1}{2}$ life (27 minutes). This represents a systemic safety phenomenon.

Search: Safety

These authors could **not** find a single mortality linked to articaine, in any age group, in its years of dental administration in Europe, Canada and currently the U.S.A.


Search: Adverse Drug Reactions

The product has been available in Germany and France since 1976 and has ~90% of the market, in Canada since 1983 with ~35%, in the United States since 2000, also with ~35%.

The authors expected to find ADR reports of post-op sequellae such as lingual nerve and/or inferior alveolar nerve paresthesia.


Search Results: ADR’s

This was **NOT** the case, implying that:
- **Not being reported**
- Not occurring
- Accepted as an occasional event in dentistry

Hawkins JM, Moore PA

Paresthesia Research is Unavailable

**Is a 4% solution neurotoxic?**

There is **no** scientific or research based data to conclude that 4% prilocaine or 4% articaine is directly causitive of dental paresthesia and/or hypesthesia.

**...HOWEVER...**

Hawkins JM, Articaine: Truths, Myths and Potentials, Academy of Dental Therapeutics and Stomatology 9 2003
Neurotoxicity

Paresthesia Incidence in Ontario

<table>
<thead>
<tr>
<th>Anesthetic</th>
<th>Incidence %(#)</th>
<th># Cartridges</th>
<th>Incidence %(#)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articaine</td>
<td>33.6 (50)</td>
<td>4,398,970</td>
<td>71.4 (10)</td>
</tr>
<tr>
<td>Prilocaine</td>
<td>28.9 (43)</td>
<td>2,353,615</td>
<td>28.6 (4)</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>3.4 (5)</td>
<td>3,062,613</td>
<td>0</td>
</tr>
<tr>
<td>Mepivacaine</td>
<td>2.7 (4)</td>
<td>1,569,037</td>
<td>0</td>
</tr>
<tr>
<td>Bupivacaine</td>
<td>0</td>
<td>241,679</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>31.5 (41)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>


Risk-Benefit Conclusions

“All the clinically used local anesthetics can produce direct toxicity to nerves if they achieve sufficiently high intraneural concentrations. Clinicians should be aware that the concentrations of formulated local anesthetic solutions are neurotoxic per se and that their dilution, in situ or in tissue, is essential for safe use.”

Miller’s 7th Edition, 2009

Risk-Benefit Conclusions

1. Don’t use it for IAN blocks
2. Use selectively – desperation?
3. Mix, match, dilute(?) with 3% mepivacaine plain (Scandanest®, Carbocaine®)
4. Articaine for IAN/Lingual - with consent?
5. Patient selection?
What should you do?

Current Standard of Care is:
1. Do not abandon contact with the patient in the hopes that the issue will "just go away"
2. Report the incident to the liability insurance underwriters and/or to the adverse reaction (sometimes the state dental board) recording group if a condition of your policy
3. Call the patient, either personally, preferably, or have a responsible team member call every other day to show care and compassion

What should you do?

4. Invite the patient in for a follow up observation / mapping appointment every few days. Record even if patient declines appointments or refuses to show.
5. Refer patient for an "expert" friendly 2nd opinion. Be proactive in this, as opposed to "if he or she chooses to". The internet is a dangerous medium.
6. Reassure the patient that these things occur from time to time in both medicine and dentistry and that it will virtually resolve 100% of the time (ref. Malamed, S)
7. Reassure yourself-you have done nothing wrong.

What should you do?

8. Reassure all - there is no scientific or research evidence that any commercially available local anesthetic causes neurotoxicity.
9. Prescribing NSAID's may (intraneural inflammation) or may not have a therapeutic effect. However it would not be wrong. Ibuprofen, 600 mg., q.6 h. (4X per day, for 1 week) and/or a systemic corticosteroid derivative such as Solumedrol MAY help. (however there is no scientific data available)

What should you do?

10. Mechanical "nerve damage" can occur without the traditional "shot" to the associated structure
11. Temperature compresses externally, hot or cold are probably of no value except in the case of a pressure (hematoma) paresthesia. There is no harm in recommending warm compresses, 20 minutes on, 40 minutes off for 1 week perhaps simultaneous with the NSAID.

Liability Claims Experience Results

- The legal definition of permanent paresthesia is 1 year. Odds of sensation returning are diminished. A patient however can sue you tomorrow morning. The liability case experiences show that settlements are almost always done out-of-court and are settled on the basis of occupation and the negative effect on future earning potential, then lifestyle, social stigma, sexual satisfaction et al
Phentolamine Mesylate

**reverses** **SOFT TISSUE ANESTHESIA ONLY**

Phentolamine Mesylate is **NOT** a **LOCAL ANESTHETIC** reversal agent

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**13%** of pediatric patients receiving IANB suffer post-treatment traumatic **injury** to soft tissues.


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Pediatric patients also recover sensation in half the time

- Median time to recovery of normal lip sensation compared to control was **reduced by:**
  - 120 minutes (67%) in the mandible
  - 53 minutes (47%) in the maxilla

Source: Tavares M, Goodson JM, Studen-Pavlovich D, and colleagues. Reversal of soft-tissue local anesthesia with phentolamine mesylate in pediatric patients. JADA 2008;139(8):1095-1104. Copyright ©2008 American Dental Association. All rights reserved. Excerpted by permission.

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**Dosing**

- **Easy to Dose**
  - 1:1 cartridge ratio to local anesthetic with a vasoconstrictor using identical injection site
- **Maximum recommended dose**
  - 2 cartridges for adults & adolescents 12 years of age and older
  - 1 cartridge for patients 6-11 years of age and over 66 lbs.
  - ½ cartridge for children 6 years of age or older weighing 33-66 lbs.
Potential complications

Needle-related:
• Trismus
• Paresthesia

OraVerse™
Now sold in sleeves of ten (10)

Phentolamine Mesylate

OraVerse™
Cost?

$8/cartridge

Performance Limitations of Current Anesthetics

• Onset Time
  Time for body to buffer anesthetic
• Analgesia
  Is No pain attainable? Always?
• Injection Pain
  Stinging is a concern for patients

Onset®
by Onpharma Inc.

Clinical Study Data Pulpal - IANB

Percentage of Participants Profoundly Numb at 2 Minutes

- 71% of the participants receiving buffered anesthetic achieved pulpal anesthesia in under two minutes
- 12% of the control participants achieved pulpal anesthesia in under two minutes

Control  Onset
Clinical Data – Pain Free Injections

- 44% of buffered anesthetic patients experienced zero injection pain
- 6% of traditional anesthetic patients experienced zero injection pain


Clinical Data – Patient Preference

72% of patients rated Onset® as the most comfortable injection


30-Minute Time Course, Pulpal Analgesia, IANB

- Onset® + Lidocaine
- Lidocaine
- Articaine


Onset® by Onpharma®

The exchange volume is only 0.18 ml.

- The first and only chair side approach for precision buffering of local anesthetic
- Cartridge Connector
- Bicarbonate Solution
- Mixing Pen

$55.00 / day based on X9 use

$299.00 Not autoclavable

Intranasal Local Anesthesia

Phase 3 clinical trials are ongoing at time of presentation

Previously:

No needle applications for teeth involved only tetracaine (anesthesia) and cocaine (anesthesia and vasoconstriction)
Intranasal Local Anesthesia

**What is it?**

An *intranasal spray* of:
- 3% tetracaine, an ester, formally marketed as 4% Ravocaine®
- ...and 0.05% oxymetazoline, an α – adrenergic agonist

Intranasal Local Anesthesia

**Flumist®?**
**Accuspray®?**
**Kovacaine®?**

No needle - teeth #3 – #14
Pulpal Anesthesia!

“In reducing the number of injections in a dental office, we reduce the anxiety level for patients, and staff.”

We hope children will respond as well to this delivery method as they have to the new vaccine, Flu-mist®.”

World’s First Intranasal Dental Anesthetic currently in research and development

Utilizing the BD ACCUSPRAY® technology currently delivered with the Flumist® nasal product

The goal is to produce a regional block enabling operative dental procedures on teeth # 3 through 14.

QUESTIONS?

LOCAL ANESTHESIA:
WHAT’S YOUR DIAGNOSIS, DOCTOR?
MY “LIFE” AS A CONSULTANT

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Mel Hawkins, DDS BScD AN
Dentist, Dentist Anesthesiologist
Toronto, ON Canada
CASE REPORT

Product Complaint
Quala brand, 3% mepivacaine plain

3% MEPIVACAINE (PLAIN)
Common local anesthetic administered

COMPLAINT:
7 patients 'stroke-like' reactions to 3% mepivacaine (plain)

BACKGROUND

• Dentist with 34 years experience
• Practices general dentistry
• High need for exodontia
• Holistic component to practice
QUOTES

• “Nobody’s going to die on my watch”
• “This last patient might sue me”
• “I know stroke when I see it”
• “It must be the mepivacaine”

PATIENT SIGNS & SYMPTOMS

• Anxiety, anxiousness, restlessness
• Panic attack, shows escapism
• "I feel weird", "My brain hurts"
• "Pray for me"
• Patient and spouse demand to "call 911"

SIGNS, SYMPTOMS OF STROKE

• Headache, dizziness, mental clouding
• Hemiplegia, unilateral weakness
• Nausea, diaphoresis
• Facial “Bells Palsy” appearance
• Fear

COMMON HISTORY: "HYPERTENSION"

• Dentist did not define her personal interpretation of hypertension
• No baseline vital signs on record
• No intra operative vital signs taken
• Multiple tooth extractions common
• 3% mepivacaine plain used for these stated “hypertension” case histories

DIFFERENTIAL DIAGNOSIS
"COULD IT BE THE PRESERVATIVE IN THE LOCAL ANESTHETIC?"

COMMENTS
• 3% mepivacaine does NOT contain a preservative

COMMENTS
• 3% mepivacaine does NOT contain a preservative

COMMENTS
• No scientific evidence of allergy
• No itching, urticaria or airway compromise
• No documented Ag-Ab in literature
• Mepivacaine molecule is a non-allergen

ALLERGY TO 3% MEPIVACAINE?

ALLERGY TO OFFICE PRODUCTS?
LATEX ALLERGY?

- Doctor states it is a latex-free office

CEREBRAL VASCULAR ACCIDENT (CVA)?

- No scientific evidence, symptoms not consistent with stroke
- No vital signs available
- Assumption: paramedics/ER took vitals
- Doctor does not know actual systolic/diastolic/rate results
- Dr. did not accompany to ER

ADDITIONAL QUESTIONS RE: DIFFERENTIAL DIAGNOSIS

MYOCARDIAL EVENT?
COMMENTS
• No scientific evidence
• No angina
• No signs or symptoms of infarction

COMMENTS
• Unknown

COMMENTS
• Dental office environment
• Dentist treatment
• Other in-office factors during procedure
• Was the local anesthetic ineffective?!
COMMENTS

• Symptoms most consistent: vasovagal syncope
• Panic attack
• Hyperventilation
• Hypoglycemia could be contributing factor

FINAL OBSERVATIONS

• Liability claims experience repeatedly characterized by poor record keeping
• Dentists often do not attend CDE programs
• > 30% of claims are either initiated by staff and/or staff backs up the patient

FINAL OBSERVATIONS

• Court almost always empathizes with patient, facts aside
• Plaintiff’s lawyer knows the dentist has liability insurance
• Company is hardly ever targeted
• Abandonment and lack of follow up is most incriminating

FINAL OBSERVATIONS

• Do not EVER offer a financial compensation directly to a patient. It is viewed as an admission of guilt
• Let the experts take care of that
• It must include a legal release

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